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Why People Choose Apps: An Evaluation of the Ecology and User Experience of Mobile Applications

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Why people choose Apps: An evaluation of the ecology and user experience of mobile applications

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A B S T R A C T

Purpose: To investigate the reasons for users' choice of mobile applications and how their choice relates to their experience of use.
Method: A mixed methods study of the factors influencing users' choice to adopt or abandon mobile applications. Seventy-nine respondents completed a questionnaire recording their top four favourite applications, the frequency of use and user experience measures: aesthetics, content, usability, pleasurable interaction, and overall experience. They also reported up to four abandoned Apps, with any alternatives considered and the reasons for use or abandoning. Follow-up interviews probed the reasons for users' choice of specific applications.
Results/Conclusions: Social media was the most favoured category of App, followed by leisure, e-commerce, and communication. Quantitative data shows that content, usability and pleasure predict overall user experience and App acceptance. Interview data indicate that user's choice of downloading and abandoning applications is also influenced by usefulness, usability, content, reliability and contextual factors such as networking and recommendations. Most user App choices appear to be fast-path decisions made without systematic comparison of products.

1. Introduction

Applications on mobile phones have developed into a fiercely competitive marketplace on both Android and iOS models (Auxier and Anderson, 2021). While positive reviews, recommendations and word of mouth may drive market success for many Apps, there is little understanding about the relative influences of utility, usability, and other factors on why people download and use particular Apps or reject them, outright or after a period of use. Several researchers have investigated the importance of mobile applications and studied factors influencing user choice, including personalisation (Tunney, 2018), practicability (Gefen et al., 2003), influence of society (Venkatesh et al., 2003) and performance (Malik et al., 2017). In this paper we investigate whether or not user experience is an important influence on users' choice and decisions to keep using or abandoning Apps.

User Experience (UX) research has identified usability, service quality (similar to utility), classic and expressive aesthetics (Lavie and Tractinsky, 2004) as important influences on users' perceptions of products. While no overall consensus of variables influencing overall judgement has emerged in UX research, the more important components

appear to be pragmatics (an amalgam of utility and usability) and aesthetics/hedonics (Diefenbach and Hassenzahl, 2009; Lavie and Tractinsky, 2004). However, interactive features may also influence user judgement of effectiveness, efficiency and overall attitude (Teo et al., 2003; Cyr et al., 2009; De Angeli et al., 2006). In a study of product acceptance amongst medical students, Hart and Sutcliffe (2019) found that functionality of the device (iPAD) and Apps was the most important influence on acceptance, and useful functions overcame poor perceived usability.

In information systems, IT product choice has been investigated in technology acceptance models (TAM) (Venkatesh et al., 2003, 2012; Williams et al., 2015). TAM models have evolved from a core set of concepts: behavioural intention, PEoU (perceived ease of use), PU (perceived utility), to include other influences such as trust, subjective norms and facilitating conditions (Venkatesh et al., 2012). Model elaboration produced UTAUT, containing several variables describing user attitudes (performance and effort expectancy, hedonic motivation), user characteristics (e.g., age, gender, experience, self-efficacy, and habit), and economic considerations such as price and value (Venkatesh et al., 2003; Williams et al., 2015). Other antecedent variables that may

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influence behavioural intention have included user self-image, culture, predisposition towards technology (Magni et al., 2010), and compatibility with the users' tasks and organisational setting (Yousafzai et al., 2007; Williams et al., 2015).

In spite of several studies, the rationale for users' choice of IT products generally and mobile Apps in particular remains unclear. Domain-specific factors may be important; however, a more general model of technology acceptance for mobile Apps is needed. Previous studies have not illuminated how users make decisions to download and use Apps; for instance, do they just follow peer pressure, as appears to be the case in social media (Aloudat et al., 2019; Lee et al., 2012), or do they make more rational decisions? Decision Making Theory (Cacioppo et al., 1986; Kahneman, 2011) asserts most people, most of the time make 'fast-path' choices based on a few dominant attributes and little conscious effort. In contrast 'slow-path' choices are evaluated more carefully with trade-offs and mental models of the choice space (Johnson-Laird, 1983). Choice of social media Apps may be fast path; however, other Apps may trigger more systematic, slow-path reasoning. This perspective forms one of the motivations for this enquiry, not only which variables influence choice but also how users make choices across different App types. This paper investigates criteria in determining users' decisions to adopt/abandon Apps on mobile phones, with the following research questions:

RQ1. What types of App are present in users' portfolios on their mobile phones?
RQ2. What are the more important determinants of users' choice ?
RQ3. How is users' choice influenced by the App type/purpose?
RQ4. Which cognitive processes (slow/fast path) do users follow when making App choices?

The paper is organised as follows: first we review related research, followed by a description of the study methods. The quantitative and qualitative results are presented, and the paper concludes with discussion on technology acceptance, user experience and reasons for choice of Apps.

2. Related research

With the growth of the Internet and mobile communication technologies, a wide range of mobile applications have been produced (Islam et al., 2010). Malik et al. (2017) analysed factors influencing customers' perspectives in adopting a particular mobile App, including ease of use, social influence, trust, performance and incentives. Harris et al. (2016) identified reputation of the App in the market and familiarity as influences leading users towards installing or rejecting an App. Noh and Lee (2016) investigated the factors influencing consumers to use banking Apps and showed that the intention to use is based on features such as safety and service quality; however, this research was conducted on the South Korean banking sector and more diverse studies in different cultures are necessary to validate these results. Wei et al. (2015) investigated how mobile gaming Apps are downloaded, and why 95% of them are abandoned within a short period. They considered that pricing, initial attractiveness, quality, followed by enhanced benefits and monetary rewards, foster user loyalty and play a significant role in the continuous usage of any gaming App.

In User Experience (UX), components that contribute to users' overall judgement of IT products have been identified as usability, service quality (similar to utility), classic and expressive aesthetics (Lavie and Tractinsky 2004); while pragmatics (an amalgam of utility and usability) and hedonics were proposed by Hassenzahl (2004) as antecedents to judgement of general product qualities of 'goodness' and 'beauty'. However, overall preferences for websites with similar content but different designs can be swayed by framing effects of tasks and users' characteristics (O'Brien 2010). Interactive system features may also influence user judgement of effectiveness, efficiency and overall attitude

(Hartmann et al., 2007; Sutcliffe, 2009; Hart and Sutcliffe, 2013). Kujala et al. (2011) reported that both pragmatic and hedonic qualities contributed to attractiveness over a 6–12 month period; this is supported by Mendoza et al. (2005) finding of decreased frustration over time, as users overcome initial usability problems. However, overall preferences for websites with similar content but different designs may depend on framing effects of tasks and users' characteristics (Porat and Tractinsky, 2012). Interactive system features may also influence user judgement of effectiveness, efficiency and overall attitude (Teo et al., 2003). In a study of product acceptance amongst medical students, Hart and Sutcliffe (2019) found that functionality of the device (iPAD) and Apps was the most important influence on acceptance, with useful functions overcoming poor perceived usability. However, contextual factors such as no perceived need, lack of training and poor fit with working practices also influenced rejection of the iPAD. Although several conceptual frameworks or models of UX have been proposed with a variety of constructs such as aesthetics, immersion, and presence (Hartmann et al., 2009) there appears to be little consensus between generic and contextual interpretations of UX (Bargas-Avila and Hornbaek, 2011). UX studies have not interpreted empirical data on influencing variables in light of Decision Making Theory, although a proto-theory of variables and temporal influences on users' perceptions of experience was proposed by Hartmann et al. (2009).

IT product choice has been investigated extensively in technology acceptance models (TAM) which have evolved over several decades (Williams et al., 2015), to include a variety of influences such as trust and risk, subjective norms and facilitating conditions (Venkatesh et al., 2012; Maruping et al., 2017), user characteristics (e.g. age, gender, experience, self-efficacy and habit), and economics, such as price and value (Venkatesh et al., 2003, 2012; Williams et al., 2015). Other antecedent variables that may influence behavioural intention have included user self-image, culture, predisposition towards technology (Magni et al., 2010), and compatibility with the users' tasks and organisational setting (Yousafzai et al., 2007; Williams et al., 2015). Lee et al. (2012) proposed a Unified Theory of Acceptance based on a survey of college students and office workers, finding that personalisation has a positive effect on performance expectancy, intention to use, and recommendations to other users. Pan and Zhao (2018) reported reasons that led to abandoning mobile healthcare Apps, ranging from difficulty faced in understanding the user interface to constraints on data entry requirements, and failure to update diagnosis. Some of the major factors for improving the continuance of the mHealth App were found to be integration with wearable healthcare devices and enhancing patient-to-physician interaction (Pan and Zhao, 2018). Hornbaek and Hertzum (2017) reviewed TAM and UX research, concluding that there was little common ground between the models in the two research areas, and that TAM models did not account for the experiential perspective of use. They argued that construct definitions needed to be improved, as well as the links to cognitive models, tasks and the context of use. While the psychological Theory of Reasoned Action (Ajzen 1991) underpins TAM models as antecedents of behavioural intent (users' choice), TAM studies have not investigated the users' reasoning processes while making product or App choices.

Overall, six main factors appear to be the more important influences on user preferences and acceptance of mobile phone Apps: *personalisation* of the level at which the desired service or information provision and features are customisable by the user (Tunney, 2018; Morosan and DeFranco, 2016; Sang-Hyeon and Sang-Hyun, 2002; Dong-Wook et al., 2008; Wei et al., 2015); *integrity*, including users' trust in the App and/or its supplier/ provenance (Wang et al., 2006; Davis et al., 1989; Dai-yon and Hyun-Jung, 2008; Baldwin et al., 2017; Adhikari et al., 2014; Pan and Zhao, 2018; Addonizio, 2017); *performance* of the App for improving users' work and effectiveness, and also performance in supporting other user tasks (Gefen et al., 2003; Venkatesh et al., 2003; Malik et al., 2017); *utility*, perceived usefulness of the App, its functionality and services (Gefen et al., 2003; Venkatesh et al., 2003; Ding

and Chai, 2015; Al-Shamaileh et al., 2012a, b); *external influences* on the decision to choose an application including overall popularity, recommendation from friends, family, reviews, social media networking effect (Aloudat et al., 2019; Gye-Soo, 2002; Al-Shamaileh and Sutcliffe, 2012a, Al-Shamaileh and Sutcliffe, 2012b; Al-Shamaileh et al., 2011; Al-Shamaileh, O., 2018; Lee et al., 2012); and *facilitating conditions,* which may be social and organisational reasons for choice (e.g. company standards), training and technological support for the App (Noh and Lee, 2016; Wei et al., 2015; Hart and Sutcliffe, 2019).

3. Study design & methods

A mixed methods approach (Creswell et al., 2003) was chosen with a survey to collect quantitative data on App choice, user experience and preferences, with free-format replies to collect qualitative data on chosen or abandoned Apps and users' reasons for their choice. Participants were recruited through advertising the study on Facebook and the Zayed University portal. The survey was completed in person and complemented by interviews to gain further insight into users' decision processes for App choice.

3.1. Survey design

Respondents were asked to complete a questionnaire consisting of demographic information (age, gender, nationality and occupation) and the following sections:

(i) Identify the top four mobile applications that they used.
(ii) Rate the frequency of use, satisfaction and mood based on their experience with their first application on a 1 to 7 scale where 1 = frequent or very positive.
(iii) Evaluate their experience of their first application on five scales: expressive aesthetics, usability, pleasurable interaction (Lavie and Tractinsky, 2004), content adapted from Bernier Instructional Design (De Angeli et al., 2006) and their overall experience with three questions (O'Brien, 2010) on a 1 to 7-point scale.
(iv) List any alternative they considered as competitors for their first chosen application (free-format reply).
(v) State their reasons for selecting their first App (free-format reply).
(vi) Repeat steps (ii) to (v) for their second App.
(vii) Repeat steps (ii), (iv-v) for their third and then fourth Apps.
(viii) Identify four applications that they had downloaded and subsequently stopped using.
(ix) Rate the frequency of use and then repeat steps (iii) to (v) for their first abandoned App.
(x) Repeat step (ix) for their second abandoned App.
(xi) Rate frequency of use and repeat steps (iv) and (v) for third and fourth choice abandoned Apps (if any cited).

The user experience scales (step iii) were chosen because they have an established track record in the HCI literature and covered the aspects of App choice more appropriately that TAM/UTAUT models (Venkatesh et al., 2012) which use more limited usability and utility scales. Users had access to their mobile phones while completing the survey; however, they primarily relied on their memory for listing popular and abandoned Apps. Limited data sets (frequency of use, alternative and reasons) were collected for Apps 3 and 4 because several respondents did not cite any Apps for their third and fourth choices; also in pilot interviews they reported that their memory of experience for these Apps was limited. The questionnaire is illustrated in Appendix A.

3.2. Interviews

After they had completed the survey, 30 participants were interviewed to elicit their opinions on the reasons behind using/abandoning each application. The interview was structured with seven questions:

How long they had used their chosen Apps (as reported in the survey).
The reasons for participants' choice of Apps which they continued to use.
Whether any alternatives were considered in their choice.
Comments on user experience.
List any abandoned Apps or any they had downloaded but used infrequently.
Reasons for abandoning or not using these Apps.
Comments on user experience.

Interviews were audio recorded and subsequently transcribed. Both the interview transcripts and text responses in the survey were analysed to investigate reasons for using or abandoning Apps. Analysis followed a hybrid approach (Cresswell et al., 2003) with preset categories and open coding (Holton, 2007) for choice reasons and other utterances which were not associated with preset categories. User experience responses were coded using the UX concepts derived from the survey: usability, content, aesthetics, satisfaction and pleasure. Sentences and utterances which did not fall into these categories were analysed using open coding to classify emergent themes and reasons for choice. The main themes which emerged from open coding were illustrated with excerpts.

The interview transcripts were analysed in more depth to investigate the decision processes for App choice, to categorise the evidence users reported to justify their choice, based on the UX concepts listed above plus any emergent categories such as cost/free App, convenience, communication (social media) and how many alternatives were considered in their choice (if any). Analysis of the abandoned or infrequently used Apps followed the same process. The relative complexity or simplicity of the reported decisions (Sloman 1996; Caciappo et al. 1986) were considered to classify the user's decision process as fast/slow path using the criteria:

Fast path: one or two reasons for choice cited, no alternative considered for adopted Apps. For abandoned Apps 1–2 reasons and possibly an alternative selected.
Slow path: >2 reasons for choice cited, evidence for considering alternatives for adopted Apps. For abandoned apps more detailed reasons, evidence for systematic search and selection of an alternative.

The authors coded a sample of ten interviews independently then compared utterance codings, resulting in an inter-coder agreement of 87%. Differences were reconciled and a list of emergent categories produced. The first author then completed the interview coding with a further sample of ten interviews dual coded to check inter-coder agreement. The second sample produced agreement of 98%.

The duration of each survey and interview was approximately one hour. The survey was carried out online between January and April 2019 using Qualtrics. Participants were sent a link to the survey and specific date/time completion sessions were scheduled with a Zoom video conference so the first authors could introduce the survey and answer any questions. Participants were then asked to complete the online survey at their own pace and a sub-set (30/79) were interviewed directly after they completed the survey. Interviews were self-selected by volunteering in advance for the post-survey interview. Most interviews were conducted in the same Zoom session as the survey; however six respondents preferred to be interviewed at a later date in 2019 and early 2020. These interviews followed the same structure as the previously completed interviews.

Qualitative data analysis from the interviews and responses to the free format survey questions on reasons for accepting/rejecting app produced the following thematic categories (see Table 1) which we describe as factors that influence users' decisions.

Excerpts from interviews are given in the results Section 4.4. for each of these themes. In the discussion of results factors refers to both the

Table 1

Theme category definitions followed in qualitative data analysis.

Theme	Inclusion criteria
Usefullness;	General evaluations of the utility and quality of service of Apps, with some specific comments on the usefulness of features and functions.
Usability:	Positive and negative comments on user interface features and operations. Reports of problems experienced while operating Apps
Content:	Comments on quality of information delivered by Apps or content in their web site.
Alternatives:	Identification of specific apps or category of Apps either investigated and/or adopted in response to the 'Alternative considered" survey question and references to alternative choices in interviews.
Reliability:	Comments relating to App failures, crashes, or other reasons for not operating as expected.
Security	Concerns about potential loss of personal data, poor security protection, potential exposure to fraud and malevolent actor in the Internet environment.
Addiction:	Specific comments about the addictive nature of social media
Influence of others:	Reasons for choice influenced by family, friends, word of mouth or internet/press reviews
Popularity:	Reasons for choice where the App was perceived to be the market leader/ most popular.
Design:	General comments on the design quality of Apps.
Overall judgement:	Statements summarizing respondents' general opinion of Apps.

above influences on users' decisions as well as quantitative data measures analysed in the survey: usability, aesthetics, content, pleasure, mood, satisfaction and overall experience.

3.3. Participant demographics

Seventy-nine respondents participated in the experiment; 34 were male (43%) and 45 female (57%). Forty worked in the private sector (51%), 11 were unemployed (14%), ten worked in the public sector (13%), nine were self-employed (11%) and nine were students (11%). Eight respondents were aged 18–25 (10%), 33 were aged 26–35 (42%), 32 were 36–45 (41%), five 46–55 (6%) and one was older than 55 (1%). The respondents were from Jordan (30, 37.9%), India (26, 32.9%), UAE (6, 7.6%), non-Middle East (Canada, USA and France each 5, 6.4%), and 1 to 3 respondents each from other countries (Egypt, Lebanon, Pakistan, Palestine, Sri Lanka and Syria, 13, 16.5%). The only large demographic sub-group was private sector employees who were Jordanian or Indian nationals (39% of respondents); otherwise, there were no intersecting groups of occupation, nationality and age.

3.4. Classification of Apps

The Apps identified in the survey were classified into the following categories:

Social media (most popular), with individual totals for the more frequently reported: Facebook, Instagram, WhatsApp, SnapChat.
Other social media: Twitter, LinkedIn, etc.
Google: all applications: Maps, Hangouts, Meet, etc.
Finance: e-banking and personal finance management Apps.
Leisure: film and video streaming services, YouTube, games, other entertainment Apps.
Communications: Internet audio and video utilities (Skype and rivals), e-mail, VPNs, Zoom, Teams, video conferencing.
E-commerce: e-shops, purchase and delivery services, e-booking services.
Information: maps, weather, any advice and information delivery.
Other: including utilities (file share), functional Apps, e-government.

4. Results

4.1. Descriptive statistics

Frequencies of the applications selected and used by respondents are illustrated in Table 2. Social networking applications were reported most frequently, followed by communications and other applications with an even spread (4–7%) amongst other categories. Within other social media Twitter and LinkedIn were more frequent. Communication Apps reflected the prevalence of e-mail and audio and video communication, although some of the expected market leaders, (Skype, Zoom, Teams) were not reported frequently. Google as a search engine was probably under-reported as it may have been an assumed App by respondents who cited Google Maps, Translate and News. There was a considerable variation in choice of individual Apps within the other categories. After the four most popular social media, only four more frequent Apps were chosen by 2–3 users, while all the others were reported by a single user.

Overall, social media dominated our respondents' choice, accounting for 75.9% of first choices, with the tail of other (13%) including information (Google Maps 5%) and finance Apps (2.5%). Second choices were also dominated by social media (65.5%), with a long tail of single user Apps. Third and fourth choices demonstrated more diverse choice with leisure Apps (games, video streaming services), finance (online banking) and communications with video conference Apps (BOTIM, Viber). Some choices might reflect the demographics of respondents residing in the UAE, e.g. Indian communications and social media Apps.

Two-thirds of respondents (64.5%) did not consider any alternatives for their first choice, and of those that did nearly all were other popular social media (WhatsApp, Instagram, Facebook). Similarly, 70.8% did not consider an alternative for their second choice, and other social media Apps formed the majority of alternatives. A similar pattern was found for third and fourth choice Apps, with most respondents (75.9% third and 72.2% fourth choices) not considering any alternatives, although the alternatives that were considered were split between social media and other Apps in the same category as their chosen App. The totals for abandoned Apps are illustrated in Table 3.

The more popular social media, WhatsApp, Facebook, Instagram and Snapchat, which are shown separately in Table 2, are aggregated in Table 3 because overall frequencies were lower. Few social media Apps were abandoned, although this may reflect the limited choice of available alternatives, including regional variations such as Orkut (an Indian Facebook rival). Leisure, e-commerce, communication and other categories accounted for most of the abandoned Apps. Abandoning of Google Apps was limited to communications, Hangout (meetings) and

Table 2

Totals of Apps used by category, in choice 1–4 order.

	First	Second	Third	Fourth	Total (%)
WhatsApp	36	11	7	6	60 (21.1)
Instagram	6	13	14	5	38 (13.3)
Facebook	10	21	8	8	47 (16.5)
Snapchat	2	6	5	7	20 (7.0)
Other social media	5	4	3	3	15 (5.3)
Google	4	2	4	2	12 (4.2)
Finance	2	2	6	8	18 (6.3)
Leisure	2	0	9	4	15 (5.3)
Communications	4	7	4	12	27 (9.5)
E-commerce	3	4	6	5	18 (6.3)
Information	2	4	3	2	11 (3.9)
Other	3	5	7	7	22 (7.4)
Total	79 (26.1%)	79 (26.1)	76 (25.1)	69 (22.7)	303
None cited	0	0	3	10	

Table 3
Totals of Apps abandoned, by category, in choice 1–4 order.

	First	Second	Third	Fourth	Total (%)
Social media 1–4	5	4	4	2	13 (5.1)
Social media >4	4	3	2	3	12 (4.7)
Google	1	2	1	1	5 (2.0)
Finance	4	6	6	3	19 (7.5)
Leisure	16	7	3	10	36 (14.2)
Communications	13	20	7	7	47 (18.4)
E-commerce	12	15	15	14	56 (21.9)
Information	3	1	4	3	11 (4.3)
Other	15	15	13	13	56 (21.9)
Total	73	73	55	56	257
None reported	6	6	24	23	59

Duo. The low frequency of abandoned finance Apps may reflect limited choice, constrained by users' choice of bank, payment service, and personal finance manager Apps. The higher frequency of abandoned communications Apps may be a facet of our international participants living in the Middle East, where a number of video and audio call Apps are available from India and other countries. The first and second choice scores indicate possible experimentation in evaluating video and audio call services, which may have been abandoned in favour of established market leaders, e.g. Skype, Zoom, Teams, although Skype did score four abandons. Abandoning e-commerce Apps may indicate users sampling a variety of local (UAE) and international purchase and delivery services, e-shops, e-malls, and booking services. Abandoning other Apps may reflect dissatisfaction with downloaded utilities (e.g. file sharing), functional Apps (e.g. photo-editing), e-government, and educational services. Few information services were abandoned, and the main reason for rejection was no need for, or poor local traffic information. Overall, the lower percentage reporting of abandoned Apps for choices 3 and 4 may reflect poor recall by our participants.

Apps downloaded and later abandoned were diverse, with few individual Apps being cited by more than two users. Social media and e-commerce (Careem, Noon, Talabat) were more frequent categories, each with 33% of the total first cited as abandoned, with information (Road Traffic Authority, RTA), entertainment (Shahid) and communications (VPN) each accounting for 11.3%. The second-place abandoned Apps were dominated by a long tail of single user Apps (75.9%), with communications 15% (Google, IMO video calls), and social media 9.1%.

Respondents considered more alternatives for abandoned Apps, with just over half reporting that they had alternatives (first 51.9%, second 58.3%, third 52.7% and fourth 54.6%) and about half of those respondents citing specific alternatives that they considered (first 61.8%, second 42.5%, third 52%, fourth 40%), of which most were Apps in the same class as the abandoned one.

4.2. User experience

Cronbach alphas were calculated to explore the internal consistency of the user experience questionnaire scales. Values ranged from 0.85 to 0.95 for all scales, so aggregate averages for all scales were used in subsequent statistical tests.

Users rated Apps they retained higher than abandoned Apps on all user experience measures (see Table 4), although standard deviations

Table 4
User experience ratings for used and abandoned Apps.

	Used Apps 1&2		Abandoned Apps 1&2	
Scale/measure	Mean	SD	Mean	SD
Aesthetics	5.02	.92	4.11	1.19
Usability	5.97	.89	4.48	1.29
Pleasurable interaction	5.14	1.04	4.14	1.21
Content	5.22	1.04	4.48	1.27
Overall judgement	5.77	.96	3.86	1.43

were higher for abandoned Apps indicating more diversity in users' judgement.

The analysis of UX scales' differences with paired-sampled t-test showed that differences in favour of retained Apps were significant for all measures: aesthetics $t_{78} = 5.7$, $p<.000$, usability $t_{78} = 9.7$, $p < .000$, pleasurable interaction $t_{78}= 5.97$, $p<.000$, content $t_{78}=4.4$, $p<.000$, overall judgement $t_{78} =9.7$, $p=<0.000$.

Similar differences were found when the first choice Apps used/abandoned were compared (t tests all $p<.000$, apart from content $p<.01$) and second choice Apps used/abandoned (t tests all $p<.000$). There were no significant differences for all UX measures between first and second choices for either used or abandoned Apps, so it appears the choice order made little difference. There were no significant differences in overall experience, satisfaction, and other UX measures on used/abandoned App by age, nationality or occupation, although small numbers in some demographic categories limited the scope of testing (ANOVAs).

4.2.1. Influence of UX on satisfaction and overall experience

Regression tests were carried out with UX factors as predictors for four dependant variables: frequency of use, mood, satisfaction, and overall experience; with gender as the control variable.

Frequency of use was not predicted by UX factors for App1 or App2 used, and the same result was found for Apps1 and 2 not used/abandoned (r^2 models all n/s).

Satisfaction $r^2.325$ $p<.000$ was predicted by pleasure ($\beta.487$, $p<.001$) and weakly by usability (β 0.328, $p<.05$) for App1 used, mood (r^2 0.369 $p<.000$) only by pleasure (β 0.518, $p<.000$), while overall experience (r^2 0.648 $p<.000$) was predicted by usability ($\beta.311$, $p<.01$), pleasure ($\beta.364$, $p<.000$) and content ($\beta.360$, $p<.000$).

The predictions for App2 used followed a similar pattern, with satisfaction (r^2 0.426 $p<.000$) being weakly predicted by pleasure (β 0.307, $p<.05$), usability (β 0.318, $p<.05$) and content ($\beta.278$, $p<.05$); mood ($r^{2\ 0}.523$, $p<.000$) by pleasure ($\beta.558$, $p<.000$), and weakly by usability ($\beta.255$. $p<.05$); while overall experience (r^2 0.721 $p<.000$) was predicted by usability ($\beta.482$, $p<.000$), pleasure ($\beta.312$, $p<.001$) and content ($\beta.248$, $p<.01$).

For abandoned Apps only the overall experience was recorded. This (r^2 0.480 $p<.000$) was predicted only by content ($\beta.401$, $p<.001$) for the first abandoned App and the same for App2 (r^2 0.639, $p<.000$), content ($\beta.388$, $p<.000$).

The results of the regressions for predicting overall experience, satisfaction and mood by UX factors for used Apps are summarised in Fig. 1.

Regression for the third and fourth Apps used tested the frequency of use with mood and satisfaction as predictors. No significant results were found for App3, and only a weak relationship for App4 with mood predicting frequency (r^2 0.131, $p<.05$, $\beta.-$ 0.335, $p<.05$).

4.3. Qualitative data results

4.3.1. Apps used: survey data

Usefulness and usability were most frequently mentioned by respondents, accounting for 76% of all comments. Comments on the used applications were nearly all positive since they reflected users' reasons for their choice; see Table 5 for the frequency of comments for used Apps by category in citation order. (A small number of responses fell into two categories, hence some column totals exceed $N = 79$ respondents.)

Usefulness comments were mainly general evaluations of the App, although a minority (10%) gave specific comments on features and functions. Connectivity, networking, keeping in touch and communication were the most frequent comments for social media, e.g., "It's fun and keeps me updated with people and celebrities I care about" (P-9). Usability comments tended to be general evaluations of ease of use: "Easy to use; easy to post pictures and videos" (P-15). Other comments included social reasons for choice, (recommended by friends/family): "My parents still use it" (P-10), general amusement or passing time and
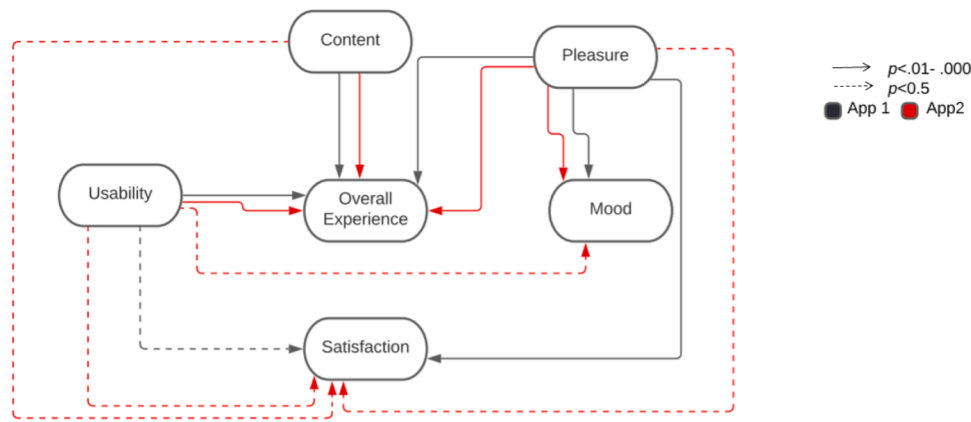
Fig. 1. Relationships of user experience factors and overall measures of experience, satisfaction and mood for Apps used 1 (black lines) & 2 (red lines).

Table 5
Frequency of comments for Apps used: survey answers.

| | Application Used | | | | |
	1	2	3	4	Total (%)
Usefulness	50	52	46	46	194 (61.2)
Usability	10	12	12	8	42 (13.2)
Content	1	2	4	3	10 (3.1)
Alternative	2	1	1	1	5 (1.6)
Other	15	12	11	14	52 (16.4)
No Reasons	1	2	4	8	14 (4.4)
	80	81	78	80	317

Table 7
Frequencies of comments for Apps abandoned, by citation order.

| | Apps citation order | | | | |
Comment category	First	Second	Third	Fourth	Total (%)
Usefulness	22	21	22	17	82 (31.6)
Usability	14	14	11	8	47 (18.1)
Alternatives	10	6	9	10	35 (13.5)
Content	4	3	2	2	11 (4.2)
Value/Price	2	2	5	1	10 (3.8)
Other	14	15	5	7	41 (15.8)
No Reasons	4	11	8	10	33 (12.7)
	70	72	62	55	259

occasionally social media addiction. Nearly all comments were positive, although comments in some other categories were neutral. The frequencies for usefulness and usability of the more popular (social media) Apps are shown in Table 6.

Of the three more frequent comment categories, usefulness was associated with general observations about connectivity, contacting friends and family, while other comments on social media reported networking effects, the addictive nature of social media and tacit coercion, e.g., "everyone's on it", "difficult to avoid". WhatsApp attracted more positive usability comments than other social media, with general ease of use opinions.

4.3.2. Apps abandoned: survey data

Poor usefulness and a few specific comments on functionality (see Table 7) were the most common reasons cited for abandoning Apps, followed by usability and then consideration of alternatives and finding one. These comments were nearly all negative criticisms, with approximately 40% being general observations, e.g., "Don't find it very useful

Table 6
Frequency of usability and usefulness comments for more popular social media and other App categories.

	Usefulness	Usability	Other
WhatsApp	48	17	13
Facebook	39	4	10
Instagram	31	4	9
Snapchat	12	1	2
Other social media	9	1	2
Google	11	1	0
Finance	13	1	2
Leisure	0	1	5
Communications	11	1	6
E-commerce	12	1	2
Information	7	1	2
Other	1	2	8
	194	36	52

anymore" (P-11), with others giving some detail about poor functionality or usability problems, e.g., "Not very easy to use despite its great content and nice design" (P-22). Content and value for money were infrequent reasons. Other comments ranged from social contextual justification for choice, e.g., moving country so the App was no longer relevant: "I only used it in Egypt and once in Jordan because I didn't have my car" (P-4), to criticisms of quality, "The quality of the voice was not good, I couldn't hear my friend" (P-23).

4.3.3. Apps used: qualitative data (interviews & survey[1])

The focus of the interview questions was on the reasons for first and second App choices. Most responses were allocated to the following UX and open derived themes: usefulness, usability, content, reliability, security, addiction to social media, unavailability of alternatives, influence of others, popularity, design, and overall judgement, although there were several other low frequency comment themes: see Table 8.

Although there were more comments for the first choice App (64.5%) than the second choice (35.5%), there were no marked differences in the distribution of comment themes, apart from usability, where the first choice App received a much higher frequency. Overall, the interview data was consistent with the survey open-format replies, with most comments focused on usefulness, usability and content. First and second choice Apps were nearly all social media that had been used for several years, (range 2 - 10+, median 5 years). Non-social media first and second choice Apps had been used for shorter durations, median 2 years.

Respondents considered usefulness and usability as the most important reasons to choose an application: category frequencies 55% and 21% respectively; see Table 7. The main social media usefulness themes were social connections, keeping up with friends, communication and chatting, as well as photo sharing. Facebook themes tended

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[1] Excerpts P-1 to 30 are interviewed participants, P-31 to 79 free-format comments from the survey

Table 8
Interview data: frequency of comments for Apps used.

Category	App used 1		App used 2		Totals	%
	Comment frequency	%	Comment frequency	%		
Usefulness	71	54%	42	58%	113	55%
Usability	34	26%	8	11%	42	21%
Content	7	5%	2	3%	9	4%
Reliability	5	4%	1	1%	6	3%
Security	3	2%	1	1%	4	2%
Addiction	3	2%	2	3%	5	2%
No alternatives	2	2%	4	5%	6	3%
Influence of others	2	2%	2	3%	4	2%
Popularity	2	2%	4	5%	6	3%
Design	1	1%	2	3%	3	1%
Overall judgement	1	1%	5	7%	6	3%
Totals	131	64.5%	72	35.5%	203	

towards social communication, networking and keeping in touch, whereas WhatsApp was valued for synchronous communication and group chat. Usefulness comments focused on social media Apps features and how helpful these features were, e.g. "WhatsApp helps me to connect with most of the friends and family, also the feature of groups in WhatsApp, helps to connect with and share with multiple people at once" (P-18); "Networking with family and friends, marketing own businesses social media" (P-2); "Sometimes it shares memory of old posts that we have shared. Those specific features make it interesting" (P-17); "The reason for using it as LinkedIn is mainly professional. Good connections particularly. You can be able to see the vacancies of companies, whatever they're posting on" (P-5); and "Facebook usually. Also I just like to just see just like friends, and you know, what are my friends doing…… and then LinkedIn I am using it for professional purposes" (P-15).

Usefulness for non-social media Apps was frequently linked to the context of use, for example connection to the user's bank; "Actually Payzapp is mainly linked with HDFC Bank. So it's fully secured; the user interface, its completely secured" (P-1); or e-government, "Yeah, I mean, nowadays whatever you are getting fines, mainly car registration and the car fines, you know that you need to do this Dubai police website" (P-9); and family communication, "And Botim we are obliged to use because I cannot talk to my son studying in India, video call. Only it is the official App. So I subscribe and I mostly use this one for making video calls" (P-8).

Usability was also considered as an important theme and participants frequently commented positively in general terms; "It's user friendly, it's easily downloadable. It's freely downloadable App. That's why we continue to use it" (P-71); "Easy to communicate with the folks and available in all the smartphones" (P-66). Although only 4% of the comments mentioned the content, these were positive and specific: "Facebook has interesting information, news, interactions, all in one platform" (P-20); "The content of LinkedIn is useful and can be used to educate myself" (P-51). Few respondents mentioned reliability, although comments were positive: "There are several map applications, but this Google Map is very clear. Like wherever I'm going for the driving, it's getting correct locations and it's getting updated automatically" (P-41); and similarly, for security, "I chose Zoom because of security reasons" (P-6). Addiction comments were mainly relating to games and social media: "It is an addictive game" (P-57). The lack of alternatives and limitations imposed by the context of use appeared as other infrequent reasons for choosing Apps: "I use Botim as WhatsApp calls were blocked in Dubai so there was no option to make video calls" (P-42). Some respondents' choice was influenced by friends and family: "Most of my friends have Facebook" (P-34); or work contexts, "Yeah. It's very useful. Most of us in company are connected through WhatsApp group only" (P-2); while others used the App for its popularity "It's the

most popular texting App" (P-37). Comments on aesthetics and user interface design were rare.

4.3.4. Apps abandoned: interview data

For abandoned applications, the majority of the comments were negative on usefulness and usability (57%); other statements included finding better alternatives (23%), criticism of content (12%), and lack of time to try out the App and overall judgement; see Table 9. In contrast to used Apps, no tail of low frequency comment themes emerged from the analysis. There were no marked differences in the distribution of theme frequencies between the first and second abandoned Apps, although overall frequencies were slightly higher for the first abandoned App (56.5/43.5%). As observed with the used Apps, the interview and survey data were consistent with poor usefulness and usability, availability of better alternatives and poor content accounting for most of the reasons cited for choice.

The most frequent reason for both abandoned applications was inadequate usefulness (35% of the total comments). Participants either found no useful features and so deleted the application, or the application was only useful for a particular context of use: e.g. "This App helped me when I was in a sharing accommodation, to identify and split the cost between our roommates. For that purpose, only I was using it. Then I moved from that room. Now I'm staying in a separate room, so I deleted that App" (P-4); or there was limited incentive for use: "Zomato, I just used to last one year only I can say, because there was a special discount given" (P4).

Usability comments (22% of total comments) were general negative statements that the App was not user friendly, had poor navigation, or was too complex, and difficult to operate. Several respondents mentioned that poor usability influenced them to stop using an application: "It's very confusing, not user friendly itself. I downloaded one song, and it's not showing, it is really confusing" (P-24); "I stopped using it because it is inconvenient and not easy to do backward and forward while watching a movie" (P-52).

Alternatives were either specific preferences, "Because I prefer to use IMO, it's more useful" (P-70), or more general choices, "I use other communication applications" (P-7). Several respondents found better Apps in terms of features and/or price: "There are other better games applications available free" (P-32); "I shifted to booking.com because it provides me with better and pleasant service" (P-21). Change in location also affected user preferences, "Yes, now that I've moved to India, I no longer need D4D, as there are other options here. So, I feel there is no use for me now" (P-23).

Other infrequent reasons for not using an application include content: "Too much information about people and I'm not interested on it" (P-45), not having enough time: "I don't have time to use it" (P-75), and general comments: "I don't like it" (P-55).

4.3.5. Decision process: interview data

The majority of user decisions in selecting and rejecting Apps were fast path (82% in the interview sample of 30 users). Of the 12% slow-

Table 9
Frequency of comments for Apps abandoned, by category.

Category	Abandoned App 1		Abandoned App 2		Totals	%
	Comment frequency	%	Comment frequency	%		
Usefulness	29	37%	19	32%	48	35%
Usability	20	26%	11	18%	31	22%
Better alternatives	14	18%	18	30%	32	23%
Content	8	10%	8	13%	16	12%
Lack of time	2	3%	3	5%	5	4%
Overall judgement	5	6%	1	2%	6	4%
Total	78	56.5%	60	43.5%	138	

path decisions ten were for abandoned Apps and eight for accepted Apps. Interviewed users reported a mean of 3.43 accepted Apps of which 53.9% were social media as first and second choices, consistent with the survey data. Fast-path decisions for social media Apps reflected norms for communication: "WhatsApp is now currently getting used by everyone I can say for office and personal use" (P-3); "And most of my colleagues and my friends, they use WhatsApp for communication, exchanging photographs, exchanging documents" (P-6); "Facebook is interesting information, news, interactions, all in one platform"(P-14). For non-social media Apps the more common reasons were the App satisfied the user's need so no alternatives were sought: "Audible is convenient, because I used to listen to audio books while driving. And fitness App helps me to do training at home and it gives me instructions to workout at home." (P-19); followed by convention or habit: "Payzapp almost 3–4 years I was using it, when I was in India" (P-1); and external constraints: "It is because of the smart Dubai of you know the smart Dubai initiative…. you have to book the taxi through the Careem App. (P-7). The more common fast-path rejection decisions were change in users' requirements so the App was no longer needed: "It's my banking App, which I used to access occasionally. But now I closed the account. So I stopped using the App" (P-14); cost: "CC camcord is actually a good App, only thing I discontinued is because, after some time it asks to be a paid App actually. It looks expensive" (P-6); and usability: [Hungama] … it's very confusing, not user friendly itself. I downloaded one song, and it's not showing, it's really confusing." (P-11). The dominance of fast-path decisions is consistent with the survey results that the majority of respondents did not consider any alternatives for the four chosen Apps.

The less frequent slow-path decisions for social media focused on choice between LinkedIn for professional use and other products and the relative merits of Facebook and WhatsApp. For other products more complex slow-path decisions reflected trade-offs: "I have all Apps that I need in my phone. Only if need to use any new App I go to Playstore. This App needs some improvement, in terms of Android and Apple there is a difference, some need password encryption, card payments, etc." (P-18); the context of use: "Udemy. … it's an online learning App. But I just used only when I was in Masters, so after that, I'm not using much on those things because it's my phone has some limited capacity, also alternative Apps keep on coming" (P-13); and comparing products: "now I am not using Amazon; also, while purchasing online I used, nowadays, I use some other way of shopping, so I deleted and stopped using the App. … For Twitter already I have Facebook, almost same features and details are available in Facebook itself. For Amazon, I'm using E-bay… because it's mainly for buying materials and all those things" (P-26).

4.4. Discussion

Reviewing our *first research question*, it appears that social media Apps dominate users' portfolios; however, a more diverse 'ecosystem' of different App categories appears after users' top two choices. While social media dominate users' portfolios of mobile phone Apps, as expected from large-scale surveys (Auxier and Anderson 2021; Wikipedia, 2020), social media coexist in a mixed ecology of e-commerce, finance, leisure, and communications with a long tail of 'others'. The market leaders, Facebook, Instagram, WhatsApp with Snapchat, were the more popular Apps in our survey, a slightly different mix than found in a USA survey (Auxier and Andson 2021) where YouTube and Pinterest are more popular. Other categories reflect a mix of utilitarian needs such as shopping, information seeking and banking, with leisure interest in games, hobbies, and recreation. The dominance of social media is consistent with other surveys (Wikipedia, 2020; Auxier and Anderson, 2021); however, there are few reports of the mobile 'ecosystem' mix of social media and other Apps. The users' choice order reflects the dominance of social media with e-commerce, communications and other categories being more common third and fourth choices. Higher frequencies of other Apps were abandoned Apps, suggesting users sample

the wide range of available alternatives and reject those with poor functionality. Few social media Apps appear to have been abandoned, possibly reflecting limited choice and the network lock-in cost of changing networks of friends and contacts (Phua et al., 2017; Liu and Yang, 2016).

Communication Apps, specialised for phone call and video group meetings, formed an important part of our users App ecosystems. Synchronous media-rich communication is an important social need (Ali-nejad, 2019; Rozzell et al., 2014; Sutcliffe et al., 2022) as reflected in social media (e.g., WhatsApp); however, other video communication Apps appear to complement social media. Other choices reflect our respondents' online life, with e-shopping, home delivery and payment services, and a mix with leisure-related Apps, for games, health, and hobbies. Competition in the App ecosystem appears to be more intense in third and fourth choices where the non-social media categories are more frequent. Many Apps in communication, leisure and e-commerce were abandoned for better alternatives, indicating more intense competition in these categories.

Our findings pertaining to the *second research question* on the influence on user choice demonstrated that usefulness followed by usability are the most important determinants of choice, reflected in the high frequency of comments, with usability and content UX quantitative measures predicting overall experience and satisfaction. Since utility was not measured in the survey, content may have been treated as a surrogate for usefulness by our respondents. However, most usefulness comments reflected overall utility, i.e. the aggregate functionality of the Apps. This is consistent with Hart and Sutcliffe's (2019) report that functionality of the device (iPAD) and Apps were the most important influence on acceptance. Functionality as perceived utility has been a dominant influence on user choice in many TAM studies (Venkatesh et al., 2012; Williams et al., 2015) and in UX studies through content, service quality and pragmatic quality measures (Lavie and Tractinsky, 2004; De Angeli et al., 2006; Hassenzahl, 2004). Usability was the second most important factor found to influence App choice, as evidenced by both survey and interview results. For chosen Apps usefulness and usability comments were positive, while for abandoned Apps both were negative; reinforcing the interpretation that usefulness and usability are the main reasons for choice. This is consistent with Diefenbach and Hassenzahl's (2009) reported importance of pragmatics (PQ: a mix of utility and usability) influencing users' overall judgement of product 'goodness'. Poor usability may be discounted when utility is perceived to be good and matching users' requirements (Lavie and Tractinsky, 2004; Porat and Tractinsky, 2012); however, we found no evidence of any such discounting. Our respondents' usability comments were favourable for Apps used, while negative usability was an important reason for abandoning applications.

In contrast to many UX studies which have reported aesthetics as an important influence on user choice (De Angeli et al., 2006; Hartmann et al., 2007; Lindgaard et al., 2011), aesthetics did not predict choice or overall experience in our study; furthermore, few aesthetics-related comments were present in the interviews. Survey data demonstrated that content and pleasure, but not aesthetics, with usability were the most important predictors of overall experience. The overall experience scale included questions on recommending the App and visiting it again, which are strong indicators of choice and similar to behavioural intention in TAM models (Yousafzai et al., 2007). The minor role of aesthetics in choice contrasts with several UX studies which have reported aesthetics and hedonics as important influences on judgement and product choice (Lindgaard et al., 2011; Diefenbach and Hassenzahl, 2004). Hedonics also appears as an antecedent variable to behavioural intention in some TAM studies (Magni et al., 2010) and has been reported with pragmatics as a longer-term influence on product acceptance (Kujala et al., 2017). One interpretation of this difference may be the contextual influence on UX and user choice (Hartmann et al., 2009), and facilitating conditions on product acceptance (Magni et al., 2010; Williams et al., 2015). The Apps chosen by our users were not orientated towards

aesthetic considerations, apart from games in leisure Apps where a few hedonic comments, e.g. "fun, excitement and stimulation" were recorded.

The factors influencing users' choice *(third research question)* were consistent across App types with usefulness and usability dominating. This was also apparent from the minor differences in qualitative data according to App choice order, where social media were more frequent as first and second choices, with other App types in third and fourth positions. This is consistent with utility and ease of use being a constant across a range of products in TAM studies (Gefen et al., 2003; Maragunić and Granić, 2015; King and He, 2006). However, the diversity of other reasons reveals several contextual influences on choice, such as change in job, location or users' needs. Other influences on users' choice, such as comments on reliability, security, lack of alternatives, influence of others, although infrequent also map to 'facilitating conditions' recorded in later generations of TAM models (Magni et al., 2010; Williams et al., 2015). Our findings broadly agree Ickin et al. (2017) survey on app choice across products, which reported App reviews as the main motivator for downloading, and no longer useful/ poor usability as the main reasons for abandoning apps; although their survey found poor reliability and greedy memory as further reasons for rejection, which were not frequent comments for our survey.

Our findings on the *fourth research question* indicate that most App choices are fast-path decisions rather than more thorough slow-path evaluation of alternatives (Cacioppo et al., 1986; Kahneman, 2011). This may reflect the App market where most products are free; hence decisions are driven either by peer pressure and social norms for social media, or simple matching to users' needs and, serendipity for other App categories. However, more systematic choice was evident when other (non-social media) Apps were considered.

Overall, the influences we found were consistent with Lee et al. (2012) Theory of Acceptance, apart from personalisation. We did not measure personalisation in the survey, although there was opportunity for users to comment on this aspect in the 'reasons' part of the survey and interviews. No personalisation comments were recorded. External influences were present, if not frequent, either in reasons for social media use, e.g., networking effect and addiction comments or through convenience and constraints on financial services and banks, use of video communication Apps by family and friends. Facilitating conditions only appear in some of the other reasons for choice, such as operating system/platform compatibility. Trust and integrity issues were not cited by our respondents, although these factors may have been implicit in security reasons, especially for financial applications.

The limitations of our study arise from the limited sample of respondents to the survey and interviews, who represent users in a particular regional setting and a diaspora community, whose choice may have been influenced by friends and family in their countries of origin. The user interface scales we used were taken from reliable sources, so those measures are robust. The questionnaire design included many free-format responses and, combined with the interviews, provided considerable qualitative data to avoid the bias towards a small number of measures. The mixed methods approach provided frequency and valency data on comment categories that could be combined with thematic coding of users' reasons for choice, thus facilitating triangulation between quantitative measures and qualitative reasons for users' choice. Combination of quantitative user experience measures with qualitative interview data helped counter limitations in the selection of measures in the survey, although our range of measures and relatively small sample size limits generalisation of our findings. Our respondents' nationalities were diverse, reflecting the ex-patriot and diaspora communities in the United Arab Emirates and Jordan, and this may have influenced the diversity of the selected Apps. Further study of the factors influencing users' choice to adopt/abandon Apps with users located in different countries is needed. The study was a cross-sectional snapshot of users' choice and their rationale, and relied on retrospective memory of used and abandoned Apps. There may have been memory bias in users'

reporting, which we attempted to counteract by probing questions in the interviews. The cognitive process results are tentative since the measures to differentiate slow/fast-path processing were indirect, and relied on assumptions about the salience in memory of factors affecting decisions. More direct concurrent protocol studies are necessary to explore users' decision making in app choice. Finally, the lack of standardisation in User experience and TAM measures (Hornbaek and Hertzum, 2017) hinders interpretation of results. While usefulness and usability approximate to perceived utility and ease of use in TAM models (Venkatesh et al., 2012), UX constructs of hedonics and beauty reflect aesthetics, while pragmatics (Hassenzahl, 2004) are an amalgam of utility and usability. Indeed the utility of usability (ISO 2018) as a concept has been challenged by Tractinsky (2020) as confounding user experience, effectiveness, utility and many other constructs.

5. Conclusions

The main contributions of our study are first to confirm the dominant role of usefulness (utility) and usability in determining users' choice, indicated by TAM studies (Venkatesh et al., 2012; Marangunić and Granić, 2015) and longitudinal studies of UX (Kujala et al., 2017; Mendoza et al., 2006). Utility, effectiveness, and efficiency were the most frequently reported attributes found in Weichbroth's (2020) review of usability in mobile applications. The second contribution is constrasting with previous studies to illustrate that aesthetics and hedonics are minor influences on App choice, although we note that pleasure was an important global variable. The third contribution, while confirming the dominant role of social media Apps, is to demonstrate that competition is more open to fill niches for e-commerce, leisure, financing management and communication domains. The fourth contribution is to indicate that the rationale for user App choice reflects fast-path / system 1 decision making (Kahneman, 2011) where only a small number of attributes are evaluated in the decision, such as utility, external influences (social media) and convenience. Few alternatives were explored and even where choice was more diverse because more Apps are free, a slow-path approach involving more complex reasoning (Payne et al., 1993) is infrequent. Further longitudinal studies of App selection and use are needed in a variety of cultural settings to elaborate App ecosystem models and choice related to user experience and technology adoption.

Authors' contribution

Ons Al-Shamaileh, Outline study design, Design of the survey, conducting survey, collation of results, Design of the interviews, conducting interviews, transcription, preliminary analysis, First draft write up of MS

Alistair Sutcliffe, Quantitative data analysis, statistical analysis and descriptive statistics. Revised qualitative data analysis, Several revisions of MS, improvement of discussion, related work and introduction, Revision in response to reviewers' comments.

Declaration of Competing Interest

We have no conflicts of interest to declare as a consequence of conducting this study.

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Data availability

Data will be made available on request.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijhcs.2022.102965.

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