

# Understanding Gerontechnology Acceptance by Elderly Hong Kong Chinese: A Senior Technology Acceptance Model (STAM)

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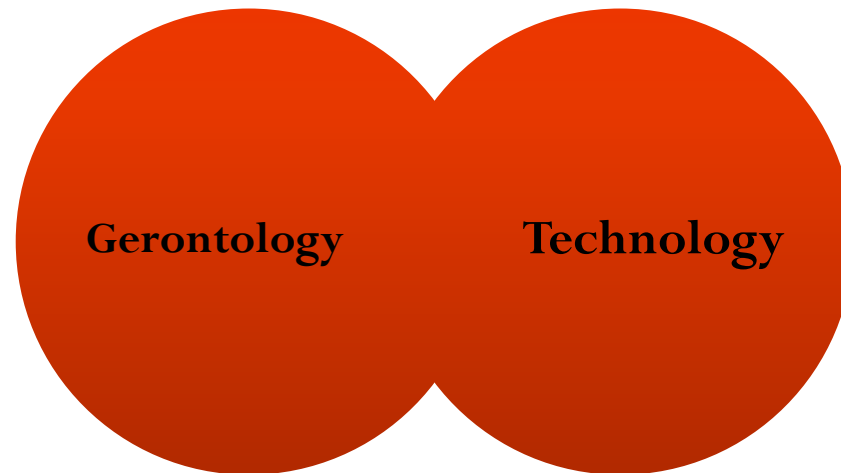
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- I. Introduction
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# Gerontechnology



- Gerontechnology aims to apply **technology** for dealing with problems and difficulties arising from ageing so as to give older people the chance to lead lives that are **healthier**, more **independent**, and more **socially engaging** on a continual basis (Fozard, Rietsema, Bouma, & Graafmans, 2000; Lesnoff-Caravaglia, 2007).

# Definition of technology acceptance

- **Technology Acceptance**

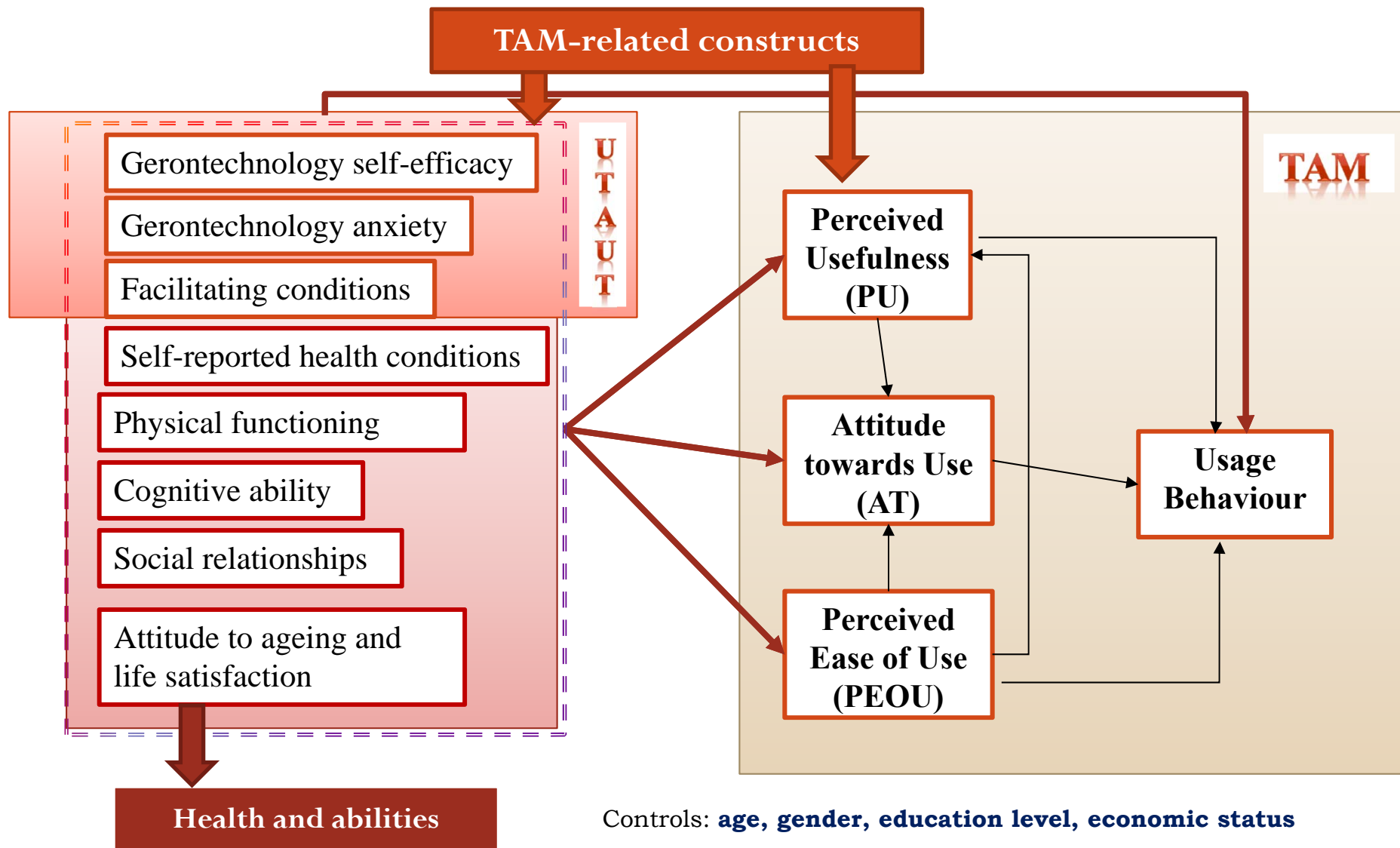
“the **approval, favorable reception** and **ongoing use** of newly introduced devices and systems (Arning & Ziefle, 2007).”



## II. Aim and objectives

- To investigate the key factors that contribute to the acceptance and non-acceptance of gerontechnology by older Hong Kong Chinese and how these factors operate and interact.
- A Senior Technology Acceptance Model (STAM) was developed and tested. The proposed STAM integrates the conventional technology acceptance model (TAM) constructs and the new elderly-specific characteristics (health and ability).

# Senior Technology Acceptance Model (STAM)



# III. Methodology

## Procedure

**Cross-sectional** questionnaire survey through **face to face interview** ( 20 mins)

## Participants

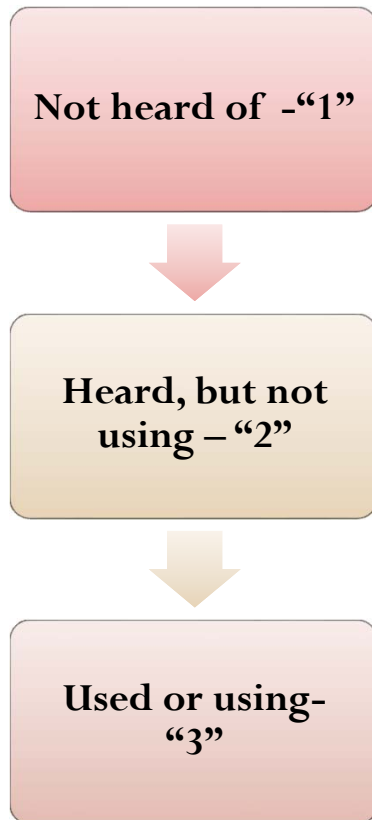
- **1012** participants from 17 local elderly centres.
- Men (25.3%) and women (74.7%).
- Majority were 75 and 84 (41.7%), living with household members (72.7%), had received primary education (35.5%), married (51.4%), retired (85.4%), of middle economic status (81.1%) , and supported by families (58.7%).

## Measurement

- Most of the scales and items have been widely used and validated in prior empirical studies.
- A **ten-point Likert** scale ranging from 1 (disagree strongly) to 10 (agree strongly) using a **visual analogue format**.

# Measurement: 1. Use of Gerontechnology

- Degree of use



- Domain of use (16-item list)

<b>Housing and daily living technology</b>
Electric cooking products
Remote control devices
Automatic teller machine
Credit cards
Transport smart cards
<b>Communication technology</b>
Mobile phones
E-mail
Computers or Internet
<b>Health technology</b>
Health products or sports equipment
Emergency alert products/services
Electronic sphygmomanometer/glucometer
Telecare
<b>Education and recreation technology</b>
Electronic dictionary
Digital cameras
CD/MP3/MP4
DVD/VCD players



## Measurement: 2. Perceptions and attitude

Constructs	Operational definition
<b>Attitude towards using gerontechnology</b>	An individual's positive or negative feelings or appraisal about using gerontechnology (Fishbein & Ajzen, 1975; Venkatesh et al., 2003).
<b>Perceived usefulness</b>	The degree to which a person believes that using the particular technology would improve his/her quality of life (Venkatesh et al., 2003).
<b>Perceived ease of use</b>	The extent to which a person believes that using a technology is free of effort (Venkatesh et al., 2003).
<b>Gerontechnology self-efficacy</b>	A sense of personal ability to successfully perform a given task of using gerontechnology (Bandura, 1977).
<b>Gerontechnology anxiety</b>	An individual's apprehension when he or she is faced with the possibility of using a gerontechnology (Venkatesh et al., 2003).
<b>Facilitating conditions</b>	Objective factors in the environments that can make gerontechnology usage easy to do (Venkatesh et al., 2003). Five indicators: basic knowledge, available help, financial resources, accessibility, and social influences.

## Measurement: 3. Age-related characteristics

Construct	Indicators	Sources
<b>Self-reported health conditions</b>	General health	Lou, 2010; McDowell, 2006, p. 619
	Health compares others	
	Hearing	
	Vision	
	Movement	
<b>Cognitive ability</b>	Memory	WHOQOL-100 and WHOQOL-BREF (McDowell, 2006, p. 619).
	Learning	
	Concentration	
	Thinking	
<b>Social relationships</b>	Personal relationships	WHOQOL-100 and WHOQOL-BREF (McDowell, 2006, p. 619).
	Support from friends and family	
	Participation in social activities	
<b>Psychological function</b>	Attitude to ageing	Philadelphia Geriatric Center Morale Scale (PGCMS)
	Life satisfaction	
<b>Physical function</b>	Perform instrumental activities of daily living (IADL) independently	Eight -item Lawton-Brody IADL scale (McDowell, 2006; Pinto et al., 2000, p. 56)

## IV. RESULTS

1. Measurement assessment
2. General use of technology
3. Structural Model

# 1. Measurement Assessment

- Measurement model fit: A **confirmatory factor analysis (CFA)** using **AMOS** software

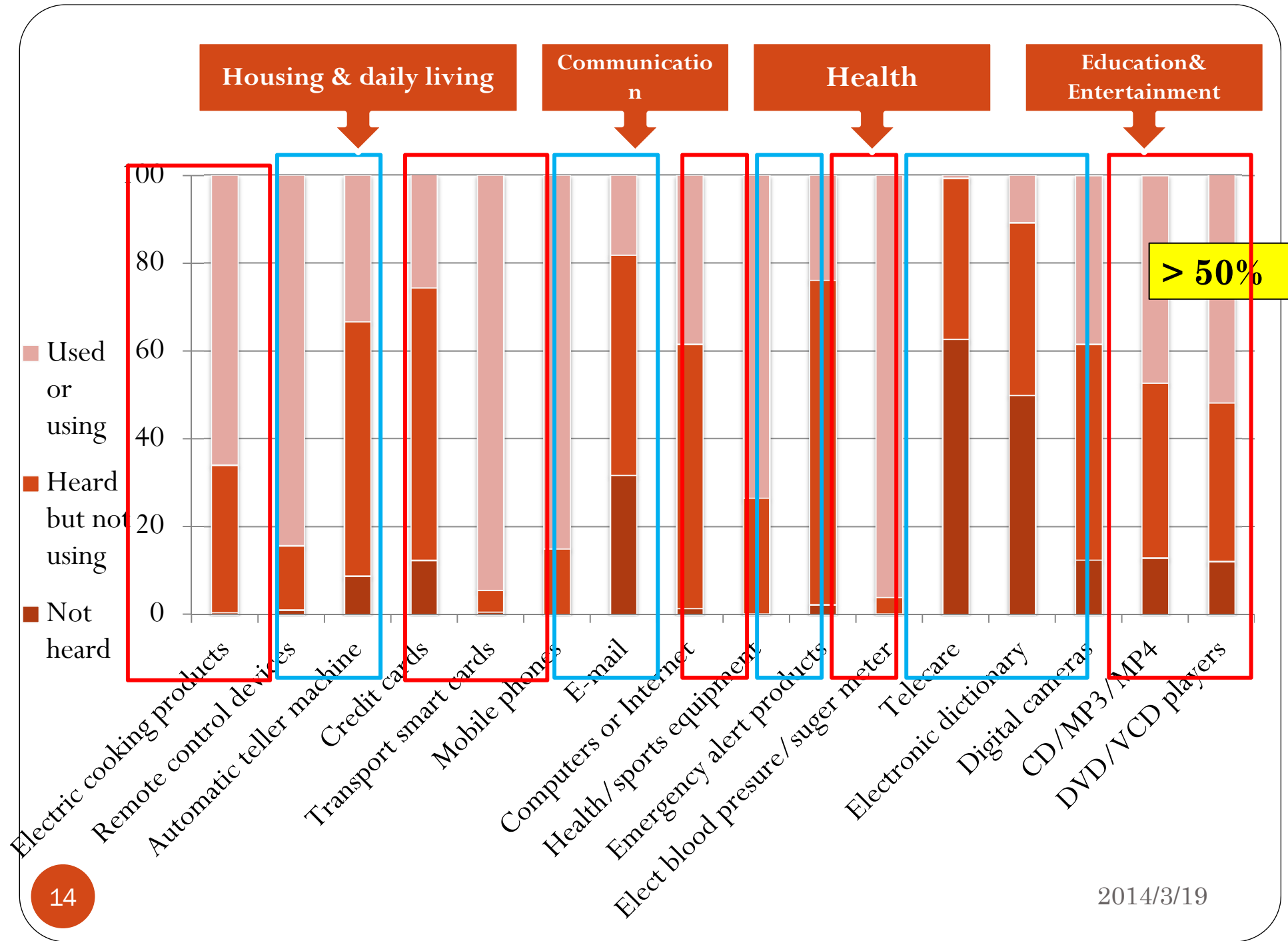
Goodness-of-fit indices	Recommended value	Results
RMSEA (root mean square error of approximation)	< 0.08	0.054
SRMR (standardized root mean square residual )	< 0.08	0.075
NFI (normed fit index)	> 0.9	0.919
NNFI (non-normed fit index)	> 0.9	0.928
CFI (comparative fit index)	> 0.9	0.938

# Measurement Reliability and Validity

Constructs	Construct reliability (CR)	Average variance extracted (AVE)
Attitude towards using	0.846	0.734
Perceived usefulness	0.952	0.869
Perceived ease of use	0.784	0.647
Gerontechnology anxiety	0.849	0.738
Gerontechnology self-efficacy	0.671	0.508
Facilitating conditions	0.852	0.536
Self-reported health conditions	0.829	0.513
Cognitive ability	0.932	0.773
Social relationships	0.827	0.624
Attitude to ageing and life satisfaction	0.670	0.505
Physical function	0.909	0.568

**Reliability: CR > 0.60**  
(Bagozzi & Yi, 1988)

**Validity: AVE > 0.50** (Hair, 2010)



# Structural Model Testing

## Hierarchical multiple regression using SPSS 16.0

- **DV:** PU, PEOU, AT, Usage Behavioral
- **IVs:**
  - Model 1: Age, gender, education, and economic status
  - Model 2: TAM-related constructs (PEOU, PU, AT, self-efficacy, anxiety, and facilitating conditions).
  - Model 3: Health and ability characteristics
- $R^2$ ; Change in  $R^2$ ; Significant level = 0.05.

## Model 1: Demographic Characteristics

Model	Independent variables	Dependent variables			
		PEOU Beta	PU Beta	AT Beta	UB Beta
1	Age	-0.298***	-0.248***	-0.230***	-0.411***
	Gender	-0.079**	-0.024	-0.046	-0.117***
	Education	0.220***	0.181***	0.147***	0.322***
	Economic status	0.058*	0.013	0.044	0.157***
	<b>R<sup>2</sup></b>	<b>0.236</b>	<b>0.143</b>	<b>0.123</b>	<b>0.517</b>



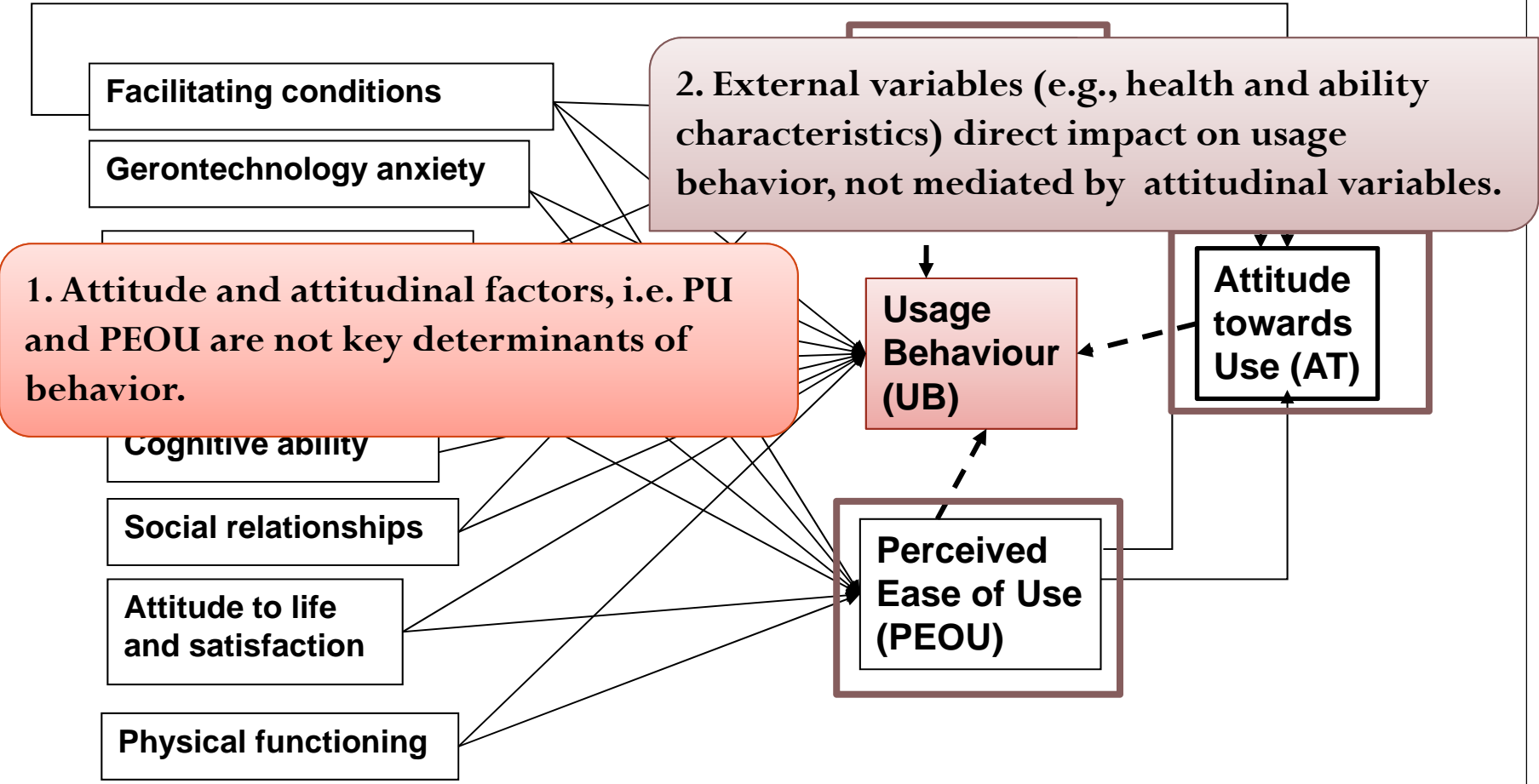
## Model 2: TAM-related Constructs

Model	Independent variables	Dependent variables			
		PEOU Beta	PU Beta	AT Beta	UB Beta
2	Age	-0.107***	-0.027	0.003	-0.279***
	Gender	-0.021	0.027	-0.017	-0.076***
	Education	-0.095**	-0.073*	-0.049*	0.129***
	Economic status	-0.093***	-0.104***	0.001	0.077***
	Self-efficacy	0.341***	0.110**	0.030	0.213***
	Anxiety	-0.061**	0.003	0.003	-0.050*
	Facilitating conditions	0.446***	0.330***	0.102**	0.205***
	Perceived ease of use		0.390***	0.078**	0.039
	Perceived usefulness			0.717***	0.061
	Attitude toward using				0.016
	<b>R<sup>2</sup></b>	<b>0.526</b>	<b>0.476</b>	<b>0.702</b>	<b>0.644</b>
<b>ΔR<sup>2</sup></b>	<b>0.290***</b>	<b>0.333***</b>	<b>0.579***</b>	<b>0.127***</b>	

### Model 3: Age-related Health and Ability Characteristics

Model	Independent variables	Dependent variables			
		PEOU Beta	PU Beta	AT Beta	UB Beta
3	Age	-0.096***	-0.018	0.011	-0.239***
	Gender	-0.021	0.020	-0.019	-0.075***
	Education	-0.093***	-0.058	-0.046	0.121***
	Economic status	-0.091***	-0.112***	-0.007	0.047*
	Self-efficacy	0.320***	0.093*	0.018	0.161***
	Anxiety	-0.058*	-0.005	0.002	-0.038*
	Facilitating conditions	0.453***	0.286***	0.087**	0.157***
	Perceived ease of use		0.393***	0.080**	0.052
	Perceived usefulness			0.707***	0.053
	Attitude toward using				-0.009
	Health conditions	0.066*	0.016	0.023	-0.067**
	Cognitive ability	0.033	-0.061	-0.011	0.072*
	Social relationships	-0.025	0.125***	0.041	0.084***
	Attitude to ageing & life satisfaction	-0.069*	0.028	0.016	0.137***
	Physical functioning	0.057*	0.002	0.006	0.066***
	<b>R<sup>2</sup></b>		<b>0.535</b>	<b>0.488</b>	<b>0.705</b>
<b>ΔR<sup>2</sup></b>		<b>0.009**</b>	<b>0.012***</b>	<b>0.003</b>	<b>0.036***</b>

# Results for the Structural Model



2. External variables (e.g., health and ability characteristics) direct impact on usage behavior, not mediated by attitudinal variables.

1. Attitude and attitudinal factors, i.e. PU and PEOU are not key determinants of behavior.

**Controlled variables: age, gender, education level, and economic status**

# CONCLUSIONS

## 1. **Lower access needs for using technology.**

- Internet usage by people over 65: **15.5%** in 2012 in Hong Kong (Census and Statistics Department of HKSAR, 2013), **45%** in Japan (Ministry of Internal Affairs and Communications, 2011), **53%** in the U.S. (Pew Internet & American Life Project, 2012), and **57.4%** in the United Kingdom (Office for National Statistics, 20 February 2013).

## 2. **Financial concerns.** 58.7% of the respondents received financial support from their **family members**; family rather than the government is taking primary responsibility for supporting the older people in Hong Kong.

## 3. **Relatively low level of literacy** among elders: 33.7% were below primary education. Universal primary education has already been achieved in most developed countries (United Nations, 2011).

## 4. **Collectivistic culture** like China dominated by notions of "*face saving*" and group conformity, other people's opinions can be expected to have a greater impact on individual's behaviour (Schepers & Wetzels, 2007)

# IMPLICATOINS



- ❑ Product designers should consider the needs and characteristics of the ageing population in product design. That designers should determine whether older users are able to withstand the physical and psychological demands made by the product/service they will use.
- ❑ Create more low-threat situations where the learners feel comfortable and in control. Emphasizes the emotional aspects or how people feel about the experience of using.
- ❑ Governments and developers may help here by providing some preferential arrangements in order to encourage older people to make greater use of gerontechnology.

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