

Solutions to Reduce Cat-Related Falls of Aging Adults in the Home

Katie Davis, Yulim Oh, Zhixuan Zhang, Francis LaRossa



Problem Statement

Aging adults falling in the home due to their pet cats being in the **wrong place** at the **wrong time**.

Research

Benefits of Pet Ownership for Aging Adults

Pet ownership can be particularly beneficial to aging adults who struggle with mental, emotional, or physical issues. Aside from the companionship that a pet can provide, an aging adult may realize **tertiary benefits** of pet ownership. Examples include: more abilities to socialize, better cognitive function, lower stress levels, etc.

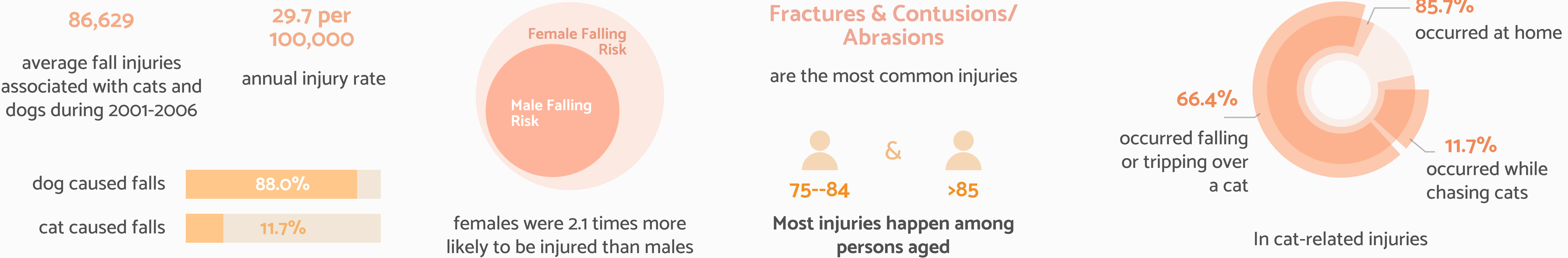
Challenges of Pet Ownership for Aging Adults

Pet ownership by aging adults can be complicated by a number of issues, including the mental, physical, and emotional realities of getting older. If not properly prepared for, pets can inadvertently create unsafe situations in the homes of aging adults. While pet related falls are a significant issue, there are other **adverse outcomes** of pet ownership that an aging adult must be aware of. Examples include: infections due to poor pet hygiene, exacerbation of lung diseases, bites / lacerations, etc.

Goals + Metrics

- Goal #1** Reduce the **rate** at which aging adults fall in the home due to pet cats (measured by: falls per 10,000 of adults >=65, comparing national averages vs homes with our design solution)
- Goal #2** Avoid negatively impacting the **relationship** of an aging adult and pet cat (measured by: experience surveys of aging adults with our design solution pre and post product implementation)

Statistics



Case Study

Location Specific Problems

#1: Entryway

You come home after a long day and open the front door. However you don't know that your cat is ready to greet you with a little scare! Caught off guard, you lose balance and fall.



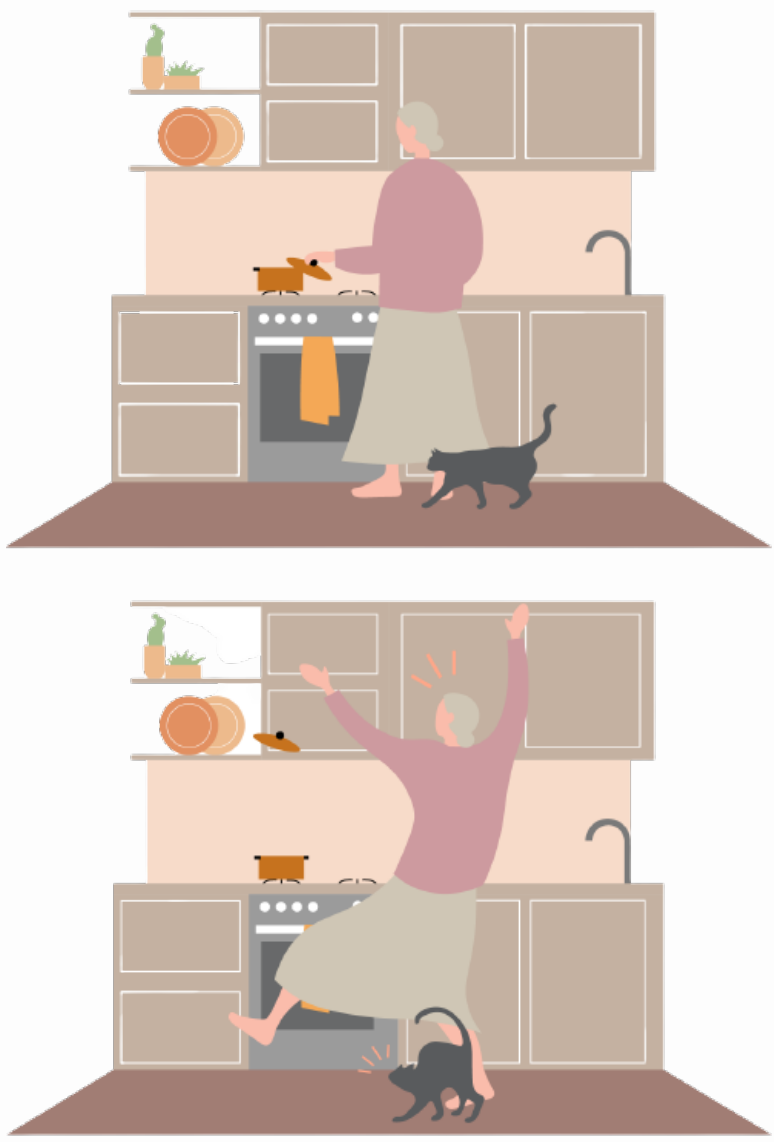
#2: Bathroom

You take a shower, thinking you locked the door (you didn't). Your pet cat arrives and curls up next to the shower door. You step out of the shower and onto....your cat!



#3: Kitchen

You are cooking and your cat is wandering around your feet expecting food. Unaware of your cat's presence, while stepping back, you accidentally trip over your cat and fall!



#4: Bedroom

You got to sleep and wake up at 3am to go to the bathroom. You swing your feet out of the bed and right onto....your cat (jerk)!



In the following study, we brainstormed 8 possible scenarios where cat-related falls can commonly happen at home.

We summarized them into two categories; the location specific problems and the location agnostic problems. The location specific problems show places in homes where it is difficult for people to see their cats, leading to a high risk of falls. The location agnostic problems are more related to actions that could potentially cause pet-related falls.

"80 female, neck of humerus injury, Reaching down to pick up cat's food dish; Cat leant against legs and patient fell forwards over cat."

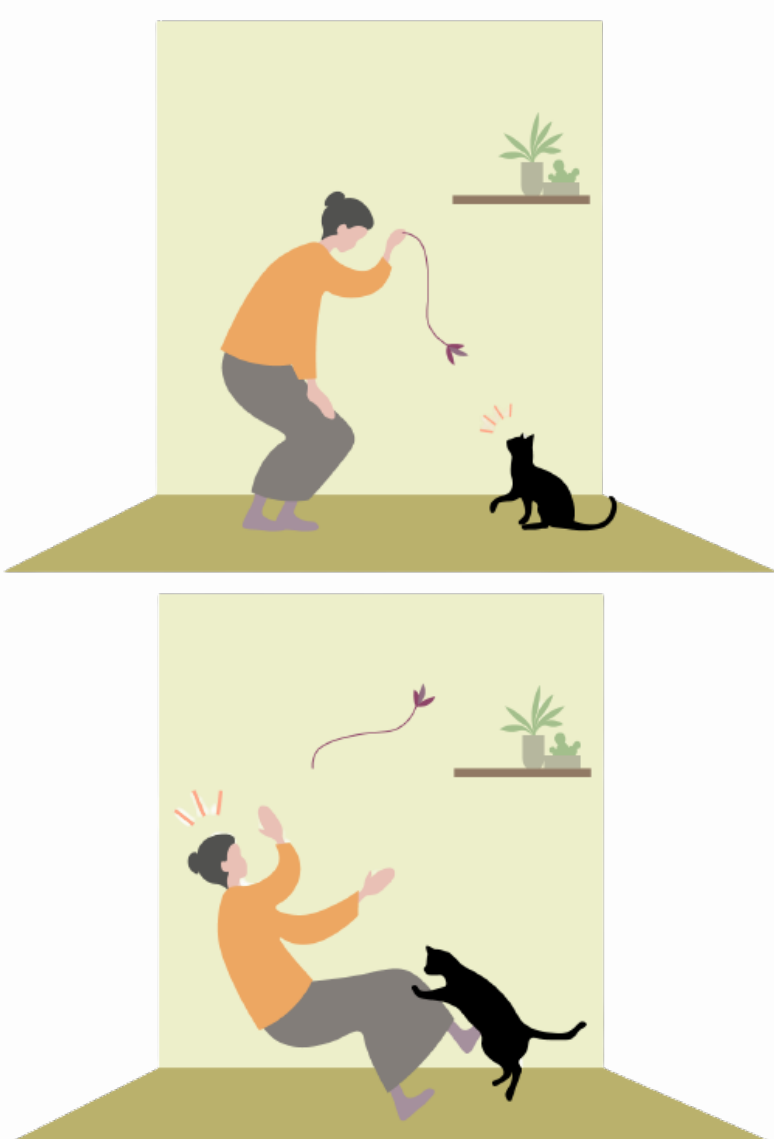
"82 female, femoral neck injury, Tripped over black cat in darkened hallway."

"80 female, pelvis injury, Fall while attempting to move quickly out back door as cat carried in a live snake"

Location Agnostic Problems

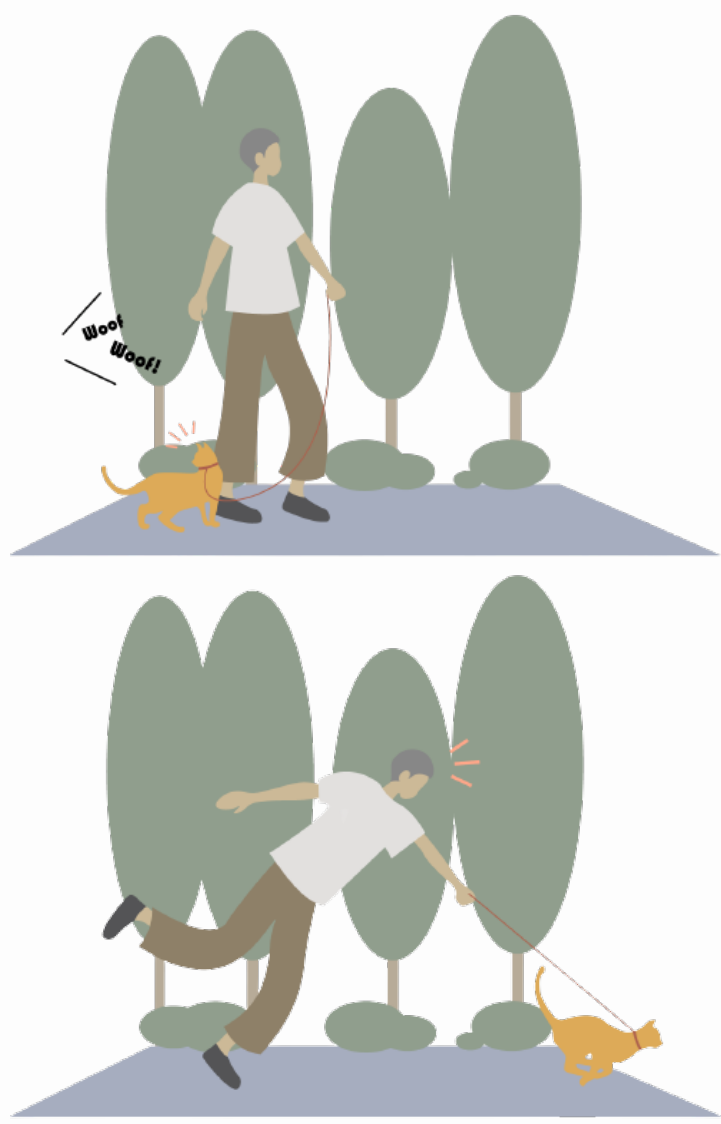
#5: Playing

You have a young and active cat who loves to play. Trying to catch the flying toy you have, your cat jumps up to you and pushes you backward, causing you to fall!



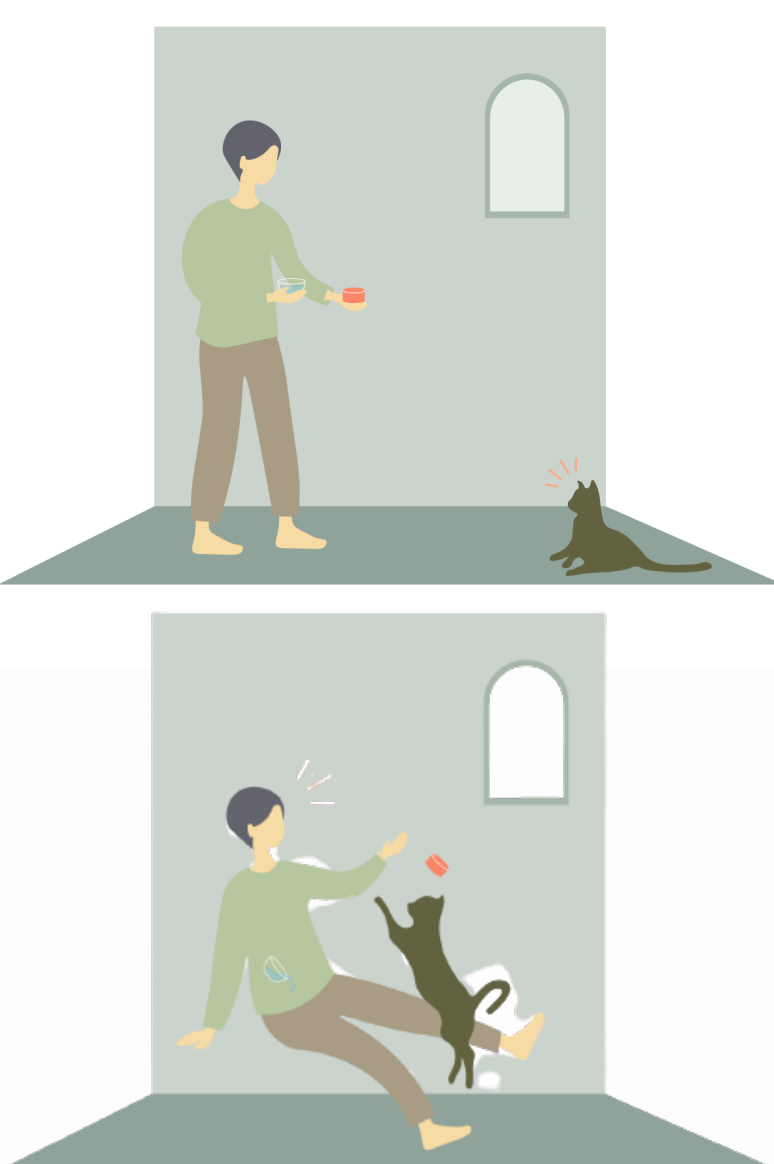
#6: Walking

You attempt to walk your cat on a leash (why!), your neighbor's dog barks and the cat freaks out, sprints toward the other direction. The sudden pull of the leash makes you fall on the ground.



#7: Feeding

You open a can of cat food (organic, of course), your cat excitedly runs under your feet to get her meal, causing you to fall.



#8: Bathing

You decide to bathe your cat (lol), they freak out and try to run away. You go to grab the cat, you slip, and fall.



References

1. Keglovits, M., Clemson, L., Hu, Y., Nguyen, A., Neff, A. J., Mandelbaum, C., Hudson, M., Williams, R., Sillanoff, T., & Stark, S. (2020). A scoping review of fall hazards in the homes of older adults and development of a framework for assessment and intervention. *Australian Occupational Therapy Journal*, 67(5), 470-478. <https://doi.org/10.1111/1440-1630.12682>
2. Cosco, T. D., & Storey, B. L. (2017). Physical activity, dog ownership and falls among older adults: a breed apart. *Journal of Epidemiology and Community Health* (1979), 71(1), 1130-1130. <https://doi.org/10.1136/jech-2017-205841>
3. Stevens, J. A., Tah, S. L., & Haileyus, T. (2010). Dogs and cats as environmental fall hazards. *Journal of Safety Research*, 41(1), 69-73. <https://doi.org/10.1016/j.jsr.2010.01.001>
4. Kurrie, S. E., Day, R., & Cameron, I. D. (n.d.). The perils of pet ownership: a new fall-injury risk factor. *The Medical Journal of Australia*, 191(11-12), 682-683. <https://doi.org/10.5694/j1326-5377.2004.1b06623>
5. Gee NR, Mueller MK and Curl AL (2017) Human-Animal Interaction and Older Adults: An Overview. *Front. Psychol.* 8:1416. doi: 10.3389/fpsyg.2017.01416
6. Centers for Disease Control and Prevention (CDC) (2009). Nonfatal fall-related injuries associated with dogs and cats—United States, 2001-2006. *MMWR. Morbidity and mortality weekly report*, 58(1), 277-281.
7. Obradović, N., Laguex, É., Latulippe, K., & Provencher, V. (2021). Understanding the Benefits, Challenges, and the Role of Pet Ownership in the Daily Lives of Community-Dwelling Older Adults: A Case Study. *Animals : an open access journal from MDPI*, 11(9), 2628. <https://doi.org/10.3390/ani11092628>
8. Connell, C. M., Solway, E., Malani, P., Singer, D., Kirch, M., Kullgren, J., & Janovic, M. R. (2019). National Poll on Healthy Aging: How Pets Contribute to Healthy Aging. *Innovation in Aging*, 3(Supplement_1), 553-553. <https://doi.org/10.1093/geroni/igz038.207>
9. Willmott, H., Greenheld, N., and Goddard, R. (2012). Beware of the dog? An observational study of dog-related musculoskeletal injury in the UK. *Accid. Anal. Prev.* 46, 52-54. doi: 10.1016/j.aap.2011.10.004
10. CDC. Web-based Injury Statistics Query and Reporting System (WISQARS). Available at <http://webappa.cdc.gov/sasweb/ncipc/nfrates2001.html>.
11. Kurrie SE, Day R, Cameron ID. The perils of pet ownership: a new fall-injury risk factor. *Med J Aust* 2004;181:682-3.
12. American Veterinary Medical Association. Socialization and training. Available at <http://www.avma.org/careforanimals/animatedjourneys/readytoadopt/training.asp>.
13. Schroeder T, Ault K. National Electronic Injury Surveillance System All Injury Program: sample design and implementation. Bethesda, MD: US Consumer Product Safety Commission; 2001.
14. American Veterinary Medical Association. U.S. pet ownership and demographics sourcebook (2007 edition). Schaumburg, IL: American Veterinary Medical Association; 2007.
15. Eastwood EA, Magaziner J, Wang J, et al. Patients with hip fracture: subgroups and their outcomes. *J Am Geriatr Soc* 2002;50:1240-9.

Persona

Jason Morris

67 / Male

Occupation: Retired

Location: Boston, MA

Living with: Anderson(Son), Molly(Cat)

Disease History: Osteoporosis, Hypertension, Adiposity

Forgetful Clean Tidy Quiet

Molly

8 / Female

Naughty Energetic Active

- Day Routine
1. Jason wakes up at 7 am and he would take a walk around the neighborhood
 2. After he comes back, he feeds Molly and plays with her for a while with some toys
 3. He read books for hours and then go out to a neighborhood restaurant for lunch
 4. He sometimes hangout with friends in the afternoon
 5. When he come back, he feeds Molly again
- Pain Points
- When Molly comes up from behind suddenly, there is a risk of falling
 - When he bends over to add food to Molly's bowl and stands up again, there is a risk of not being stable and falling

Cindy Schwartz

75 / Female

Occupation: Retired

Location: Atlanta, GA

Living with: Whiskers(Cat), Oscar(Cat), Fluffy(Cat), Daisy(Cat)

Disease History: Diabetes

Caring Calm Generous

Whiskers

15 / Male

Quiet Lazy

Oscar

14 / Male

Alert Active

Fluffy

8 / Male

Frisky Joyful

Daisy

0.4 / Female

Naughty Curious

- Day Routine
1. Cindy wakes up at 8:30 am and cooks herself for breakfast
 2. She then prepares food for herself and all cats and calls them to eat
 3. In the afternoon, she would do some yoga or some bakery for a local restaurant
 4. Cindy prepares food for herself and all cats again in the afternoon
 5. Read and go to bed
- Pain Points
- When cats fight and Cindy try to stop them, there is a risk of getting scratched or falling
 - When Cindy was sleeping in the bedroom or taking a nap in the living room, there is a risk of stepping on the cats nearby and fall

Design Process

Version 1.0:

Design 1: Cat Deterring Mat

Features:

- Low tech mat designed with a **combination** of features (materials, smells, vibrations, sounds) to prevent cats from sleeping in high-fall risk areas.

Limitations:

- **All cats are unique!** Meaning, one mat design may not work for all and doesn't allow for trial and error / customizatoin.
- Design assumes cats should always be deterred away vs attracted to a different location to prevent a fall.

Design 2: Smart Watch App

Features:

- Chips embedded in cats are paired with a smart watch worn by an aging adult to prevent falls.
- App based solution **alerts** an aging adult when a cat is nearby during high-fall risk situations (e.g. in the middle of the night).

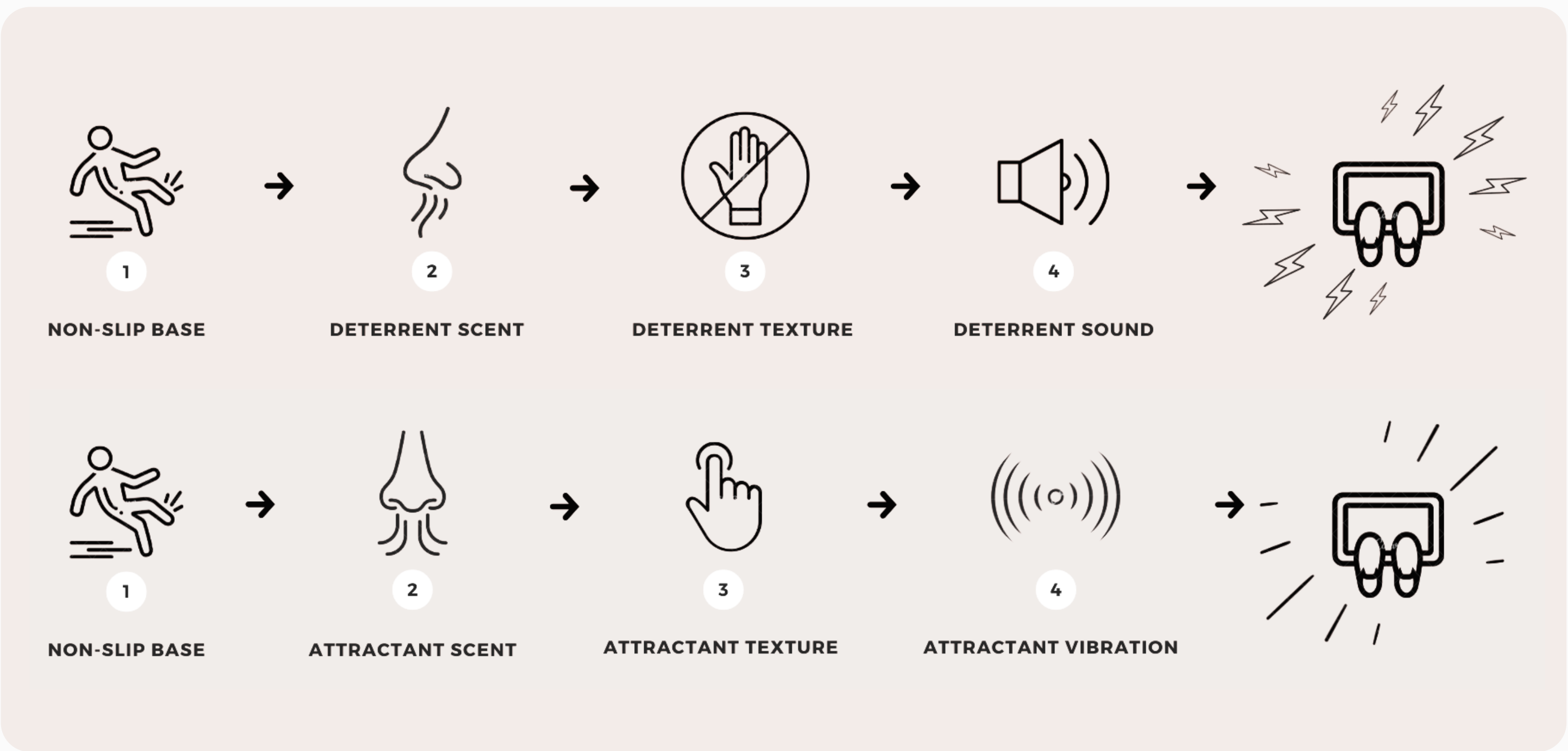
Limitations:

- The design has **no value** if the user forgets to wear the device and keep it charged.
- Aging adults may not be **technically advanced** enough to use app.

Version 2.0:

Customized Cat Deterring or Attracting Mat

- Features:
- Low tech mat designed with a **menu** of features (materials, smells, vibrations, sounds) that the aging adult **select** to fit the specific tendencies of their cat to prevent falls.
- New:
- Ability to choose features to either **deter** a cat from a fall prone area or **attract** a cat away to a safer area.
- Limitations:
- Aging adults may struggle to select or understand which features are best for their cat / may be **overwhelmed** by too many options.



Final Solution

Version 3.0:

Customized Mat with Matching Cat Personas

- Features:
- Low tech mat designed with a **menu** of features (materials, smells, vibrations, sounds) that the aging adult **select** to fit the specific tendencies of their cat to prevent falls.
 - Ability to choose features to **deter** a cat from a fall prone area or **attract** a cat away to a safer area.
- New:
- Product is enhanced by providing a personalized cat **assessment tool** to help guide an aging adult to select the persona and mat features that fits their needs.
- Limitations:
- Successful implementation of this solution will be dependent on material costs, availability, and ultimately the **out-of-pocket** cost to an aging adult.

