Attitudes towards in-app advertising: a uses and gratifications perspective

Kelty Logan

College of Media, Communication and Information,
University of Colorado,
1511 University Avenue 748 UCB,
Boulder, CO 80309, USA
Email: kelty.logan@colorado.edu

Abstract: This multi-phase study contributes to the uses and gratifications literature by focusing on young adults in the USA and their use of smartphone applications (apps) in the belief that a thorough understanding of the gratifications sought (GS) from smartphone apps will provide guidance to advertisers regarding the relative levels of involvement associated with each type of app. The first stage addressed scale development. Focus groups and surveys were conducted to develop scales for GS by young adults. Surveys were fielded to provide an exploratory factor analysis and subsequent confirmatory factor analysis. The second stage of the research addressed the relationships between GS, gratifications obtained from specific smartphone apps, and attitudes toward advertising on those apps. Results suggest that consumers are most tolerant of in-app advertising when it is encountered in apps used for assistance and informational purposes.

Keywords: apps; attitudes towards advertising; confirmatory factor analysis; exploratory factor analysis; in-app advertising; scale development; smartphone applications; uses and gratifications.

Reference to this paper should be made as follows: Logan, K. (2017) 'Attitudes towards in-app advertising: a uses and gratifications perspective', *Int. J. Mobile Communications*, Vol. 15, No. 1, pp.26–48.

Biographical note: Kelty Logan (PhD, University of Texas at Austin) is an Associate Professor in the Department of Advertising, Public Relations and Design at the University of Colorado. She has more than 20 years of experience as a marketing executive in the advertising, broadcast network, and product marketing industries. As an academic she focuses on the challenges of the new media environment. In particular, she is fascinated by the changing patterns of media usage resulting from digital technology and its impact on the advertising industry. Her work has appeared in the *Journal of Advertising Research, Journal of Interactive Advertising, International Journal of Internet Marketing and Advertising, Journal of Marketing Communications*, and at national and international conferences.

This paper is a revised and expanded version of a paper entitled 'How uses and gratifications of smartphone apps affect attitudes toward in-app advertising', presented at the *Annual Conference of the American Academy of Advertising* on 29 March 2015 in Chicago, Illinois.

1 Introduction

The introduction of the smartphone has dramatically changed peoples' expectations from their telecommunications devices. However, once upon a time an American teenage girl was happy with a pink, rotary dial Princess telephone, today's teenagers require more from their phones than a long chat. Today, most young people own smartphones. eMarketer (2014) has estimated that more than 2 billion people worldwide will own and use smartphones by the end of 2016, representing a 31% increase over 2014. The USA is the second largest smartphone market, behind China, and is projected to have 207 million users by the end of 2016. As of January 2014, about 75% of US adults owned smartphones (eMarketer, 2014). Among young adults aged 18–34, however, smartphone penetration increased to 83% (Pew Research Center, 2015).

A smartphone is a mobile phone that runs on a mobile operating system. Because the operating system provides more advanced computing capability, smartphones provide a greater range of functions compared to standard mobile phones. In addition to calling, texting, and email functions, smartphones offer application software - or mobile apps - that allow easy access to a wide range of services. Mobile apps, which became available in 2008, are distributed by mobile operating systems such as Apple, Google, and Windows and are downloaded from the application platform to smartphones. Apps are available in two forms: free (with ads) and paid (without ads). Approximately 90% of apps app downloads worldwide are free apps, indicating that consumers want free apps more than they want to avoid advertising (Gartner Inc., 2013).

As of December 2015, the Apple App Store alone offered 1.5 million different apps (Apple, 2015). The App Store organises the apps into the following categories: games, education, entertainment, lifestyle, business, books, utilities, travel, music, and sports. Smartphone owners can download apps for anything from weather reports to movie ticket purchases. In the words of a 2009 Apple television campaign, if you want to do something, "There's an App for that"™.

Academic research has sought to understand why and how smartphones are used. The uses and gratifications approach to media use explores the functional and psychological reasons that drive the use of a specific medium as well as the links between media use and media effects. Because smartphones incorporate a myriad of different types of media (email, texting, voice calls, video calls, videos, self-help apps, games, etc.), the uses and gratifications approach to smartphone use is a viable means to learn about the hierarchy of needs that drives the use of the various smartphone functions and applications. Furthermore, the uses and gratifications approach provides insight into why specific smartphone functions and applications may be more effective advertising vehicles. Interestingly, the academic research that investigates smartphone usage from a uses and gratifications perspective does not reflect usage in the USA.

This study examined smartphone app use among young adults in the USA from the perspective of uses and gratifications. Specifically, this study reports the results from qualitative and quantitative research fielded among young adults (18–34) in the USA. The research explored the gratifications sought (GS) from smartphone applications (apps) to provide guidance to advertisers regarding the relative levels of involvement associated with each type of app. The remainder of the paper provides the theoretical support for the uses and gratification approach to smartphone use, followed by a discussion of the research questions, research design, results, discussion, conclusions, and areas for future research.

2 Literature review

Uses and gratifications research assumes that media use is initiated at the behest of the consumer in order to gratify specific need states. Those need states can be satisfied by media content, the degree of media use, and the social context of use. The attributes of a specific medium can also satisfy specific needs. Katz, Haas and Gurevitch (1973) investigated GS from five media (television, radio, newspapers, books, and film) in relation to 35 need states and mapped those gratifications by medium. Their research suggested the interchangeability of some media for others based on the gratifications provided by each medium. They found that television was the medium that provided the broadest range of gratifications while cinema and newspapers provided the most limited range. Based on the degree of functional similarities, however, television and radio were found to be highly interchangeable while television and books were not. Advertisers' media plans during the 1970s and 1980s - perhaps unwittingly - reflected this perspective. Television was used to reach broad audiences and other media such as radio and print were used as complementary media, acknowledging the different social contexts of usage associated with each medium. Both radio and print were viewed as solitary experiences but radio was acknowledged to be less involving than print. Since the emergence of the internet during the 1990s, however, adults have turned to online sources - most of them accessible on smartphones - for information and entertainment that was traditionally sought from television, radio, newspapers, books, and film.

Recent academic research has applied the uses and gratifications approach to a vast range of computer-mediated activities including shopping (Lim and Ting, 2012), directory services (Hicks et al., 2012), gaming (Huang and Hsieh, 2011), social media (Smock et al., 2011; Zhang, Tang and Leung, 2011; Chen, 2011), video use (Bondad-Brown, Rice and Pearce, 2012), and political participation (Lariscy, Tinkham and Sweetser, 2011).

In regard to mobile phone use, however, research has focused on the technological acceptance perspective. Specifically, researchers have explored how a user's degree of technology acceptance predicts adoption of mobile phone functions such as news retrieval (Chan-Olmsted, Rim and Zerba, 2013), games (Chen and Kuan, 2012), and acceptance to mobile phone advertising (Özçam, Kuşçu and Yozgat, 2015). Lai and Shi (2015) employed the unified theory of acceptance and use of technology (UTAUT2) model to explain the impact of privacy concern on use of social media apps and instant messaging. Other studies have focused on consumer behaviour, such as the effect of social influence factors on intentions to continue using social media apps (Wang and Chou, 2016) and word-of-mouth on the downloading of apps (Oh, Baek and Ahn, 2015).

Most of the studies that examine mobile phone use from a uses and gratifications perspective are limited to the voice and messaging uses of mobile phones (Petrič, Petrovčič and Vehovar, 2011; Balakrishnan and Loo, 2012). There are, however, three recent studies that focus on the functions of smartphones. Sun, Ju and Zhang (2012) studied the intentions of Chinese youth to upgrade to smartphones in terms of the gratifications they sought. Their conclusions suggested that Chinese youth did not exhibit a strong impulse to upgrade their mobile phones, were not uniformly interested in new functions and features, and did not seek status and fashion gratification from their mobile phones. A second study was conducted among students at two large universities in Singapore (Lee et al., 2010). This study identified perceived gratification factors that significantly predicted intention to use Indagator, an application that incorporates

multiplayer, pervasive gaming elements into mobile content-sharing activities. In a third study, Albarran (2009) investigated the most popular mobile phone applications among young people in Colombia, Mexico, Argentina, Chile, and Uruguay. The sample also included US Latinos. The study ranked the participants' mobile phones in comparison to other types of technologies. The study revealed significant differences on the basis of nationality but suggested that laptops were perceived to be more important than mobile phones, perhaps due to low penetration of mobile phones and insufficient infrastructure.

This study seeks to contribute to the uses and gratifications literature by focusing on young adults in the USA and their use of smartphones in the belief that a thorough understanding of the GS from smartphone applications (apps) will provide guidance to advertisers regarding the relative levels of involvement associated with each type of app. Specifically, the study explores young adults' hierarchy of needs, the needs they seek to gratify through the use of various smartphone apps, and their attitudes toward the advertising found in those apps.

3 Research questions and hypotheses

RQ1: What are the most commonly used smartphone apps among young adults?

RQ2: What are the GS from those functions?

H1: Attitudes toward in-app advertising will vary according to the category of app.

H2: Attitudes toward in-app advertising will vary according to GS from the category of app.

4 Method

The research consisted of two stages. The first stage addressed scale development. Specifically, focus groups and two surveys were conducted to develop scales for GS by young adults. Qualitative research was used to assess a preliminary typology of need states as well as a manageable means to reduce the enormous range of smartphone apps into identifiable categories. Surveys were fielded to provide an exploratory factor analysis (EFA) and subsequent confirmatory factor analysis. Once the GS scales were validated, the second stage of the research addressed the relationships between GS, gratifications obtained from specific smartphone apps, and attitudes toward advertising on those apps.

5 Scale development

5.1 Focus groups

Five focus groups were conducted during 27–30 November 2012 in a conference room on the campus of a large, public, Midwestern university. Each group consisted of four to six participants and lasted approximately 45 min. The subject population was comprised of students attending the university between the ages of 18 and 24. Participants were

recruited in large, undergraduate survey courses across academic disciplines and pre-screened on the basis of smartphone ownership. A total of 25 students participated in the focus groups and each received a $10 Starbucks gift certificate as compensation. The subjects participated in a guided discussion regarding all of the uses and gratifications they attributed to smartphones.

The subjects participated in a guided discussion. The warm up questions probed general cognitive and affective needs and how they were most likely to be satisfied. This allowed participants to indicate sources of gratification that were beyond the scope of the research. Participants were then given three pictures of specific digital media: a smartphone, a laptop, and a digital tablet. They were asked to list below each photograph all of the uses they attributed to that medium. The remainder of the discussion focused on the uses and anticipated gratifications related to smartphone app use.

5.1.1 Social media apps

All of the participants were engaged with social media on their smartphones. Facebook, the most mentioned social media app, was used primarily to share photos, videos, and status updates. Respondents felt that sharing pictures served a number of purposes. They took pride in the photos they uploaded, enjoyed sharing the experiences with their friends, and took pleasure in remembering the events that were photographed. Respondents indicated that they were likely to use Facebook when they were bored, lonely, seeking escape or, as one young woman said, "When I'm by myself, waiting for somebody, that's when I'll look at Facebook." A young man added, "I use it to fill time…When I get to class early I'll just roll through my phone." They also reported that posts on Facebook provide an opportunity to present a point of view as well as learn about others' points of view.

Twitter was also mentioned as a way to influence opinion and learn about other's opinions. In particular, however, Twitter was viewed as a means to follow like-minded people. Participants tended to post Tweets when they sought connection with others. They also checked their Twitter feeds when they sought to elevate their moods, alleviate boredom, or to escape.

Respondents used Instagram, Tumblr, Pinterest, and Snapchat to post photographs. They expressed pride in their collections ("I have 1,200 photos"), and enjoyed viewing others' photo and video collections as well as the accompanying blogs. These sites tended to provide entertainment and a sense of connection. The participants appeared to rely heavily - though not exclusively - on their smartphone cameras to participate in these social media sites.

5.1.2 Assistance apps

Each participant used apps that they felt provided assistance, or a helping hand. The GPS and banking apps were frequently mentioned, but participants were also enthusiastic about apps that allowed them to check the weather, find restaurants, buy movie tickets, and keep track of their fitness. Both men and women participants were particularly enthusiastic about GPS, indicating that it was empowering. Women respondents tended to mention that GPS also made them feel safe. Mobile banking use was more pervasive among the young men participants. They stated that mobile banking allowed greater sense of control. One young man admitted, "It makes me feel like an adult."

5.1.3 Information apps

While most participants used Google search to fact check, some participants mentioned apps that allowed them to stay informed on a regular basis. Sports enthusiasts mentioned ScoreCenter as a valuable source of up-to-the minute, worldwide sports information. A young man volunteered, "I feel like I'm ahead of everybody else. It's like reading a juicy story in a gossip magazine." Other sources of information that participants mentioned were Reddit ("the new Digg"), magazine apps, and newspaper apps.

5.1.4 Entertainment apps

Most of the participants mentioned using a music function on their smartphones on a daily basis. Although the participants used commercial music streaming services such as Pandora and Spotify, they were more likely to listen to their own playlists. Music was used to improve focus when in noisy environments ('drown out noise'), enhance an activity, fill a brief interlude, improve spirits, and escape from the pressures of the day. A young woman volunteered, "If I need to get out of the reality of everyday life, I'll listen to music." Participants also listened to music while engaged in activities such as driving, riding public transportation, working out, or riding a bicycle. Most of the participants who used music during activities did not describe themselves as active listeners, however. Rather, music provided a soundtrack for their activities. Participants were more likely to listen actively when they used music for emotional reasons, such seeking to relax, cheer up, or escape. As one young man explained, "I am generally listening to [the music}…it makes my mood better." When listening to commercial music streaming services, advertising was regarded as a minor inconvenience ("I just don't listen"). Only one participant, a music enthusiast, paid for the commercial-free version of Spotify to avoid the advertising. Participants indicated that listening to music served both cognitive and affective needs. In addition to the previously mentioned music apps, the respondents mentioned book and games apps as other options when they sought to alleviate boredom, elevate their mood, or escape for a few minutes.

5.1.5 Results

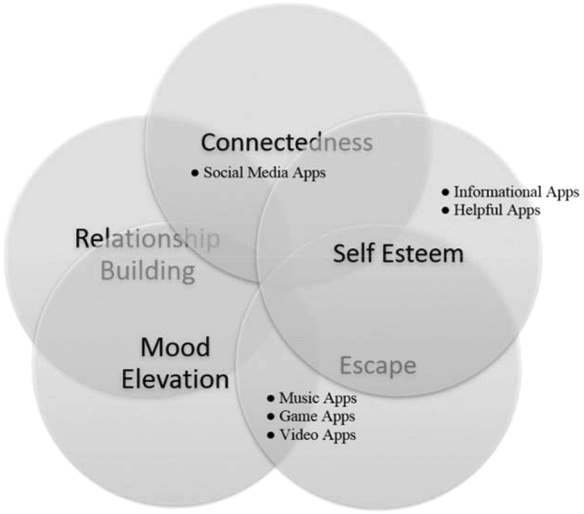
Use of the smartphone apps appeared to be driven by five areas of GS: connectedness, relationship strengthening, self esteem, escape/boredom relief, and mood elevation. The wide selection of smartphone apps was qualitatively classified into six categories: informational (such as apps for search, sports scores, news, and weather), assistance (used to accomplish a task, such as apps for GPS, maps, movie listings, banking, and fitness), music (such as Pandora and Spotify), games (such as Candy Crush and Angry Birds), videos (such as YouTube), and social networks (such as Facebook, Twitter, Instagram, and Snapchat). These findings responded to research question 1 and provided a typology of smartphone apps for the subsequent studies.

Participants distinguished between the need for connectedness and the need for relationship-strengthening on the basis of personal interaction. Relationship-building was viewed as a one-on-one conversation. Connectedness, on the other hand, referred to keeping in touch with others and social media apps were viewed as ideal for that purpose. Self-esteem was interpreted by participants as 'staying on top of things.' When seeking to improve their self-esteem, they used apps for information or assistance. Participants indicated that they used music, video, and game apps to elevate their moods. When

seeking mood elevation, they were inclined to listen carefully to the music, pay attention to the videos, and play games competitively. Participants revealed that music, video, and game apps also provided escape from everyday life. They suggested, however, that they used the apps to fill time ('zone out') and tended not to pay much attention to the content.

Figure 1 provides a map of the gratifications attributed to the smartphone apps most often used by the students. The overlapping areas indicated that some apps were used to gratify more than one need. These findings provided the basis for the first quantitative effort to develop measurements for the GS among young adults.

Figure 1 Study 1 - smartphone apps and gratifications sought



5.2 Exploratory factor analysis

An online survey was fielded during among 156 young adults between the ages 18 and 34. All participants owned smartphones and used smartphone apps at least once a week. All the data were collected electronically by an online research company during the week of October 11, 2013. Participants were screened for age, gender, race, ethnicity, geography, smartphone ownership, and app use. Compared to the US online adult population, the sample skewed more Asian, more educated, and featured less representation from the Western states (Appendix A). The survey consisted of 50 questions. Randomisation was utilised to ensure that the order of questions asked and, when appropriate, the order of multiple choice responses provided were not subject to order bias.

5.2.1 Measures

The importance that individuals attributed to social and psychological needs was assessed using 30 items developed by Katz, Haas and Gurevitch (1973) and two additional items reflecting the focus group results. All items were measured using a seven-point Likert-type scale (1 = Extremely unimportant; 7 = Extremely important).

5.2.2 Data analysis

An EFA, utilising IBM SPSS statistical software, was employed to determine how many factors best characterised the covariance structure of the 32 social and psychological needs addressed in the survey. A scree test (Cattell, 1966) indicted that six factors should be extracted and an oblique rotation was then applied (Appendix B). Only five factors remained when only items with primary loadings of 0.6 and above, and no loading of 0.40 and above on another factor were retained (McCroskey and Young, 1979).

The first factor included five items: the need to feel accomplished, on top of things, develop good taste, learn new things, raise one's morale, and experience beauty. This factor addressed the need to improve one's opinion of oneself. Identified as 'Self-Esteem' in the focus group research, the decision was taken to adopt the term used by McQuail, Blumler and Brown (1972). They defined the need to confirm personal values, find models of behaviour, and gaining insight into oneself as 'Personal Identity'. The personal identity factor had an Eigenvalue of 11.49 and explained 35.9% of the total variance.

The second factor included five items: the need to feel connected to family members, connected to friends, obtain useful information for daily life, be in a good mood, and understand how others feel. This factor addressed the need to be connected to others and was identified as 'Connectedness' in the focus group research. The connectedness factor had an Eigenvalue of 3.54 and explained 11.08% of the total variance.

The third factor included four items such as the need to feel that others 'think as I do', to overcome loneliness, kill time, and escape from the reality of everyday life. This factor addressed the need to escape and improve one's mood. The focus group research identified two separate needs ('Escape' and 'Mood Elevation') but both needs aligned on a single factor in the EFA. McQuail, Blumler and Brown (1972) defined the need to escape from problems, relax, fill time, and seek emotional release as 'Diversion'. The decision was taken to adopt that term for the construct. The diversion factor had an Eigenvalue of 2.60 and explained 8.13% of the total variance.

The fourth factor included three items: the need to spend time with family members, participate in discussions with friends, and spend time with friends. This factor addressed the need to build relationships. The relationship-building factor had an Eigenvalue of 1.66 and explained 5.19% of the total variance.

The fifth factor included three items: the need know what the world thinks about the USA, feel that "I am participating in current events," and understand those who disagree with government policy. This factor addressed the need for news and information. McQuail, Blumler and Brown (1972) defined the need to learn about current events, seek guidance on decisions, understand things, and gain a sense of security through knowledge as 'Surveillance'. The surveillance factor had an Eigenvalue of 1.14 and explained 3.56% of the total variance.

The internal reliability of the five GS scales was evaluated according to the standards suggested by DeVellis (2003). Specifically, scales that fall below 0.60 are *unacceptable*, between 0.60 and 0.65 are *undesirable*, between 0.65 and 0.70 are *minimally acceptable*, between 0.70 and 0.80 are *respectable*, between 0.80 and 0.90 are *very good*, and above 0.90 could require a shorter scale. The internal reliability for all of the scales was very good. Respondents indicated that the need for connection was the strongest gratification sought (Table 1).

Table 1 Study 1 - gratifications sought scales ($N = 156$)

	α	*Mean*	*Standard deviation*
Personal identity	0.93	5.47	1.16
Connectedness	0.86	5.67	0.88
Surveillance	0.83	4.85	1.16
Relationship-building	0.80	5.61	1.07
Diversion	0.80	4.68	1.18

5.2.3 Results

The study indicated that the 32 social and psychological needs reflected five GS: self-identity, connectedness, relationship-building, diversion, and surveillance. These results differed from the focus group findings in two ways. First, the items associated with Mood Elevation and Escape - two separate constructs in the focus group research - aligned on one factor in the EFA. Second, a new need (Surveillance) was identified. This was attributable to the survey design. Specifically, the survey asked about respondents' needs for news and information while the subject did not emerge in the campus focus groups. The next quantitative study was designed to validate the GS scales.

5.3 Confirmatory factor analysis

An online survey was fielded among 166 young adults between the ages of 18 and 34 during the week of 6 July 2014. Participants were screened for age, gender, race, ethnicity, geography, smartphone ownership, and app use. Compared to the US online adult population, the sample skewed more Asian, more educated, and featured more representation from the Northeast and less representation from the South (Appendix A). All the data were collected electronically by an online research company. The survey consisted of 50 questions. Randomisation was utilised to ensure that the order of questions asked and, when appropriate, the order of multiple choice responses provided, were not subject to order bias.

5.3.1 Measures

The importance that individuals attributed to social and psychological needs were assessed using 30 items developed by Katz, Haas and Gurevitch (1973) and two additional items reflecting the focus group results. All items were measured using a seven-point Likert-type scale (1 = Very unimportant; 7 = Very important).

5.3.2 Data analysis

Confirmatory factor analysis using AMOS 21 was used to establish construct reliability and validity. Chi-square (χ^2), degrees of freedom (df), the ratio of chi-square to degrees of freedom (χ^2/df), the *p*-value, comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean squared error of approximation (RMSEA) are reported. SPSS statistical software was used for all statistical analyses. Pearson correlations and variance inflation factor tests were analysed to assess multicollinearity issues.

5.3.3 Measurement validation

A confirmatory factor analysis was conducted to evaluate the appropriateness of the measurement model for the latent constructs. The initial model fit was poor because the connectedness and relationship variables were perfectly correlated. The indicators for both variables were loaded onto a single latent variable (personal relationships). McQuail, Blumler and Brown (1972) defined personal relationships in terms of social empathy, sense of belonging, and enabling to connect with family, friends, and society.

The fit for the revised model was acceptable but exhibited discriminant and convergent validity issues. The standardised regression weights were examined for each latent variable indicator. Two indicators for the connectedness variable and one indicator for the escape variable were eliminated from the model because they did not meet the recommended 0.70 threshold weight. Because the model still exhibited discriminant and convergent validity issues, five indicators were iteratively eliminated from the model. Specifically, three indicators were removed from the self-esteem variable and two indicators were removed from the connectedness variable. The final model (Appendix C) achieved acceptable fit in accordance with the guidelines proposed by Hair et al. (2010). Specifically, fit indices for the model ($\chi^2 = 114.09$, df = 59, $\chi^2/df = 1.93$, $p < 0.001$, CFI = 0.95, TLI = 0.93, RMSEA = 0.07) suggested acceptable fit for the data. The significant *p*-value is most likely attributable to the large sample size, and therefore was not considered problematic.

Measures of latent variables achieved satisfactory reliability levels. Construct reliability was assessed using two measures of internal consistency: Cronbach's alpha (α) and composite reliability (CR). Values for both measures should be above 0.70 to indicate an acceptable reliability (Chin, 1998). Table 2 provides measures of construct reliability and validity. The constructs were also determined to meet the necessary criteria for validity according to Hair et al. (2010). Convergent validity was achieved when the CR assumed values greater than the average variance extracted (AVE) and if the AVE was greater than 0.5. Discriminant validity was achieved if the values of the maximum squared shared variance (MSV) and the average shared squared variance (ASV) were less than the AVE. The Escape variable exhibited convergent validity issues in that the AVE (0.46) was less than 0.50.

Table 2 Study 2 - measures of construct reliability and validity

	α	*CR*	*AVE*	*MSV*	*ASV*
Personal identity	0.71	0.71	0.46	0.33	0.30
Diversion	0.88	0.87	0.69	0.56	0.33
Personal relationships	0.88	0.88	0.65	0.56	0.42
Surveillance	0.79	0.79	0.55	0.35	0.28

Note: ASV, average shared squared variance; AVE, average variance extracted; CR, composite reliability; MSV, maximum squared shared variance; α, Cronbach's alpha

Pearson correlations (Table 3) revealed significant, strong correlations between all four observed composite variables, suggesting possible multicollinearity issues. Variance inflation factor (VIF) tests revealed that the multicollinearity issues were not a problem, however. Specifically, the VIFs were less than '3' in all cases (Hair et al., 2010).

Table 3 Study 2 - correlations among constructs

	1	*2*	*3*	*4*
1. Personal identity	1.00	0.40**	0.67**	0.34**
2. Diversion		1.00	0.45**	0.42**
3. Personal relationships			1.00	0.50**
4. Surveillance				1.00

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

5.3.4 Results

The confirmatory factor analysis indicated that the four latent variables aligned with the four general need states - or GS - identified by McQuail, Blumler and Brown (1972): personal identity, diversion, personal relationships and surveillance. These findings responded to research question 2, providing validated measures for GS among young adults. The final quantitative study implemented these measures to test the hypotheses.

6 Hypotheses testing

An online survey was fielded during among 53 young adults between the ages of 18 and 34 during the week of 22 June 2014. Participants were screened for age, gender, race, ethnicity, geography, smartphone ownership, and app use. Compared to the US online adult population, the sample was more likely to be attending college than to have graduated from college (Appendix A). All the data were collected electronically by an online research company. The survey consisted of 85 questions. Randomisation was utilised to ensure that the order of questions asked and, when appropriate, the order of multiple choice responses provided, were not subject to order bias.

6.1 Measures

Gratifications sought was measured using the scales developed in the prior research (Appendix C). Specifically, the needs for personal identity, diversion, and surveillance were measured using three-item, seven-point Likert type scales and the need for Personal Relationships was measured using a four-item, seven-point Likert type scale (1 = Extremely unimportant; 7 = Extremely important).

Gratifications obtained from smartphone apps (Appendix E) was measured using 24 seven-point Likert-type questions. Respondents were asked to complete the following sentence: "When I seek (Personal Identity, Diversion, Personal Relationships, or Surveillance) this type of app (Assistance, Social Media, Music, Video, Games, and Informational) is (1 = Very useless; 7 = Very helpful). In each case, the gratification sought was defined. For example: "When I seek personal identity (to increase my self-esteem)…"

Frequency of smartphone app use was measured by asking respondents to indicate how often they used six different types of smartphone apps (assistance, social media, music, video, games, and informational). The seven response options ranged from 'Never' to 'More than once a day.'

Preferred apps were ascertained by asking respondents to name the app they would most likely use within the six categories (assistance, social media, music, video, games, and informational).

Attitudes toward Advertising for each type of app was measured using a three item, seven-point Likert scale ranging from very strongly disagree (1) to very strongly agree (7), which was adapted from Ha's (1996) study on advertising clutter in consumer magazines (Appendix E). For each category of app (assistance, social media, music, video, games, and informational), respondents were asked to respond to statements such as "[Assistance] Apps devote too much time to advertisements," "Advertisements interrupt my enjoyment of [Assistance] Apps," and "There are too many advertisements on [Assistance] Apps." The responses were reverse coded.

6.2 Data analysis

SPSS statistical software was used for all statistical analyses, including repeated measures of ANOVA and Pearson correlation analysis.

6.3 Results

6.3.1 Frequency of smartphone app use

Table 4 shows the reported frequency of app use by category of smartphone apps. Social media apps (such as Facebook and Twitter) were the most heavily used smartphone apps among the young adult sample. More than 70% of the respondents indicated that they used social media apps at least once a day. Chi-square analysis indicated no significant differences regarding the use of social media apps on the basis of age (18–24 vs. 25–34) or gender. In fact, chi-square analysis revealed that only the use of music apps varied on the basis of demographics. Compared to men, women are heavier users of music apps, $\chi^2(7, N = 53) = 15.88$, $p < 0.05$. The majority of participants indicated that they used all categories of apps at least once a week.

Table 4 Study 3 - frequency of smartphone app use ($N = 53$)

	Never (%)	*Less than once a month (%)*	*Once a month (%)*	*A few times a month (%)*	*Once a week (%)*	*Every other day (%)*	*Once a day (%)*	*More than once a day (%)*	*Total (%)*
Music apps	15.1	7.5	5.7	5.7	15.1	26.4	3.8	20.8	100.0
Video apps	0.0	11.3	3.8	7.5	18.9	24.5	5.7	28.3	100.0
Social media apps	7.5	3.8	0.0	3.8	3.8	9.4	24.5	47.2	100.0
Informational apps	11.3	9.4	3.8	11.3	15.1	18.9	15.1	15.1	100.0
Assistance apps	3.8	7.5	0.0	17.0	26.4	20.8	11.3	13.2	100.0
Game apps	5.7	9.4	1.9	5.7	13.2	18.9	13.2	32.1	100.0

6.3.2 Relationships among the variables

Reliability assessment was conducted on each of the scales (Appendix D) using Cronbach's Alpha. All but one of the 22 scales exceeded the generally accepted guideline of 0.70 (Hair et al., 2010).

6.3.3 Attitudes toward in-app advertising

In order to answer hypothesis 1, repeated measures of ANOVA were conducted to assess whether attitudes toward in-app advertising differed significantly among app categories (assistance, social media, music, video, games, and informational). Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (14) = 71.92, $p < 0.001$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.63$). These results indicated that the respondents indicated significantly different attitudes toward in-app advertising depending upon the app category, $F(3.15, 163.60) = 6.73$, $p < 0.001$. Post hoc, pairwise comparisons using the Bonferroni correction indicated that respondents were significantly more favourable toward advertising in assistance and informational apps than advertising in music and video apps. Hypothesis 1 was supported.

6.3.4 Gratifications sought

Repeated measures of ANOVA were conducted to assess the likelihood that GS by respondents differed significantly in terms of degree (personal identity, personal relationships, diversion, and surveillance). Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (5) = 20.16, $p < 0.001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.80$). These results indicated that the respondents indicated significantly different strengths of feeling regarding GS, $F(2.41, 125.43) = 10.74$, $p < 0.001$. Post hoc, pairwise comparisons using the Bonferroni correction indicated that respondents were significantly more likely to seek personal identity and personal relationships than diversion and surveillance. The mean scores for personal identity and personal relationships were not significantly different, however.

6.3.5 Gratifications sought and attitudes toward in-app advertising

In order to address hypothesis 2, a series of repeated measures of ANOVA were conducted, followed by post hoc pairwise comparisons. When seeking to gratify the need for personal identity, respondents were likely to use the full range of apps. Repeated measures of ANOVA indicated no significant preferences among the apps. While Pearson correlations revealed that the more a person seeks personal identity, the less favourable their attitude toward advertising in music apps ($r = -0.36$, $p < 0.01$) and video apps ($r = -0.27$, $p < 0.05$), Pearson correlations revealed no significant correlation between the degree of personal identity sought and attitude toward advertising in any of the other types of apps.

When seeking to gratify the need for personal relationships, participants indicated they were most likely to use social media apps. A series of repeated measures of ANOVA were conducted to assess the whether the apps used by respondents to obtain personal relationships differed significantly in terms of likely use. Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (14) = 68.31, $p < 0.001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.66$). These results indicated that the respondents indicated that the gratification of personal relationships differed depending upon the app, $F(3.30, 171.80) = 16.02$, $p < 0.001$. Post hoc, pairwise comparisons using the Bonferroni correction indicated that respondents were significantly more likely to use social media apps than any of the other apps. Pearson correlations revealed that the need for personal relationships correlated positively with the use of social media apps as a means to gratify that need ($r = 0.53$, $p < 0.01$) and frequency of social media apps use ($r = 0.37$, $p < 0.01$). There was not a significant relationship, however, between the need for personal relationships and attitudes toward advertising on social media apps.

When seeking to gratify the need for diversion, respondents indicated they were most likely to use apps for video, games, and music. A series of repeated measures of ANOVA were conducted to assess the whether the apps used by respondents to obtain diversion differed significantly in terms of likely use. Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (14) = 37.97, $p < 0.001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.72$). These results indicated that the respondents indicated that the gratification of Diversion differed depending upon the app, $F(3.60, 187.31) = 23.54$, $p < 0.001$. Post hoc, pairwise comparisons using the Bonferroni correction indicated that respondents were significantly more likely to use video, games, and music apps than the other three apps. Pearson correlations revealed that the need for Diversion correlated positively with the use of apps for video, games, and music as a means to gratify that need ($r = 0.29$, $p < 0.05$, $r = 0.64$, $p < 0.01$, $r = 0.40$, $p < 0.01$, respectively) and the amount of game app use ($r = 0.36$, $p < 0.01$). There was not a significant relationship, however, between the need for Diversion and attitudes toward advertising on apps for video, games, or music.

When seeking to gratify the need for Surveillance, respondents indicated they were most likely to use informational, assistance, and video apps. A series of repeated measures of ANOVA were conducted to assess the whether the apps used by respondents to gratify the need for surveillance differed significantly in terms of likely use. Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (14) = 37.97, $p < 0.001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = 0.72$). These results indicated that the respondents indicated that the gratification of surveillance differed depending upon the app, $F(3.60, 187.31) = 23.54$, $p < 0.001$. Post hoc, pairwise comparisons using the Bonferroni correction indicated that respondents were significantly more likely to use informational, assistance, and video apps than the other three apps. Pearson correlations revealed that the need for surveillance correlated positively with the use of informational and video apps as a means to gratify that need ($r = 0.34$, $p < 0.01$; $r = 0.39$, $p < 0.01$, respectively), frequency of informational apps use ($r = 0.29$, $p < 0.05$), and negatively correlated with their attitudes toward advertising in informational apps ($r = –0.28$, $p < 0.05$) and video apps ($r = –0.41$, $p < 0.01$).

Hypothesis 2 was supported. Attitudes toward in-app advertising did vary according to the GS. Attitudes toward advertising in music and video apps were negatively correlated with seeking personal identity. Attitudes toward advertising in all types of apps were not correlated with seeking personal relationships or diversion. Attitudes toward advertising in music, informational, social media, video, and game apps were negatively correlated with the need for surveillance.

7 Conclusion

This multi-phase study developed valid scales to measure GS among young adults as well as a manageable categorisation of smartphone apps. The study used these findings to investigate the relationships among young adults' general GS, perceived gratifications obtained from the use of various categories of smartphone apps, and attitudes toward in-app advertising within the app categories.

The findings suggest that young adults are most likely to seek gratifications for personal identity and personal relationships. When seeking personal identity, the apps that provide the most gratification are music and video apps. There is a negative relationship, however among seeking personal identity and attitudes toward advertising in music and video apps. In other words, advertising in music and video apps does not reach a receptive audience among those most likely to use the apps.

When seeking personal relationships, the apps that provide the most gratification are social media apps. There is no correlation between seeking personal relationships and attitudes toward advertising in social media apps. In fact, there is no correlation among seeking personal relationships and attitudes toward advertising in any of the apps (music, informational, social media, assistance, video, and game apps). It would appear that advertising in social media apps does not generate negative attitudes among those most likely to use the apps.

When seeking diversion, the apps that provide the most gratification are video, games, and music apps. There is no correlation between seeking diversion and attitudes toward advertising in in video, games, and music apps. In fact, there is no correlation among seeking diversion and attitudes toward advertising in any of the apps (music, informational, social media, assistance, video, and game apps). While advertising in music and video apps runs the risk of alienating those most likely to use them (those seeking personal identity), it would appear that advertising in game apps does not generate negative attitudes among those most likely to use them (those seeking diversion).

When seeking surveillance, the apps that provide the most gratification are informational, assistance, and video apps. There is a negative relationship among seeking surveillance and attitudes toward advertising in informational and video apps. There is no correlation between seeking surveillance and attitudes toward advertising in assistance apps. In other words, while advertising in informational and video apps does not reach a receptive audience among those most likely to use the apps, advertising in assistance apps does not generate negative attitudes among those most likely to use them.

The findings suggest, therefore, that there is an opportunity to advertise effectively on social media, game, and assistance apps. Each of these app categories are used to satisfy

different gratifications (personal relationships, diversion, and surveillance, respectively) and do not indicate negative attitudes toward advertising. Social media apps appear to provide the greatest opportunity, however, because they are the most frequently used apps. A 72% of respondents indicated that they used social media apps more than once a day, compared to 45% for game apps and 25% for assistance apps.

8 Limitations and future research

There are limitations in regard to this study. First, the scale development has not incorporated mobile app-specific gratifications. Future research should capture the unique attributes attributable to mobile apps in such a manner as to better differentiate apps among the many digital media platforms. A second limitation is the fact that the sample sizes for both the qualitative and quantitative studies were relatively low (25 focus group participants and 156, 166, and 53 survey respondents, respectively). In particular, the small sample size for Study 3 allowed only limited data analysis. Future research should investigate the relationships among the types of apps and gratifications obtained from them with a more representative sample. A third limitation of this study is that it relied upon self-reported data. A survey instrument was used based on the belief that a broad, nationally representative sample would provide more useful information than an experiment. Self-reporting could allow for over- or under-estimations of respondents' hierarchy of needs, however. Reliance upon self-reporting may also reduce candour regarding actual use of smartphone apps.

The findings of this study indicate an exciting area for future research, however. Specifically, a larger sample size would allow the use of structural equation modelling to explain the impact of uses and gratifications variables on attitudes toward in-app advertising within the expectation-confirmation theoretical framework (Oliver, 1977, 1980).

References

Albarran, A.B. (2009) 'Young Latinos use of mobile phones: a cross-cultural study', *Revista de Comunicacion-Universidad de Piura*, Vol. 8, pp.95–108.

Apple (2015) 'Number of apps available in leading app stores as of July 2015', *Statista* [online], http://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/ (accessed 9 March 2016).

Balakrishnan, V. and Huck-Soo, L. (2012) 'Mobile phone and short message service appropriation, usage and behavioral issues among university students', *Journal of Social Sciences*, Vol. 8, No. 3, pp.364–371.

Bondad-Brown, B.A., Rice, R.E. and Pearce, K.E. (2012) 'Influences on TV viewing and online user-shared video use: demographics, generations, contextual age, media use, motivations, and audience activity', *Journal of Broadcasting and Electronic Media*, Vol. 56, No. 4, pp.471–493.

Cattell, R.B. (1966) 'The Scree test for the number of factors', *Multivariate Behavioral Research*, Vol. 1, No. 2, pp.245–276.

Chan-Olmsted, S., Rim, H. and Zerba, A. (2013) 'Mobile news adoption among young adults: examining the roles of perceptions, news consumption, and media usage', *Journalism and Mass Communication Quarterly*, Vol. 90, No. 1, pp.126–147.

Chen, G.M. (2011) 'Tweet this: a uses and gratifications perspective on how active Twitter use gratifies a need to connect with others', *Computers in Human Behavior*, Vol. 27, No. 2, pp.755–762.

Chen, L.S-L. and Kuan, C.J. (2012) 'Customer acceptance of playing online game on mobile phones', *International Journal of Mobile Communications*, Vol. 10, No. 6, pp.598–616.

Chin, W.W. (1998) 'Issues and opinion on structural equation modeling', *MIS Quarterly*, Vol. 22, No. 1, pp.VII.

DeVellis, R.F. (2003) *Scale Development Theory and Applications*, Sage Publications, Thousand Oaks, CA.

eMarketer (2014) 'Number of smartphone users worldwide from 2014 to 2019 (in millions)', *Statista* [online], http://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/ (accessed 9 March 2016).

Gartner Inc. (2013) 'Number of free and paid mobile app store downloads worldwide from 2011 to 2017 (in billions)', *Statista* [online], http://www.statista.com/statistics/271644/worldwide-free-and-paid-mobile-app-store-downloads/ (accessed 9 March 2016).

Ha, L. (1996) 'Advertising clutter in consumer magazines: dimensions and effects', *Journal of Advertising Research*, Vol. 36 No. 4, pp.76–84.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) *Multivariate Data Analysis*, Prentice Hall, New Jersey.

Hicks, A., Comp, S., Horovitz, J., Hovarter, M., Miki, M. and Bevan, J.L. (2012) 'Why people use Yelp.com: an exploration of uses and gratifications', *Computers in Human Behavior*, Vol. 28, No. 6, pp.2274–2279.

Huang, L-Y. and Hsieh, Y-J. (2011) 'Predicting online game loyalty based on need gratification and experiential motives', *Internet Research*, Vol. 21, No. 5, pp.581–598.

Katz, E., Haas, H. and Gurevitch, M. (1973) 'On the use of the mass media for important things', *American Sociological Review*, Vol. 38, No. 2, pp.164–181.

Lai, I. and Shi, G. (2015) 'The impact of privacy concerns on the intention for continued use of an integrated mobile instant messaging and social network platform', *International Journal of Mobile Communications,* Vol. 13, No. 6, pp.641–669.

Lariscy, R.W., Tinkham, S.F. and Sweetser, K.D. (2011) 'Kids these days: examining differences in political uses and gratifications, internet political participation, political information efficacy, and cynicism on the basis of age', *American Behavioral Scientist*, Vol. 55, No. 6, pp.749–764.

Lee, C.S., Goh, D.H-L., Chua, A.Y.K. and Ang, R.P. (2010) 'Indagator: investigating perceived gratifications of an application that blends mobile content sharing with gameplay', *Journal of the American Society for Information Science and Technology*, Vol. 61, No. 6, pp.1244–1257.

Lim, W.M. and Ting, D.H. (2012) 'E-shopping: an analysis of the uses and gratifications theory', *Modern Applied Science*, Vol. 6, No. 5, pp.48–63.

McCroskey, J.C. and Young, T.J. (1979) 'The use and abuse of factor analysis in communication research', *Human Communication Research*, Vol. 5, No. 4, pp.375–382.

McQuail, D., Blumler, J. and Brown, J. (1972) 'The television audience: a revised perspective', in McQuail, D. (Ed.): *Sociology of Mass Communications*, Penguin, Harmondsworth, England, pp.271–284.

Oh, S., Baek, H. and Ahn, J. (2015) 'The effect of electronic word-of-mouth (WOM) on mobile application downloads: an empirical investigation', *International Journal of Mobile Communications*, Vol. 13, No. 2, pp.136–156.

Oliver, R.L. (1977) 'Effect of expectation and disconfirmation on postexposure product evaluations: an alternative interpretation', *Journal of Applied Psychology*, Vol. 62 No. 4, pp.480–486.

Oliver, R.L. (1980) 'A cognitive model of the antecedents and consequences of satisfaction decisions', *Journal of Marketing Research (JMR)*, Vol. 17 No. 4, pp.460–469.

Özçam, D., Kuşçu, A. and Yozgat, U. (2015) 'Understanding mobile advertising acceptance: an integrative approach', *International Journal of Mobile Communications*, Vol. 13, No. 4, pp.379–397.

Petrič, G., Petrovčič, A. and Vehovar, V. (2011) 'Social uses of interpersonal communication technologies in a complex media environment', *European Journal of Communication*, Vol. 26, No. 2, pp.116–132.

Pew Research Center (2015) 'U.S. smartphone use', April [online], http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/ (accessed 7 March 2016).

Smock, A.D., Ellison, N.B., Lampe, C. and Wohn, D.Y. (2011) 'Facebook as a toolkit: a uses and gratification approach to unbundling feature use', *Computers in Human Behavior*, Vol. 27, No. 6, pp.2322–2329.

Sun, Z., Ju, H. and Zhang, S. (2012) 'Who are intending to update mobile phones? An investigation among Chinese young people', *China Media Research*, Vol. 8, No. 3, pp.92–101.

Wang, E. and Chou, N. (2016) 'Examining social influence factors affecting consumer continuous usage intention for mobile social networking applications', *International Journal of Mobile Communications*, Vol. 14, No. 1, pp.43–55.

Zhang, Y., Tang, L.S-T. and Leung, L. (2011) 'Gratifications, collective self-esteem, online emotional openness, and traitlike communication apprehension as predictors of Facebook uses', *CyberPsychology, Behavior and Social Networking*, Vol. 14, No. 12, pp.733–739.

Appendix A

Sample composition

	US internet users (%)*	*Study 1 (N = 156) (%)*	*Study 2 (N = 166) (%)*	*Study 3 (N = 56) (%)*
Gender				
Male	50.0	50.0	43.4	49.1
Female	50.0	50.0	56.6	50.9
Age				
18–24	39.0	51.9	45.8	41.5
25–34	61.0	48.0	54.2	58.5
Race/ethnicity				
Caucasian, non-Hispanic	66.0	61.5	63.9	62.3
African American, non-Hispanic	11.0	13.5	6.0	15.1
Asian	5.0	16.0	15.7	9.4
Hispanic	10.0	6.4	13.9	11.3
Native American		1.3	0.6	
Other	8.0	1.3	0.0	1.9
Region				
South	37.0	30.8	28.9	35.8
Northeast	19.0	25.6	25.9	18.9
Midwest	22.0	28.2	20.5	20.8

Sample composition (continued)

	US internet users (%)*	*Study 1 (N = 156) (%)*	*Study 2 (N = 166) (%)*	*Study 3 (N = 56) (%)*
West	23.0	15.4	24.7	24.5
Income				
Less than $35,000	46.0	–	34.9	–
$35,000–49,999	24.0	–	19.9	–
$50,000–74,999	16.0	–	19.3	–
$75,000+	15.0	–	10.2	–
Declined to answer education				
High school or less	31.0	15.4	18.1	28.3
Some college	31.0	41.0	37.3	66.0
College+	38.0	43.6	44.6	5.7

*2010 US census/2012 Pew American internet and American life project.

**Report on daily deals (2012).

Appendix B

Study 1 - pattern matrix

	Self esteem	*Connectedness*	*Escape*	*Relationship building*	*News and information*
To feel accomplished*	0.869				
To feel on top of things*	0.843				
To develop good taste	0.788				
To learn new things*	0.910				
To raise my morale	0.841				
To experience beauty	0.628				
To release tension					
To be entertained					
To re-experience events in which I was involved					
To feel that I am utilising my time well					
To order my day					
To strive for a higher standard of living					
To feel that I am influential					
To feel that others think as I do			0.638		
To overcome loneliness when I am alone*			0.712		
To kill time*			0.694		

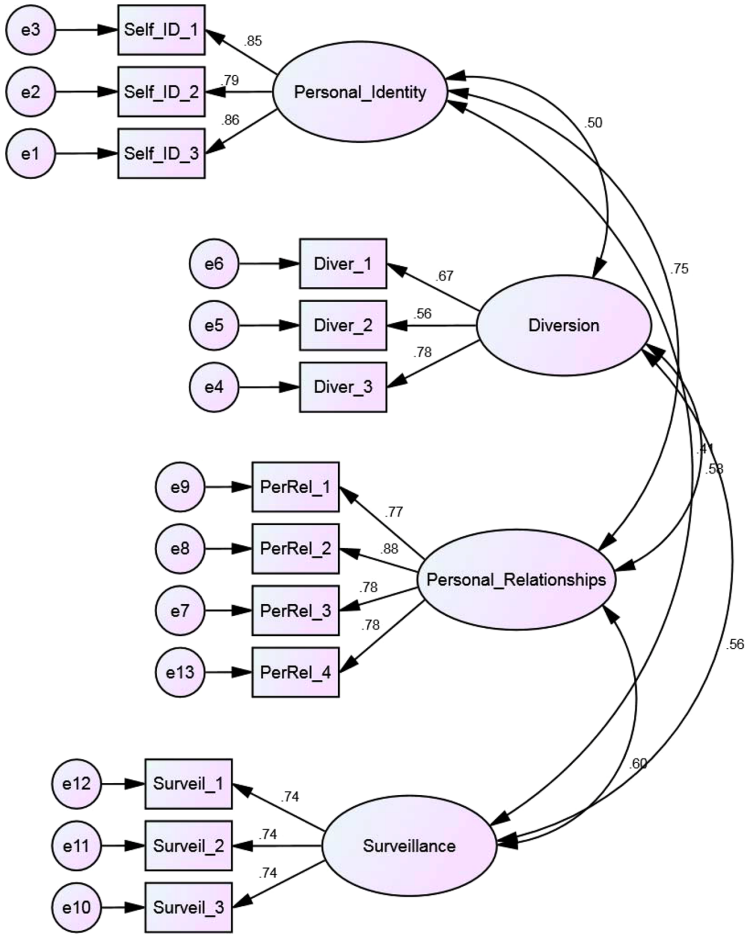
Study 1 - pattern matrix (continued)

	Self esteem	*Connectedness*	*Escape*	*Relationship building*	*News and information*
To escape from the reality of everyday life*			0.631		
To feel needed					
To spend time with family members				0.744	
To participate in discussions with my friends*				0.744	
To learn how to behave among others					
To spend time with friends*				0.653	
To feel connected to family members*		0.779			
To understand what goes on in the world					
To feel connected to friends*		0.768			
To know what the world thinks about the US*					0.691
To obtain useful information for daily life		0.744			
To feel that I am participating in current events*					0.617
To be in a good mood		0.648			
To understand those who disagree with government policy*					0.674
To understand how others feel		0.613			
To participate in the experiences of other people					

*Final scale items.

Appendix C

Study 2 - confirmatory factor analysis: final model



Appendix D

Study 3 - gratifications sought

Variables	*Variable*	*Mean*	*Standard deviation*	α
Gratifications sought				
Personal identity				
To feel accomplished	IDENT_1	5.41	0.98	0.76
To feel on top of things	IDENT_2			
To learn new things	IDENT_3			

Study 3 - gratifications sought (continued)

Variables	*Variable*	*Mean*	*Standard deviation*	α
Diversion				
To overcome loneliness when I am alone	DIVER_1	4.95	1.09	0.71
To kill time	DIVER_2			
To escape from the reality of everyday life	DIVER_3			
Personal relationships				
To participate in discussions with my friends	PER_REL1	5.35	1.06	0.87
To spend time with friends	PER_REL 2			
To feel connected to family members	PER_REL 3			
To feel connected to friends	PER_REL 4			
Surveillance				
To know what the world thinks about the US	SURVEIL_1	4.76	1.19	0.81
To feel that I am participating in current events	SURVEIL_2			
To understand those who disagree with government policy	SURVEIL_3			

Appendix E

Study 3 - Descriptive statistics: gratifications obtained from app categories and attitudes toward advertising

Gratification obtained	*Apps category*	*Mean*	*Standard deviation*	α
Personal identity	Music	4.30	1.87	*
	Video	4.30	1.80	*
	Social media	4.25	1.87	*
	Game	4.15	1.90	*
	Informational	4.15	1.74	*
	Assistance	4.04	2.03	*
Personal relationships	Social media	5.23	1.45	0.75
	Video	4.18	1.76	0.75
	Game	3.93	1.82	0.85

Study 3 - Descriptive statistics: gratifications obtained from app categories and attitudes toward advertising (continued)

Gratification obtained	*Apps category*	*Mean*	*Standard deviation*	α
	Music	3.88	1.77	0.76
	Assistance	3.79	1.74	0.78
	Informational	3.69	1.78	0.77
Diversion	Video	5.18	1.26	0.75
	Game	5.15	1.34	0.86
	Music	5.14	1.72	0.92
	Social media	4.61	1.56	0.79
	Informational	4.35	1.60	0.83
	Assistance	3.96	1.65	0.67
Surveillance	Informational	5.51	1.41	*
	Assistance	5.25	1.27	*
	Video	5.08	1.14	*
	Social media	4.58	1.59	*
	Music	3.83	1.72	*
	Game	3.47	1.81	*
Attitudes towards in-app advertising	Assistance	3.52	1.82	0.92
	Informational	3.30	1.60	0.96
	Social media	2.81	1.51	0.92
	Game	2.63	1.55	0.90
	Music	2.55	1.60	0.94
	Video	2.44	1.33	0.92

Note: *Single-item scales.