The perceived challenge of everyday technologies in Sweden, the United States and England: Exploring differential item functioning in the everyday technology use questionnaire

Sarah Wallcook, Camilla Malinowsky, Louise Nygård, Georgina Charlesworth, Jenica Lee, Ryan Walsh, Sophie Gaber & Anders Kottorp

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

The perceived challenge of everyday technologies in Sweden, the United States and England: Exploring differential item functioning in the everyday technology use questionnaire

Sarah Wallcook[a,b] , Camilla Malinowsky[a] , Louise Nygård[a] , Georgina Charlesworth[c] , Jenica Lee[d], Ryan Walsh[e] , Sophie Gaber[a,b] and Anders Kottorp[f]

aDepartment of Neurobiology, Care Sciences and Society, Division of Occupational Therapy, Karolinska Institutet, Huddinge, Sweden; bFaculty of Brain Sciences, University College London, London, UK; cResearch Department of Clinical, Educational and Health Psychology, University College London, London, UK; dDepartment of Occupational Therapy, University of Illinois at Chicago, Chicago, IL, USA; eProgram in Occupational Therapy, Washington University School of Medicine, St. Louis, MO, USA; fFaculty of Health and Society, Malmö University, Malmö, Sweden

ABSTRACT

Background: The changing technological environment is reflected in regular updates made to the everyday technology (ET) use questionnaire (ETUQ). Newly added ETs may not present comparable challenges across countries and diagnoses.

Aims: To identify whether country context, or dementia diagnosis, impact ETs' challenge level.

Material and methods: 315 older adults from three countries were included; Sweden ($n = 73$), United States ($n = 114$), England ($n = 128$), and had a confirmed diagnosis of mild dementia ($n = 99$) or no known cognitive impairment ($n = 216$). Differential Items Functioning (DIF) analysis was performed on 88 ETs included in the ETUQ by country and diagnosis. The impact of DIF was evaluated in a Differential Test Functioning (DTF) analysis.

Results: Nine items (10.2%) in the ETUQ showed statistically significant DIF between countries; five of which were public space ETs and none of which were information and communication technologies (ICTs). Three ICT items, and no others, showed significant DIF by diagnosis. The items' DIF was shown to have no impact upon person measures of ability to use ET in the DTF.

Conclusions and significance: The utility of the ETUQ in occupational therapy practice and research internationally is highlighted through the stability of the challenge hierarchy and lack of impact on person measures.

Background

Validated assessments, such as the everyday technology (ET) use questionnaire (ETUQ), have supported occupational therapists and researchers to develop knowledge about the impact of ETs upon daily life [1–3]. The term ET refers to the commonplace technological, electronic and mechanical artefacts and services encountered by people both in their homes and in society (e.g. microwave, smartphone and ATM) [4]. Data collected from the ETUQ have mapped the changing challenge and relevance of ETs over time [5,6]. While differences, similarities and overlaps in the relevance of ET and the ability to use ET among groups with a wide variety of health conditions have also been observed [7–10]. From an inventory of 90 ET items, the questionnaire maps those ETs that a person identifies as not relevant to them, as well as those that are relevant (definition to follow, see *instruments*).

More recently, the ETUQ has demonstrated various evidence of validity and precision in different high-income countries [11]; inter-rater and test-retest reliability in Denmark [12], and rating scale function, internal scale validity and person response validity in Sweden [3,13], Japan [14] and Portugal [13]. The ETUQ is designed within the principals of the Model of Human Occupation (MoHO) and captures a view on occupation from the perspective of individuals' interactions with ETs in their contexts [15,16]. As each cultural context may influence the perceptions of
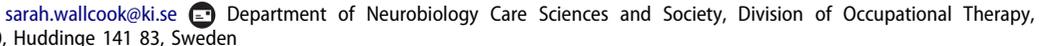
the challenge of each ET, it is, therefore, also valuable to investigate how the items within this tool function even among similar Anglophonic and European countries. However, since the technological environment changes over time, both in terms of the ETs that are relevant and the level of challenge those technologies present [5,6], so too has the ETUQ been recently updated in response. The latest update now includes items particularly relating to information and communication technologies (ICTs; i.e. smartphone text message and tablet internet banking) and ETs found in public spaces (e.g. ticket machine and ATM).

ICTs receive great attention in research and public policy since they are critical to achieving the (cost-)effectiveness and universal coverage objectives of e-health [17] among other e-services and e-governance [18]. However, such studies and reports tend to be focussed solely on ICTs. This means that those who consider themselves 'non-users' or who find ICT difficult to use are underrepresented, as they are more likely to decline to participate [19]. It has repeatedly been found that groups of people with dementia consider lower amounts of ET, including ICT, relevant to them in comparison to older adults with no known cognitive impairment [3,20]. Furthermore, it has been shown that the amount of ETs used by older adults with cognitive impairment decreases as the impairment progresses [21]. Consequently, people with dementia are more likely to be non-users of ET, and are therefore less likely to be included in ICT research, despite living within the general global population in increasing numbers [22].

Within research using the ETUQ, it seems that the questionnaire's additional focus on domestic ETs (e.g. kettle, microwave and lawn mower) supports better representation of non-ICT users in sampling. This may be because the questionnaire affords people the opportunity to discuss the technologies that matter to them in the context of their strengths and interests. For example, one such study in Sweden using the ETUQ, which interviewed people between 2015 and 2017, included those who did not consider themselves ICT users. This study reported computers perceived as relevant among 62% of their older adults without cognitive impairment, and 49% of adults with dementia [20]. Contra to this, the report from an earlier 2015 pilot survey in Sweden, acknowledged bias in favour of ICT users, which the authors encouraged readers to accommodate. This accommodation was made by suggesting that access to computers may be more representative at several percentage points lower than the 71% of older adults who responded to the pilot [19]. So, by offering participants a broader basis

to the technology discussion, the ETUQ may generate better representation when it comes to seeking specific knowledge about ICT use or non-use among older adults generally.

The updating of the ETUQ to include more ICTs and public space ETs is particularly pertinent given the European Commission's intention to initiate ICT-based solutions and age-friendly communities to meet the urgent need of supporting Europe's ageing population [23]. This is in part based within the World Health Organization's initiative, which similarly informed the development of age-friendly initiatives in the United States of America (U.S.A) [24]. Sweden, in particular, has been exemplified as a country that is technologically advanced and has implemented e-governance and e-services using ETs at a more rapid rate in comparison to other countries [18]. This could therefore lead to the assumption that more older adults in Sweden will not only consider more of these types of ETs to be relevant to daily life, but also that they are using them to a greater degree. Since it is popularly considered that 'practice makes perfect', it might also be assumed that overall ability to use technology in groups of people from these countries could be higher than in other countries where uptake and diffusion are considered to be comparatively less. Furthermore, frequency of use contributes to the formation of habits [15] and so to familiarity and ease of use of ETs [25]. Consequently, habits, familiarity and ease of use may vary between countries as a consequence of policy initiatives, which justify investigation of ETs' challenge level.

Identifying variation in the challenge level of ICTs and public space ETs, not only between countries, but also between older adults with and without cognitive impairment, e.g. dementia, would increase understanding about how to make age- and dementia-friendly initiatives suitable for the target population. Applying such understanding through the occupational therapy profession could be integral to ensuring inclusive outcomes for these initiatives. A perspective with the MoHO, highlights that access to ET is insufficient to ensure inclusion, since individuals' habits, skills and preferences are seen to inevitably be influential [15]. So, occupational therapists can be a key profession in bridging that gap, for example by supporting older adults to access and use transport in order to reach places needed for daily activities (e.g. shopping, socializing and health care). Investigating the proportional relevance of any varying ETs to older adults could further provide contextual information pertinent to digital inclusion for each country. Identifying variation allows an opportunity to

Table 1. Characteristics of participants from the three-country subgroups.

	Sweden (n = 73)	U.S. (n = 114)[a]	England (n = 128)	Comparison test
Gender				
Male n (%)	27 (37%)	69 (60.5%)	65 (51.2%)	χ^2
Female n (%)	46 (63%)	44 (38.6%)	63 (49.2%)	$p < 0.01$
Age				
Median (IQR)	77 (71–82)	73 (68–79)	76 (68.25-82)	Kruskal–Wallis
Min-Max.	59–96	65–92	55–96	NS
Living situation				
Alone n (%)	44 (60.3%)	70 (61.4%)	49 (38.3%)	χ^2 Swe/U.S. vs. Eng
Co-habiting n (%)	29 (39.7%)	44 (38.6%)	79 (61.7%)	$p < 0.001$
Diagnosis of mild dementia				
No known cognitive impairment n (%)	36 (49.3%)	Unknown	64 (50%)	χ^2
Mild dementia n (%)	37 (51.7%)		64 (50%)	NS
MoCA Score[b]				
Median (IQR)	23 (18.5–27)	24 (21–26)	24 (21–26)	Kruskal–Wallis
Min-Max.	4–30	13–31	12–30	NS
Overall Ability[c]				
Can live independently in the community n (%)	29 (39.7%)	47 (41.2%)	56 (43.8%)	χ^2
Needs minimal-maximal assistance to live independently in the community	44 (60.3%)	67 (58.8%)	72 (56.2%)	NS

Swe: Sweden; U.S.: United States of America; Eng: England.
[a]One U.S. participant did not report gender. Six U.S. participants did not complete the MoCA.
[b]Montreal Cognitive Assessment [27] – maximum score 30. Additional point given for ≤12 years of education.
[c]Judged according to guidelines given in the ETUQ manual [28].

consider why such variation exists and to strive for equitable ease of use for ETs.

Variation in the challenge level of ETs may further have an impact on how the ETUQ responses can be used to generate measures of perceived ability to use ET. Such an impact could lead to biased measurement where the ETUQ appears to favour particular country groups. Therefore, evaluating such variation has implications for the validity and reliability of cross-country comparative assessments using the ETUQ since the person ability measures should be stable. Such an investigation would support the positioning of culturally relevant technology research within a shared age-friendly policy context.

Consequently, the aim of this study is to identify whether the country context (Sweden, U.S. and England), where public space ETs and ICTs are used by older adults, or having a diagnosis of dementia, impacts upon the level of challenge of those ETs. For any ETs that vary in challenge level, what is the proportional relevance of that ET to each subgroup? Further, do any country or diagnosis-specific differences impact upon the measures of person ability to use ET between countries?

Materials and methods

A cross-sectional study design was used to compare ETUQ data from three participant groups recruited in Sweden, the U.S. and England. These groups included people with and without a diagnosis of mild stage dementia. ETUQ data comparisons were made using descriptive statistics and modern test theory [26].

Participants

Table 1 shows the descriptive characteristics of the 315 participants, recruited in three different countries between August 2015 and November 2017; Sweden (n = 73), the U.S. (n = 114) and England (n = 128). All the U.S. participants were sampled by convenience from a community centre for older adults in a suburban area of Chicago. Participants in Sweden were recruited within three municipalities of Stockholm county, which included both urban and suburban contexts. In England, participants were recruited in London, Greater Manchester (comprising urban and suburban contexts) and Cumbria (mostly rural). Participants with a diagnosis of dementia were recruited through memory investigation units or memory services in Sweden and England (n = 99). The remainder (purposively sampled in Sweden and England as 'having no known cognitive impairment' n = 102) were recruited through a variety of strategies tailored to each socio-cultural context; e.g. via word of mouth, recruitment flyers in public places (libraries, doctors surgeries, town halls and places of worship), presentations about the research given to community social, activity or religious groups. Additional studies relating to each country-specific sample have been published separately [20,27,29].

Instrument and data collection

The MoHO underpins the development of the ETUQ, which fundamentally seeks to capture a person's perceived fit to the technological aspects of their environment [2,15]. Occupational therapists can currently

administer this questionnaire in one of four available languages (Swedish, Norwegian, English and Danish), after a one-day training course. The training focuses on ensuring that administration of the questionnaire is consistent and reliable and is given by the developers of the ETUQ in person or via the web. After updating the Swedish and US-English language versions of the ETUQ with new ET items (total 90+), the tool was adapted into British English [16]. The ETs included in the ETUQ are segregated into seven categories. The four categories of interest to this study were *information communication* (i.e. smartphone text message, tablet internet banking), and three which together comprise the designation of 'public space ET'; *accessibility* (i.e. entry code, lift), *economy and purchasing* (i.e. ATM, self-checkout), and *travel* (i.e. automated passport control, ticket machine). Administration of the questionnaire took approximately 30–45 min with experienced and trained researchers or research assistants in occupational therapy. Interviews took place in the participants' own homes or at another place of their choosing (e.g. community centre). All participants had the opportunity to have another person present for support and prompting as they wished, but not for proxy reporting. The questionnaire maps, first, the amount of ETs the person perceives as relevant, i.e. the ET is available to the person and; the person uses the ET, has used it in the past, or intends to use it in the future [16]. Second, each person's perceived ability to use those relevant ETs is rated on a five-step rating scale from; *the ET is used with no difficulties or hesitation (5)*, to; *the ET is not used anymore, or has not yet come into use, even if it is relevant (1)* [16].

Ethics

Approval for the data collection procedures was granted by the Stockholm regional ethics board (2010/5:2, 2010/120-31/5, 2017/4:3) in Sweden, the University of Illinois at Chicago's institutional review board in the U.S. (2016-0797), and the United Kingdom's Health Research Authority: South West – Frenchay Research Ethics Committee (IRAS project ID: 215654, REC reference: 17/SW/0091). All participants independently gave written informed consent to participate in their respective studies and were made aware of their right to withdraw from the study at any time. Participants were provided with written information to consider in advance and had opportunities to ask questions before agreeing to participate. With sensitivity to increased vulnerability and the possibility of impaired ability to give informed consent due to dementia, participants with a diagnosis of dementia had multiple opportunities to consider and discuss taking part.

Data analysis

Preliminary analysis

Based on the probability odds relating to the ordinal responses for each ET item, a Rasch model logarithmically transformed the raw scores into linear measures [30,31]. Expressed in 0-100 logits, the analysis simultaneously produced two generic sets of estimated measures for the full sample ($n = 315$); 'challenge measures' for each of the ET items, and ET 'ability measures' for each person. Only the 88 ETs common between the two Swedish and US-English ETUQ versions were included (text TV and washing machine booking system were removed as they were present only in the Swedish version). The calibrated level of challenge for each ETUQ item was located on a logit scale in relation to the challenge of other ETs in the sample. Similarly, each person's perceived ability to use ET had been calibrated and located in relation to the ability of other people in the sample. Furthermore, the logit scales for these two independent measures are common, meaning that the location of each ET item's challenge can be seen relative to each person's ability [26].

Primary analysis

The data were split into the three-country sub-groupings (Sweden $n = 73$, U.S. $n = 114$, England $n = 128$), and two diagnostic sub-groupings from only the Sweden and England data (no known cognitive impairment $n = 102$, mild dementia $n = 99$). As diagnostic information was not available for the U.S. subgroup and the wide-ranging MoCA scores indicated the possibility of underlying pathologies with consequential cognitive impairment, all of these 114 participants were excluded from the diagnostic subgroupings. A two-faceted Rasch model produced in WINSTEPS® [31], was then used to evaluate the stability of the ET challenge measures, first, between each country, and second, between each diagnostic subgroup, using a Differential Items Functioning (DIF) analysis. Rasch models are designed to handle large amounts of missing data, which is an intentional by-product of the ETUQ as the tool seeks to map only those ETs which are relevant to individual respondents [2].

Table 2. DIF contrasts in ET challenge level, showing which technologies were relatively easier or harder to use by country. Evaluated with the Welch's paired t-test and Mantel Chi-Square with adjusted significance level of $p < 0.01$.

Item	Country contrast		DIF (logits)	Welch t-statistic, p Value	Mantel Chi Sq statistic, p Value
	Easier	Harder			
Cash machine/ATM	U.S.	Swe	6.39	$-2.81, p < 0.01$	$10.30, p < 0.01$
		Eng	5.87	$-2.79, p < 0.01$	$11.46, p < 0.001$
Automatic ticket gate	Swe	Eng	5.86	$-3.18, p < 0.01$	$10.28, p < 0.01$
Self-check-in kiosk	U.S.	Swe	6.14	$-3.75, p < 0.001$	$13.75, p < 0.001$
	Eng		5.59	$-3.75, p < 0.001$	$7.14, p < 0.01$
Baggage drop-off	U.S.	Swe	9.26	$-4.34, p < 0.001$	$12.67, p < 0.001$
Petrol/gas pump	U.S.	Swe	5.52	$-2.70, p < 0.01$	$6.85, p < 0.01$

Swe: Sweden; U.S.: United States of America; Eng: England.

DIF identifies whether an item contributes to measuring the abilities of groups of people in different ways, i.e. the item is relatively more easy or difficult to use between groups. Central to the Rasch model is that individuals with the same ability to use ET will share the same likelihood of rating an item on a given scale step regardless of the country or diagnostic group the individual belongs to. Allowing for measurement error, each item is intended to measure the same ability across groups. Therefore, the impact of DIF at the scale level, relating to the person ability measures generated by group is an important consideration for the validity of the ETUQ. Consequently, country- and diagnosis-specific person measures of ability to use ET were generated for each of the three country (Sweden, U.S. and England), and two diagnostic sub-groups (dementia, no known cognitive impairment).

The evaluation of DIF used the Welch's paired t-test of the difference between the challenge measures based on the standard errors of the measures. The null hypothesis is that the measures are the same between sub-groups, except for measurement error. As the Welch procedure is suitable for use when score frequencies are low due to large amounts of missing data, but less suitable for small samples (<200 per subgroup), the Mantel Chi-Square statistic was also evaluated. Items that displayed DIF in the Welch t-test were subsequently therefore also evaluated with the Mantel Chi-Square statistics. To reduce the risk of DIF by chance, an adjusted significance level of $p < 0.01$ was used in both tests. To support the validity of the ETUQ for the purposes of invariance in the ET challenge hierarchy between subgroups, it is generally desirable that no more than 5% of the total 88 items should demonstrate DIF [30]. However, the DIF analysis also provides the possibility to learn about the bias and variation of ETs' challenge level in different countries and is central to this exploratory investigation [26].

For supplementary analysis, the proportions of specific ET relevance for each country and diagnostic subgroup are presented and compared using the Chi-Square test with $p < 0.05$ for each item displaying DIF.

Lastly, the impact of DIF on these country- and diagnosis-specific person measures was evaluated using Differential Test Functioning (DTF). This procedure compares the z-scores of the standard errors of each person's country-specific ability measure, with the z-scores of the standard errors for each person's generic ability measure [14,32]. Comparative z-scores of more than ±1.96 would demonstrate a significant difference in how the ETUQ measures the ability of that person, and therefore difference is allowable for maximum of 5% of the total sample ($n = 315$).

Results

Results of the DIF analysis by country

Nine ET items (10.2%, $n = 88$) across the ETUQ demonstrated statistically significant DIF by country according to the set criteria. Of those nine items, five were public space ET items (31.3% of 16 public space ETs) and none were ICTs (0% of 41 ICTs) (shown in Table 2). This evidence of DIF indicated that the cash machine (ATM) was relatively more challenging to use by the group from Sweden (+6.39 logits) and England (+5.87 logits) in comparison to the group from the U.S. This coincided with the cash machine being reported relevant by a significantly lower proportion of the U.S. subgroup (64.0%, $p < 0.001$) compared to the subgroups from Sweden (90.4%) and England (92.2%) (refer to Figure 1). Automatic ticket gates appear relatively more challenging to use by the group from England (+5.86 logits) than participants from the U.S. This ticket gate was relevant to a larger proportion of the group from Sweden (82.2%, $p < 0.001$) compared to the U.S. (57.0%) and England (55.5%). The self-check-in kiosk was found to be relevant in similar proportions and relatively more challenging in Sweden (48.0%) than the U.S. (36.0%, -6.14 logits) and England (35.9%, -5.59 logits).
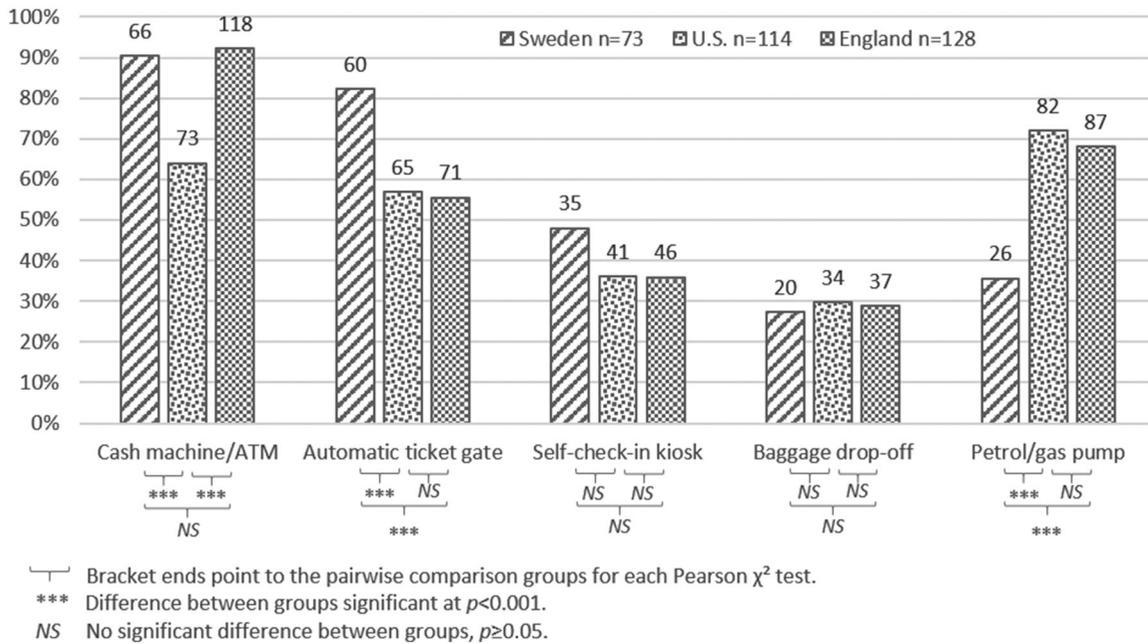
Figure 1. Comparison of the proportional relevance of DIF displaying ETs between country subgroups.

Table 3. DIF contrasts in ET challenge level, showing which technologies were relatively easier or harder to use by diagnosis. Evaluated with Welch's paired t-test and Mantel Chi-Square with adjusted significance level of $p < 0.01$.

| Item | Diagnosis contrast | | DIF (logits) | Welch t-statistic, p Value | Mantel Chi Sq statistic, p Value |
	Easier	Harder			
Word processing - computer	NKCI	MD	3.91	$-2.71, p < 0.001$	12.54, $p < 0.001$
Web searching - computer	NKCI	MD	4.44	$-2.85, p < 0.01$	11.30, $p < 0.001$
Internet banking - computer	NKCI	MD	5.62	$-2.92, p < 0.01$	14.15, $p < 0.001$

NKCI: no known cognitive impairment; MD: mild dementia

So too were the baggage drop-off (+9.26 logits) and petrol/gas pump (+5.52 logits) relatively more challenging for the subgroup from Sweden than the subgroup from the U.S. The bag drop-off coincided with approximately even proportions of relevance between groups (~28%). Whereas the high challenge of the gas pump coincided with lower proportional relevance among the subgroup from Sweden (35.6%, $p < 0.001$) compared to the U.S. (71.9%) and England (68.0%) subgroups.

### Results of the DIF analysis by diagnosis

All three ET items (3.4%, $n = 88$) that displayed evidence of DIF by diagnosis are shown in Table 3. The three items related to the computer and were shown to be statistically, relatively more challenging for the subgroup of people with mild dementia than the subgroup with no known cognitive impairment; word processing (−3.91 logits), conducting a web search (−4.44 logits) and internet banking (−5.62 logits). Respectively; word processing, web searching, and internet banking were reported relevant by a

significantly lower proportion of the group with dementia (41.4%, 48.5% and 28.3%) compared to the group with no known cognitive impairment (68.6%, $p < 0.001$; 74.5%, $p < 0.001$; 53.9%, $p < 0.001$) (refer to Figure 2).

Results of the DTF analysis and subgroup comparisons of perceived ability to use ET

In the DTF analysis comparing the z-scores of the standard errors in person measures between the generic and country-specific heirarchies; no individual z-score exceeded ±1.96. Consequently, none of the 315 participants' ability to use ET was evaluated as being changed substantially by the impact of country DIF, or DIF by diagnosis.

Table 4 shows person ability measures and how they overlapped between country subgroups. The group from England were shown to have significantly lower perceived ability to use ET (median 52.30 logits, IQR 5.53 logits) than the subgroups from Sweden (median 56.98 logits, IQR 7.90 logits, $H(2)=86.93$, $p < 0.001$) and the U.S. (median 56.40, IQR 6.35
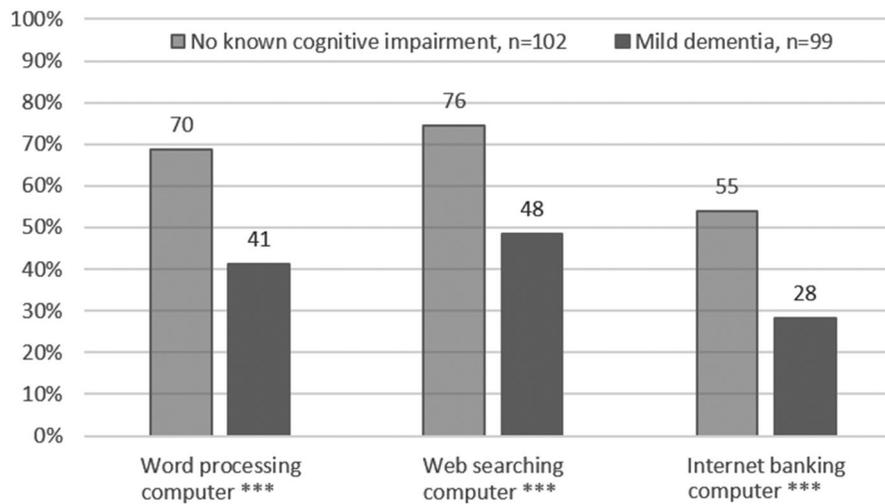
*** Difference between groups in the Pearson χ^2 test significant at $p<0.001$.

Figure 2. Comparison of the proportional relevance of DIF displaying ETs between diagnostic subgroups.

Table 4. Median person ability scores and interquartile ranges for each country and diagnostic subgroup, compared for statistical differences.

Subgroup	n	Median ability (logits)	Interquartile range	Comparison test
Sweden	73	56.98	7.90	Kruskal–Wallis and Dunn's pairwise test
U.S.	114	56.40	6.35	Swe vs. Eng $H(2) = 81.38$, $p < 0.001$
England	128	52.30	5.53	U.S. vs.Eng $H(2) = 86.93$, $p < 0.001$
				Swe vs. US $H(2) = -5.55$, NS
No known cognitive impairment	102	56.21	5.69	Mann–Whitney U Test
Mild dementia	99	50.83	5.23	$U = 1536.5$, $p < 0.001$

Swe: Sweden; U.S.: United States of America; Eng: England.

logits, $H(2)=81.38$, $p < 0.001$), whose ability measures were statistically similar ($H(2)= -5.55$, $p\geq 0.05$).

Table 4 also shows that the perceived ability to use ET of the subgroup of people with mild dementia was seen to be statistically significantly lower (median 50.83 logits, IQR 5.23 logits) than the subgroup with no known cognitive impairment (median 56.21 logits, IQR 5.69 logits, $p < 0.001$).

Discussion

The majority of 88 ETs did not demonstrate DIF either between countries or diagnoses, and these minority of ETs that did show evidence of DIF had no impact on the individual ability scores in the DTF analysis. These findings continue to support the use of the ETUQ internationally among older adults with and without cognitive impairments. This adds to the body of knowledge that the hierarchy of items, while changing over time, is perceived to be generally stable by diverse groups of people [5,6,32] in different countries. As such, the hierarchy can be used to identify ETs, both at home and in public space that may present higher challenge to older adults. Giving attention to more challenging ETs provides an opportunity to consider inclusive design principles, which may vary by international context, and ultimately to support the development of more useable technologies that suit a broader range of people.

While only a minority of ETs overall showed evidence of DIF, the proportion this minority represented in the analysis of DIF by country (10.2%) exceeded the accepted 5% limit, while the proportion in the DIF by diagnosis (3.4%) fell within the accepted limit. As such, this minority of public space ETs and ICTs highlighted by each analysis provide opportunities to explore and consider the implications for occupational therapy practice. Primarily, the MoHO has been used to facilitate a view of how the social, political and physical contexts may be influencing the match between users' abilities and environmental demands [15]. The MoHO's assumptions have been applied to support the utility of the discussion and to highlight anticipated consequences to, and practical suggestions for optimizing occupational performance.

Discussion of DIF by country

Most ETs did not show evidence of DIF according to the country that participants lived in. Participants with equivalent ability to use ET did respond

differently to five, from a possible 16 public space ET items according to country, whereas none of the ICTs (maximum 41) displayed country DIF. This means each of those five public space ETs has been shown to be statistically relatively more, or relatively less challenging according to the country the participants lived in.

These differences in challenge may be a consequence of each country subgroup being located within different phases of a common societal shift, e.g. 'cashless societies', causing adjustments to the frequency of routines that would then impact the technological interaction i.e. with the ATM. As advancement to a cashless society may have progressed less for the subgroup in the US [33] so the ATM may be more frequently used by that lower proportion of the subgroup who perceive the ATM relevant. According to MoHO, a higher frequency of use may lead to increased familiarity and skills using the specific technology, this may explain the differential in relative challenge level compared to Sweden and England [15,34]. The significantly lower proportional relevance of the ATM among the US subgroup (64%, compared to 90.4% Sweden and 92.2% England) may relate to the continued preference for, and availability of, in-bank services nationally [35].

It could be considered too that design features, known to impact the level of challenge when used [25,36], vary between countries more commonly within the public space categorization of ETs, than for ICTs. This provides opportunities to learn from which design features, more prevalent perhaps in one country than another, may enhance the technology's relevance to the user, and ultimately also reduce its level of challenge when used (e.g. payment terminals unique to each petrol pump, secure vestibule entry to an ATM).

Furthermore, differences in the diffusion of technology and the availability of face-to-face alternatives (i.e. pay-at-the-pump systems) may influence perceptions of the ET under question in each country subgroup leading to DIF. If such technologies are unequally diffused, then from the perspective of MoHO, the respondents may not be similarly habituated to the technologies [15]. Consequently, they may perceive fundamentally different ETs as the subject of the question (i.e. the petrol dispensing hose and trigger, versus the petrol pump selection and payment machine). Rather than unequal diffusion of technologies, it could be that the country subgroups do not similarly participate in the activities (i.e. travelling by private car, plane or public transport) that the

technologies (i.e. petrol pump, automatic check-in, ticket gates) are used for. This would also lead to unequal habituation of use, impacting technologies' challenge level and/or relevance [15,35]. The match between perceptions of use and relevance, and the environmental demands may be further influenced by differences between each country's context (i.e. travel infrastructures, or societal attitudes to travel influenced by wider considerations such as climate change).

The ETUQ intends to measure the unidimensional construct of perceived ability to use ET, also known as the primary dimension, which should be common to all ET items [2,26]. While it is accepted that items often measure other secondary dimensions (e.g. technologies that also require cognitive management of distractions, or social expectations and conventions in public places), only a minority of items should be involved in the measurement of each additional dimension [37]. Evidence of DIF can be considered indicative of the presence of a secondary dimension [37], and since the DIF is concentrated within the public space categorization of ETs, it is prudent to explore the possibility of systematic inter-country differences in the public space environment. This indication also follows a study based on Japanese data that could not conclude evidence of unidimensionality of the ETUQ for use in Japan [14]. In that study, a principal component analysis identified public space and ICT items may be contributing to 2.8% of the variance as a secondary dimension [14]. Linked to this, a cluster analysis found that more pronounced difficulties in managing technology were particularly linked to environmental context, and disproportionately affected the performance of those study participants who had cognitive impairments, affecting fewer of those without [38]. Empirical evidence identifying the specifics of environmental influence is scant; however, an experiment involving 40 participants with a mean age of 73, showed that attentional task performance was worse in a distracting environment [39].

As a general exploration then, perhaps one such distraction lies within the social interactionist nature of public space ET use. In this context, a personal encounter with technology becomes a tool that externally communicates an individual's performance skills, and the outcome of the performance confirms or disconfirms self-image to others. Goffman describes 'face' as the efforts people make to sustain positive images of themselves in front of others [40]. For everyone who witnesses a technological encounter which disconfirms a person's self-image, feelings and

face management strategies are a consequence, and are defined by the rules of the group, interdependent on wider social norms [40]. Across international contexts, people living in different countries to some degree develop country-specific social expectations, rules and face management strategies for negotiating problematic situations in public [41,42]. From these unequal country-specific conditions, perhaps unequal emotional labour is exerted, particularly when the encounter with the public space ET feels more scrutinized (i.e. ATM compared to the relative privacy of a lift/elevator). This may be part of the explanation for why some public space ETs – perhaps those where societal considerations may be more proximate and influential to the interaction – show evidence of DIF in the relative challenge between Sweden, England and the U.S. However, more in-depth qualitative enquiries could clarify whether people consider face management strategies an issue in public space technological interactions.

That ICTs do not appear to have evidence of DIF by country could be more an expression of the ecological nature of the ETUQ. As the interview takes place in a person's home, this may be the natural environmental situation that is recalled for ICT use and therefore the context for reflections on ability. As an example of a less pressing environment [15], the home is likely to be more conducive to technology use than public places. Less press would result from expectations at home tending to be habituated and self-initiated, and distractions being regularized and more modifiable. However, some older adults in the sample may exclusively be accessing and using ICTs in public places (i.e. computer at the library) and the nature of portable ICTs is that they are designed for use in multiple environments. This could impact reporting, since a mobile phone could be recorded as relevant but not used at home, while further discussion may have revealed the mobile was important to the person's feelings of security in public. Furthermore, such reports may alter according to the purpose of use, since making a call to a family member may be less challenging for some people to do than calling to book a health care appointment [43]. As a consequence it should not be assumed from the results of this study that ICTs are equally as challenging to use within the home as outside it, nor that there is a certain lack of inter-country variation. Given the societal impulsion for individuals to use mobile and e-services, further studies are needed to explore the relationship between ICT challenge, context for use and purpose for use. Such knowledge could i) contribute to a better understanding of how ICTs are influencing occupation, and ii) support improved evaluation of the potential to enable people's continued engagement.

Discussion of DIF by diagnosis

Evidence of DIF by diagnosis was shown for three ETs (3.4%, $n = 88$), all of which were ICTs (7.3%, $n = 41$), indicating these technologies were relatively more challenging for the group of people with dementia to use than the group with no known cognitive impairment. Since there was no evidence of DIF within the public space categorization of ETs, these items' level of challenge seems statistically consistent between the group of people with dementia in comparison to the group without known cognitive impairment. This minimal level of DIF and general stability in the level of relative challenge of all ETs compared between the two diagnostic groups, indicates that the ETUQ allows for more accurate discrimination of abilities between individuals and groups.

The evidence of DIF found for web searching, word processing and internet banking functions on a computer indicates these functions may be disproportionately more challenging to people with dementia than to people without cognitive impairment. While computers can be used for a range of occupations, their functions have been at the top of the hierarchy since their inclusion in the ETUQ [5,6,34]. This even higher ranking of challenge perceived by the group with dementia could reflect the sensitivity of these more challenging computer functions to discriminate the declining abilities of this group to use ET.

While the group with dementia had an overall lower ability to use ET, there was no evidence of DIF among these items to create a disordering in the hierarchy of ETs' challenge. Previous findings on data using the updated ETUQ with this study's same group of participants from Sweden have presented the item hierarchy to show how particularly public space ETs and ICTs compare in their level of challenge to one another [20,29]. This study, with the addition of 242 participants from England and the U.S., further indicates the reliability and stability of this hierarchy to discriminate between the abilities of groups with and without dementia. This study also provides further evidence that smartphone functions are as challenging or less challenging to use than those on a push-button mobile. This is an important finding to consider when popularly push-button mobiles may be thought of by family members, friends or the older

person (with or without dementia) themselves as the easier to use device. Consequently, ongoing research is necessary to maintain contemporary knowledge of older adults' interactions with ET, particularly since it is popularly assumed that the subsequent generations will outgrow difficulties in using technology [44]. As the technological environment continuously evolves, so too do older adults' perceptions of their abilities or difficulties in interacting with ETs.

Methodological discussion

Men and women were recruited in unequal proportions between countries. Although an earlier study provided evidence that the ETUQ does not demonstrate any evidence of DIF by gender [32], generic conclusions related to similarities/differences in ET use between countries should still be made with caution. The intention to comprise equal subgroups of people living with mild dementia and people with no known cognitive impairment between the groups from Sweden and England was broadly achieved. This was not the intention in the U.S. sample.

As part of the interview, all participants (with the exception of six from the U.S.) completed the Montreal Cognitive Assessment (MoCA), which facilitated descriptive comparison of cognitive function between country subgroups. This tool takes approximately 10 minutes to administer, and was selected on the basis of evidence indicating its suitability and sensitivity for detecting early cognitive decline [28]. Although the participants from the U.S. were not purposefully sampled for a diagnosis of dementia, their MoCA scores varied similarly to the participants from Sweden and particularly England, with an interquartile range of 21–26. This supports the comparisons made between country subgroups, indicating that findings may be less biased by the presence of cognitive impacts on ET use.

This study has taken a conservative approach to identifying DIF, which reduces the potential for errors in over-identifying evidence of DIF where in fact, none is there (type I error). However, this also increases the risk in the opposite direction, that no evidence of DIF is identified, where there may be some (type II error). Furthermore, no technique is immune to sample size, which can become problematically small (<10) if a large proportion of sub-group responses against an item are recorded as not relevant, therefore creating missing data [45]. For example, a smartphone is listed for 11 separate functions meaning there will be 11 data points missing for each person for whom this device is not relevant.

This scenario is more likely particularly for the diagnostic sub-groupings, since groups of people with dementia have repeatedly been shown to report fewer, particularly public space ETs and ICTs as relevant [20,29]. As a consequence, the results displayed here should be treated as an estimation, and the possibility of more or less DIF items by country and by diagnosis using the ETUQ cannot be ruled out. More validation studies with the updated ETUQ requiring larger sample sizes on all items may, therefore, be needed. However, the negligible impact that these DIF-displaying ETs have on the country-specific person measures compared to the generic person measures, supports the stability of the person hierarchies, and the validity of the measures produced from the ETUQ data. This is an important finding contributing to the psychometric properties of the current update of the ETUQ, and supports the questionnaire's suitability and utility for occupational therapy practice and research internationally.

With regard to international use of the ETUQ, this inter-country comparison has been conducted with non-randomized samples drawn from localized areas in the three countries. As such, results should not be considered representative of each intra-country population. However, all participants have been drawn from countries generically classified as high-income countries [11]. While this adds to the body of knowledge generated using the ETUQ in other high-income countries (Sweden [2,7–9], Japan [14,46], Portugal [13], Denmark [12], US [27]), the presence of DIF between relatively similar economic contexts indicates that it is not advisable to generalize these results to low and middle-income countries (LMICs). As ET continues to permeate and become ubiquitous in daily life globally, it is important to investigate the validity and utility of the ETUQ in LMICs. Mobile phones especially are being extensively adopted for everyday use, notably in Uganda where such technologies are under investigation for their potential to meet unmet occupational therapy needs [47]. Using the ETUQ in research that investigates the challenge and use of ETs in LMIC contexts is therefore recommended to increase the representativeness and applicability of knowledge about how ETs support or hinder daily life activities internationally.

Conclusions and significance

The ETUQ is a suitable tool for mapping clients' interactions with the technological environment in different countries, provided the inventory of items

reflects the environment in a country. While using the questionnaire, it may be useful to check any assumptions, and ensure there is a clear and common perception of the ET under discussion with a client (i.e. the petrol pump selection, payment machine or the petrol dispenser). It may also be useful to probe the contexts of use particularly for ICT devices, since the response recorded within the ETUQ may differ accordingly. Both public space and country contexts may affect technology use, potentially increasing the complexity and demands on the user. So practitioners must consider the environment where public space ETs and ICTs are intended for use. Additionally, the disproportionately higher level of challenge found for three ICT functions implies that rehabilitative interventions to restore use may not be ethically appropriate. The person may be deliberately choosing to, or may require sensitive approaches and support to adapt their habits in the technological environment to match their changing abilities.

There may be choices to be made between different public space ET designs; whether these are choices for the user or choices for the procurer of the technology. Occupational therapists can support those choices, by utilizing the MoHO to consider the interplay between the design of objects and the wider societal context [15]. For example, by raising awareness of the more enabling features of particular designs, and the enabling features of the wider context in which the ET is sited. Such awareness-raising could be useful both for individual clients and for people that are responsible for selecting such technologies and the sites for them in public places. By collaborating with designers and service planners at the societal level inclusive changes could be made to the technological environment. Such attention would support the inclusive objectives of country-specific age- and dementia-friendly initiatives. Achieving these objectives stands to benefit more vulnerable people in the community regardless of age and disability.

On an individual or group practice level, occupational therapists who are aware of systemic societal shifts, like the 'cashless society' can support their clients to transition their routines and remain included in a changing society. Furthermore, the ET hierarchy can be used to target, perhaps even non-relevant, as well as relevant and appropriately challenging ETs that are needed in daily life for intervention with clients [20,48].

Occupational therapists have a significant role to play in supporting older people, including those with dementia in their personal habits with technological devices. Each country's context is not mono-cultural, nor are the people homogenous. As such, people's unique needs to save face in technological interactions could influence intervention approaches. This may relate particularly to public space ETs where the presence of other people may affect people's willingness to interact with an ET they encounter.

Finally, while the technological environment evolves and new designs become more personalizable and customizable, people's ideas about technology may be slower to react. Furthermore, while they constantly evolve, negative attitudes towards older adults and particularly people with dementia prevail around the world [49]. The occupational therapy profession may, therefore, need to question misguided assumptions among some clients or their social circle, regarding the level of challenge of different technologies. Addressing outdated or stigmatizing beliefs about technologies and the people that use them could be part of ensuring that modifications to a person's technological environment are person-centred and evidence-based.

Acknowledgements

Disclosure statement

The authors report no conflict of interest.

Funding

ORCID

Sarah Wallcook http://orcid.org/0000-0002-8861-7552
Camilla Malinowsky http://orcid.org/0000-0002-6938-5282
Louise Nygård http://orcid.org/0000-0003-1813-7390
Georgina Charlesworth http://orcid.org/0000-0002-5278-1756
Ryan Walsh http://orcid.org/0000-0001-5872-9548
Sophie Gaber http://orcid.org/0000-0001-5804-0433
Anders Kottorp http://orcid.org/0000-0002-8976-2612

References

[1] Rosenberg L, Kottorp A, Winblad B, et al. Perceived difficulty in everyday technology use among older

adults with or without cognitive deficits. Scand J Occup Ther. 2009;16(4):216–226.

[2] Rosenberg L, Nygård L, Kottorp A. Everyday technology use questionnaire: psychometric evaluation of a new assessment of competence in technology use. OTJR: Occup Particip Health. 2009;29(2):52–62.

[3] Nygård L, Pantzar M, Uppgard B, et al. Detection of activity limitations in older adults with MCI or Alzheimer's disease through evaluation of perceived difficulty in use of everyday technology: a replication study. Aging Mental Health. 2012;16(3):361–371.

[4] Nygård L, Starkhammar S. The use of everyday technology by people with dementia living alone: mapping out the difficulties. Aging Ment Health. 2007; 11(2):144–155.

[5] Hedman A, Kottorp A, Almkvist O, et al. Challenge levels of everyday technologies as perceived over five years by older adults with mild cognitive impairment. Int Psychogeriatr. 2018;30(10):1447–1454.

[6] Malinowsky C, Kottorp A, Patomella AH, et al. Changes in the technological landscape over time: relevance and difficulty levels of everyday technologies as perceived by older adults with and without cognitive impairment. Technol Disabil. 2015;27(3): 91–101.

[7] Hällgren M, Nygård L, Kottorp A. Technology and everyday functioning in people with intellectual disabilities: a rasch analysis of the everyday technology use questionnaire (ETUQ). J Intellect Disabil Res. 2011;55(6):610–620.

[8] Fallahpour M, Kottorp A, Nygård L, et al. Perceived difficulty in use of everyday technology in persons with acquired brain injury of different severity: a comparison with controls. J Rehabil Med. 2014; 46(7):635–641.

[9] Ryd C, Nygård L, Malinowsky C, et al. Associations between performance of activities of daily living and everyday technology use among older adults with mild stage Alzheimer's disease or mild cognitive impairment. Scand J Occup Ther. 2015;22(1):33–42.

[10] Malinowsky C, Kottorp A, Wallin A, et al. Differences in the use of everyday technology among persons with MCI, SCI and older adults without known cognitive impairment. Int Psychogeriatr. 2017;29(7):1193–1200.

[11] World Bank Country and Lending Groups [Internet]. Washington (DC): World Bank Group; 2019 [cited 2019 Aug 13]. Available from: https:// datahelpdesk.worldbank.org/knowledgebase/articles/ 906519-world-bank-country-and-lending-groups.

[12] Kaptain RJ, Kottorp A, Patomella AH, et al. Inter-rater and test-retest reliability of the Danish version of the everyday technology use questionnaire. Scand J Occup Ther. 2019;26(3):226–234.

[13] Patomella AH, Kottorp A, Ferreira M, et al. Everyday technology use among older adults in Sweden and Portugal. Scand J Occup Ther. 2017;7: 1–10.

[14] Malinowsky C, Kottorp A, Tanemura R, et al. Validation of the everyday technology use questionnaire in a Japanese context. Hong Kong J Occup Ther. 2015;26(1):1–8.

[15] Kielhofner G. A Model of human occupation: theory and application. 4th ed. Baltimore (MD): Lippincott Williams & Wilkins; 2008.

[16] Nygård L, Rosenberg L, Kottorp A. Users manual: everyday technology use questionnaire, English version. Solna, Sweden: Stockholm Karolinska Institutet; 2016.

[17] World Health Organisation. Global diffusion of eHealth: making universal health coverage achievable - report of the third global survey on eHealth [Internet]. Geneva, Switzerland: World Health Organisation; 2016. p. 160. [cited 2019 Aug 13]. Available from: https://apps.who. int/iris/bitstream/handle/10665/252529/978924 1511780-eng.pdf;jsessionid=104437B57A82062A3C0ACA6396 41CD66?sequence=1.

[18] OECD. OECD comparative study: digital government strategies for transforming public services in the welfare areas [Internet]. Paris: OECD Publishing; 2016. p. 63. [cited 2019 Aug 13]. Available from: http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf.

[19] Olsson T, Viscovi D, Hannu N, et al. Remaining divides: access to and use of ICTs among elderly citizens. In: Kramp N, Carpentier A, Hepp A, editors. Politics, civil society and participation: media and communications in a transforming environment. Bremen, Germany: Edition Lumière; 2016. p. 273–288.

[20] Wallcook S, Nygård L, Kottorp A, et al. The use of everyday information communication technologies in the lives of older adults living with and without dementia in Sweden. Assist Technol. 2019;Aug:8. [cited 2019 Aug 30];

[21] Hedman A, Nygård L, Almkvist O, et al. Amount and type of everyday technology use over time in older adults with cognitive impairment. Scand J Occup Ther. 2015;22(3):196–206.

[22] Prince M, Wimo A, Guerchet M, et al. World Alzheimer report 2015: the global impact of dementia - an analysis of prevalence, incidence, cost and trends [Internet]. London: Alzheimer's Disease International (ADI); 2015. p. 87. [cited 2019 Aug 13]. Available from: https://www.alz.co.uk/research/ WorldAlzheimerReport2015.pdf.

[23] European Commission. European scaling-up strategy in active and healthy ageing [Internet]. Luxembourg: European Commission; 2015. p. 36. [cited 2019 Aug 13]. Available from: https://ec.europa.eu/research/ innovation-union/pdf/active-healthy-ageing/scaling_ up_strategy.pdf

[24] World Health Organization. The global network for age-friendly cities and communities [Internet]. Geneva, Switzerland: World Health Organization; 2018. p. 44. [cited 2019 Aug 13]. Available from: https://www.who.int/ageing/gnafcc-report-2018.pdf.

[25] Patomella AH, Kottorp A, Nygård L. Design and management features of everyday technology that challenge older adults. Br J Occup Ther. 2013;76(9): 390–398.

[26] Bond TG, Fox CM. Applying the Rasch model fundamental measurement in the human sciences. 2nd ed. New York (NY): Routledge; 2007.

[27] Walsh R, Drasga R, Lee J, et al. Activity engagement and everyday technology use among older adults in an urban area. Am J Occup Ther. 2018;72(4): 7204195040p1–7204195040p7.

[28] Nasreddine ZS, Phillips NA, Bedirian V, et al. The Montreal cognitive assessment, MoCA: a brief screening tool for mild cognitive impairment. J Am Geriatr Soc. 2005;53(4):695–699.

[29] Gaber SN, Nygard L, Brorsson A, et al. Everyday technologies and public space participation among people with and without dementia. Can J Occup Ther. 2019;86(4):400–441.

[30] Linacre JM. Winsteps® Rasch measurement computer program user's guide. Beaverton (OR): Winsteps.com.; 2019.

[31] Linacre JM. Winsteps – Rasch model computer program [software]. Version 3.92.1 Beaverton (OR): Winsteps.com.; 2017. Available from: www.winsteps.com.

[32] Kottorp A, Malinowsky C, Larsson-Lund M, et al. Gender and diagnostic impact on everyday technology use: a differential item functioning (DIF) analysis of the Everyday Technology Use Questionnaire (ETUQ). Disabil Rehabil. 2019;41(22):2688–2694.

[33] Thomas H. Measuring progress towards a cashless society: exclusive insights from MasterCard advisors [Internet]. Purchase (NY): Mastercard; 2013. p. 3. [cited 2019 Aug 13]. Available from: https://newsroom.mastercard.com/wp-content/uploads/2014/08/MasterCardAdvisors-CashlessSociety-July-20146.pdf.

[34] Patomella AH, Kottorp A, Malinowsky C, et al. Factors that impact the level of difficulty of everyday technology in a sample of older adults with and without cognitive impairment. Technol Disabil. 2011;23(4):243–250.

[35] Board of Governors of the Federal Reserve System. Consumers and mobile financial services 2015 [Internet]. Washington (DC): Federal Reserve Board; 2015. p. 78. [cited 2019 Aug 13]. Available from: https://www.federalreserve.gov/econresdata/consumers-and-mobile-financial-services-report-201503.pdf.

[36] Malinowsky C, Almkvist O, Nygard L, et al. Individual variability and environmental characteristics influence older adults' abilities to manage everyday technology. Int Psychogeriatr. 2012;24(3):484–495.

[37] Roussos LA, Stout W. Differential item functioning analysis: detecting DIF items and testing DIF hypotheses. In: Kaplan D, editor. The SAGE handbook of quantitative methodology for the social sciences. Thousand Oaks (CA): SAGE Publications Inc.; 2004. p. 108–117.

[38] Malinowsky C, Fallahpour M, Lund ML, et al. Skill clusters of ability to manage everyday technology among people with and without cognitive impairment, dementia and acquired brain injury. Scand J Occup Ther. 2018;25(2):99–107.

[39] Rodrigues PFS, Pandeirada J. Attention and working memory in elderly: the influence of a distracting environment. Cogn Process. 2015;16(1):97–109.

[40] Goffman E. On face-work. Psychiatry. 1955;18(3): 213–231.

[41] Hofstede G. Dimensionalizing cultures: the Hofstede model in context. Online Read Psychol Cult. 2011; 2(1):26.

[42] Ting-Toomey S. The matrix of face: an updated face-negotiation theory. In: Gudykunst WB, editor. Theorizing about intercultural communication. Thousand Oaks (CA): Sage; 2005. p. 71–92.

[43] Jakobsson E, Nygård L, Kottorp A, et al. Experiences from using eHealth in contact with health care among older adults with cognitive impairment. Scand J Caring Sci. 2019;33(2):380–389.

[44] Wandke H, Sengpiel M, Sönksen M. Myths about older people's use of information and communication technology. Gerontology. 2012;58(6):564–570.

[45] Bernstein I, Samuels E, Woo A, et al. Assessing DIF among small samples with separate calibration t and Mantel-Haenszel χ^2 statistics in the Rasch model. J Appl Measur. 2013;14(4):389–399.

[46] Malinowsky C, Nygård L, Tanemura R, et al. Everyday technology use among older adults in Sweden and Japan: a comparative study. Scand J Occup Ther. 2018;25(6):446–456.

[47] Kamwesiga JT, Eriksson GM, Tham K, et al. A feasibility study of a mobile phone supported family-centred ADL intervention, F@ce^{TM}, after stroke in Uganda. Global Health. 2018;14(1):82.

[48] Kassberg AC, Prellwitz M, Malinowsky C, et al. Interventions aimed at improving the ability to use everyday technology in work after brain injury. Scand J OccupTher. 2016;23(2):147–157.

[49] World Health Organization. Global action plan on the public health response to dementia 2017–2025 [Internet]. Geneva: World Health Organization; 2017. p. 27. [cited 2019 Aug 13]. Available from: https://apps.who.int/iris/bitstream/handle/10665/259615/9789241513487-eng.pdf?sequence=1.