

Reimagining Exercise and Mobility Interventions for Older Cancer Survivors



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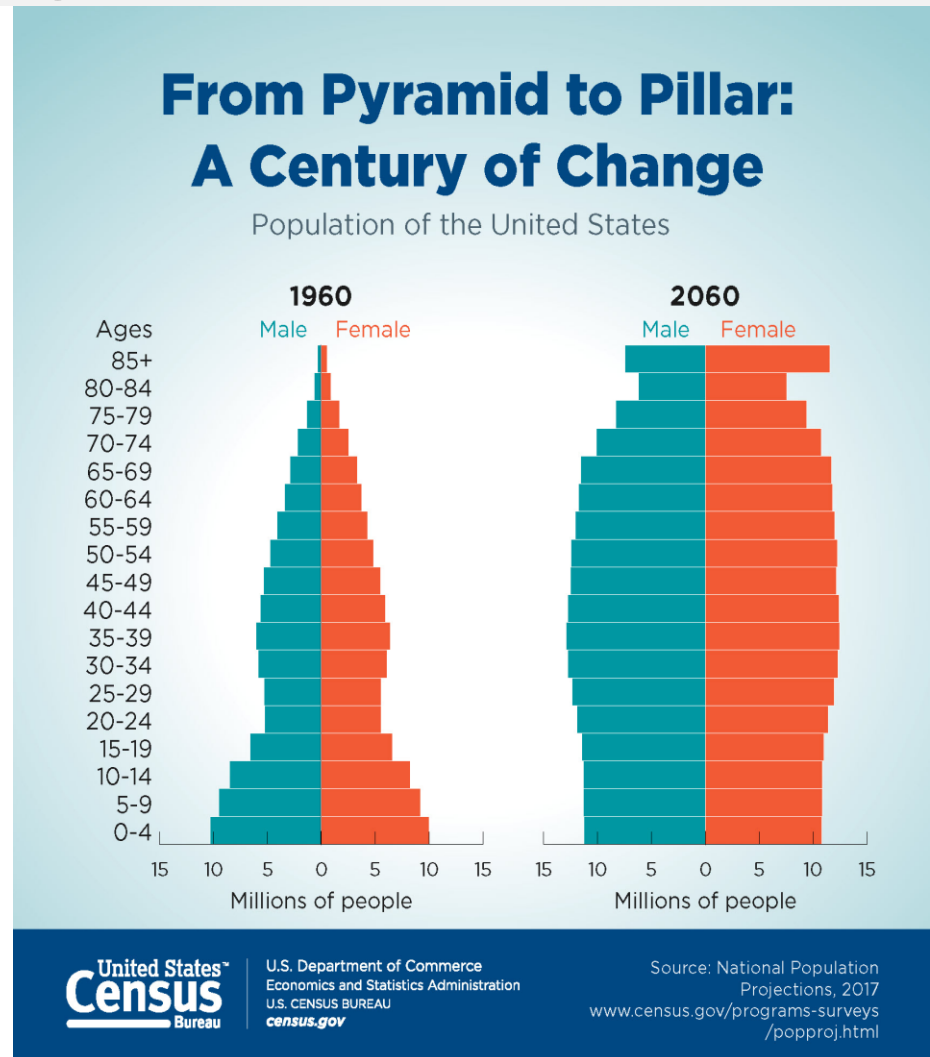


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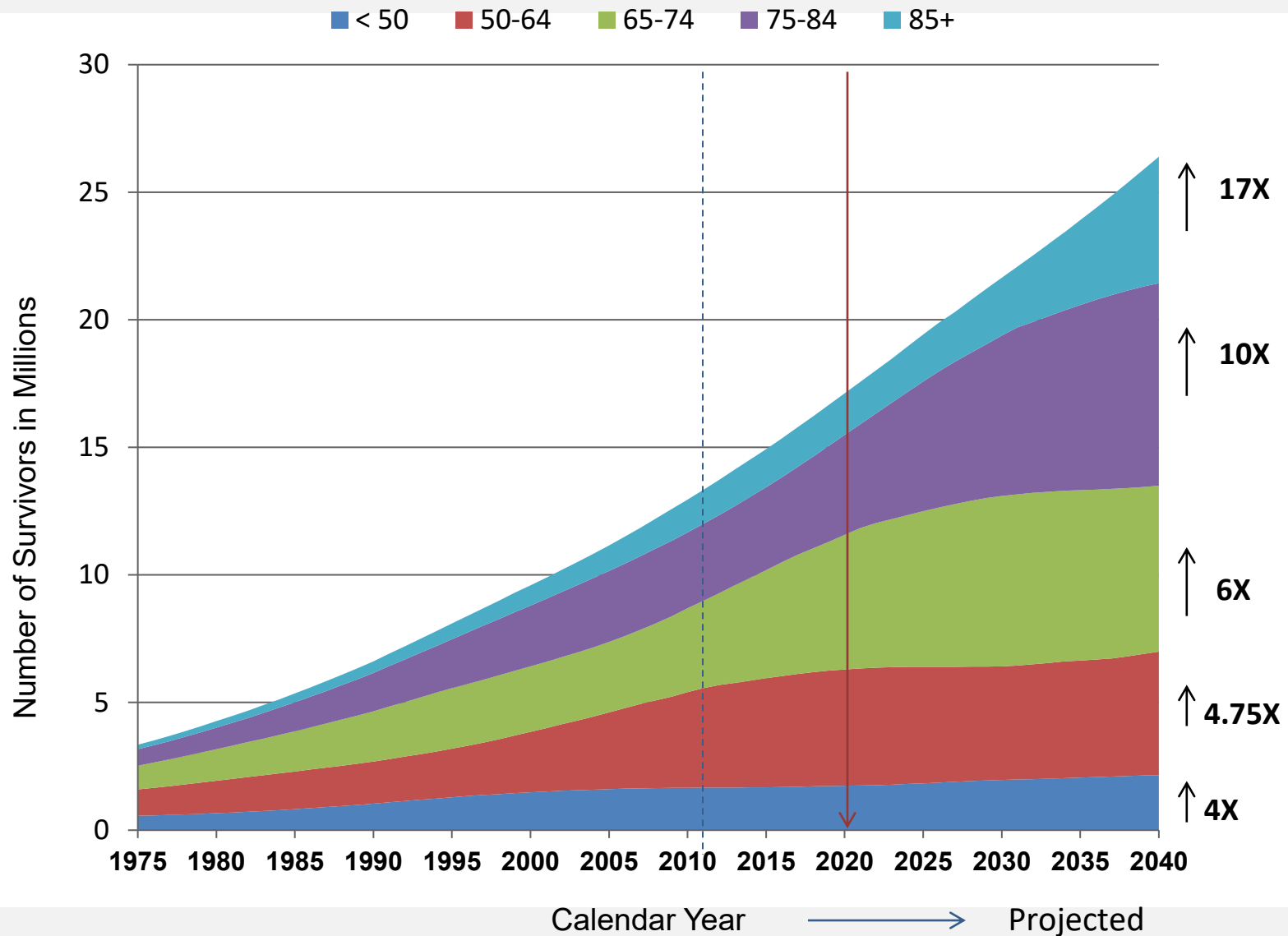
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The Graying of America

- The US is undergoing a major population transformation
- 77 M Baby boomers (born 1946-1964), turning 65 years at a rate of 10,000 people per day (Pruchno, 2012), starting in 2011
- More older people at risk for age-related conditions, including cancer, and mobility limitations.



Prevalence from 1975 to 2040 by Age



Source: *Bluethmann, Mariotto and Rowland, CEBP 2016*

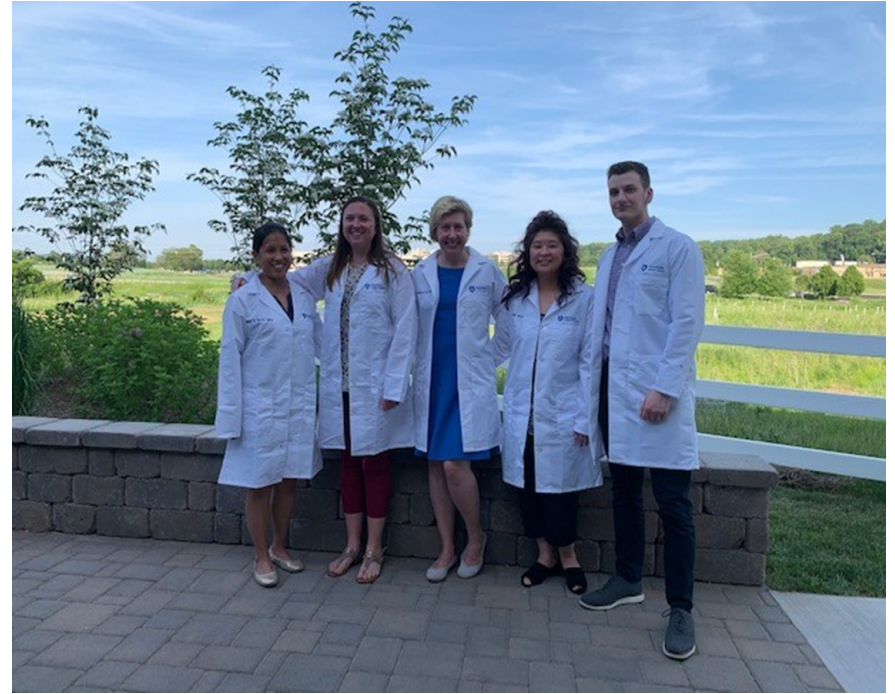


Aging Competes with Cancer Recovery

- ➔ Early effects – Fatigue, insomnia, depression, cognitive impairment
- ➔ Late effects – Heart disease, diabetes, osteoporosis, pulmonary (treatment toxicities) (Bellury et al., 2012)
- ➔ Age-related co-morbidities increase symptom burden – arthritis, asthma, dementia (Anatoli et al., 2009)



Healthy Aging After Cancer Lab (PI Bluethmann)



The primary goal of the Healthy Aging After Cancer lab is support older adults with cancer (ages 60 years and older) especially after the completion of cancer treatment. The lab will lead development, testing and implementation of evidence-based lifestyle programs (including physical activity and age-appropriate technology) to promote health, mobility, and **quality of years**.



Exercise is Medicine® is a global initiative to establish physical activity as a standard in healthcare.

EIM's Goal is Transformational Change

- ❖ To institutionalize physical activity *assessment & prescription* into Global Healthcare Systems



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Benefits of Exercise for Symptom Management in Older Cancer Survivors

- Enhanced function and recovery
- Reduced risk of cancer recurrence
- Demonstrated benefits of PA for common treatment symptoms
 - Fatigue, Cognitive impairment, phys. dysfunction, sleep disturbances, quality of life
 - Bone loss and joint pain

(Mustian et al, 2012; Irwin et al, 2014)



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Exercise Underutilized

- Most Older adults 65+ do not achieve recommended PA
 - 27% NHANES 2011-2012
- Doctors don't routinely recommend exercise for symptom management
- Patients don't believe that it is for them
- In the 2008 Barriers to Physical Activity for People with Disabilities survey
 - 40% of educated adults with disabilities do not exercise because they do not believe it will improve their condition
 - 50% exercise because they do not know how to do so safely with their condition(s)



Using Exercise to Relieve Arthralgia (Joint Pain) and Improve AI Adherence (REJOIN): A Pilot Study



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Who is at risk?

- Half of BCS are Post-menopausal, 70% have hormone-sensitive disease (ER+).
- Standard of care for ER+ patients is adjuvant hormonal therapy (known to reduce recurrence and mortality risk if taken as prescribed)
- So? 50% of eligible women do not take as prescribed. Most discontinue within 2 years.
(Burstein et al., 2014)

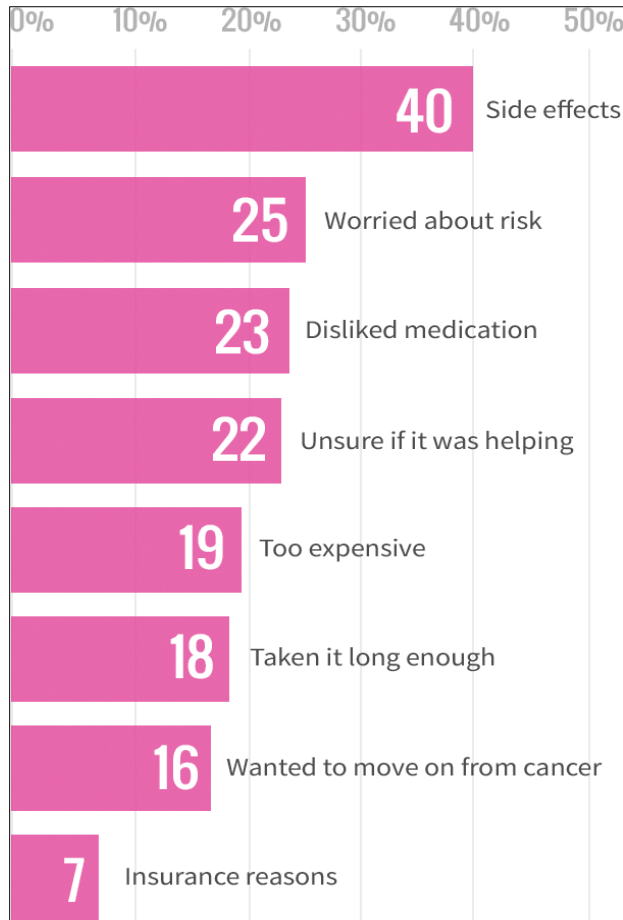


ASCO | GUIDELINES

- **2010 Recommendation:** Previous ASCO guidelines recommended treatment of women who have hormone receptor– positive breast cancer and are premenopausal with 5 years of tamoxifen, and those who are postmenopausal a minimum of 5 years of adjuvant therapy with an aromatase inhibitor or tamoxifen...
- **Updated 2014 Recommendation:** If women are pre- or perimenopausal and have received 5 years of adjuvant tamoxifen, they should be offered 10 years total duration of tamoxifen. If women are postmenopausal and have received 5 years of adjuvant tamoxifen, they should be offered the choice of continuing tamoxifen or switching to an aromatase inhibitor for 10 years total adjuvant endocrine therapy.



Why don't women take AIs as prescribed?



- One modifiable reason is Medication side effects – 50% of women experience joint pain
- Options for controlling side effects are limited, esp for older patients
- Effective strategies (pain medication) provide only short-term relief

Source: Breast Cancer Index



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How can this be addressed?

- Exercise is Medicine! Beneficial for many cancer symptoms as well as chronic diseases
- Exercise is a non-pharmacological, sustainable method of managing symptoms, esp for AI joint pain (Irwin, 2014)



Research Question and Aims

REJOIN -- does a self-management approach (education + exercise) improve joint pain management better than standard care?

- **Aim 1: Adapt an evidence-based PA intervention for older cancer survivors planning to take AIs.**
- **Aim 2: Test the effect of a pilot intervention on arthralgia and behavioral predictors for AI medication adherence (e.g., knowledge and self-efficacy).**
- **Aim 3: Test the effect of a pilot intervention on adherence to aromatase inhibitors.**



The Exercise Intervention

Eligibility (n=76):

- Female BCS
- 65 years +
- ER+
- Not exercising
- Not yet taking AIs
- Stages I-III

Fit & Strong!

An award-winning, evidence-based physical activity program for older adults



About Fit & Strong!

- Home Page
- About Fit & Strong!
- Evidence Recognition / Awards
- Partners
- Testimonials
- Locations
- Staff
- Royal Product
- Our Support
- System Login
- Contact Us

Welcome to Fit & Strong!

Fit & Strong! is an [award-winning](#), multi-component, [evidence-based](#) physical activity program for older adults. This eight-week program targets older adults with osteoarthritis and has demonstrated significant functional and physical activity improvements in this population.

Awards



[Read about our Archstone Foundation and ASA awards here.](#)

Testimonials

"The exercise has made it possible for me to have better movement in joints with less pain."

[More Testimonials »](#)



For Providers

- Offering Fit & Strong!
- Resource Requirements
- Program Costs
- FAQs

For Instructors

- Training & Certification
- Program Overview
- Schedule / Locations
- Interested in Training?

Fit & Strong! helps participants:

- Gain a clear understanding of what osteoarthritis is and how physical activity that is tailored to the needs of persons with arthritis can help them manage arthritis symptoms
- Learn to perform safe stretching, balance, aerobic and strengthening, exercises which gradually increase in frequency, duration, and intensity

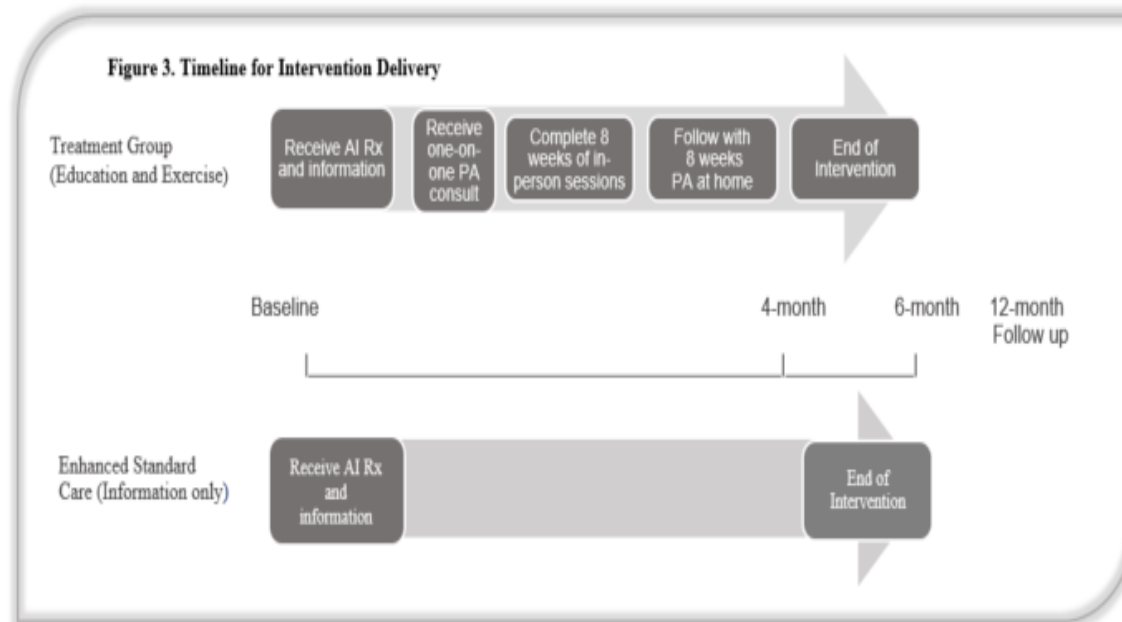


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Overview of Study Design –

- Two-armed randomized trial – Treat = Education plus Exercise,
- Enhanced Standard Care=ACS informational material only
 - Recruitment goal, N=76
 - Recruiting through PSCI, Andrews Patel, community clinics



Primary Outcomes

- Joint Pain
 - Brief Pain Inventory (modified)
 - Grip Strength (4x)
 - WOMAC (upper body)
 - Quick DASH (lower body)
- Adherence to Als
 - Self-reported at 4 assessments
 - Comparison with prescription refill records
- Behavioral Predictors
 - Exercise self-efficacy and TINQ knowledge assess.



Secondary Outcomes

- Physical Activity
 - Self-report (CHAMPS) and accelerometer
- Geriatric Assessment (Modified CARG survey)
 - Physical function, cognitive screen, polypharmacy, frailty
- Blood draw – inflammatory biomarkers (CRP, IL-6, Tnf-alpha) plus future analyses indicated by trial results



The Best Laid Plans

- IRB approval Feb 20,2020
- But then COVID...



Institutional Safeguards

- Recruitment impossible – patients too scared to come to hospital, exercise not priority
- All in-person research was paused and could not be continued unless redesigned in a remote delivery format
- Many older adults, especially in rural areas, did not have broadband or experience with video platforms
- Pew Report describes the new normal as “tele-everything” but this leaves older adults behind.



Digital Divide



- Outdated assumptions about older adults and tech*
 - As of 2016, 67% of US Adults 65+ use the internet, up from 7% in 2000
 - Increases in smartphones, tablets, cellphone use
 - After age 75, internet and broadband use drops off
(GI Generation, born 1936)

*Older Adults and Internet Use, Pew Center, 2016



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Original Class Design

- Original Plan:
 - 2x weekly 60-min session held at the Mohler Senior Center
 - Use exercise equipment and practice stretching together with trainers



Revised Exercise Class Design

- Changes to meet new research guidelines
 - Remote program using Zoom
 - Mail manual plus exercise equipment to each home
 - Use exercise equipment and practice stretching
 - Household member present during exercise
 - Camera facing the exercise area



Pre-test with Eligible BCS

Software interface showing the **Rate of Perceived Exertion (RPE) Scale** and a video call with four participants.

Rate of Perceived Exertion (RPE) Scale

Strain Level	RPE Rating	Description
Too much strain	10	Maximal Effort
	9	
	8	Very Hard
	7	Moderately Hard
	6	
	5	Hard
	4	Somewhat Hard
	3	Moderate
Too easy for effective exercise	2	Somewhat Easy
	1	Very Easy

Video call participants:

- Meghan Grotte
- Mr. Jared Heitzenrater
- [Participant]
- [Participant]



Acceptability of Adapted Format

-- Collected feedback from 6 BCS, 3 in phone interviews, 3 for live pretest with adapted materials

-- Participants gave the adapted format a mean score of 9.2/10 for satisfaction

-- Quotes:

"I thought it was going to be tedious, and it went fast"
(Participant 1-5).

"I thought was (good and) pretty well rounded"
(Participant 1-6).

"It gave me some confidence and, and it established in my mind that, you know, this is what I need to do to move forward" (Participant 1-7).

Documenting Progress and Lessons Learned

Bluethmann SM, Truica C, Klepin HD, Olsen N, Sciamanna C, Chinchilli VM, Schmitz KH. Study design and methods for the using exercise to relieve joint pain and improve AI adherence in older breast cancer survivors (REJOIN) trial. *Journal of Geriatric Oncology*. 2021 May 26.

Under Review -- Adapting an Evidence-based
Exercise and Education Program for Older Breast
Cancer Survivors for the REJOIN Trial

Increased Mobility Impairment Risk for Cancer Survivors

- Cancer treatment increases mobility impairments for cancer patients (neuropathy, pain, musculoskeletal issues)
- Yet, extent of mobility impairment or device use specifically among older cancer survivors is UNKNOWN
- Physical activity is recommended for everyone, including cancer survivors (PAG 2018, ACS, NCCN) but functional status varies



Not Just Science Fiction

Smart Cane for the Aging

고령계층의 생활지원을 위한 스마트 키트(도구)

www.smartcane.com
Tel: 042.484.0000 Fax: 042.484.1111

Health

Map

Music

Mutimedia

Camera

Telephone

Banking

Mail

Calendar

SNS

스마트지팡이란?

지팡이와 스마트폰의 결합으로 각종정보 및 건강소식을 빠르게 전달할 수 있도록 하였다. 어르신들이 활발한 이동 및 커뮤니케이션을 위해, 갖가지 기능 및 위치추적이 가능하며, 영상지원 및 이동시 다양한 콘텐츠를 접할 수 있도록 제공함에 따라 고령계층의 생활지원을 위한 도구로 활용될 것으로 예상된다.

주요기능

Health : 사용자의 건강상태, 질병정보를 확인 할 수 있습니다.

Telephone : 어디서나 대화가 가능합니다.

Map : 사용자의 현재위치를 확인하며 실시간 교통 CCTV 지형철 버스노선 모바일 지도검색 및 위치검색이 가능합니다.

Camera : 사진, 동영상 등을 통해 추억을 기록하며, 긴급상황시 자신의 위치를 알릴 수 있습니다.

Calendar : 날씨확인 및 스케줄관리 그리고 알림기능이 있습니다.

Banking : 언제, 어디서나 온라인으로 은행업무가 가능합니다.

Mail : 메일 확인 및 발송이 가능합니다.

Music : 최신 국내, 해외 음악검색 및 음원 차트 순위를 확인할 수 있습니다.

Mutimedia : 라디오, 영화 TV, 비디오 등 다양한 미디어를 볼 수 있습니다.

SNS : 페이스북, 트위터 등 온라인 관계 망 서비스를 제공합니다.

What
노인의 보행보조기구 및 다양한 콘텐츠제공

When
평상시 보행기구 및 콘텐츠이용시

Where
모든장소에서 사용

Who
보행능력이 감소노인 및 건강상 불편한 사람 이용가능

How
스마트폰과 지팡이의 결합(스마트스틱)으로 두가지 조건이 하나로 합쳐짐에 따라 보행기구뿐만 아니라 다양한 콘텐츠제공



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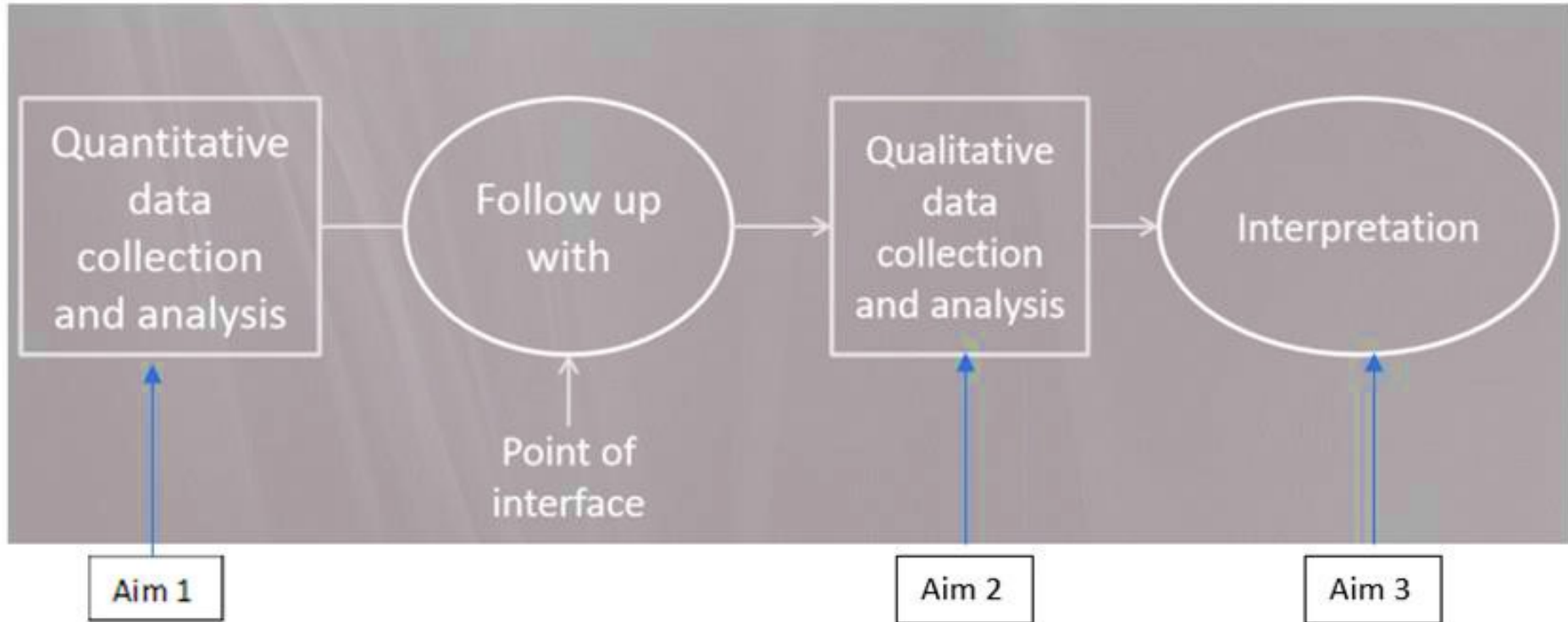
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Questions

- What is the prevalence of mobility device use among cancer survivors in the US?
- What are the predictors of mobility disability among older cancer survivors?
- Is there an opportunity for innovation in clinical approaches to support recovery in these older survivors and caregivers?



Mixed Methods Design





National Health &
Aging Trends Study

how daily life changes as we age

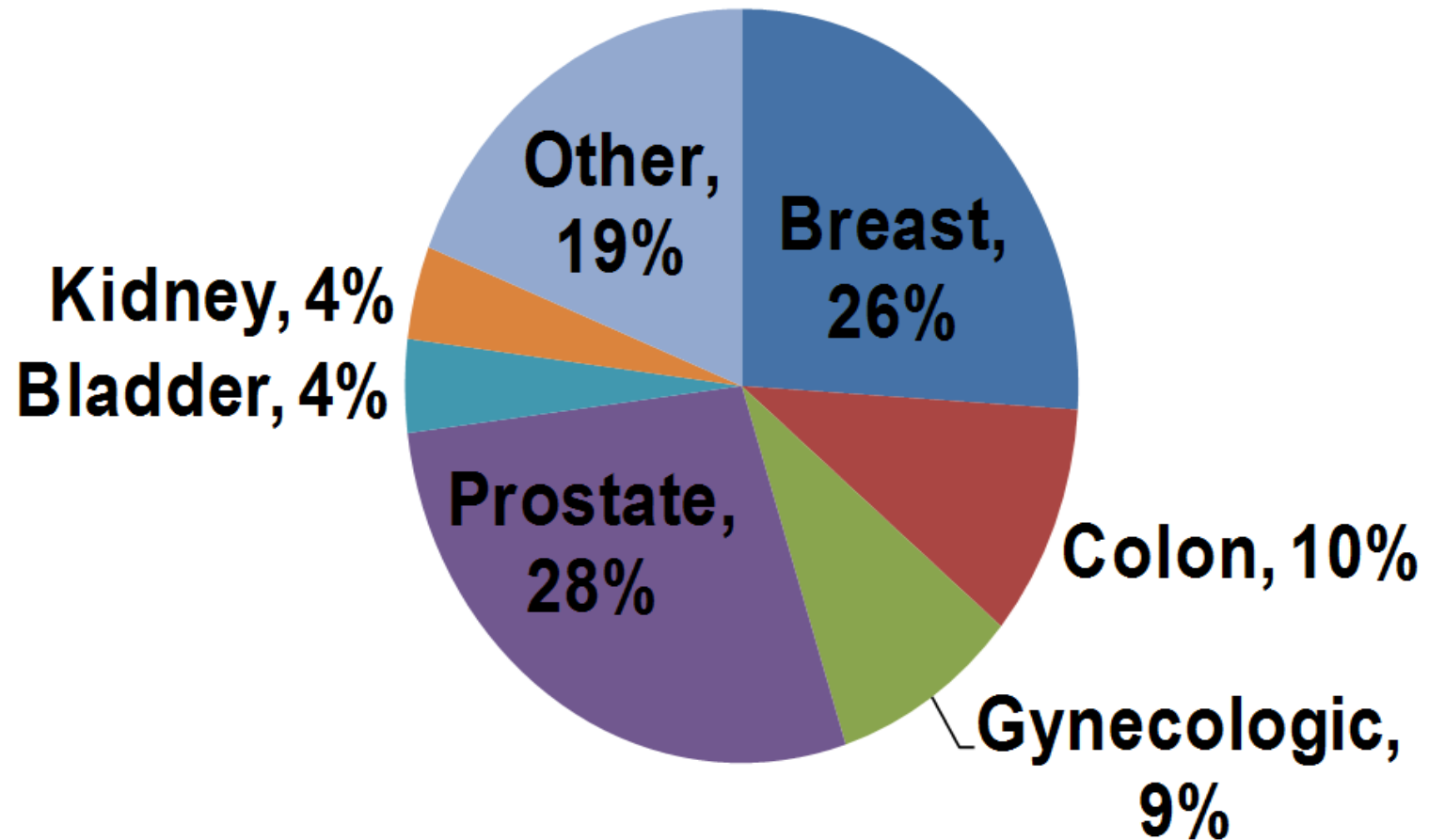
- NHATS -- Nationally representative data from community-dwelling, Medicare beneficiaries (all 65 +), n=6080
 - Administered by NIA/NIH
- Includes claims data, co-morbidities, cancer diagnosis, use of mobility devices (cane, walker, wheelchair, scooter)



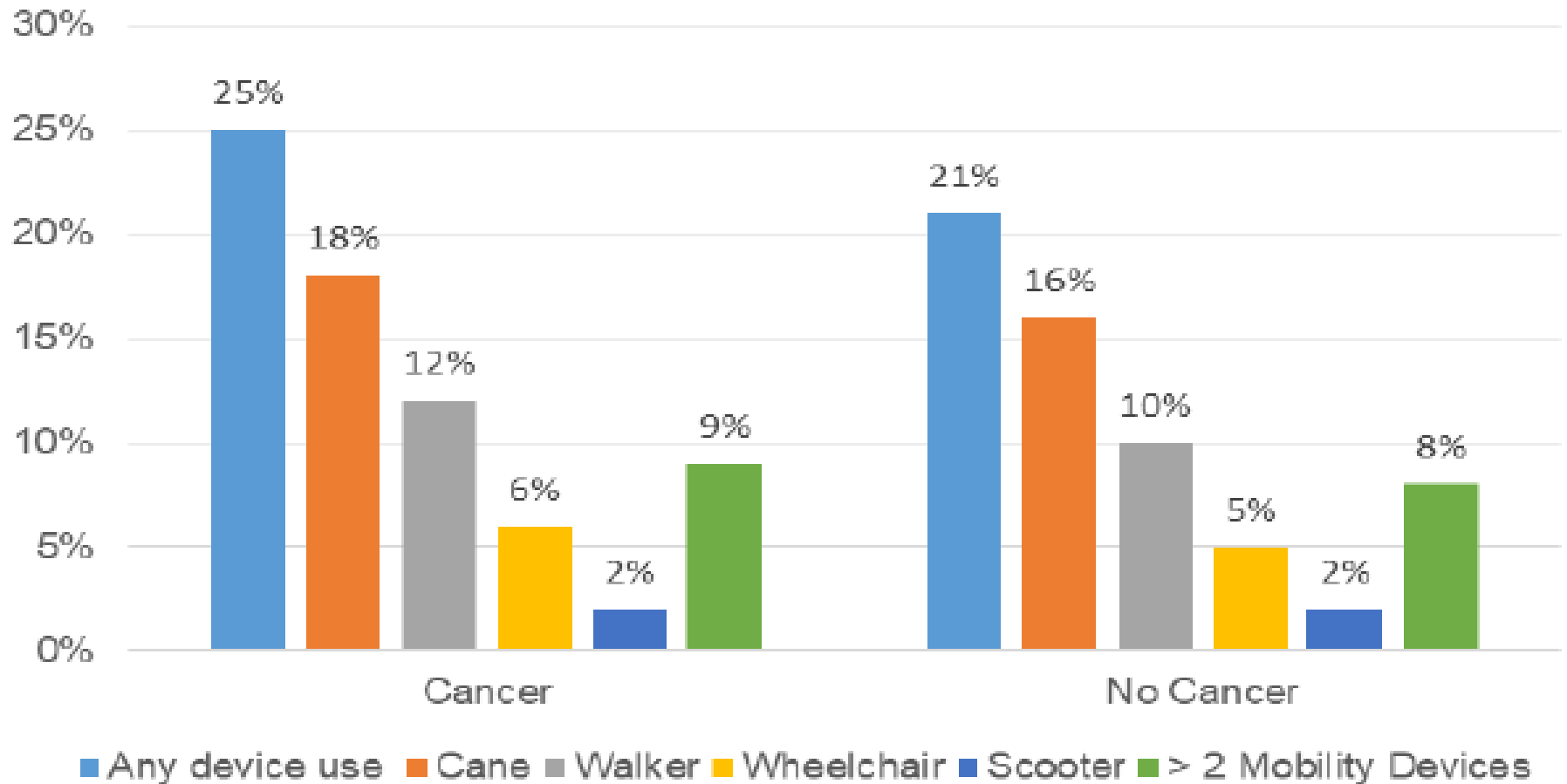
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Distribution by Site (n=1203)



Prevalence of Mobility Device Use by Cancer History



Source: Bluethmann SM, Flores E, Campbell G, Klepin HD. Mobility device use and mobility disability in US Medicare beneficiaries with and without cancer history. *Journal of the American Geriatrics Society*. 2020 Dec;68(12):2872-80.



Gait Speed Test and Mobility Disability

- Gait speed test robust predictor of mobility disability based on three large cohort studies (Miller, 2018)
- All NHATS clinical tests conducted at Johns Hopkins labs
- Each test was graded on a scale of 0-4, Higher score = better function, scoring protocol provided by NIA
- Mean scores: CS=2.39 (2.34–2.45), .027; Non-CA=2.27 (2.18–2.35), variability by cancer site



Adjusted Odds of Mobility Disability

- In regression models, survivors were 23% less likely than non-cancer adults to perform well on the gait speed test (OR=0.77, $p<.01$).
- Older survivors (75+ years) were 57% less likely (OR=0.43, $p<.001$) and the oldest (85+ years) were 83% less likely (OR=0.17, $p<.001$) to achieve the highest score on the gait speed test compared to adults 65-74 years.
- Being underweight, overweight, Black, having ≥ 3 medical conditions and experiencing pain that limited activity were also all associated with worse performance on the gait speed test (all $p<.05$).

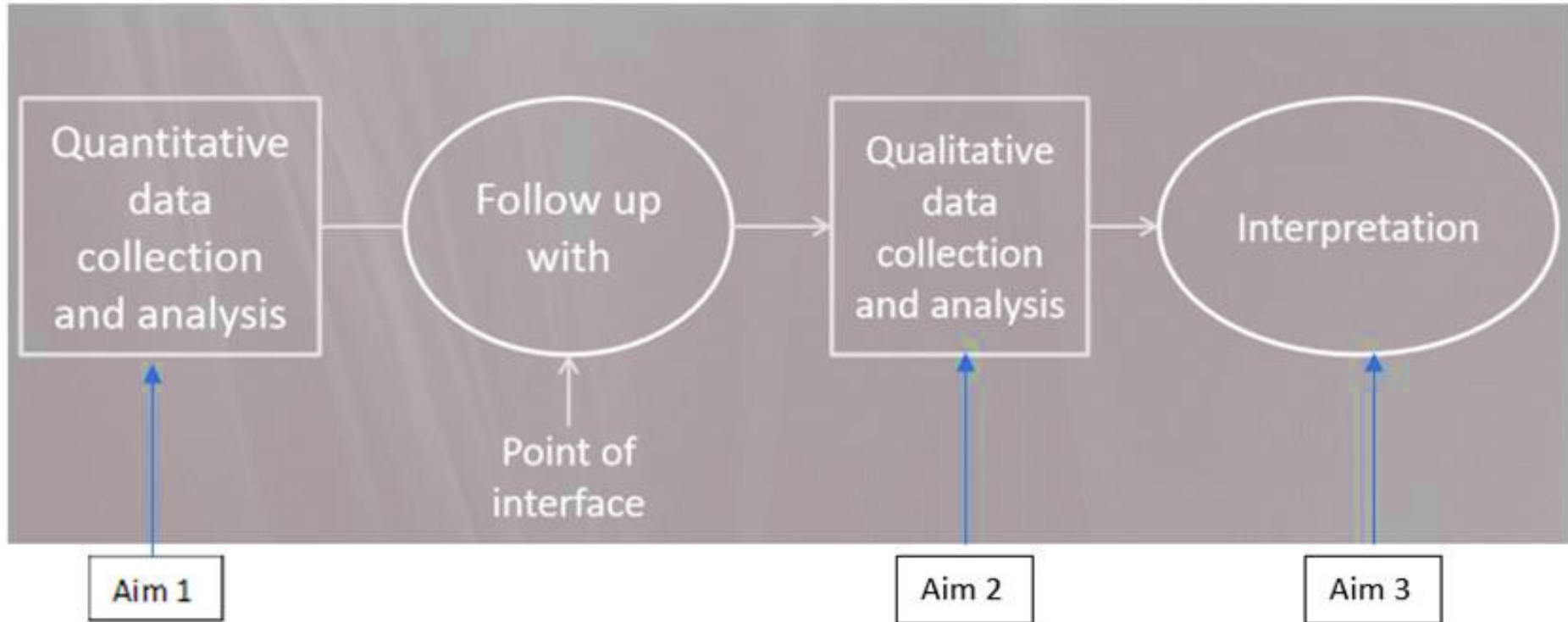


Limitations

- NHATS data did not include key cancer variables (treatment received, time since diagnosis)
- Not all cancer sites represented (e.g., lung not described)
- Not all ethnic/minority groups represented
- Limited data on duration of mobility device use, restricted interpretation



Mixed Methods Design



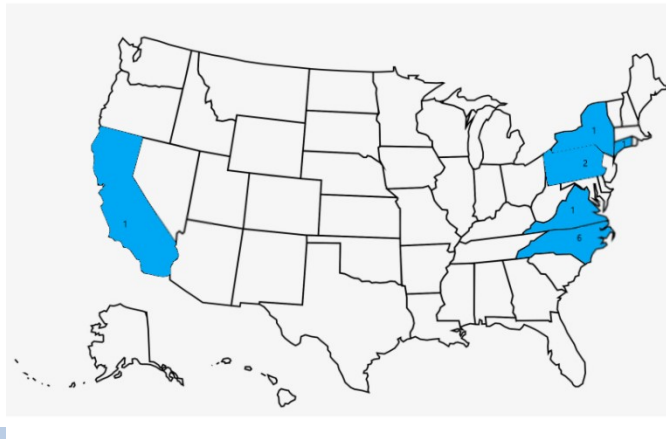
Conduct Focus Groups

- **Assess acceptability and perceived usefulness of various intervention approaches (including technology) to address mobility barriers as part of cancer recovery in older survivors.**
- **Explore opportunities for technology-enabled mobility devices in supportive care for survivors at multiple stages of recovery, with an end goal of independence and longevity.**
- **We recruited older survivors and caregivers for focus groups**
 - Groups conducted via zoom, pre-survey conducted with Senior Technology Acceptance Scale, also reflected in Focus Group script
 - Participants recruited from support groups, advocacy groups, including Cancer and Aging Research Group (CARG)



Smart Cane Focus Group Participants

- 12 participants (5 M, 7 F) ages 68-86 (mean age 74), mainly from the east coast (NC, PA, NY, VA, CT and CA).
- 8/12 were both survivors and caregivers for their partner
- All participants were educated (college, grad ed)
- 10 White, 1 African-American, and 1 Asian-American
- All but one participant reported fed insurance (Medicare, Medicaid, TRICARE).



Smart Cane Focus Group Participants

- Participant cancer diagnoses included: breast (4), colon (2), prostate (1), thyroid(1), skin (basal and melanoma) (2), lymphoma (1), and lung (1).
- Surgery, Chemotherapy, Radiation, Immunotherapy and/or Hormonal therapy were received by participants more than 5 years ago (8), 2-4 years ago (2), within the last year (2).
- Participants co-morbidities included high blood pressure (8), heart condition (5), arthritis (3), and diabetes (2).



- Overall, participants ranked their health as being Excellent (4), Very Good (6), Good (1) and Fair (1) and only two participants indicated that their physical health “moderately” limited their activity.
- 3 participants had previous experience with mobility devices.

Attitudes Toward Technology and Device Use (Senior Technology Acceptance Model (Chen, 2014))



- **75%** surveyed, responded (agreed or strongly agreed) that a technology-enhanced mobility device would enhance their effectiveness in daily activities.



- **100%** strongly agreed that they could complete a task or use a device if there was demonstration provided and they also felt confident that they could be skillful at device use.



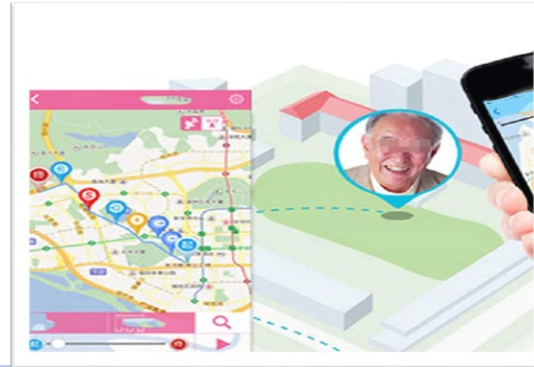
Video Demo of Smart Cane



Adjustable 45° Angle Head

Low Beam:
Illumination
Range Is About
1.5 Meters

High Beam:
Illumination
Range Is About
30 Meters



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Preliminary Results from Groups

- Overall, participants were excited about idea in concept
 - *“I love this cane. I think it's very well done.”*
 - *“I would use (this smart cane)-- I would use it in a heartbeat.”*
- But there was some trepidation about new tech
 - *“But I feel like the technology moves faster than we are able, actually, legitimately, to adopt it. And so I do believe some people are absolute whizzes at technology, and some people have to grapple with it. And I am actually somebody who has to grapple with it.”*



Who would teach survivors?

- *“I think PTs and OTs are it because your doctors, when you go through hip or knee surgeries, you go to physical therapy. So who better to give it to you? I mean, you do want to run it by orthopods because they're the ones who, you know, do the surgeries, and it'd would be interesting to get their input. But I think the ones that really need to teach it is the PT and the OT.”*



Next Steps

- Much more analysis and manuscript
- In-person research, gait analysis lab
- Testing with broader range of participants (more diversity, less tech experience)
- Input from clinical providers



Thank You

Dr. Bluethmann is supported through a Mentored Research Scholar Grant in Applied and Clinical Research, MSRG-18-136-01-CPPB, from the American Cancer Society and through funds from the Penn State CTSI NIH UL1 TR002014.



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