Digital cultural tourism: older adults' acceptance and use of digital cultural tourism services

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ABSTRACT

Physiological and psychological constraints, e.g. increased risk of serious illness or loneliness imposed by mobility restrictions, make older adults one of the hardest hit tourist segments amidst during and after COVID-19. Older adults play a particularly important role as consumers of cultural tourism services. To mitigate for lack of in-situ cultural tourism experiences, many service providers have moved their offerings to a digital format, from virtual museum tours to livestreamed concerts. However, previous research suggests that older adults may not be as agile users of digital technology as younger tourists, potentially making it difficult for them to partake in digital cultural tourism. To that end, this paper explores factors influencing older adults' acceptance and use of digital technology to access and partake in digital cultural tourism experiences. An empirical study drawing on technology acceptance model (TAM) is conducted, whereby 357 Finnish older adults (aged 60+) are surveyed. Findings indicate that digital cultural tourism services are seen to complement in-situ cultural tourism experiences to some degree, but that challenges such as lack of feeling of community and interaction, technical constraints, as well as lack of information of available services limit adoption. Implications for tourism management are considered.

Introduction

Culture and tourism have been closely interlinked for centuries. Partaking in cultural activities, e.g. visiting museums and galleries, heritage sites, festivals and other cultural events, is a major motivator for travel, while travel in and of itself has also in turn influenced culture for instance through the development of travelling behaviour (Richards, 2018). Cultural tourism, defined by the United Nations World Tourism Organization as "tangible and intangible attractions and products that represent material, intellectual, spiritual and emotional features of a society" (2018), has become a key part of tourism management and the broader tourism system (Hjalager, 2009). Given its significance, cultural tourism plays a

major role in terms of the economic development of both rural and urban destinations (MacDonald & Jolliffe, 2003; Torre & Scarborough, 2017). Recently, the UNWTO (2018) estimated that in total, cultural tourism accounted for as much as 39% of all international tourism arrivals and equated to circa 516 million international trips in 2017.

COVID-19 has changed the status quo of tourism, whereby the global pandemic spurred local, regional and national governments to impose strict restrictions on tourists' mobility (El-Said & Aziz, 2022). While this has been devastating for national economies, including international and domestic travel as well as cultural events (Gössling et al., 2020), the various lockdowns, curfews, and other social isolation measures have had a particularly severe impact on individuals most vulnerable to the virus, e.g. older adults (Armitage & Nellums, 2020). Representing one of the most important domestic and international tourist segments as measured by volume and purchasing power (Kim et al., 2015), older adults play a particularly significant role as consumers of cultural tourism services (Zhang et al., 2017). However, given the pandemic-related mobility restrictions, this role has been severely impacted.

Tracking the broad impact of the pandemic on the arts and culture sector, Statista (2021) reports that Live Nation, the world's biggest live event promoter, saw an 86% drop in concert revenue in 2020, with only drive-in and socially distanced concerts being able to take place. Indeed, in response to COVID-19 mobility restrictions, an increasing number of cultural tourism service providers from museum to galleries and the performing arts have moved their service offerings online. A recent YouGov survey of 1011 Italians found that 57% had partaken in digital cultural tourism experiences such as online visits to museums and galleries or livestreaming of theatre performances since the start of the pandemic (Statista, 2021). Despite this increased adoption of e-tourism during a time of limited access to in-person cultural tourism experiences, previous research has suggested that older adults may not be as agile in adopting digital technology in comparison to younger generations of tourism consumers, potentially making it particularly difficult for older adults to partake in digital cultural tourism experiences. This may widen the so-called digital divide, that is, the gap between those who benefit from the increase in digital service provision and those who do not (Mostaghel, 2016; World Economic Forum, 2021), and as such more research is needed.

To that end, this paper addresses the literature gap of older adult tourists and digital cultural experiences as highlighted by Björk et al. (2020). Focusing on Nordic tourists, this research seeks to explore factors influencing older adults' acceptance and use of technology to access and partake in digital cultural tourism experiences when mobility is restricted e.g. due to government-mandated lockdowns, increased vulnerability to severe disease caused by viruses, or other movement impairments and disabilities attributed to ageing (Caiola et al., 2023). Doing so is imperative to better understand how cultural tourism service providers and national, regional and local tourist destinations could more proactively serve the needs of this significant tourism consumer segment, particularly when previous research has asserted that the lack of opportunity to partake in social activities, e.g. cultural tourism events, may exacerbate negative social and public health outcomes, such as feelings of anxiety and depression, among older adults (Santini et al., 2020; Zhang et al., 2017).

The specific research question this study seeks to address is: What are the key factors influencing older adults' acceptance and use of digital cultural tourism services when their normal mobility is restricted? To address this, an empirical study is conducted, drawing on

well-established theories of technology acceptance and intention to use technology, i.e. technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT) (Davis, 1989; Venkatesh et al., 2003). The empirical study is situated in the Nordic context, whereby the paper focuses on Finnish older adults over 60 years of age. In this study, 60 years has been set as threshold for participating in the research in order to capture older adults who are still working as well as those who have already retired (with the average retirement age in Finland being 65). Recent statistics place Finland as the second oldest population in the world (only behind Japan), making older adults a significant tourism segment for the region (World Economic Forum, 2020; Zainal Abidin, Tuomi, et al., 2023). Further, according to the United Nations (2017), Finnish older adults are also more likely to live on their own when compared to other OECD countries, thus exacerbating the potential harmful effects of exclusion from social activities, e.g. partaking in cultural tourism experiences. The findings of the study therefore make important contributions to the growing body of tourism literature on older adults as users of digital cultural tourism services. This allows for better understanding of how and what type of digital cultural tourism services should be developed by cultural events planners, technology developers and tourism destination managers. From a theoretical perspective, the study makes a contribution by extending technology adoption literature and theory (namely TAM and UTAUT, both of which have emerged from information systems science) in the context of cultural tourism, thus highlighting the uniqueness of technology adoption as part of tourism experience and its management.

Literature review

The next two sub-chapters present a literature review on cultural tourism and technology acceptance. First, cultural tourism is defined and its significance is considered through examples. Second, key developments in technology acceptance research is discussed in general and in the context of older adult tourists in particular.

Digitalisation of cultural tourism

Despite a significant increase in research interest in recent years (Richards, 2018), existing research offers limited consensus on a standard definition of cultural tourism. In their work, Reisinger (1994) saw cultural tourism as "a form of special interest and experiential tourism based on the search for or participation in new and deep cultural experiences of an aesthetic, intellectual, emotional or psychological nature". Bringing some tangibility to the definition, Richards (1996, p. 24) saw cultural tourism as "all movements of persons to specific cultural attractions, such as heritage sites, artistic and cultural manifestations, arts and drama outside their normal place of residence". Modern cultural tourism tends to look beyond visiting physical cultural tourism attractions and in 2018, UNWTO (2018) re-defined cultural tourism to refer to "both tangible and intangible attractions and products, that represent material, intellectual, spiritual and emotional features of a society". This broader view on cultural tourism emphasises inclusion, as diverse aspects of culture such as gastronomy, beliefs, traditions, creative and intellectual heritage, along with

unique features of local cultures, are acknowledged as part of cultural tourism (UNWTO, 2018).

Cultural events typify creative heritage, and they can be described as hedonistic experiences which offer a setting for people with similar interests and motives to gather and interact with one another (Levy, 2010). Examples of cultural events include performing arts e.g. theatre or opera, guided museum and gallery tours, concerts, cinema and festivals. For instance, Hjalager (2009) notes opera festivals in Bayreuth, Germany as some of the first events that prompted music focussed travel. Drawing a comparison to other leisure tourism activities, Levy (2010) highlights pleasure, social opportunities, and/or self-development in the form of gaining new knowledge as the main reasons for why individuals choose to attend cultural events. However, research has noted that the trend in consumption of cultural events is different between younger and older consumers. For instance, the young tend to prefer events such as film and music festivals e.g. Cannes, Tomorrowland, while the older population is more active in engaging in so-called high culture, e.g. classical music concerts, operas, ballets, as well as other traditional forms of arts, e.g. the Bayreuth opera festival (De la Vega et al., 2020; Eijck & Knulst, 2005; Hjalager, 2009).

The cultural event industry as a whole has seen a massive growth in the past few decades in terms of profile and size, driven in part by the technological advancements that have altered the means of managing and facilitating events (Lockstone-Binney & Junek, 2013). Information communications technology (ICT) in particular has created novel opportunities for cultural event digitalisation as innovations such as the internet, mobile phones, or virtual reality (VR) have been harnessed into the use of providing services and interacting with the audience. This has also transformed the consumption of cultural events, as online access to content has not only increased accessibility itself but provided novel means for reaching broader audiences (De la Vega et al., 2020). While many of the traditional forms of cultural events, such as music festivals, operas and ballets, have long relied on physical venues, the turmoil caused by COVID-19 has forced event organisers to find alternative ways to operate in the new normal (Caiola et al., 2023). This is characterised by the changing restrictions on social distancing and other safety measures as well as temporary shutdowns of cultural venues. These changes, at the latest, has accelerated digitalisation of cultural events (Statista, 2021). A prime example is demonstrated by Tomorrowland's venture into digital music festivals in 2020 and 2021.

Technology acceptance and older adults

Driven by the ongoing march of digitalisation, technology-facilitated interactions have become an inseparable aspect of our day-to-day life. Interactions between people and between people and services are increasingly happening entirely within the digital sphere. The proliferation in the use of ICT has not gone unnoticed by scholars, including tourism scholars, and indeed, several theoretical models for understanding how technology is adopted and used have emerged. One of the most widely cited models is the technology acceptance model (TAM) which emerged from the information systems literature as originally proposed by Davis (1989). The model postulates that the intention and actual use of a technology is influenced by two main factors: perceived usefulness and ease of

use of the technology (Davis, 1989). Successors of TAM have later been developed into Technology Acceptance Model 2 (Venkatesh & Davis, 2000), Technology Acceptance Model 3 (Venkatesh & Bala, 2008), as well as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). While the successors have expanded the model by including additional cognitive and psychological factors (e.g. Pan & Jordan-Marsh, 2010), the two core concepts of "perceived usefulness" and "ease of use" remain as the foundation to understand technology acceptance.

Given its seminal nature, TAM has also been widely used to study technology acceptance amongst older adults. While the terminology used to refer to "older adult" vary (cf. Trucil et al., 2021 for a recent discussion on the use of terms "senior", "elderly" and "older adult"), in social science research contexts older adults are often referred to as people of at least 60 years of age. Current literature suggests that TAM is generally applied in task-specific research (i.e. adopting technology to check health status and to ease daily activities). For example, Guner and Cengiz (2018) investigated the use and acceptance of ICT in the daily life of 232 older adults. Their research highlighted the need for assistance, encouragement and friendlier user interface designs in addition to the perceived usefulness and ease of use of using everyday technology (Guner & Cengiz, 2018). Etemad-Sajadi and Dos Santos (2019) further demonstrated that higher levels of trust and social presence positively affected the acceptance of healthcare technology amongst senior citizens. This may be due to the positive mood associated with using the technology and therefore, increasing the willingness to adopt new technology (Loiacono & Djamasbi, 2010). Meanwhile, Dogruel et al. (2015) explored older adults' acceptance towards entertainment media technology (i.e. 3D movie and computer game simulation). Their study suggests that older adults perceive the usefulness of entertainment media technology as a means for enjoyment rather than fulfilling a specific task. However, the perceived ease of use was identified as a significant predictor of the perceived usefulness to later accept the technology (Dogruel et al., 2015). This may be due to the higher levels of technophobia and lower confidence in using new technology amongst older adults as compared to younger demographics (Neves et al., 2013). Nonetheless, while there is an increasing interest in using TAM to better understand older adults and their technology use, existing research offers limited insights of understanding the barriers and opportunities of older adults using technology within a cultural tourism context, particularly to access digital cultural tourism services during a period of immobility due COVID-19 lockdown measures.

As previously mentioned, although the overall development of digital environments has altered the means of communication and servicescapes, older adults have been one of the least likely user segments to adapt to the use of new technologies (Olphert et al., 2005). Kim et al. (2016) concluded that preconceptions, especially with regards to the perceived benefits of the new technologies and the effort of learning, negatively influence the readiness of the elderly to adopt new technology. These preconceptions may increase the digital divide, which according to Norris (2001) can be classified into three distinct domains: global divide (referring to the accessibility of internet between industrialised and developing societies); social divide (referring to the gap of information between people within a nation); and democratic divide, which addresses the difference between the people who use technology to participate in the public life, and those who do not (Norris, 2001).

Of these, the social and democratic dimensions of digital divide are perhaps the most important for understanding older adult tourists' acceptance and use of technology. Social and democratic divide increase inequality as groups such as older adults are left behind in the development and use of ICT. Research has found that a higher risk for social disconnectedness within this group seems to exist especially for older adults who come from lower educational and socio-economic backgrounds (Koopman-Boyden & Reid, 2009). As technology can offer new ways for maintaining one's social relationships and accessing services, digital exclusion might potentially increase the social disconnectedness in cases where the mobility of an older adult has weakened. In other words, digital divide can have a direct negative impact on older adult tourists' well-being and quality of life, despite technology holding much potential (Aggarwal et al., 2020). For example, in their study, White et al. (2002) observed a decrease in loneliness and depression among older adults who used the internet compared to the non-users of the same age group.

To summarise our literature review, there exists a large body of prior research which has demonstrated the effectiveness of the two core TAM dimensions, perceived usefulness and perceived ease-of-use, as predictors of users' attitude towards technology as well as their technology adoption intention in the context of new technology (Davis, 1989; Lee & Kim, 2009; Pan & Jordan-Marsh, 2010; Venkatesh & Davis, 2000). In addition to the core TAM dimensions, we also observe that in the specific context of older adult users' technology acceptance, factors relating to technology-related skills and knowledge as well as access to specific technological equipment and support with using technology have been found to influence technology usage (Guner & Cengiz, 2018; Kim et al., 2016; Pan & Jordan-Marsh, 2010). However, in the context of cultural tourism, we note a lack of research focusing on older adult tourists' technology acceptance. To that end, we aim to fill the gap in current knowledge by exploring the key factors influencing older adult tourists' acceptance and use of digital cultural services when their normal mobility is restricted. In practice, we propose to add and test a new antecedent construct to TAM: "Accessibility", defined as the degree to which a user has the appropriate skills, knowledge, technical equipment, and social support available to using technology. Altogether, we put forward the following hypotheses:

H1: Accessibility positively affects perceived ease-of-use of digital cultural tourism services among older adults.

H2: Accessibility positively affects perceived usefulness of digital cultural tourism services among older adults.

H3: Perceived ease-of-use positively affects perceived usefulness of digital cultural tourism services among older adults.

H4: Perceived ease-of-use positively affects attitude towards using digital cultural tourism services among older adults.

H5: Perceived usefulness positively affects attitude towards using digital cultural tourism services among older adults.

H6: Perceived usefulness positively affects behavioural intention towards using digital cultural tourism services among older adults.
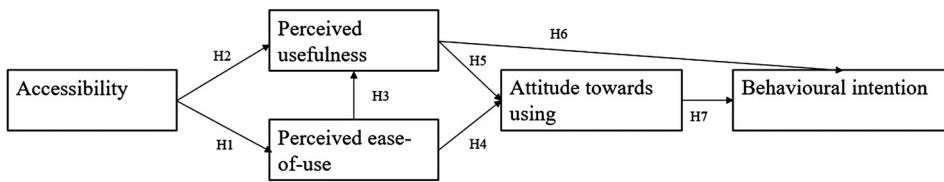
Figure 1. Conceptual model used in this study.

H7: Attitude towards using positively affects behavioural intention towards using digital cultural tourism services among older adults.

Figure 1 illustrates the conceptual model used in this study.

Methodology

This study adopted a concurrent mixed methods approach (Creswell, 2009), whereby a single survey instrument with both qualitative and quantitative items was used in order to triangulate data types and thus more accurately explore the relationships among variables of interest (Castro et al., 2010). The following sub-sections discuss the structure of the questionnaire, data collection method used, sampling procedure, data analysis and measurement reliability and validity.

Measurements

The survey instrument consisted of 28 questions, of which four questions captured participants' background information, four questions explored the impacts of COVID-19 on participants' consumption of digital cultural tourism services, 13 questions measured the studied constructs related to hypotheses, and seven were open-ended questions which attempted to probe participants to provide more in-depth information about their technology acceptance and usage behaviour in the context of digital cultural tourism services amidst the COVID-19 pandemic. With regards to the relatively high number of open questions, as the target group of this study were people who might not be perceived as technologically adept as other users (Pesonen et al., 2015), the researchers wanted to include ample room for participants to provide additional information in order to better address the study's research question, that is, what are the key factors influencing older adult tourists' acceptance and use of digital cultural events when their normal mobility is restricted. In terms of the studied constructs (accessibility, perceived usefulness, perceived ease-of-use, attitude towards using and behavioural intention), all of these were measured on a 7-point Likert scale, with 1 = Strongly disagree and 7 = Strongly agree. As shown in Table 1, the accessibility construct was measured by four items, the perceived usefulness and perceived ease-of-use constructs had two items each, the attitude construct had four items, and finally one item was used to measure intention to use.

Sample and data collection

Data were collected between October–November 2021 through an online survey. First, to test for comprehension and content validity, the survey items were pre-tested with

Table 1. Measurement items and supporting literature.

Items	Supporting literature
Accessibility • ACC1: I have the required skills to use digital cultural tourism services • ACC2: I have enough knowledge and information about using digital cultural tourism services • ACC3: I have the required technology to use digital cultural tourism services • ACC4: I have enough support available to me about using digital cultural tourism services	Pan and Jordan-Marsh (2010); Williams et al. (2013); Dogruel et al. (2015); Kim et al. (2016); Guner and Cengiz (2018); Aggarwal et al. (2020)
Perceived ease-of-use • PEOU1: I think digital cultural tourism services are easy to use • PEOU2: It is easy to become proficient in using digital cultural tourism services	Davis (1989); Venkatesh et al. (2003); Lee and Kim (2009)
Perceived usefulness • PU1: Using digital cultural tourism services improves my well-being • PU2: Using digital cultural tourism services reduces my feelings of loneliness	Davis (1989); White et al. (2002); Venkatesh et al. (2003); Koopman-Boyden and Reid (2009); Aggarwal et al. (2020)
Attitude towards using • ATT1: Digital cultural tourism services are only useful when access to traditional cultural tourism services is restricted • ATT2: Using digital cultural tourism services is a good idea • ATT3: Overall, I am positive towards digitalisation, including digital cultural tourism services • ATT4: It is important to me that digital cultural tourism services are offered to older adults	Venkatesh et al. (2003); Pan and Jordan-Marsh (2010); Dogruel et al. (2015); Etemad-Sajadi and Dos Santos (2019); Neves et al. (2013)
Behavioural intention • BI1: I am interested in using digital cultural tourism services	Davis (1989); Venkatesh et al. (2003); Pan and Jordan-Marsh (2010)

10 participants: five experts specialising in digital tourism service development, service development for older adults, and human–computer interaction research, as well as five members of the target group of the research, i.e. Finnish people over 60 years old. As the survey targeted Finnish older adults, the survey was distributed in Finnish. Based on the pre-test, the wording of three questions were revised (ACC4, PU2 and ATT1) to improve readability and ensure the participants understand the question as intended. The instructions of the survey (i.e. the introduction message on the survey landing page) were also slightly revised. After the pre-test, a convenience sampling approach was adopted, whereby the survey was distributed online through two channels: (1) three closed groups on social media focused on older adults (two pensioners' groups and one group focusing on older adult cultural aficionados), responses $n = 52$), and (2) through a domestic, Finnish-language survey panel, responses $n = 336$. For both distribution channels the survey link was open for two weeks, after which the data from both channels were combined. In total 388

responses to the survey were received. However, 31 responses contained multiple segments of missing data, so the final sample included 357 valid responses that were used for analysis.

Methods of analysis

A combination of descriptive statistics (questions related to background information and participants' behaviour during COVID-19) and structural equation modelling (SEM; questions relating to hypotheses) were used to analyse the data. Statistical analysis was performed with IBM SPSS (version 26) and AMOS (version 27). Content analysis was used to analyse qualitative data (open-ended questions).

Measurement validity and reliability

First, to ensure model fit and to evaluate the measurement validity and reliability, the internal consistency of the constructs was examined by calculating Cronbach's alpha values with a recommended cut off value of 0.7 (Nunnally & Bernstein, 1994). As reported in Table 2, all constructs exceeded the recommended value (accessibility 0.81, perceived ease-of-use 0.85, perceived usefulness 0.86, and attitude 0.90), indicating a very good internal reliability of the measurements. Next, the model fit was examined with confirmatory factor analysis (CFA). CFA provided results of good fit with Kaiser-Meyer-Olkin Measure = 0.908, Bartlett's Test sig. = $p < 0.001$, CMIN/df = 4.798, CFI = 0.937, TLI = 0,917. All these indicators exceeded their suggested acceptance levels (Hair et al., 1998; Hu & Bentler, 1995, 1999), and thus, the model was accepted as having strong fit.

Table 2. Measurement model assessment.

Construct/items	Standardised factor loadings	t-values	SMC	CR	AVE
Accessibility ($\alpha = 0.81$)				0.95	0.83
ACC1	0.88	_ [a]	0.77		
ACC2	0.72	15.53***	0.52		
ACC3	0.56	11.02***	0.31		
ACC4	0.69	14.77***	0.48		
Perceived ease of use ($\alpha = 0.85$)				0.95	0.90
PEOU1	0.82	_ [a]	0.67		
PEOU2	0.91	19.93***	0.83		
Perceived usefulness ($\alpha = 0.86$)				0.94	0.89
PU1	0.93	_ [a]	0.86		
PU2	0.82	20.61***	0.67		
Attitude ($\alpha = 0.90$)					
ATT1	0.86	_ [a]	0.73		
ATT2	0.89	23.01***	0.80		
ATT3	0.82	16.63***	0.67		
ATT4	0.80	18.78***	0.63		
Behavioural intention				NA	NA
BI1		_ [a]	0.79		

Notes: Model fit statistics: Kaiser-Meyer-Olkin Measure = 0.908, Bartlett's Test sig. = $p < 0.001$, CMIN/df = 4.798, CFI = 0.937, TLI = 0.917. Because behavioural intention was measured with one variable, it was excluded from the reliability assessment. All factor loadings were significant on a level $p < 0.001$. SMC = squared multiple correlation, CR = composite reliability, AVE = average variance extracted, NA = not available.
—[a] Path was fixed to one to identify the corresponding parameters.
*$p \leq 0.05$, **$p \leq 0.01$, ***$p \leq 0.001$.

Next, convergent validity was assessed through examining the standardised factor loading values and squared multiple correlations (SMC) (Bollen, 1989). As suggested by Stevens (1992), all factor loadings exceeded the cut-off value of .40 and were significant at $p < 0.001$. All items except one (ACC3 0.31) surpassed the recommended .40 value for SMC (Bollen, 1989). In addition, composite construct reliability (CR) and average variance extracted (AVE) were calculated for all constructs. The composite reliability is a measure that depicts the extent to which a number of items indicate a common construct. AVE indicates the variation explained by the latent variable in comparison to measurement error. As illustrated in Table 2, all values were greater than the cut-off values .70 for CR and .50 for AVE as suggested by Hair et al. (1998). Therefore, the conditions for convergent validity were met for all constructs.

Results

The next sub-sections discuss the findings of both quantitative and qualitative parts of the survey instrument. First, descriptive statistics of the sample are presented. Then, the results of hypothesis testing through structural equation modelling (SEM) are discussed. Finally, the results of the qualitative part of the survey, i.e. content analysis of responses to the seven open-ended questions, are thematically analysed and discussed.

Respondent profile

Table 3 illustrates the background information of participants, that are, key demographic factors, technology acceptance, and use behaviour in the context of digital cultural tourism services amidst COVID-19. Majority of the participants were female (female 58%, male 42%), over 70 years old (55%), and lived with someone else, e.g. a partner (62%), in contrast to living alone (38%).

Vast majority lived in an urban area (94%), had reduced their overall use of cultural tourism services during COVID-19, and had first-hand experience of using digital cultural tourism services (61%). The most often used device to access digital cultural tourism services was laptop computer (46%), followed by tablet computer (25%), desktop computer (10%), smartphone (10%), and smart TV (8%). The most used type of digital cultural tourism content were live streams and on-demand recordings of music concerts and festivals (64% of participants), followed by virtual museums and galleries (58%) and performing arts (53%).

SEM analysis and hypotheses testing

SEM was conducted to examine the relationships between the constructs. All but one of the hypothesised structural paths between the latent variables were supported at the significance level $p < 0.05$, most at $p < 0.001$, see Figure 2.

The results showed that accessibility (ACC) had a significant positive impact on perceived ease-of-use (PEOU), and thus, H1 is supported. The results suggest that the proficiency to use digital cultural tourism services combined with an access to suitable technical equipment, and available peer support, increases the confidence for using digital cultural tourism services (Guner & Cengiz, 2018; Pan & Jordan-Marsh, 2010).

Table 3. Descriptive characteristics of the respondents.

Item	Percentage of participants ($n = 357$)
Gender	58% Female
	42% Male
Age	25% 60–64 years old
	20% 65–69 years old
	28% 70–74 years old
	20% 75–79 years old
	7% 80+years old
Living circumstance	38% Lives alone
	62% Lives with somebody, e.g. partner
Place of residence	94% Lives in an urban area
	6% Lives in a remote area
Overall usage of cultural tourism services amidst COVID-19	82% My use of cultural tourism services has decreased
	17% My use of cultural tourism services has stayed the same as before COVID-19
	1% My use of cultural tourism services has increased
Usage context	21% I have used cultural tourism services only in person
	31% I have used cultural tourism services both digitally and in person
	30% I have used cultural tourism services digitally
	18% I have not used cultural tourism services in person or digitally
Device used	8% Smart TV
	10% Desktop computer
	46% Laptop computer
	26% Tablet computer
	10% Smartphone
Type of cultural tourism service used digitally	64% Music concerts and festivals
	58% Museums and galleries
	53% Performing arts
	14% Other (Library, cinema, webinars, religious meetings, etc.)

However, as hypothesised, accessibility did not have an impact on perceived usefulness (PU), whereby H2 was not supported due to non-significance of the results with a negative regression weight value. This could be explained by the overall context of the study: the usefulness of digital cultural services may be influenced first and foremost by the type and availability of cultural content (e.g. content created specifically for digital channels) rather than the availability of social support, technical equipment, or the know-how of utilising it. In terms of the core TAM constructs, perceived usefulness was positively impacted by perceived ease-of-use, and as such, H3 was supported. Further, as expected, relationships between perceived ease-of-use and attitude (H4), and perceived usefulness and attitude (H5), were also supported, as were the relationships between perceived usefulness and behavioural intention (H6), and attitude and
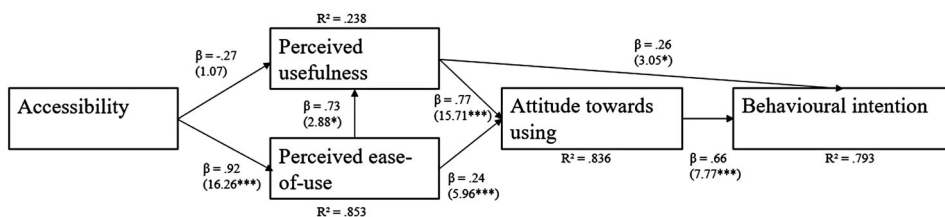

Figure 2. Structural equation model and hypotheses testing results.

Table 4. Correlation of constructs.

Constructs	1	2	3	4	Mean	SD
1. Accessibility	1				5.22	1.30
2. Perceived ease of use	0.76	1			4.81	1.60
3. Perceived usefulness	0.36	0.44	1		4.39	1.68
4. Attitude	0.50	0.59	0.78	1	5.18	1.45
5. Behavioural intention	0.41	0.51	0.77	0.84	4.59	1.85

Notes: Composite scores were calculated for each construct by averaging the respective item scores. All correlations were significant at a level $p < 0.01$.

behavioural intention (H7). Overall, the results of the SEM analysis indicate that the higher the level of proficiency and confidence in using digital cultural tourism services older adults have, more likely they are to view such services to be useful. This corresponds and extends previous research on TAM in the context of older adults (Aggarwal et al., 2020; White et al., 2002).

Table 4 illustrates the correlations, means, and standard deviations of constructs' composite scores; Table 5 shows the results of SEM.

Content analysis of open-ended questions

After the statistical analysis, the qualitative parts of the survey instrument were examined through content analysis following Stemler (2001). According to Stemler (2001), content analysis seeks to examine trends and patterns in documents. In total, the seven open-ended questions included in the survey captured 1495 individual comments consisting of a total 8457 words. The comments were professionally translated to English, and then grouped together and analysed thematically (Braun & Clarke, 2012). The core dimensions of TAM were used as an a priori, deductive basis for coding, including our added antecedent factor: accessibility. As expected, four major themes with nine sub-themes were extracted. The major themes were: (1) Accessibility, i.e. the degree to which physical, technical or informational constraints were found to facilitate uptake of digital cultural tourism services, (2) Ease-of-use, i.e. the ease of completing required service processes related to digital cultural tourism service usage, e.g. registration or payments, as well as the ease of navigating the actual user interfaces digital cultural tourism services consist of, e.g. size and layout of text and other clickable features, (3) Usefulness, i.e. the degree to which the readily available content on digital cultural tourism services was perceived as bringing added value to users' vis-à-vis existing cultural experiences, and (4)

Table 5. SEM analysis and hypothesis testing.

H	Path	Standardised regression weights	t-value	Supported
H1	ACC to PEOU	0.923	16.26***	Supported
H2	ACC to PU	−0.270	−1.07	Not supported
H3	PEOU to PU	0.726	2.88*	Supported
H4	PEOU to ATT	0.237	5.96***	Supported
H5	PU to ATT	0.777	15.71***	Supported
H6	PU to BI	0.255	3.05*	Supported
H7	ATT to BI	0.656	7.77***	Supported

Notes: Model fit statistics: CMIN/df = 4.798, CFI = 0.937, TLI = 0.917.
*Significant at $p < 0.05$.
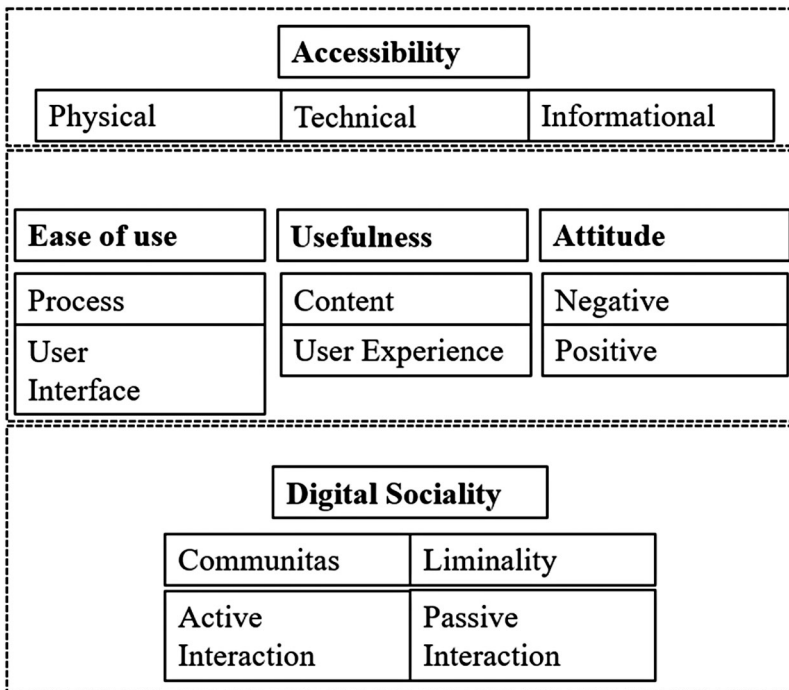***Significant at $p < 0.001$.

Figure 3. Major themes extracted from the analysis.

Attitude, i.e. the users' negative or positive perception of technology-use in the context of digital cultural tourism services, based on priori experiences with other related (digital and non-digital) services. One additional major theme, (5) Digital Sociality, was also found inductively, referring on one hand to the spatiotemporal boundedness of a traditional cultural tourism experience (the experience has a specific start and end time, and it is experienced with a specific group of people around you), and on another to the active or passive interaction (social or other) of users as they undertake the cultural tourism experience.

The next sections go through the results of the qualitative analysis in detail. The five major themes extracted through content analysis are illustrated in Figure 3.

Accessibility

Accessibility was identified as the most relevant antecedent factor in influencing users' acceptance of and intention to use technology in the context of digital cultural tourism services aimed at older adult tourists. In particular, participants commented on accessibility from three primary points-of-view: physical accessibility, technical accessibility, and informational accessibility.

First, in terms of physical accessibility, participants commented on the physical strain of sitting in front of a computer device for prolonged periods of time. Participants also commented on physical impairment attributed to old age and related to e.g. vision or mobility. As put by participants:

It's painful and arduous to sit by the computer for long. (Female, 70–74 years old)

> Old age means visual impairment which makes using mobile phones more difficult. Also motor coordination gets slower, so I'm slower to react than I would like. (Male, 60–64 years old)

Second, in terms of technical accessibility, participants lamented the lack of appropriate digital technology to make the most of available digital cultural tourism services, e.g. too small screen or poor-quality speakers. Participants also commented how even when they had the necessary equipment, they lacked support in terms of using digital technology to access cultural services. As put by participants:

> [Digital cultural services are] Difficult to use, you need good quality IT equipment and a fast internet connection. (Male, 65–69 years old)

> You need to have good IT equipment so that e.g. sound quality and picture quality are enjoyable. (Female, 65–69 years old)

> Technology is too difficult and there is no help available. (Female, 75–79 years old)

Third, in terms of informational accessibility, participants noted a lack of information on available digital cultural services. As illustrated by one participant:

> There must be a lot of choice available, but personally I haven't found many of them. (Female, 65–69 years old)

Overall, in their research, Williams et al. (2013) arrived at similar accessibility-related considerations when designing human–computer interfaces for older adults. Their review emphasised particularly the physical and technical dimension of accessibility; informational accessibility seems less well-established in past research and therefore presents an interesting avenue for future exploration, particularly given the unique features of travel-related decision-making processes (Choi et al., 2012).

Ease-of-use, usefulness, and attitude

In terms of TAM's endogenous factors, i.e. ease-of-use, usefulness, and attitude, qualitative data provided interesting insight across all three fronts.

First, in terms of ease-of-use, participants highlighted factors related to the service process of using digital cultural tourism services (e.g. ease of making payments, registration; joining and leaving a service) as well as the user interface (UI, e.g. specific features of the service). Previous research has demonstrated that the high effort to learn a new technology may negatively impact acceptance and use amongst older adults (Kim et al., 2016), and that there is a general need for user-friendlier UIs when designing services for the older adult user segment (Guner & Cengiz, 2018; Ouyang & Zhou, 2019). As put by participants:

> System needs to be easy to use particularly when joining a service for the first time. (Female, 65–69 years old)

> A good addition would be a common portal where you can find all the recordings. (Female, 60–64 years old)

Second, in terms of usefulness, participants emphasised content and user experience (UX)-related factors. In terms of content, participants hoped for content that is designed explicitly with digital distribution channels in mind in order to enhance TV-like

recordings or live streams of traditional performances. In terms of UX, a key theme was the feeling of being in control, e.g. being able to decide from which camera angle to view a performance, or leaving the performance on the spot. These resonate well with the work by Dogruel et al. (2015), El-Said and Aziz (2022) and Zainal-Abidin, Scarles, et al. (2023), which highlight technology as a means of hedonic entertainment for tourists. As put by participants:

> Directing plays and performances in a way that they are made particularly for digital devices rather than just settling with a recording. (Female, 75–79 years old)

> I would like shorter content. (Female, 70–74 years old)

> Digital concerts, theatrical plays and so on are quite TV-like. These could be more "dynamic" and show the audience as well (if GDPR allows), so that you feel like you are there, part of the action. Now everything is shot from a static tripod and the experience feels "clinical". (Male, 60–64 years old)

> Multiple cameras or points of view from which the user can choose what to use. (Male, 65–69 years old)

> If I don't like the show or performance, I can easily leave and do something else. (Female, 60–64 years old)

Third, in terms of attitude, there was a clear split between two opinions in the open-ended comments. On one hand, participants saw digital cultural tourism services as a useful means of enjoying cultural tourism activities when they could not otherwise do so (e.g. due to the pandemic). On the other hand, participants expressed negative attitude towards digitalisation in general and increased screen-time in particular, contrasting their experiences of digital cultural tourism services with the in-person equivalent. In their work, Loiacono and Djamasbi (2010) found that users' mood whilst using technology influences their overall attitude towards said technology. Similarly, Tussyadiah et al. (2018) et al. found that a positive destination marketing VR experience resulted in a positive attitude change towards the destination itself. Negative attitude towards technology may also be attributed to technophobia or technostress (Neves et al., 2013). As discussed by participants:

> I belong to the risk group and I have not wanted to go to places with lots of people present, in order to reduce my risk of getting ill. (Female, 60–64 years old)

> I can use it [digital cultural services] even when I'm sick or have issues with my legs. (Female, 75–79 years old)

> I'm very sensitive to smells, so I don't have to deal with that if I'm staying at home. (Female, 60–64 years old)

> Staying at home makes people passive. So does too much sitting. (Male, 60–64 years old)

> Digitalisation makes me anxious. To experience something is to be there, to listen, watch, let your mind wonder, the audience next to me, the energy and anticipation radiating from them, their comments. At home I sit by my digital device bored and alone, in the same space where I eat, read the newspaper, etc. Must I stay here, in the same spot, even to enjoy culture! Going out, dressing up, the journey itself is all already part of the anticipation for the coming experience. (Female, 65–69 years old)

Emergent normative factor

In addition to our original conceptualisation of TAM, including accessibility as an antecedent factor influencing technology acceptance, the content analysis of open comments revealed one emergent normative factor we dub "Digital Sociality". Consisting of two dimensions: communitas-building and liminality of experience, as well as active and passive interaction, our view of digital sociality corresponds well with Etemad-Sajadi and Dos Santos' (2019) work on social presence and trust as determinants of older adult users' acceptance and use of technology. It also resonates with Neuhofer et al.'s (2021) recent work on transformative festival experiences through the intentional design of liminal time–space experiences.

First, in terms of communitas-building and liminality of experience, participants lamented the lack of feeling like they are experiencing something together in the same time and space (Neuhofer et al., 2021) when the experience was delivered via digital technology:

> You don't get the same feeling of experiencing something together, the magical moment when the lights start to dim … . (Female, 60–64 years old)

> Going to the venue with appropriate dress and makeup and meeting with others is a holistic experience. A mere cultural service, like a play or an opera on a screen is a poor imitation. It may work for sports, but not for theatres or concerts. (Male, 65–69 years old)

> Specific time window for when the performance is viewable would make the experience more unique. (Female, 60–64 years old)

Second, in terms of active and passive interaction, participants called for more features that would allow them to play a role in how the digital cultural tourism experience unfolds. Suggested modes of interaction included both social interaction, e.g. having an option to exchange views with the other participants through a chat function or to form viewing parties or digital culture clubs, as well as other means of interaction, e.g. contributing to the cultural content directly through virtual applauds, encore requests, or feedback forms. As put by participants:

> I miss interaction, it's much more enjoyable to be on Zoom or Teams and listen to other people as well, not just the performer. And to be able to pitch in and say something yourself, too, rather than to just watch by yourself passively on YouTube and not knowing at all who else is there. (Female, 60–64 years old)

> You could always try something participatory, for example an encore-vote system in a concert. The technology for it already exists. (Male, 60–64 years old)

> An option to give feedback. Giving a virtual round of applause or booing. (Female, 65–69 years old)

> A chance to chat with others would be nice. (Female, 70–74 years old)

> Maybe digital cultural clubs or something like that could be added. (Female, 75–79 years old)

Overall, in order to drive successful user acceptance of digital cultural tourism services, tourism stakeholders need to push for incorporating elements of digital communitas-building in the experience, make sure the experience includes multiple types and layers of interaction, and has an option for liminality e.g. through time-gated live streaming start–end times (Neuhofer et al., 2021).

Conclusions and discussion

Many implementations of technology are designed to please younger generations. However, as discussed by Kim et al. (2016), by better addressing the needs and values of older adults, in addition to highlighting the usefulness over challenges of learning, older adults' attitudes towards technological innovations could become more acceptable. Furthermore, they observed that older adults were more open to learning digital skills if they had peer support available, especially within one's already existing social network. Findings of this empirical study build on these notions, adding to the ongoing discourse on older adults as consumers of tourism services (c.f. Björk et al., 2020; Zainal Abidin, Tuomi, et al., 2023). However, as evidenced by this study, it is also important to keep in mind that older adults as a tourism segment are diverse, and factors such as mobility, capabilities or needs can fluctuate drastically within the group (Pesonen et al., 2015). Existing research on technology acceptance offers limited understanding on the barriers and opportunities of older adults using technology within a cultural tourism context, particularly to access digital cultural tourism services during a period of immobility due COVID-19 lockdown measures. To that end, this paper builds on well-established technology acceptance models to offer several theoretical and practical contributions for tourism management and new service development.

In terms of theoretical implications, this study provides contributions in two key areas: enhancing knowledge on older users' experiences of using technology in cultural tourism contexts and contributing to current understanding on TAM. First, past studies have highlighted the accelerated use of technology during COVID-19 predominantly amongst the younger generation (i.e. Millennials and Gen Z) (Björk et al., 2020). Meanwhile, this study builds on current Nordic tourism literature on tourist segments and experience patterns by providing evidence that older adults, a largely untapped demographic in past e-tourism research, indicate a desire to use technology for partaking in virtual cultural experiences, whereby the COVID-19 mobility restrictions have accelerated the use of technology amongst the older adult population. Furthermore, existing research offers limited insights into the experiences of older adults using technology in a tourism context. To that end, this paper contributes to the current understanding on how older adults use technology for digital cultural experiences and the distinct challenges they face.

Second, this study contributes theoretical understanding to Davis' (1989) original conceptualisation of TAM in two ways: exploring "accessibility" as an antecedent factor influencing perceived ease-of-use and usefulness of technology, and identifying a novel emergent normative factor, "digital sociality", consisting of communitas-building, liminality of experience, as well as active and passive interaction. Both our approach and findings extend current understanding of TAM, further enhancing the work of e.g. Etemad-Sajadi and Dos Santos (2019). Additionally, while TAM has been predominantly applied to explore task-related use of technology (Venkatesh & Davis, 2000), this paper provides evidence that older adults use technology for hedonic entertainment purposes, supporting and extending the findings of Dogruel et al. (2015) and Tussyadiah et al. (2018). Moreover, this research provides a deeper understanding on the "perceived ease-of-use" construct in the context of older adults. Specifically, a greater

emphasis on UX and UI is required to increase technology acceptance among older adult users. The research provides deeper insights into how this can be done through fine-tuning various functionalities. Additionally, the research also contributes to the understanding of accessibility as a factor influencing "perceived ease-of-use". Past research has widely explored accessibility in terms of technicality and physicality. This research identifies information accessibility as an additional key aspect, as previously highlighted to be particularly important in the tourism decision-making process (Choi et al., 2012). Therefore, the research builds on existing theories of technology acceptance specifically for the older adult segment and creates a basis for future research in the topic in the context of tourism management.

In addition to theoretical implications, the research provides considerable implications for tourism policy and industry practice. The research provides evidence on the challenges that older adult tourists face due to COVID-19 lockdowns. As older adults yearn for social engagement, tourism policymakers and service providers should consider new ways of interacting with older adults through ICT (Caiola et al., 2023). In particular, greater considerations should be placed in supporting and incentivising online cultural tourism experiences to be more accessible. Furthermore, the research poses significant implications for the management and marketing of digital cultural tourism services aimed at older adult users. In particular, the study provides guidelines for the industry when designing digital cultural tourism experiences for older adults particularly in two key aspects: user interface (UI) and user experience (UX). As previously mentioned, designers need to consider three different types of accessibility when designing digital services for older adults: physical, technical and informational accessibility. Designers and developers should prioritise simple and flexible user experience which gives a sense of control to older adult users through different functionalities (encouraging active and passive interactions). The provision of support staff is also identified to enhance the confidence and acceptance of technology. Furthermore, new experiences designed for older adults should primarily be developed using devices that they already have such as laptop or tablet computers rather than introducing a new technology, e.g. VR glasses.

There are some limitations to this study that should be considered. First, the study adopts a self-report survey as its research method. In addition to the usual limitations this poses (e.g. in terms of response bias) (Grandcolas et al., 2003), in this study data was aggregated from two datasets (data collected online through social media and online through a survey panel). While this provides a broader final sample for analysis, it also poses methodological considerations (e.g. participation based on self-select vs. invitation). Second, we have collected data solely through electronic means, thus potentially excluding any less tech-savvy older adults altogether. A multi-pronged approach which includes a traditional pen and paper survey (administered through mail or collected in person by researchers) might bring added dimensionality to our results. Third, we have collected data only from Finnish participants, situated in the context of digital cultural tourism service use in Finland. While this makes sense from the viewpoint of ageing population (Finland has the oldest population in Northern Europe), levels of digital literacy are also quite high in Finland. Following Zainal Abidin, Tuomi, et al.'s (2023) suggestion to cross-culturally compare data from other geographic locations, e.g. Italy (which represents another relatively old population in

Southern Europe), Japan (which represents the oldest population in the world) or India (which represents one of the youngest populations in the world) (United Nations, 2017; World Economic Forum, 2020), would provide an interesting avenue for future research.

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