Preliminary Findings on Advancing Women's Health in Singapore through AI Acceptance

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05 February 2025

I. Background

1. Current Situation & Challenges

1) Historical Research Bias: Long-standing use of the male body as the "default model" has led to female-specific or prevalent conditions (e.g., cardiovascular diseases) being underestimated, misdiagnosed, or treatment-delayed.
2) Socio-Cultural Impact: Gender stereotypes often cause women's health symptoms to be dismissed as emotional issues, obscuring true physiological conditions.
3) Core Issue: A lack of gender-sensitive perspectives in healthcare systems urgently needs addressing.

2. AI's Potential & The Critical Factor

1) Technological Empowerment: AI can synthesize vast clinical datasets to offer:

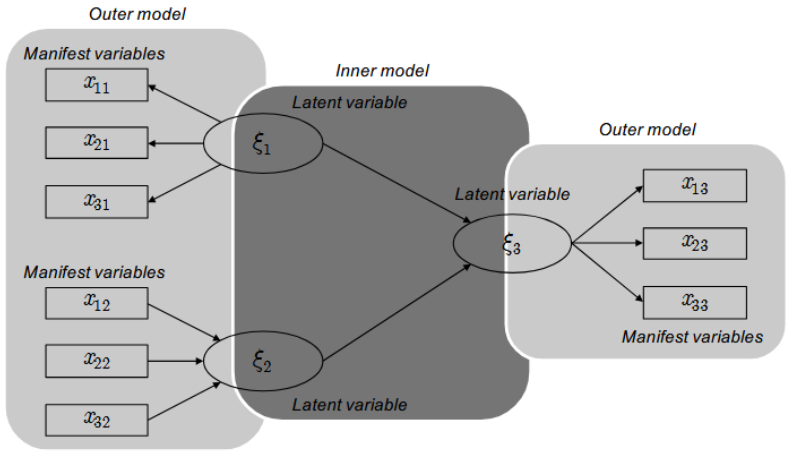
- More precise risk assessments and early warnings.
- Personalized prevention and management strategies.

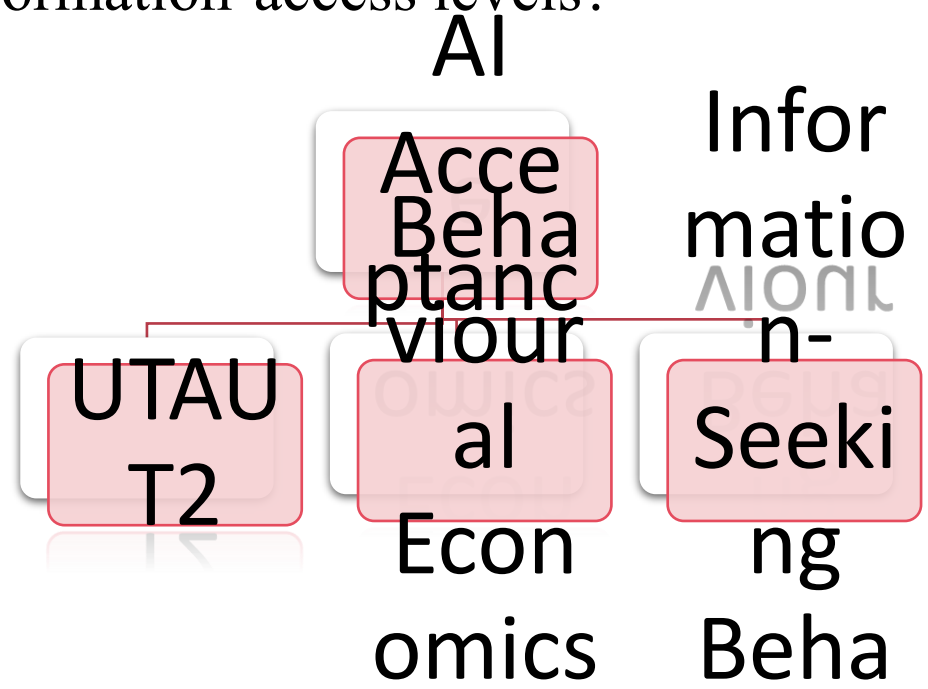
2) The Crucial Link: Adoption hinges on women's willingness to use these tools, influencing not just individual health but also family-wide health decision-making and behaviors.

I. Background

3. Research Question

How do Singaporean women develop trust, confidence, and willingness to use AI-assisted healthcare at psychological, behavioural, and information-access levels?





II. Research Methodology

1. Questionnaire

1) Survey Basis: Structured online questionnaire survey
2) Target Population: Singaporean women aged 21 and above (including citizens and permanent residents), targeting an approximate margin of error of ±5%
3) Theoretical Framework:

- UTAUT2 Model
- Behavioral Economics
- Information-Seeking Behavior Theory

4) Measurement Dimensions: technological perceptions, cognitive biases, and information interaction
5) Measurement Tool: Employs a 7-point Likert scale for all multi-faceted items

2. Methods

1) Sampling: Purposive sampling within non-probability sampling, focusing on exploring behavioral patterns and influencing factors.
2) Professional Perspective: Particular emphasis on recruiting women with medical backgrounds to incorporate professional insights.
3) Preliminary analysis: completed (n = 52).

II. Research Methodology

3. Data Analysis

1) Method: PLS-SEM

2) Rationale: Particularly suited for small-sample, prediction-oriented exploratory research. Capable of simultaneously handling measurement and structural models to examine complex path relationships among multiple latent variables.

3) Procedure:

- Independent Model Testing: Separate modeling for the three theoretical frameworks to evaluate the measurement quality and explanatory power of each construct.
- Robustness Validation: Bootstrap resampling (1000 iterations) was used to calculate standard errors and confidence intervals for path coefficients.

All analyses were performed using Stata MP version 19, with statistical significance evaluated at the 10% level.

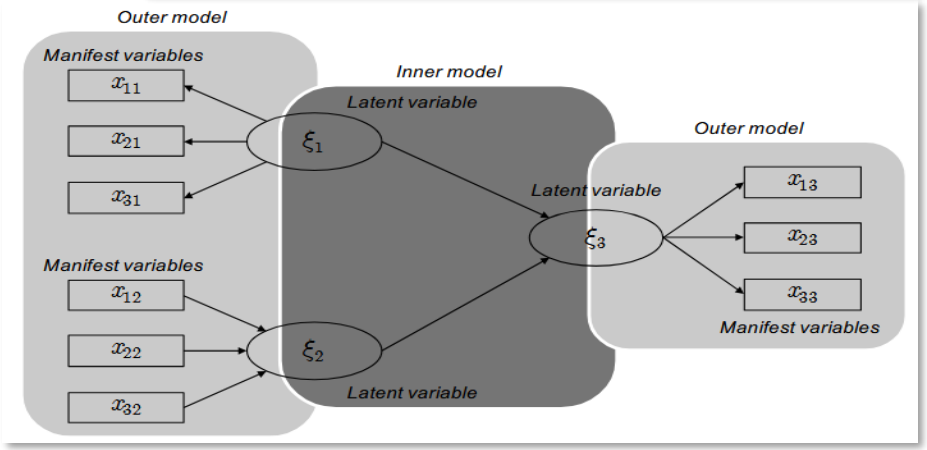
```
plssem (LV1 > varlist1) (LV2 > varlist2), ///
  structural(LV2 LV1).
```

Journal of Statistical Software
March 2019, Volume 88, Issue 8. doi: 10.18637/jss.v088.i08

plssem: A Stata Package for Structural Equation Modeling with Partial Least Squares

Sergio Venturini
Università Bocconi

Mehmet Mehmetoglu
Norwegian University of Science and Technology



II. Research Methodology

3. Data Analysis

Latent Variable

- **Definition:** An abstract concept that cannot be directly observed.
- **Types:**
  Exogenous: Not influenced by other variables within the model.
  Endogenous: Predicted by exogenous or other endogenous latent variables.

Manifest Variable

- **Definition:** A concrete, directly measurable variable.
- **Role:** Operationalizes a latent variable, representing its observable form.

Outer Model (Measurement Model)

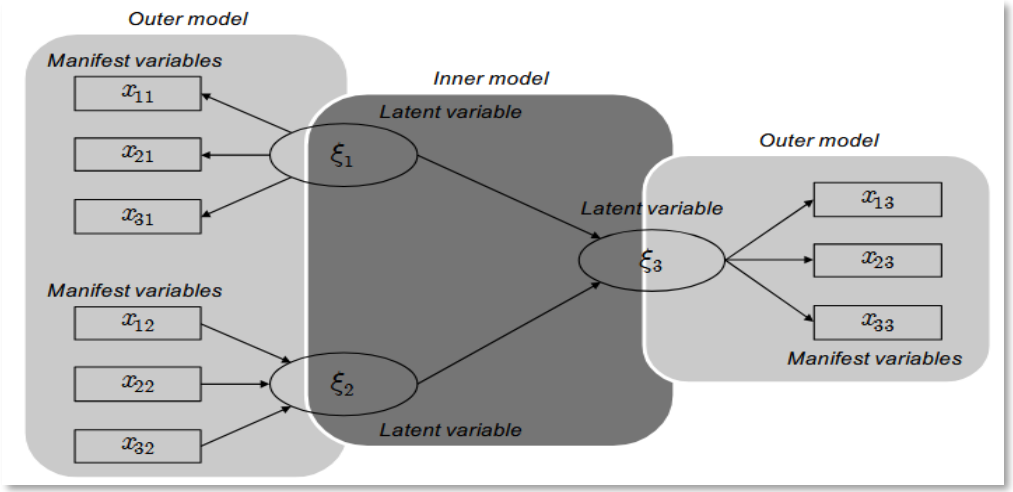
- **Definition:** Defines relationships between latent variables and their observed indicators.

1. Reflective Model

Indicators are reflections of the latent variable.
Arrows point from latent variable → observed variables.

2. Formative Model

Indicators collectively form or constitute the latent variable.
Arrows point from observed variables → latent variable.



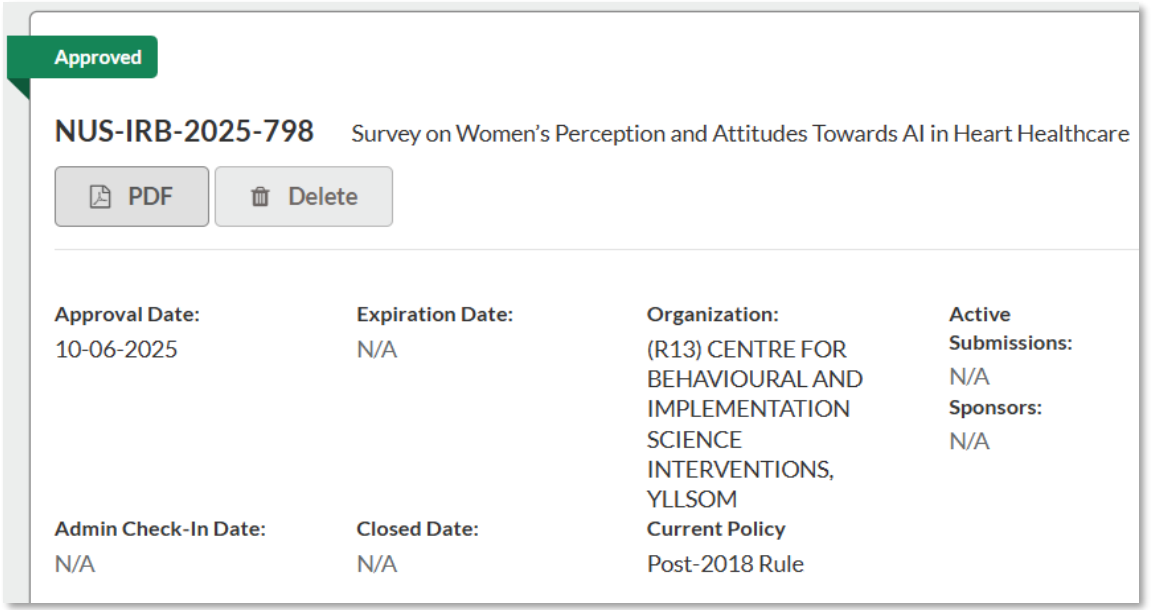
Inner Model (Structural Model)

- **Definition:** Specifies causal or associative relationships between latent variables.
- **Core Purpose:** Estimates path coefficients between latent variables, indicating the strength and direction of influence.

II. Research Methodology

4. Ethical Considerations

- **Approval:** The study was approved by the Ethics Review Committee of the National University of Singapore.
- **Compliance:** Strict adherence to Singapore's Personal Data Protection Act (PDPA).
- **Participant Protection:** All data collection was conducted with informed consent. Data is stored and analyzed in an anonymized manner, fully safeguarding participant privacy and rights.



Questionnaire (Selected Sections)

NUS-IRB reference code (NUS-IRB-2025-798)

Research Objectives Statement
If you are a Singaporean woman aged 21 and above, you are invited to participate in this research study.

Your feedback will provide valuable insights into how the public perceives and accepts Artificial Intelligence (AI) in healthcare. By sharing your views, you are contributing to shaping the future of healthcare services in Singapore and beyond.

The findings may help clinics and policymakers design AI solutions that are more patient-centered, effective, and aligned with public needs. In addition, this survey aims to raise awareness of the potential of AI to enhance access, safety, quality, and efficiency in healthcare.

Data Privacy and Rights Statement
The questionnaire does not collect personally identifiable information (e.g., names or contact details), except when participants choose to provide an email address voluntarily. All data will be stored using an anonymized ID system, ensuring that individual responses cannot be traced back to participants.

Your responses will be used exclusively for statistical analysis in this study, and all raw data will be securely stored in encrypted form.

Instructions for Completion
Please answer each question independently, based on your own circumstances, without consulting others. All questions are mandatory unless marked as "optional." If no option fully reflects your response, select "Other" and provide additional details. Kindly refer to the specific instructions in every section. All questions are mandatory.

1. Demographics & Background

Please choose the option that best reflects your situation. For questions that require additional details, kindly provide the information in the space provided.

1.1 Age:
☐ 21-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60 or above

1.2 Ethnicity:
☐ Chinese ☐ Malay ☐ Indian ☐ Other (please specify): ___

1.3 Education Level:
☐ Primary or below ☐ Secondary ☐ Diploma ☐ Undergraduate ☐ Postgraduate

1.4 Employment status:

2. Technology Acceptance

Please rate each statement from 1 to 7.
1 : Strongly Disagree | 7 : Strongly Agree

A higher score indicates a higher degree of agreement.

2.1 Performance Expectancy (PE)
2.1.1 Using AI-assisted healthcare services can improve my ability to manage my health (e.g., more accurately monitor health indicators, obtain timely health advice, etc.).
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.1.2 AI healthcare services enhance my ability to make better health decisions.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.1.3 AI healthcare services are helpful for improving my overall health.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.2 Effort Expectancy (EE)
2.2.1 Learning to use AI health tools (e.g., smart health APPs, AI diagnostic devices, etc.) would be easy for me.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.2.2 Becoming skillful at using AI health applications is easy for me.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.2.3 Using AI healthcare services would be mentally effortless.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.3 Social Influence (SI)
2.3.1 People who are important to me (e.g., family members, close friends, trusted doctors, etc.) believe I should use AI healthcare services.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.3.2 My friends and family support my use of AI-assisted healthcare services.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.3.3 My doctor would encourage me to use AI healthcare services.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

2.4 Facilitating Conditions (FC)
2.4.1 I have the resources (e.g., smartphone, internet) needed to use AI healthcare services.
☐ No ☐ Yes,

3. Behavioural Economics
Please rate each statement from 1 to 7.
1 : Strongly Disagree | 7 : Strongly Agree

A higher score indicates a higher degree of agreement.

3.1 Time Preference / Present Bias
3.1.1 I often choose convenience in the present, even if it may have an adverse impact on my future heart health (e.g., choosing fast food instead of healthy food, which may increase the risk of heart disease in the future)
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.1.2 I find it difficult to follow heart-healthy habits because the benefits feel far away.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.1.3 Short-term comfort matters more to me than long-term health outcomes.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.2 Loss Aversion
3.2.1 The fear of losing my health motivates me more than the idea of gaining better health.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.2.2 I am more worried about suffering a heart attack than excited about living longer.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.2.3 When I am told that I may lose something (e.g., mobility, ability to take care of myself, etc.), I will take action faster than when I am told that I may gain something (e.g., a better health status, a longer lifespan, etc.)
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.3 Framing Effects
3.3.1 I feel more motivated when health advice is framed as a gain ("You will enjoy good health") rather than as a loss ("You will suffer poor health").
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.3.2 The way doctors present health information strongly influences my health decisions.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

3.3.3 If health advice emphasizes risk avoidance (e.g., "Taking this behavior can reduce the risk of a heart attack"), I am more likely to follow it than if it emphasizes benefit gain (e.g., "Taking this behavior can improve heart health")
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

4. Information-Seeking Behaviour
Please rate each statement from 1 to 7.
1 : Strongly Disagree | 7: Strongly Agree

A higher score indicates a higher degree of agreement.

4.1 I regularly look for information about women's heart health from reliable sources (e.g., doctors, official health websites).
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

4.2 When I come across articles or news about women's heart health, I usually read or watch them carefully.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

4.3 I pay more attention to health information that feels personally relevant to my own life.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

4.4 Sometimes I avoid reading about heart health because it makes me feel anxious or fearful.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

4.5 I often discuss women's heart health with friends, family, or online communities to learn more.
1. ☐ Strongly Disagree 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ Strongly Agree

4.6 Through which channels do you typically obtain information about women's heart health? (multiple selections allowed)
☐ Doctors / Hospital brochures
☐ Official health websites
☐ Social media (e.g., Facebook/Instagram)
☐ AI health app notifications
☐ Television / Newspapers
☐ Recommendations from friends/family
☐ Online forums / Communities
☐ Offline health talks / Community Outreach
☐ Other (please specify): ___

4.7 Would you be willing to receive heart health information through AI tools such as chatbots or smart notifications?
☐ Very unwilling ☐ Unwilling ☐ Neutral ☐ Willing ☐ Very willing
If you selected "Unwilling" or "Very unwilling," please choose the primary reason(s) (multiple selections allowed):

III. Preliminary Findings: Sample Characteristics

1) Demographics

- **Age:** Predominantly women aged 30–59 years
- **Education & Employment:** Majority hold higher education qualifications and are in full-time employment, representing a middle-to-high income cohort.

2) Professional Background

44.2% of participants have a medical, clinical, or dental background, providing critical insight into how professional perspectives shape AI acceptance.

3) Healthcare & Tech Behavior

- **Recent Healthcare Use:** Vast majority sought medical care within the past year (71.2%).
- **AI-Healthcare Exposure:** Actual use of AI-enabled healthcare services remains low (15.4%).
- **Tech Adoption Profile:** Most self-identify as "average technology adopters" (76.9%).

1.13	Freq.	Percent	Cum.
Average adopter	40	76.92	76.92
Early adopter	5	9.62	86.54
Late adopter	4	7.69	94.23
Not sure	3	5.77	100.00
Total	52	100.00	

III. Preliminary Findings: UTAUT2

1) Most Significant Predictors of AI Adoption

- **Habit:** suggesting that once AI tools are integrated into daily routines, usage becomes an automatic behavior.
- **Performance Expectancy:** meaning adoption is higher among women who believe AI genuinely improves health outcomes.

2) Non-Significant Factors

The following UTAUT2 factors did not show statistically significant effects in this model: Effort Expectancy; Facilitating Conditions; Hedonic Motivation; Price Value

3) Model Strength

Adjusted $R^2 = 0.833$

The model explains over 83% of the variance in behavioral intention, indicating strong overall explanatory power.

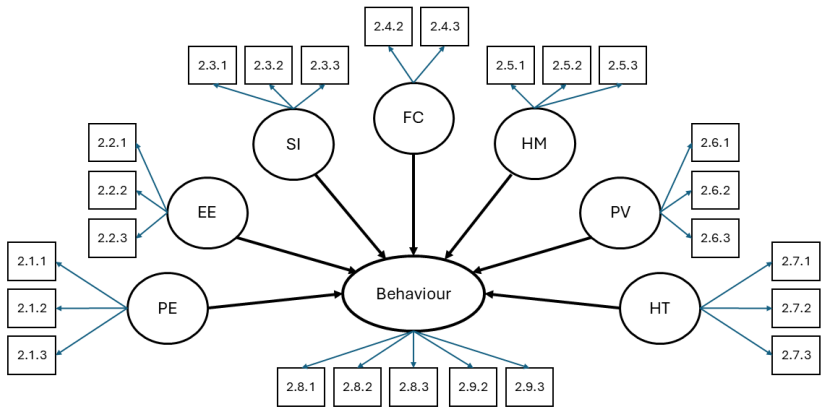
```
//* UTAUT2 *//
plssem (PE > AC AD AE) (EE > AF AG AH) (SI > AI AJ AK) (FC > AO AP) (HM > AQ AR AS) (PV > AT
 AU AV) (HT > AW AX AY) (Behave > AZ BA BB BD BE), structural(Behave PE EE SI FC HM PV HT)
maxiter(1000) seed(1234) boot(1000)
```

Structural model - Standardized path coefficients (Bootstrap)

Variable	Behave
PE	0.237
	(0.015)
EE	-0.145
	(0.164)
SI	0.234
	(0.122)
FC	0.082
	(0.413)
HM	0.092
	(0.511)
PV	0.116
	(0.240)
HT	0.470
	(0.000)
r2_a	0.806

p-values in parentheses

	Reflective: PE	Reflective: EE	Reflective: SI	Reflective: FC	Reflective: HM	Reflective: PV	Reflective: HT	Reflective: Behave
AC	0.942							
AD	0.955							
AE	0.920							
AF		0.941						
AG		0.975						
AH		0.854						
AI			0.911					
AJ			0.892					
AK			0.676					
AO				0.913				
AP				0.942				
AQ					0.895			
AR					0.946			
AS					0.927			
AT						0.949		
AU						0.956		
AV						0.960		
AW							0.946	
AX							0.869	
AY							0.942	
AZ								0.912
BA								0.928
BB								0.891
BD								0.838
BE								0.802
Cronbach	0.933	0.915	0.772	0.839	0.913	0.952	0.908	0.923
DG	0.957	0.946	0.870	0.925	0.945	0.969	0.943	0.942
rho A	0.933	0.947	0.806	0.862	0.923	0.959	0.910	0.931



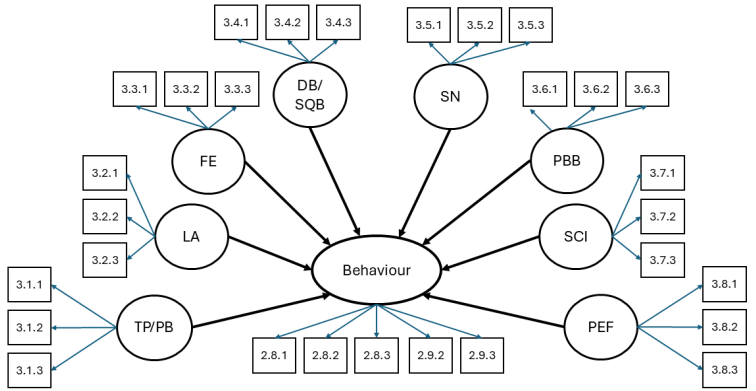
III. Preliminary Findings: Behavioural Economics Model

1) Weaker Performance: This model demonstrated limited explanatory power in predicting AI acceptance.

2) Key Result: Beyond social norms, other classic behavioral bias constructs—loss aversion, framing effects, and status quo bias—showed no significant direct influence on AI acceptance behavior.

```
//* Behavioural Economics *//
plssem  (TPPB > BF BG BH) (LA > BI BJ BK) (FE > BL BM BN) (DBSQB > BO BP BQ) (SN > BR BS BT)
 (PBB > BU BV BW) (SCI > BX BY BZ) (PEF > CA CB CC) (Behave > AZ BA BB BD BE), structural(
Behave TPPB LA FE DBSQB SN PBB SCI PEF) maxiter(1000) seed(1234) boot(1000)
```

	Reflective: TPPB	Reflective: LA	Reflective: FE	Reflective: DBSQB	Reflective: SN	Reflective: PBB	Reflective: SCI	Reflective: PEF	Reflective: Behave
BF	0.953								
BG	0.902								
BH	0.607								
BI		0.730							
BJ		0.935							
BK		0.282							
BL			0.672						
BM			0.593						
BN			0.732						
BO				0.945					
BP				-0.254					
BQ				0.548					
BR					0.781				
BS					0.922				
BT					0.892				
BU						0.075			
BV						0.933			
BW						0.442			
BX							-0.064		
BY							0.928		
BZ							0.133		
CA								-0.154	
CB								-0.119	
CC								0.985	
AZ									0.914
BA									0.931
BB									0.895
BD									0.842



Structural model – Standardized path coefficients (Bootstrap)

Variable	Behave
TPPB	0.163
	(0.387)
LA	0.071
	(0.780)
FE	0.032
	(0.865)
DBSQB	-0.030
	(0.879)
SN	0.480
	(0.034)
PBB	-0.119
	(0.526)
SCI	-0.302
	(0.297)
PEF	0.142
	(0.459)
r2_a	0.195

p-values in parentheses

III. Preliminary Findings: Information-Seeking Behaviour Model

1) Non-Decisive Role: The path to AI acceptance was positive but not statistically significant.
2) Supplementary Factor: The model's moderate explanatory power suggests information acquisition acts more as a supplementary influence rather than a decisive driver.

```
//* Information-Seeking Behavior *//
plssem (InfoSeek > CD CE CF CG CH) (Behave > AZ BA BB BD BE), structural(Behave InfoSeek )
maxiter(1000) seed(1234) boot(1000)
```

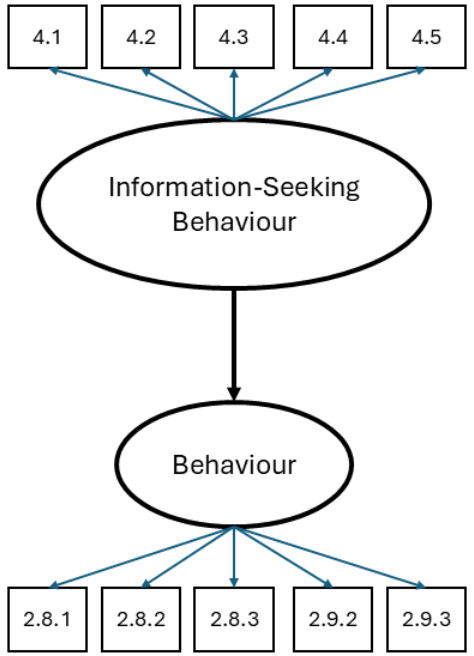
Structural model – Standardized path coefficients (Bootstrap)

Variable	Behave
InfoSeek	**0.384**
	(0.404)
r2_a	**0.129**

p-values in parentheses

Measurement model – Standardized loadings

	Reflective: InfoSeek	Reflective: Behave
CD	**0.701**	
CE	**0.623**	
CF	**0.202**	
CG	**-0.638**	
CH	**0.794**	
AZ		**0.904**
BA		**0.913**
BB		**0.859**
BD		**0.880**
BE		**0.825**
Cronbach	**0.592**	**0.926**
DG	**0.482**	**0.943**
rho_A	**0.591**	**0.952**



III. Preliminary Findings: Overall Results

Three core drivers influence Singaporean women's adoption of AI-assisted healthcare:

- Habit: Integration into daily routines promotes sustained use.
- Performance Expectancy: Belief that AI improves health outcomes drives acceptance.
- Social Norms: Perceptions and expectations of others play a critical role.

Constructs	UTAUT2		BE		ISB	
	Standardized path coefficients	p-value	Standardized path coefficients	p-value	Standardized path coefficients	p-value
Performance Expectancy	0.237	0.015				
Effort Expectancy	-0.145	0.164				
Social Influence	0.234	0.122				
Facilitating Conditions	0.082	0.413				
Hedonic Motivation	0.092	0.511				
Price Value	0.116	0.240				
Habit	0.470	<0.001				
Time Preference / Present Bias			0.163	0.387		
Loss Aversion			0.071	0.780		
Framing Effects			0.032	0.865		
Default Bias / Status Quo Bias			-0.030	0.879		
Social Norms			0.480	0.034		
Perceived Barriers and Benefits			-0.119	0.526		
Social and Cultural Influence			-0.3.2	0.297		
Psychological and Emotional Factors			0.142	0.459		
Information-Seeking Behaviour					0.384	0.404

IV. Discussion

1. Three Pillars of AI Healthcare Adoption

1) Performance Expectancy (UTAUT2)

- The "Why": The foundational value for adoption.
- Mechanism: A robust rational basis forms when AI is perceived to genuinely enhance health management and enable more informed decisions.

2) Habit (UTAUT2)

- The "Sustain": The engine for continued use.
- Mechanism: Seamless integration into daily routines increases "stickiness", facilitating the shift from trial to dependency.

3) Social Norms (Behavioral Economics)

- The "Legitimise": Builds collective trust and implicit permission.
- Mechanism: Shared expectations within communities or professional groups create an implicit "script" for behaviour.

IV. Discussion

2. A Critical Theoretical Distinction

Aspect	Social Influence (UTAUT2)	Social Norms (Behavioral Economics)
Nature	External, direct pressure or encouragement from significant others.	Internalised, shared expectation about "how most people in my group behave."
Mechanism	Compliance with specific referents' expectations.	Adherence to a perceived collective standard.

3. Next Phase of Research

Current findings are preliminary.

1) Advanced Modeling: Apply limited mixed models to identify differences across distinct female cohorts.

2) Network Analysis: Explore interactive relationships among psychological and behavioral factors for a more nuanced understanding.

IV. Discussion

4. From Insight to Impact

This exploration is just the beginning. These behavioural insights provide a human-centred framework for key stakeholders:

- For Policymakers: Design inclusive campaigns and trustworthy governance.
- For Healthcare Providers: Integrate AI tools into clinical pathways and patient communication.
- For Technology Developers: Build habit-forming and socially-reinforced features.

Collectively, we can advance a more inclusive, trustworthy, and effective AI-driven healthcare future.

Thank you