TECHNOLOGY SUPPORTED AGING-IN-PLACE: FROM INFORMATION COMMUNICATION TECHNOLOGY TO ASSISTIVE ROBOTICS

SAJAY ARTHANAT, PHD., OTR/L., ATP

PROFESSOR

DEPARTMENT OF OCCUPATIONAL THERAPY

UNIVERSITY OF NEW HAMPSHIRE



AGE OF CHAMPIONS, 2022

OVERVIEW

Highlight three research studies that demonstrate the role of innovative technologies to promote aging-in-place

- Information Communication Technology (ICT) training program for older adults at risk of transition to long-term care [2015-2019]
- 2. Home automation technology to support care partners of individuals with Alzheimer's disease & dementia [2018-2020]
- 3. Development of a Social Assistive Robot (SAR) for care of individuals with Alzheimer's disease & dementia [2019-Ongoing]

BACKGROUND

Scope of technology mediated aging-in-place

- Social Connectedness
- Health Management
- Personal Safety
- Leisure
- Independent and Community Living Skills

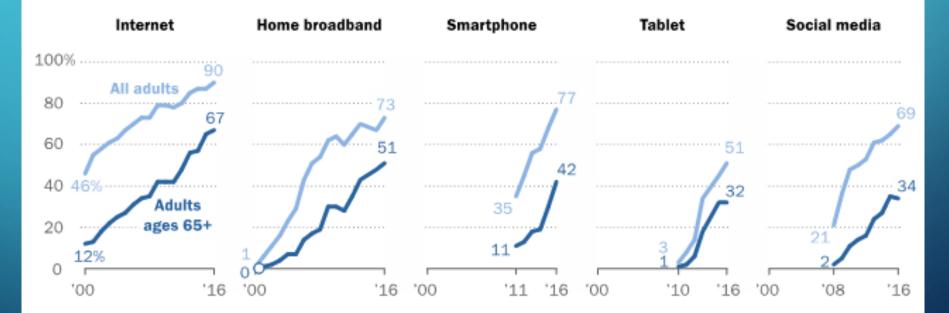


λ

Addressing the Digital Divide

Smartphone adoption among seniors has nearly quadrupled in the last five years

% of U.S. adults who say they have or use the following



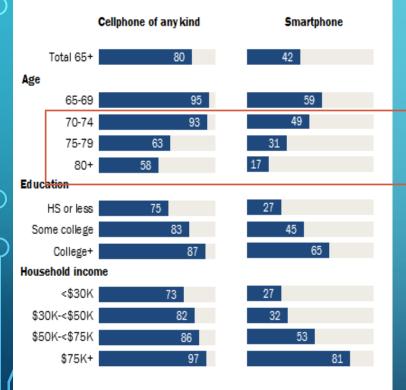
Source: Survey conducted Sept.29-Nov.6, 2016. Trend data are from previous Pew Research Center surveys. "Tech Adoption Climbs Among Older Adults"

PEW RESEARCH CENTER

ρ

Addressing the Digital Divide

Roughly four-in-ten seniors are smartphone owners % of U.S. adults ages 65 and older who say they own the following ...



Source: Survey conducted Sept.29-Nov.6, 2016. "Tech Adoption Climbs Among Older Adults"

PEW RESEARCH CENTER

Among seniors, roughly a third own tablets and a fifth own e-readers

% of U.S. adults ages 65 and older who say they own the following ...

		т	ablet		E-reader			
	Total 65+	32			19			
				_				
Age	65-69	41			21			
	70-74	32			23			
	75-79	28			18			
	80+	20		1	3			
Educ	ation							
	HS or less	18		9				
S	ome college	34			24			
(College grad		56		32			
Household income								
	<\$30K	16		1	4			
\$	30K-<\$50K	26		1	.3			
\$	50K-<\$75K	37			22			
	\$75K+		62		37			

Source: Survey conducted Sept.29-Nov.6, 2016. "Tech Adoption Climbs Among Older Adults "

PEW RESEARCH CENTER

Around a third of seniors report using social media

% of U.S. adults ages 65 and older who say they ever use social networking sites

Total 65+	34				
Age					
65-69	47				
70-74	41				
75-79	24				
80+	17				
Education					
HS or less	20				
Some college	39				
College+	56				
Household income					
<\$30K	23				
\$30K-<\$50K	30				
\$50K-<\$75K	42				
\$75K+	57				

Source: Survey conducted Sept.29-Nov.6, 2016.

"Tech Adoption Climbs Among Older Adults"

PEW RESEARCH CENTER

TURNING THE CHALLENGE INTO OPPORTUNITY

Rapid Growth of:

- Broadband Internet
- IoTs (Smart devices and wearables)
- Telehealth Technologies
- Semi-autonomous driving
- Artificial Intelligence & Machine Learning

Tapping the potential: "Dual Impact"

<u>Seniors</u>

- 70-75 & Above
- Living alone
- Living in rural areas
- Lower socio-economic status
- With a disability or chronic condition
- Care partners

Study I: Individualized Community and Home-based Technology Training (i-CHATT)

One-on-one
Home-based
Individualized
Inter-generational



For more information: <u>https://ichatt.unh.edu/</u>

Funding from the National Institute of Aging [National Institute of Health] Academic Research Enhancement Award# 1R15AG044807-01A1

Co-Investigator- Dr. Kerryellen Vroman, UNH-OT

TRAINING PROTOCOL

3-Month Training Program

- Participant paired with "student coaches"
- Orientation and an activity priority list completed
- Long term goals (activity-based) and short-term goals (skill-based and application-based) chosen
- Student coaches conduct 3 home visits
 - Increase operational know-how and access to day-to-day ICTs
 - Create individualized lesson plans in accordance to priority checklist
 - Monitor progress with goals
 - Address ongoing questions and concerns
 - Scheduled check-ins

Study I: Individualized Community and Home-based Technology Training (i-CHATT): TWO-YEAR RCT

Participants (65+) who met our at-risk / low profile ICT inclusion criteria

Recruited from various community agencies

Staggered design: $N \sim 15$ in each training cohort and control group x 3



Study I: Individualized Community and Home-based Technology Training (i-CHATT): TWO-YEAR RCT

RESULTS

Over the 2-year follow-up period, compared to the subjects in the control group, the training group subjects significantly...

Performed more activities using ICT	Expressed greater independence in	Expressed acceptance of ICT on measures of
 Instrumental Activities (#17) Health Management (#11) Leisure (#12) 	 Online Shopping Volunteering Leisure Family Connections Social Connections 	 Readiness Comfort Satisfaction

Mixed Repeated Measures of ANOVA F (4,1)

Arthanat, S. (2021). Promoting information communication technology adoption and acceptance for aging-in-place: A randomized controlled trial. *Journal of Applied Gerontology*, 40(5), 471-480.

Study II: Home automation technology to support care partners of individuals with Alzheimer's disease & dementia



Study II: Home automation technology to support care partners of individuals with Alzheimer's disease & dementia

Adapt and implement mainstream home automation technology specific to support the needs of care partners Goals are centered on:

- Care recipient engagement and routines
- Monitoring and home safety
- Emergency response and assistance
- Care partner autonomy

Study II: Home automation technology to support care partners of individuals with Alzheimer's disease & dementia

Themes from case studies "Installation and

"I'm not good with this kind of stuff" set-up is just really frustrating and not fun to go through."

Unfamiliarity

"It is like the Apple Vs PC! Its scary!. We won't know if we go out and buy something. What if we end up with a bunch of things that won't work together I'm now familiar with the TV, the stove, the lights. I use them automatically without thinking, and I better be able to handle these devices the same way before I lose it.

ming

"All depends on where you are in your progression with the disease"

"My schedule used to be his schedule, and now this has allowed me better use of my own time."

> Value ...I ar ...y get "I went ahead zs done on and purchased ""'It would have been ~cond echo *helpful at the time of my* ' and mother's diagnosis, if a ned it doctor or social worker told us here are five *m*" things that will be useful going forward."

"Before he never"

hydrated during

the day and now

he drinks a little

bit of water each

time he is

reminded".

Figure: Smart Home Automation Early Intervention Framework to Support ADRD Caregiving

Reisberg's Seven St	ages /Glob	al Deteriorati	on Scale					
-	No Decline	Very Mild Decline	Mild Decline	Moderate Decline		oderately ere Decline	Severe Decline	Very Seve Decline
Major Process / Cognitive Skill Deficits & Key Performance Areas to Address	Mild Cognitive Impairment: Short-term Declarative Memory, Attention & Concentration -No major performance deficits -Routine forgetfulness Moderate Cognitive Impairment: Orientation, Reasoning, Semantic Memory & Language -IADLs -Social participation -Leisure -Work					airment:		
Smart Home Functionality & Goals	-Daily Ro -Health N -Home N	•	nent -Home Monitoring				ngagement	
Common Devices	WearaSocial iTelehe		Smart Wat		art Hor	me Interface Tier I	es Devices & A	pplications
and Applications	 Smart cameras Smart locks Smart sensors Smart outlets and switches Fall and Vital Health Monitoring & Assistance Automobile GPS Trackers 				Tier	ll Devices &	Applications	
	 Photo 	orded videos sharing apps or leisure	for promp	ting		Tier III	Devices & A	Applications

۶

STUDY III: Development of a Social Assistive Robot (SAR) for care of individuals with Alzheimer's disease & dementia

Future of Care (What can SARs do?)

- Offer companionship
- Help engage in routines
- Safety and emergency response
- Remain linked with the care partner or family



Work in Progress: A short video

Funded by UNH-CoRE Pilot Research Partnership Award (2019-2020)

Q



or

l socially *ogy*, *15*(7),

Thanks / Questions

Acknowledgement & Thanks: UNH- Occupational Therapy Students UNH- Center for Aging & Community Living



For Information: Sajay.arthanat@unh.edu

AGE OF CHAMPIONS, 2022