

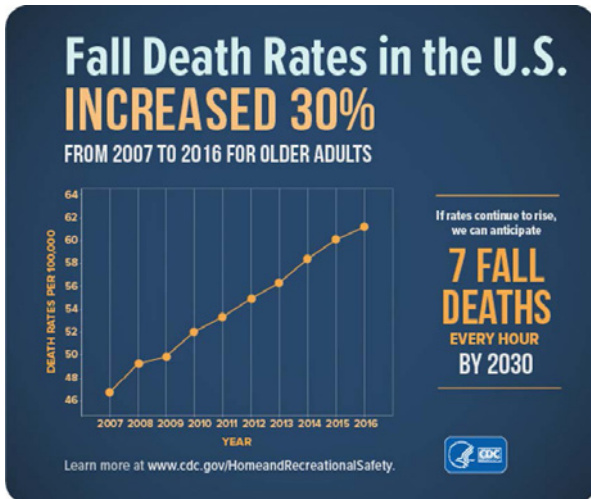
WHITE PAPER

A man and a woman are walking hand-in-hand on a sandy beach. The woman is on the left, wearing a white and beige striped short-sleeved shirt and light-colored pants. The man is on the right, wearing a blue polo shirt, a light-colored scarf, and blue jeans. They are both smiling and looking towards each other. The background shows the ocean with waves breaking on the shore under a clear blue sky.

**Implementing a Falls
Prevention Program
For Seniors**

Implementing a Falls Prevention Program For Seniors

Industry surveys suggest that up to 75% of senior living communities have implemented some type of fall prevention program. Unfortunately, there is evidence that this explosive growth in fall prevention programs has not been effective in reversing the epidemic of falls among older adults and leads to loss of physical activity, increased loneliness, accelerated cognitive decline, and higher risk of [cancer](#)¹, heart disease, and [dementia](#)².



Data published by the Centers for Disease Control (CDC) shows the fall death rate among adults age 65 and older increased 40% between 2007 and 2018, reaching 64 per 100,000.

The risk and consequences of falls in older adults are staggering.

- More than **1 out of 4**³ older adults fall every year (**36 million!**⁴), and this rate increases to 1 out of 3 for residents in senior living and **3 out of 4 adults**⁵ in nursing homes.
- In 1 out of 5 falls⁶, the elder person experiences a serious injury, such as a fracture or traumatic brain injury.
- **Almost 50%**⁷ of older adults limit their activity because of a fear of falling and adults over 65 typically identify falling as their **greatest fear by a wide margin**⁸.
- 6 months after a hip fracture due to a fall, 25% of older adults return to their living environment but pull back on daily activities, 50% require a higher level of care, and 25% are deceased.⁹

5 Key Issues With Current Fall Prevention Programs

Almost all fall-prevention programs are [evidence-based](#)¹⁰, meaning there are studies demonstrating effectiveness. But, peer-reviewed papers often describe fall prevention programs as only [modestly effective](#)¹¹ or even [ineffective](#)¹². So, what's missing?

- Common and popular fall risk assessments are mostly [unable to discriminate](#)¹³ between fallers and non-fallers^{14,15}. As a result, fall prevention programs tend to be reactive
- Current fall prevention interventions force participants to choose between short-term individualized therapy provided by a high-cost physical therapist or longer-term wellness activity provided in a low-cost group setting. Neither arrangement is optimum in preventing falls over a large population
- Overemphasis on environmental mitigation and physical exercise without addressing the role of executive function in balance and gait
- Adherence rates are relatively low, around **60 to 70%**¹⁶, especially for those interventions that may take several months to show demonstrable effects

Current practices are not very effective. Numerous meta-analysis studies have shown reductions in falls of only 25 to 30%¹⁷, which plummets to 8 to 10%¹⁸ when adherence rates are below 70%

After listing the limitations to current fall prevention programs, it is interesting to compare that to the three standard activities often implemented within a fall prevention program at a senior living facility.

Three Standard Activities Within a Fall Prevention Program *

1) **Eliminate potential tripping or slipping hazards.** Adding more lighting, ensuring appropriate handrails at all stair locations, using low-pile rugs, providing wide aiseways, etc. This can be instituted in the home and within a community living environment.

2) **Review individual risks.** This can include ensuring prescriptions for glasses are up to date, medications are reviewed for possible cognitive or physical side effects, and periodically evaluate any vestibular or neurological issues that they may be experiencing.

3) **Targeted interventions to prevent falls.** Targeted intervention can include physical therapy, less intense group programs or classes¹⁹, such as Otago, Tai Chi, and Bingocize.

*The cost of these programs is sometimes covered by the Medicare Advantage (itself or through Silver Sneakers), sometimes by the senior living community, and sometimes by the individual.

¹ Kassandra I Alcaraz, et al. Social Isolation and Mortality in US Black and White Men and Women American Journal of Epidemiology, 2018; DOI: 10.1093/aje/kwy231

² American Academy of Neurology. "Walking And Moderate Exercise Help Prevent Dementia." ScienceDaily. ScienceDaily, 21 December 2007

³ Gwen Bergen, PhD; Mark R. Stevens, MA, MSPH; Elizabeth R. Burns, MPH. Falls and Fall Injuries Among Adults Aged ≥65 Years — United States, 2014

⁴ Briana Moreland, et al. Trends in Nonfatal Falls and Fall-Related Injuries Among Adults Aged ≥65 Years — United States, 2012–2018

⁵ Falls in Nursing Homes, CDC, 2012

⁷ Pandemic may have increased older adults' fall risk, U-M poll suggests, Michigan news, University of Michigan, 2021.

⁸ Alan M. Jette, PT, PhD. Fear-of-Falling in Older Persons, Philips Lifeline, 2008 <https://www.lifeline.philips.com/content/dam/PLL/PLL-B2C/PDFs/Fear-of-Falling-in-Older-Persons.pdf>

⁹ George F. Fuller. Falls in the Elderly. Am Fam Physician. 2000 Apr 1;61(7):2159-2168.

¹⁰ About Evidence-Based Programs, NCOA, 2020

¹¹ Catherine M. Walsh, et al. Temporal Trends in Fall Rates with the Implementation of a Multifaceted Fall Prevention Program: Persistence Pays Off, NCBI, 2018

¹² No reduction in fractures seen in falls prevention programmes prescribed to older people, University of Warwick, 2020

¹³ Simon Gates, et al. Systematic review of accuracy of screening instruments for predicting fall risk among independently living older adults, JRRD, 2008

¹⁴ Gade GV, Jørgensen MG, et al., Predicting falls in community-dwelling older adults: a systematic review of prognostic models, BMJ Open 2021;11:e044170. doi: 10.1136/bmjopen-2020-044170

¹⁵ Park, Seong-Hi. "Tools for assessing fall risk in the elderly: a systematic review and meta-analysis." Aging clinical and experimental research 30.1 (2018): 1-16

¹⁶ Oluwaseyi Osho, et al. Adherence and Attrition in Fall Prevention Exercise Programs for Community-Dwelling Older Adults: A Systematic Review and Meta-Analysis, Research Gate, 2017

¹⁷ Sherrington C, et al. Evidence on physical activity and falls prevention for people aged 65+ years: systematic review to inform the WHO guidelines on physical activity and sedentary behaviour. Int J Behav Nutr Phys Act. 2020 Nov 26;17(1):144

¹⁸ Osho, et al. Adherence and Attrition in Fall Prevention Exercise Programs for Community-Dwelling Older Adults: A Systematic Review and Meta-Analysis. Journal of Aging and Physical Activity. (2017)

¹⁹ Evidence-Based Falls Prevention Programs, NCOA, 2021

These recurring issues in fall prevention programs may be linked to a general standardization of the activities offered. It is imperative that health care providers adapt current practices with a better and more modern approach. We will evaluate how the implementation of semi-immersive mobility technologies may be used to optimize gait rehabilitation.

Implementing a Falls Prevention Program With Gaitbetter's Semi-immersive VR Technology

- Solves the limitations with current fall prevention programs.
- Uses semi-immersive virtual reality in combination with standard treadmills to provide individualized motor-cognitive therapy for both short-term and longer-term interventions.
- Based on over 10 years and \$8 million of research funding and backed by multiple randomized clinical trials with over 17 peer-reviewed publications
- Harnesses advances in 3D sensing and artificial intelligence to actively resolve existing issues with fall prevention programs.

*Identify
Implement
Optimize
Increase
Improve*





Step 1: Identify First-Time Fallers

Identifying older adults at risk of falling is crucial in lowering the per capita fall rate, both in senior living communities as well as in the larger population. While there are a number of approaches, existing data suggest they are generally ineffective. As a result, an increasing number of researchers are suggesting that all adults over 65 should be viewed as a fall risk and should take a proactive approach to fall prevention.

The semi-immersive virtual reality experience from GaitBetter encourages older adults to participate because it is fun and engaging, providing immediate and quantifiable feedback. The combined motor-cognitive therapy drives significant benefit, even when sessions are only once a week. The multiple virtual reality environments and numerous destinations ensures that participants stay interested, even after months or even years of GaitBetter therapy. And the real-world experiences (remembering a destination, avoiding obstacles, disregarding distractions, etc.) provides a strong transfer to everyday activities and quality of life.



Step 2: Implement Within Physical Therapy or Wellness Classes

It is well known that physical therapy can be more effective in reducing falls than classes or other generalized programs. But, the 1-on-1 approach is expensive long-term and can be hard to justify. Wellness classes are much more affordable (less than \$25 per individual per session), but they are very teacher-dependent and lack any individualization.

The GaitBetter technology allows organizations to combine the benefits of both approaches. The initial session with GaitBetter can be set up by a physical therapist, providing a robust starting point based on the individual's capabilities. The system will then use a combination of this initial baseline, the participant's performance, and artificial intelligence to gradually increase the physical and cognitive challenges with each new session. Since the GaitBetter therapy can be self-administered, the cost of each session is equivalent to a class, but far more repeatable and individualized.





Step 3: Optimize Executive Function, Prevent Falls

It is increasingly known that walking is not an autonomous task, but instead requires significant cognitive load²⁰. Therefore, any attempt to reduce falls and improve mobility must include therapy that slows or reverses the decline in executive function seen in older adults.

The foundation of GaitBetter is combined motor-cognitive training. As the participant walks through the virtual reality environment, they are forced to utilize working memory, decision making, and motor planning. These are all key cognitive tasks that must be utilized during the process of dynamic walking to maximize the improvement in executive function (benefits are greatly reduced if cognitive challenges are presented while standing still²¹).

The combination of cognitive with dynamic motor is key for a strong transfer to real world experiences, where the overwhelming majority of falls are while moving and being distracted (falls do not tend to occur when the person is not in motion).

²⁰ Anat Mirelman et al. Executive function and falls in older adults: new findings from a five year prospective study link fall risk to cognition, PubMed, 2012;7(6):e40297. doi: 10.1371/journal.pone.0040297

²¹ Anat Mirelman, et al. Increased frontal brain activation during walking while dual tasking: an fNIRS study in healthy young adults, 2014;. doi: 10.1186/1743-0003-11-85

²² Dr Anat Mirelman, et al. Addition of a non-immersive virtual reality component to treadmill training to reduce fall risk in older adults (V-TIME): a randomised controlled trial. Lancet. 2016 Sep 17;388(10050):1170-82



Step #4: Increase Adherence Rates

Fall prevention programs struggle with adherence, with many reporting self-discharge or no-show rates of up to 40%. Participants report that repetitive and boring exercises and limited to no improvement in the short-term were major drivers for lack of participation.

Organizations that have implemented GaitBetter into their fall prevention programs have reported adherence rates of over 90%²². Trainees have reported that they feel an overall improvement in their confidence in walking and look forward to upcoming sessions. This is due to the virtual reality environment (participants feel like they are playing a game) and the immediate benefits (participants report experiencing noticeable improvement after 4 to 5 sessions).





Step #5: Improve Efficacy

Existing fall prevention programs typically aim to reduce falls by 30 to 40%, though the actual rates may vary depending on the comorbidities being experienced by the participant. When combined with low adherence rates, the actual fall reduction rates can be as little as 25%. Attempts to improve efficacy can be hampered by the outsourcing of program activities to third parties, such as physical therapy firms or independent class instructors.

Real world studies on GaitBetter have reported fall reduction by up to 80%. This was achieved in an ongoing study conducted by the Israeli Ministry of Health at Maccabi Health Care system on the first 80 patients completing 6 month follow up post intervention, with improvements relatively consistent across different populations (post-stroke, Parkinson's, implant, etc.). Combined with high adherence rates, this provides a path for a more meaningful reduction in falls within senior communities.

As noted by Phil Cadman, CEO of Premier Health22 -

"I know that falls are just a devastating thing for older people and I mean you could break a hip and then things go down from there.

GaitBetter is a great thing that we're very excited about and all the patients who have been on it so far have loved it and they like the challenge. They want to be scored the next time, so it's one of those things that kind of feeds into their positive feedback."

Summary

Among people aged 65 and older, falls are the leading cause of both fatal and nonfatal injuries. Yet, current fall prevention programs are often only modestly effective or ineffective. Assisted Living Facilities and Senior Living Communities need new approaches to integrate and enhance current fall prevention programs to drive cost savings while improving wellness outcomes.

This white paper highlights how GaitBetter's semi-immersive VR technology can be combined with both short-term and longer term fall prevention interventions to solve this growing challenge. Easily combined with any treadmill, GaitBetter's technology has achieved up to 80% fall reduction in real-world studies and adherence rates of over 90%.

GaitBetter is currently working with Wellness Programs at Independent and Assisted Living Communities across the US and Canada to increase mobility training and drastically reduce falls.



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