

# Lower Saxony Research Network Design of Environments for Ageing (GAL)

## Personality and Adaptive Technology Use in Old Age

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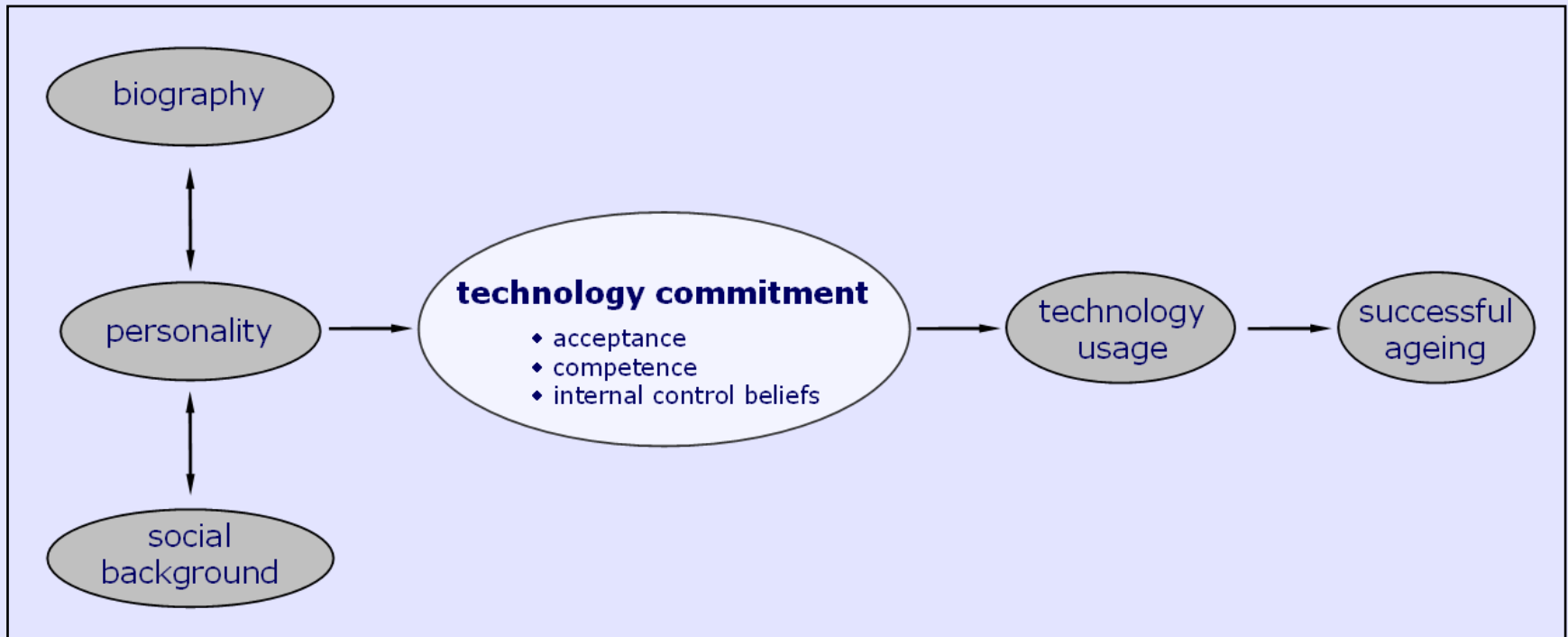
Institute of Psychology

Personality Psychology & Psychological Assessment



# Technology Commitment and Ageing

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# Agenda

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## Objective

- ◆ empirical verification of a theoretical model explaining individual differences in ***technology commitment***

## Approach

- ◆ development and validation of a scale for measuring technology commitment as a predictor of **technology usage**

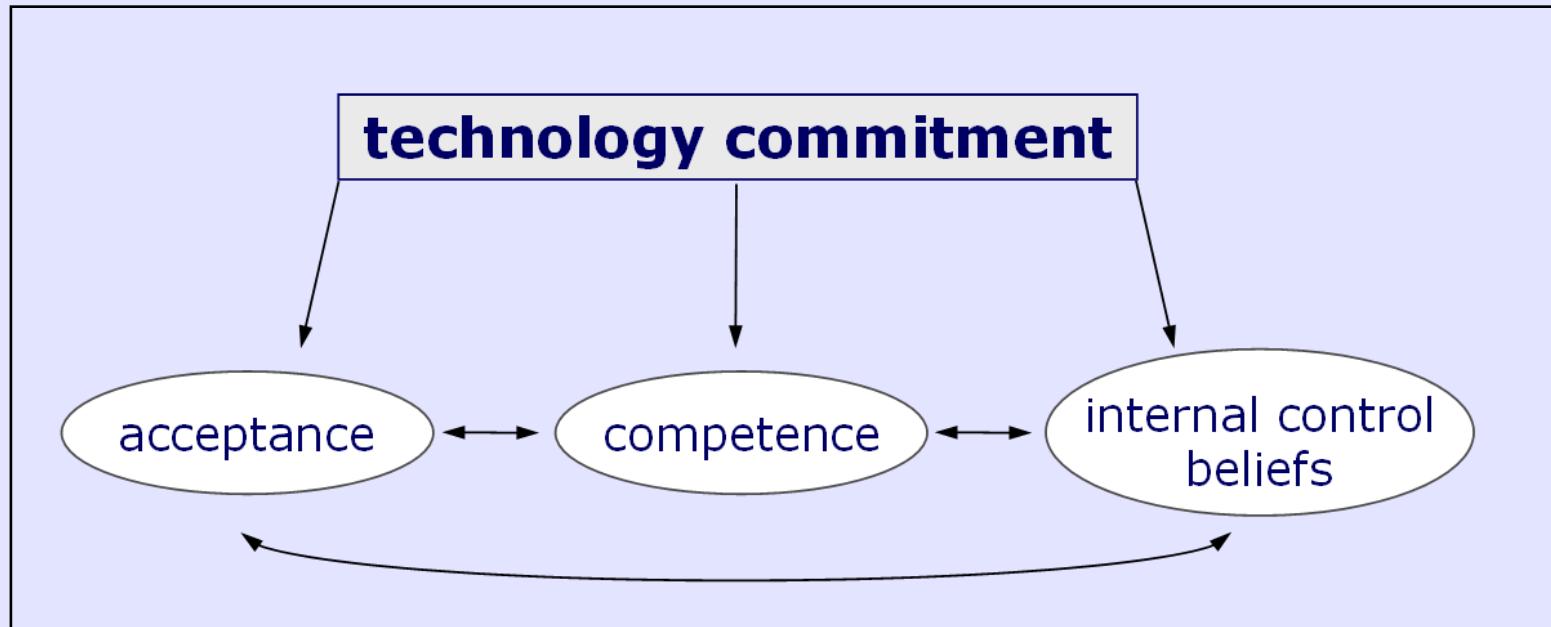
## Benefits

- ◆ information about potential **user profiles**; knowledge about **concerns**, special **needs** and requirements of elderly people concerning the implementation and usage of assisting systems

# Theoretical background

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⇒ technology commitment as a personality trait



# Theoretical background

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## items (examples)

- ◆ **technology acceptance (⇒ attitude)**

  - „I think new technologies are helpful.“

  - „I enjoy the usage of new technologies.“

- ◆ **technology competence (⇒ mastery)**

  - „I have trust in my ability to use new technologies.“

  - „Often I am in fear of failing when using new technologies.“

- ◆ **technology related control beliefs (⇒ internal vs. external control)**

  - „When I am successful in dealing with new technologies, then it is because of luck.“

  - „It depends on me whether or not I solve problems that I might face when dealing with new technologies.“

# Approach to model testing

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⇒ **study plan for the development and validation of an inventory measuring technology commitment**

**(1) pilot phase** (*completed*)

generation of an item pool based on a literature screening and consultation of established inventories measuring acceptance, competence and control beliefs

**(2) scale construction** (*completed*)

questionnaire studies for item selection; empirical test of the three-dimensional structure of technology commitment

**(3) validation phase** (*ongoing*)

construct and criterion validation of the technology commitment scale; empirical test of the theoretical model concerning the determination of technology commitment and its significance for predicting technology usage

# Measuring technology commitment: Scale construction

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## **Aims**

- ◆ construction of a reliable and economic scale measuring technology commitment
- ◆ empirical test of the hypothesized three-dimensional structure of technology commitment (acceptance, competence, control beliefs)

## **Preliminary validity checks**

- ◆ sex / age / education-based differences
- ◆ behavior prediction

# Measuring technology commitment: Scale construction

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## Method

- ◆ 2 questionnaire studies (online + paper pencil), May – August 2009
- ◆  $N_{\text{all}} = 774$ ;  $N_{\text{Online}} = 627$  (65.9% female; *Mean Age* = 36.1 years)  
 $N_{\text{PaperPencil}} = 147$  (46.3% female; *Mean Age* = 64.8 years)

## Contents

- ◆ demography; educational & job biography
- ◆ item pool for the construction of the technology commitment scale
  - technology acceptance: 43 Items
  - technology competence: 22 Items
  - technology related control beliefs: 16 Items
- ◆ actual usage of new technologies in different domains of daily living
  - e.g., household, communication, public life

## Analysis

- ◆ factor analysis (EFA, CFA); reliability and validity analysis

# Measuring technology commitment: Scale construction

(33 item pool)

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## (1) exploratory factor analysis (maximum-likelihood, varimax rotation)

⇒ **intercorrelations of the 3 selected factors**  
(5 items per factor with highest factor loadings)

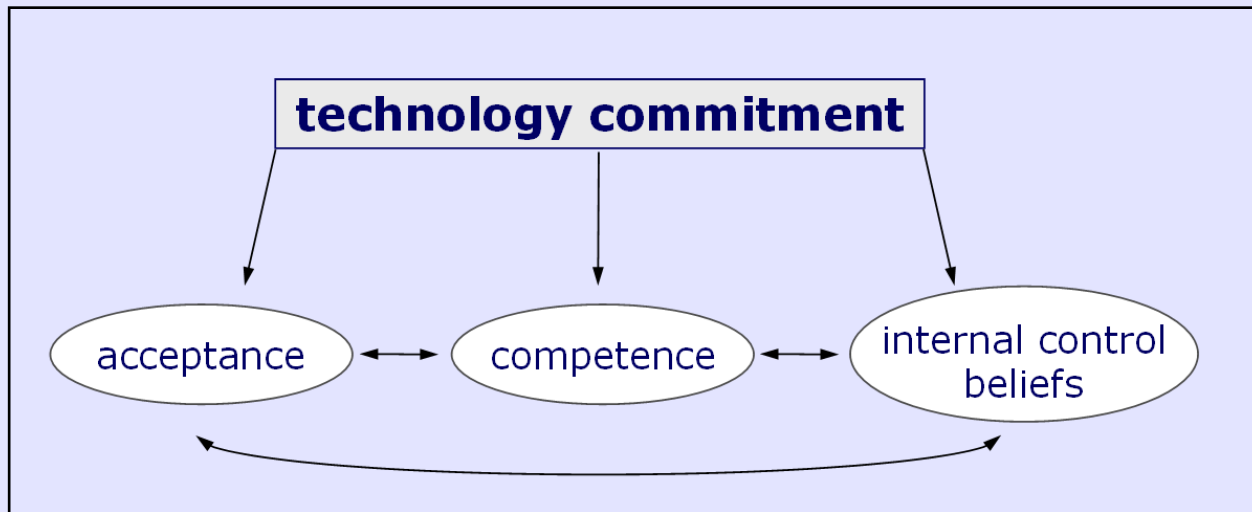
	<b>F2: acceptance</b>	<b>F3: internal control beliefs</b>
<b>F1: competence</b>	<b>.52**</b>	<b>.26**</b>
<b>F2: acceptance</b>	<b>---</b>	<b>.35**</b>
<b>F3: internal control beliefs</b>		<b>---</b>

# Measuring technology commitment: Scale construction (33 items pool)

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## (2) confirmatory factor analysis

- ♦ model fit of the theoretical 3-factor solution: *CMIN*, *RMSEA*, *NFI*, *CFI* ✓



## (3) reliability analysis

- ♦ acceptance Cronbach's  $\alpha = .89$ ;  $r_{it} = .67-.77$
- ♦ competence: Cronbach's  $\alpha = .89$ ;  $r_{it} = .66-.78$
- ♦ internal control beliefs: Cronbach's  $\alpha = .75$ ;  $r_{it} = .46-.55$

# Continued Analysis

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- ◆ Sex / age / education-based differences in technology commitment

female	<	male
age+	=	age-
education-	<	education+

- ◆ Technology commitment predicts actual technology usage.

# Scale construction study: Summary

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- ◆ three-dimensional structure of technology commitment established!
- ◆ scale construction analysis:
  - interpretable factor structure (reliability)
  - satisfying item- and scale statistics
- ◆ technology commitment scale: 15 items (5 per subscale), 5-point answer scale (1 = not true at all; 5 = very true)
- ◆ first evidence for scale validity ⇒ predicting technology usage

# Approach to model testing

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⇒ **study plan for the development and validation of an inventory measuring technology commitment**

**(1) pilot phase** (*completed*)

generation of an item pool based on a literature screening and consultation of established inventories measuring acceptance, competence and control beliefs

**(2) scale construction** (*completed*)

questionnaire studies for a data-driven item selection; empirical test of the hypothesized three-dimensional structure of technology commitment

**(3) validation phase** (*ongoing*)

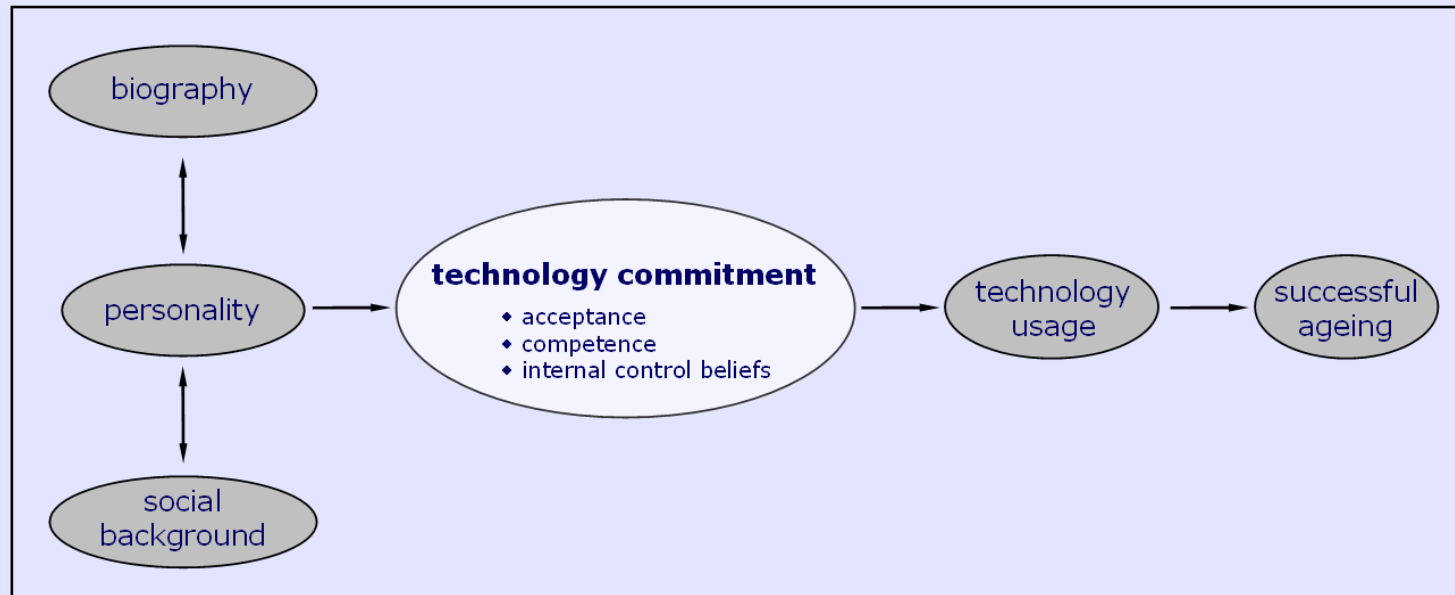
construct and criterion validation of the technology commitment scale; empirical test of the theoretical model concerning the determination of technology commitment and its significance for predicting technology usage

# Validation studies

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## Aims

- ◆ construct and criterion validation of the technology commitment scale
- ◆ empirical test of the theoretical model:
  - ⇒ predictors of technology commitment
  - ⇒ technology commitment as a predictor of technology usage + successful ageing



# Validation study 1 *(ongoing)*

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## Method

- ◆ computer-based interviews (ca. 1½ hours)
- ◆ sample: middle-aged and elderly people (55-75 years)

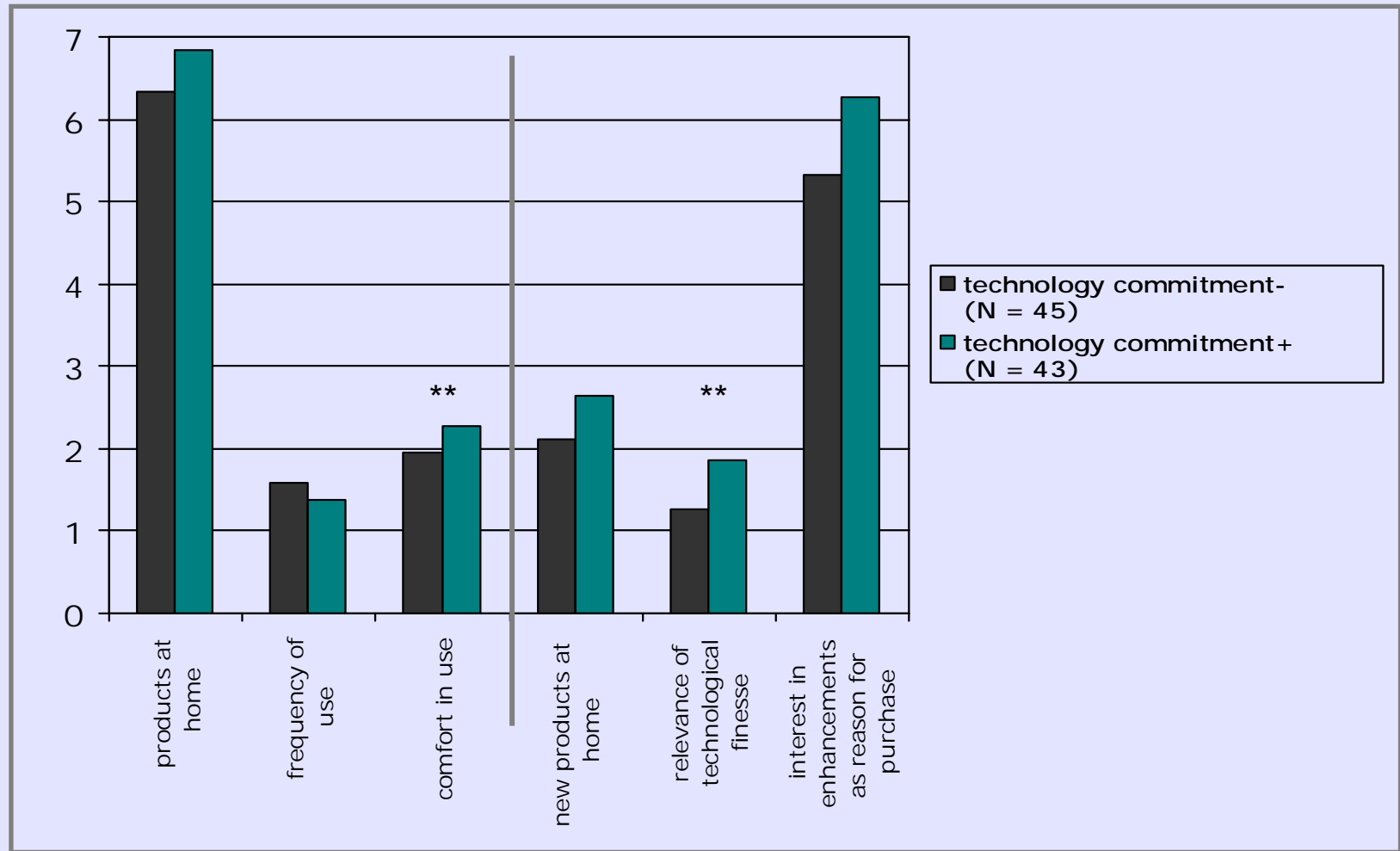
## Sample

- ◆  $N_{\text{aim}} = 200$
- ◆  $N_{\text{current}} = 91$  (61.5% f; 38.5% m;  $M_{\text{Age}} = 66.4$  years)

## Contents *(selection)*

- ◆ technology commitment scale, technology related biography (job-related/privat), technology usage in daily life, interest in GAL-scenarios
- ◆ performance (concentration, figural intelligence  $\Rightarrow$  fluid intelligence), personality, health, social network, attitude towards aging

# Technology commitment and use: Scale validity



\*\* $p < .01$ .

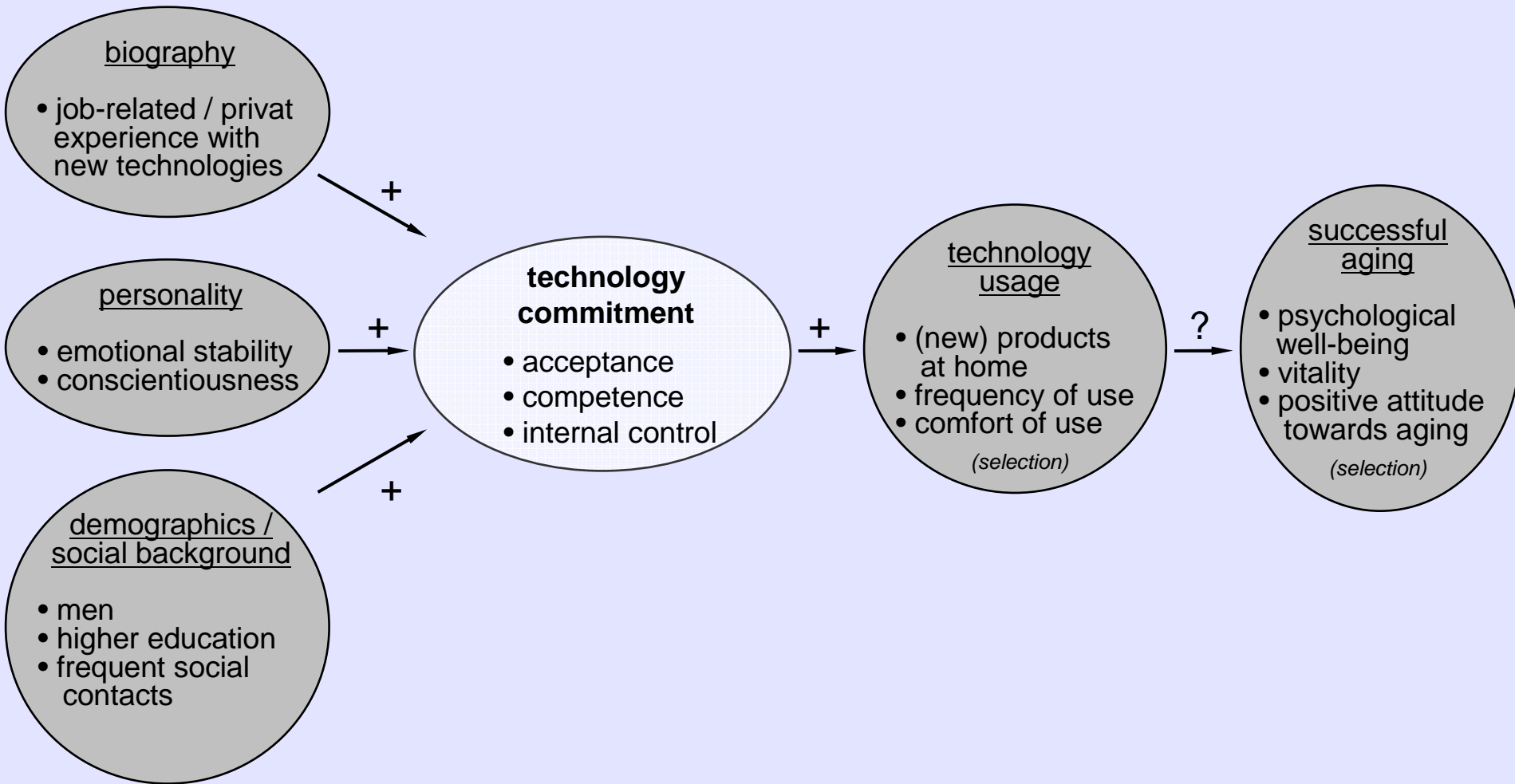
# Correlates of technology commitment (*selection*)

	acceptance	competence	internal control	commitment
⇒ <b>experience</b>				
• job-related	.29**	.37*	---	.27*
• private	.49**	.40**	---	.39**
⇒ <b>cognitive ability</b>				
• fluid intelligence (figural)	---	---	---	---
⇒ <b>personality</b>				
• neuroticism	---	-.39**	---	-.20*
• conscientiousness	---	.23*	---	.20*
⇒ <b>social network</b>				
• contact frequency	.18*	---	---	---
⇒ <b>health</b>				
• psychological well-being	.23*	.23*	---	.21*
• vitality	---	.18*	---	---
⇒ <b>successful aging</b>				
• positive attitude towards aging	.26*	.28**	.18*	.32**

\*\* $p < .01$ ; \* $p < .05$ .

# Summary: Approved model paths *(selection)*

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# Summary and Perspectives

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## **Established:**

- ◆ Theoretical model of technology commitment  $\Rightarrow$  acceptance, competence, and control beliefs.
- ◆ Reliable measure of technology commitment.
- ◆ Convergent and discriminant validity of technology commitment.

## **To be done:**

- ◆ Confirming predictive validity based on representative samples and subsamples with special needs.
- ◆ Application on GAL-scenarios.

# Thank you very much for your attention.

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