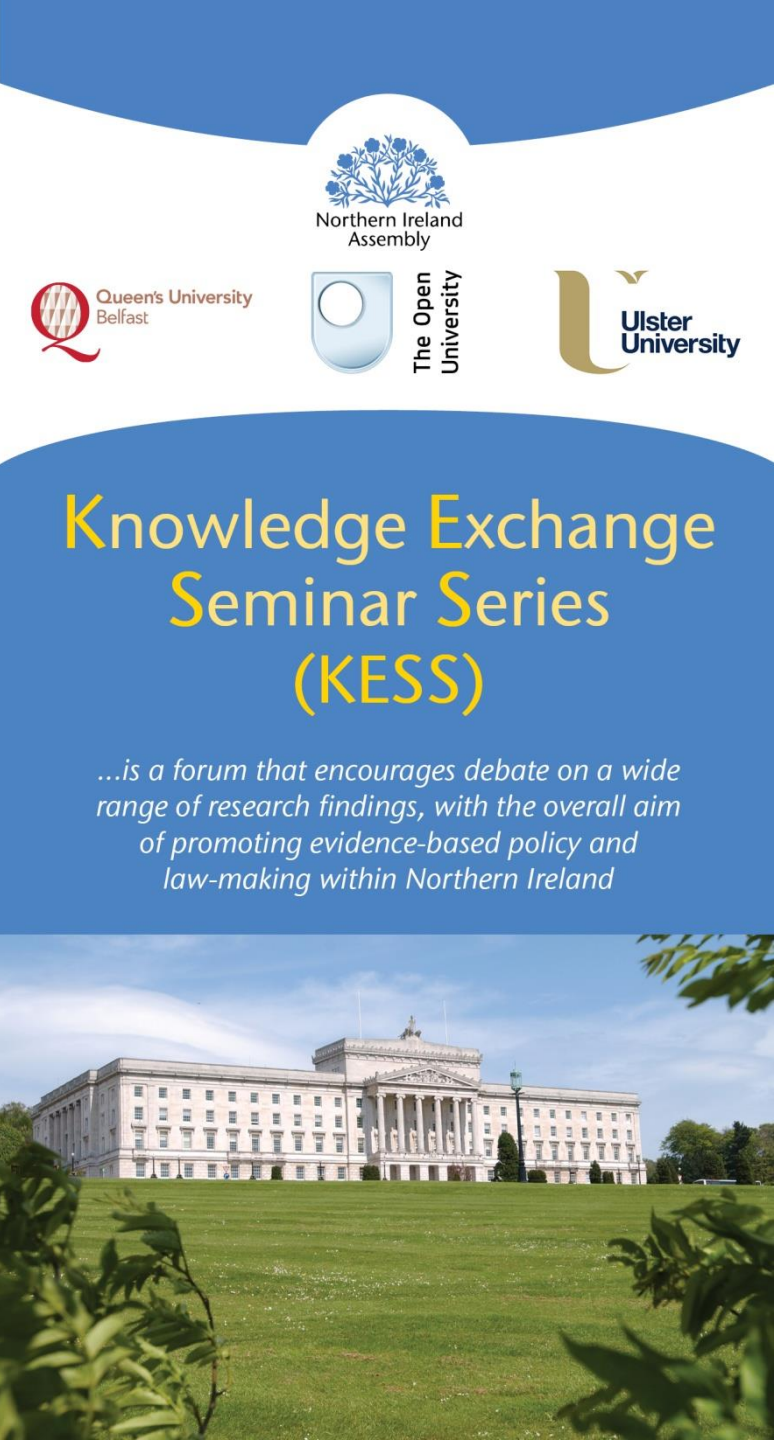
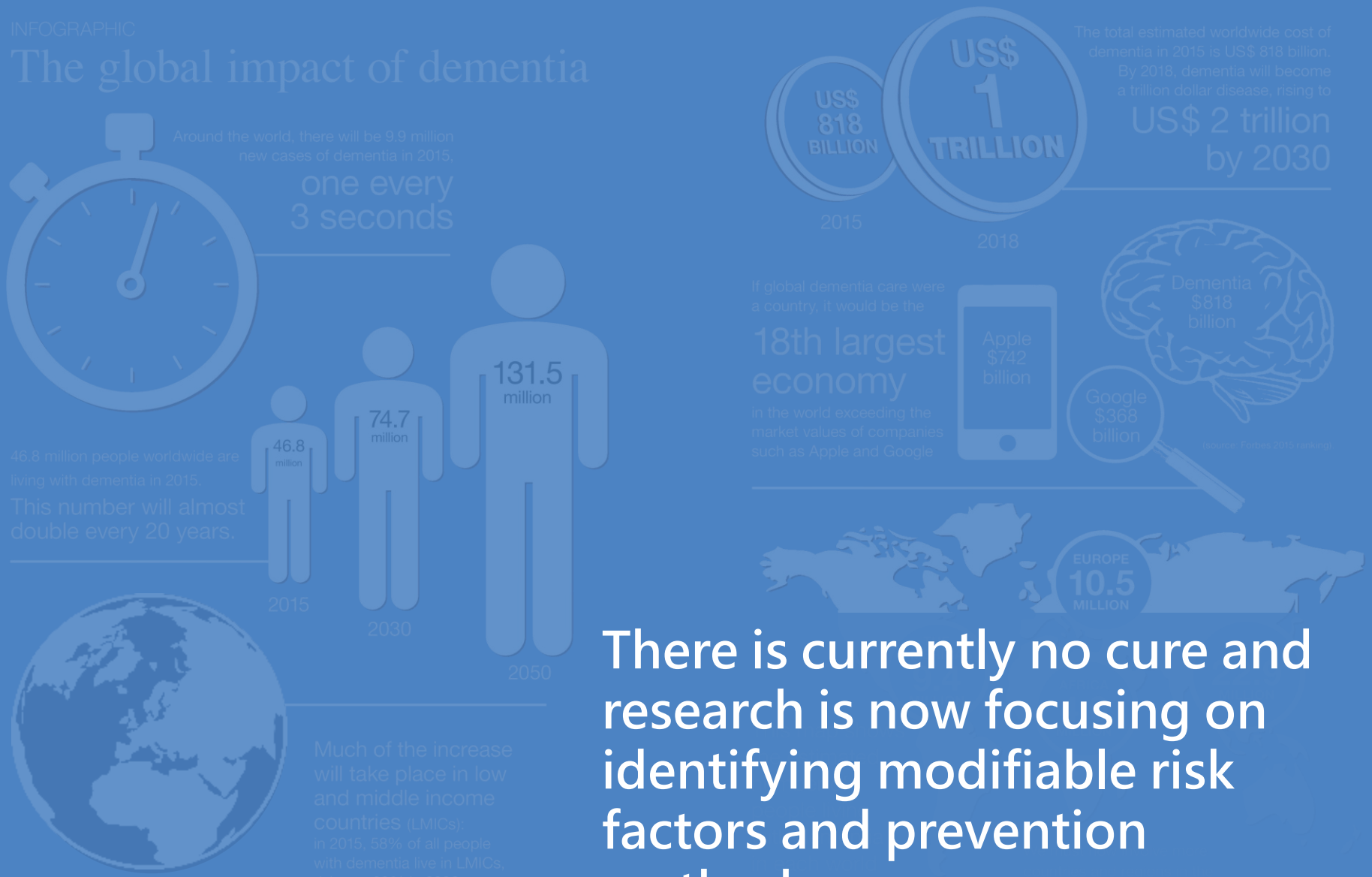


Gray Matters Study

The Empowering role of smartphones in Behaviour Change Interventions

Prof. Chris Nugent, Dr. Ian Cleland,
Prof. Sally McClean.



There is currently no cure and research is now focusing on identifying modifiable risk factors and prevention methods.

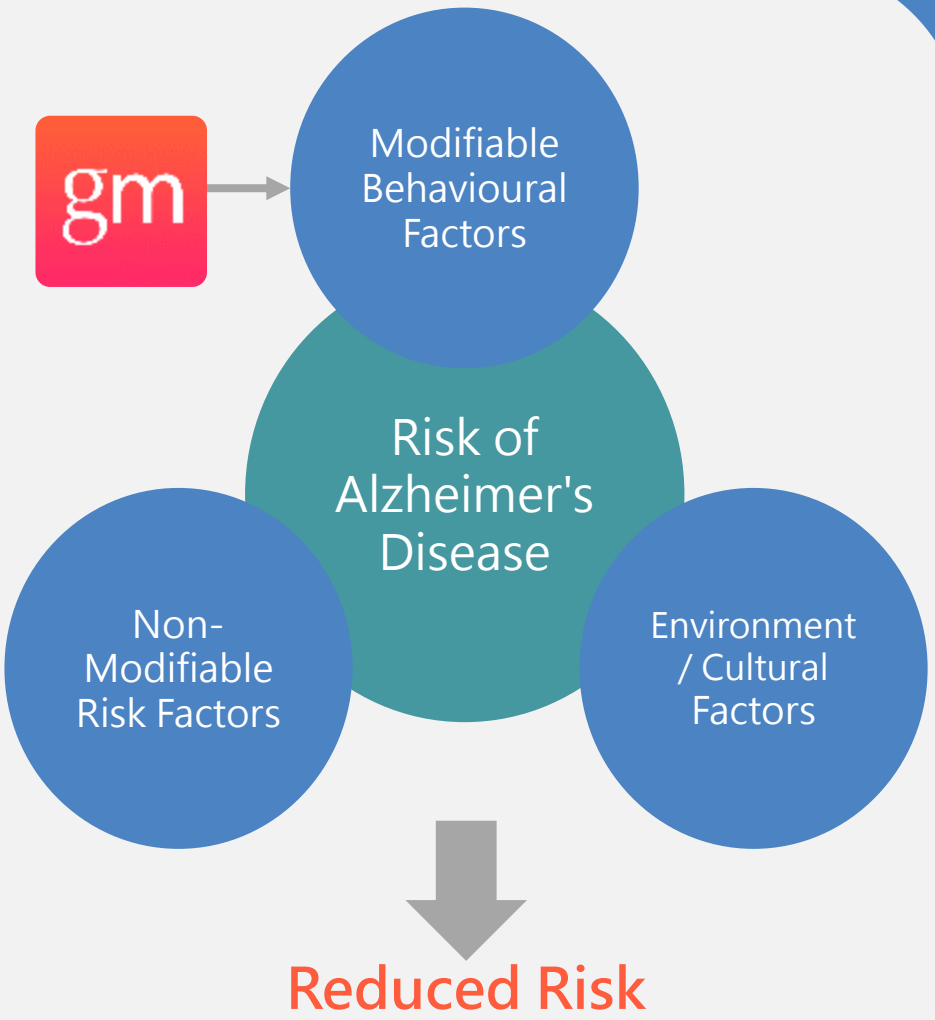
Prevention in Public Health

Actions

- Encouraging healthy behaviors
- Integrating risk reduction prevention policies
- Raising awareness of risk
- Producing information on reducing the risks
- Delivering services to promote behavior change

Who is the focus?

- Adults aged 40–64 years
- A particular focus on people at increased risk of developing dementia
- Those with unhealthy behavior and lifestyle.



The projected effect of risk factor reduction on Alzheimer's disease prevalence. Barnes, D. E. and K. Yaffe. *Lancet Neurol* (2011) 10:819-828.

Can we prevent Alzheimer's disease? Secondary "prevention. Carrillo, Maria C., et al. trials in Alzheimer's disease." *Alzheimer's & Dementia* 9.2 (2013): 123-131.

Dementia (including Alzheimer's disease) can be prevented: statement supported by international experts. Yaffe, Kristine, et al. *Journal of Alzheimer's Disease* 38 (2014): 699-703.

***Potential for primary prevention of Alzheimer's disease: an analysis of population-based data.** Norton, Sam, et al. The Lancet Neurology 13.8 (2014): 788-794.

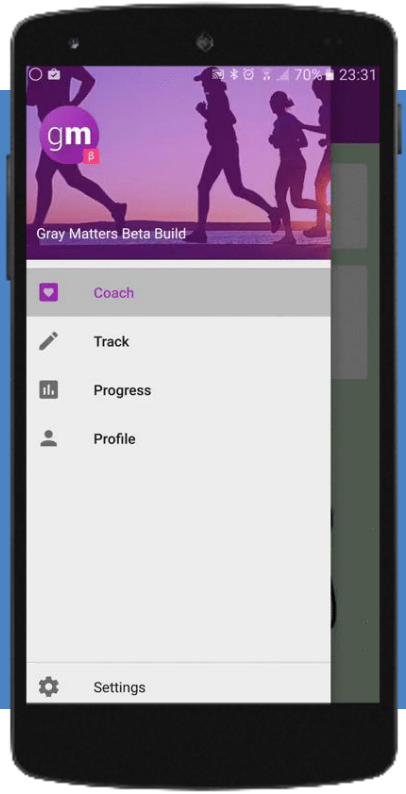
1/3 of **Alzheimer's disease** cases may be attributed to potentially modifiable risk factors*

What's good for the *heart* is good for the *brain*!

Modifiable factors may include:

1. **Increase Physical activity**
2. **Eat healthier**
3. **Improve sleep quality**
4. **Become more socially active**
5. **Reduce Stress**
6. **Increase cognitively stimulating activity**
7. **Reduce alcohol consumption**
8. **Reduce smoking**

The Gray Matters App



PROVIDES A DAILY FACTOID AND SUGGESTION PAIR

Gives users a short snippet of text based on health literature about Alzheimer's disease. It then suggests a lifestyle change that could improve the likelihood of preventing AD.

FACILITATES USER DATA ENTRY TO ENABLE LIFESTYLE TRACKING

Users answer 12 preset questions aimed to assess performance across 6 behavioral domains.

PROVIDES REAL TIME PERFORMANCE FEEDBACK

Based on the users' answers, they are provided with visual feedback in the form of a 5 star rating for each domain. They can also see a weekly summary of their efforts.

Aims to *lesson* the risk of developing *Alzheimer's disease* through *behavior change*

Google play

Available on the App Store

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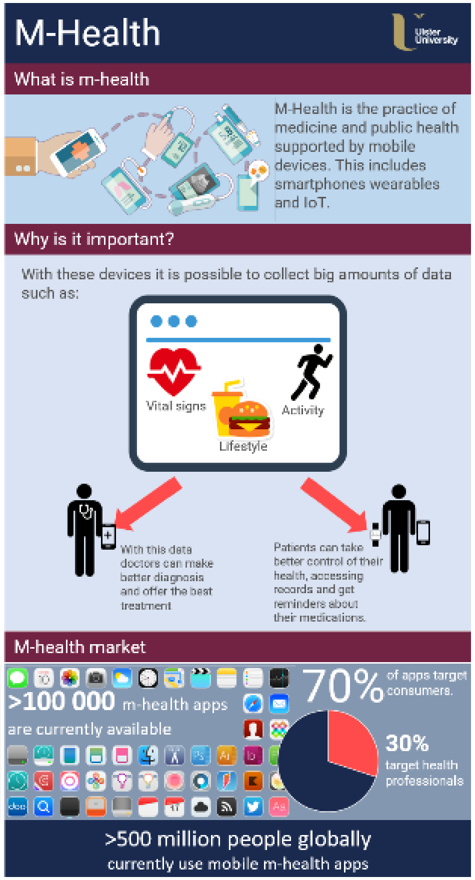
Just another App?

- •Apps are limited by quality, inaccurate information and an absence of evidence-based content.
- •Lack of user and clinician engagement during their development.
- •Many apps do not contain theoretically behavior change techniques.
- •Few apps comply with regulatory processes & have had their effectiveness assessed.
- •Leading to concerns about lack of benefit or even potentially harmful apps.



1. Lee, Hopin, et al. "Smartphone and tablet apps for concussion road warriors (team clinicians): a systematic review for practical users." British journal of sports medicine 49.8 (2015): 499-505.
2. Aitken M, Gauntlett C. Patient apps for improved healthcare, from novelty to mainstream, in reports, 2013. IMS Institute for Healthcare Informatics. http://www.imshealth.com
3. Mobasheri MH, Johnston M, King D, et al. Smartphone breast applications—what's the evidence? Breast 2014;23:683–9.
4. Hoeppner B, Hoeppner SS, Seaboyer L, et al. How smart are smartphone apps for smoking cessation? A content analysis. Nicotine Tob Res 2015;18:1025–31.
5. Stoyanov, Stoyan R., et al. "Mobile App Rating Scale: A New Tool for Assessing the Quality of Health Mobile Apps." JMIR mHealth and uHealth 3.1 (2015).

The Team
Multi-disciplinary & Intersectoral

Technical

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Statistics

Chris Nugent
Pervasive Computing

Ian Cleland
Wearable Technologies

Phillip Hartin
Software design

Clinical

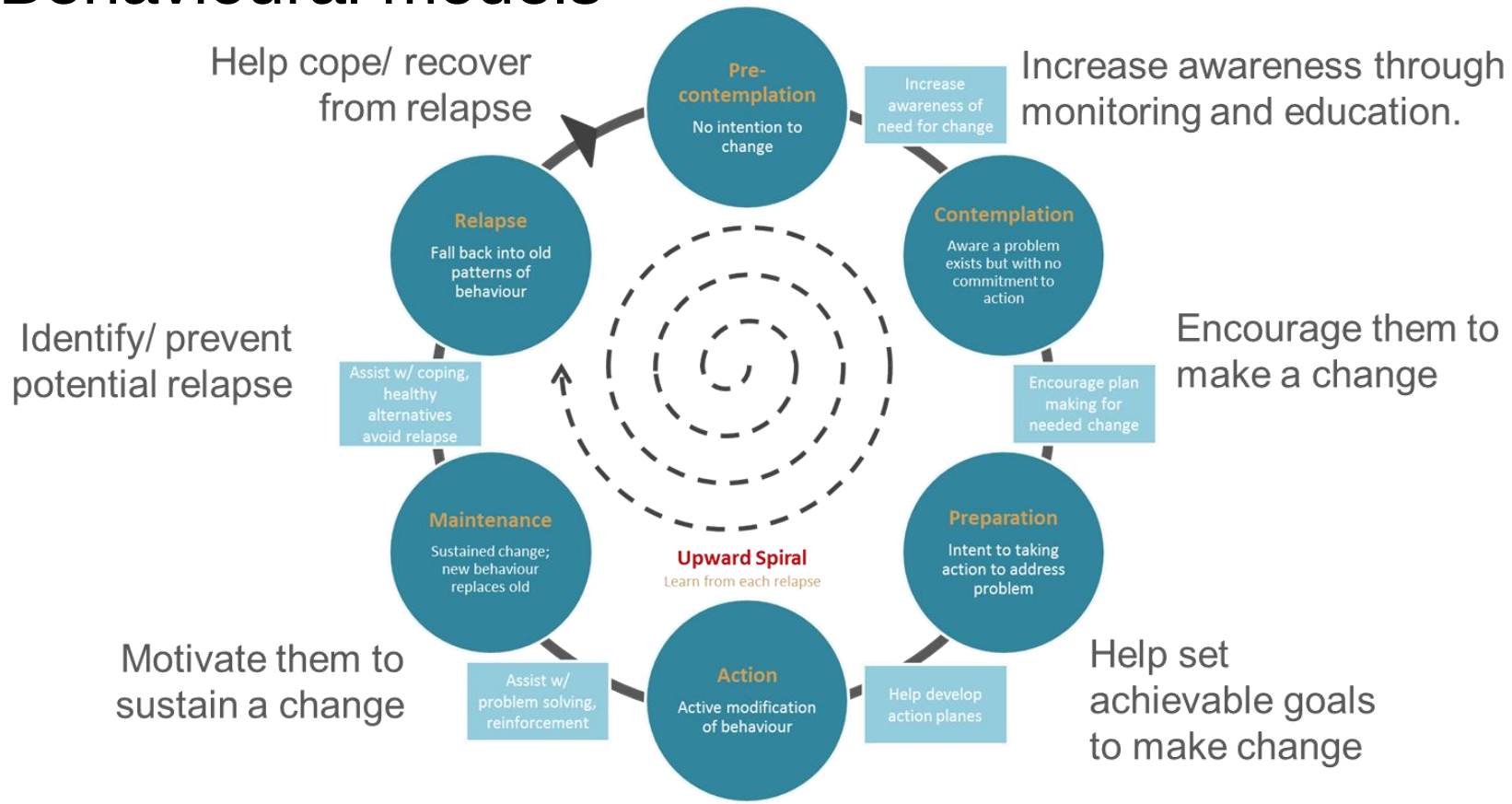
Maria Norton
Dementia Epidemiology

Business

Cristiano Paggetti
Business Development

Underpinned by Research

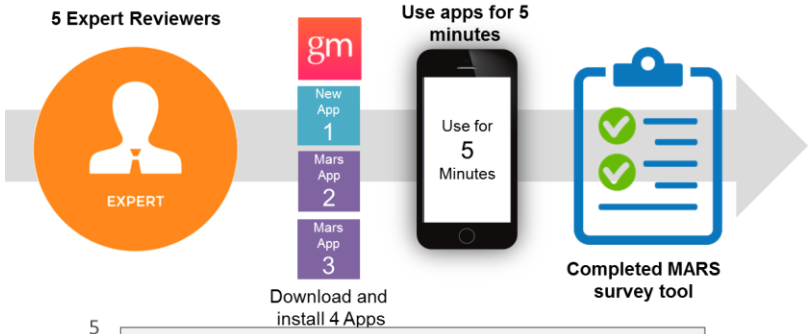
Behavioural models

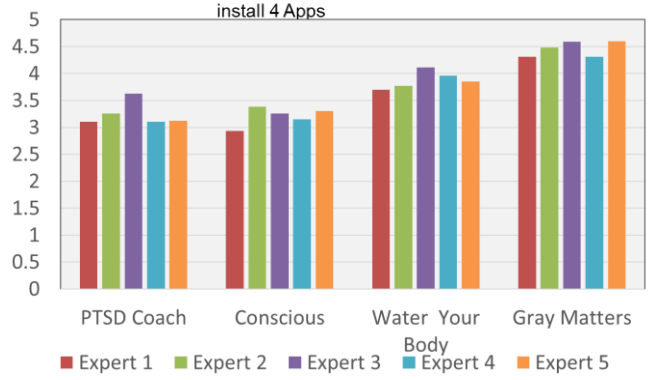


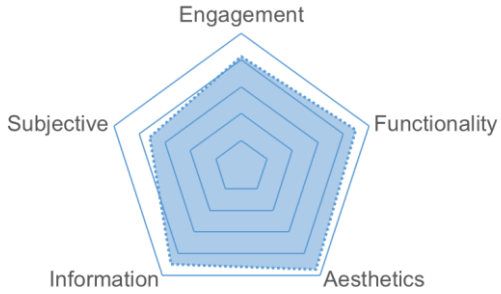
Ensuring Scientific Rigour

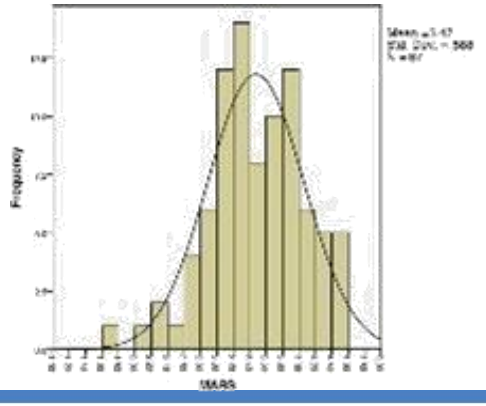
Through Peer Review

Detailed assessment of health related apps in order to insure that both the app and the educational content was of high quality.









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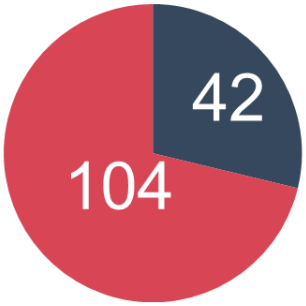
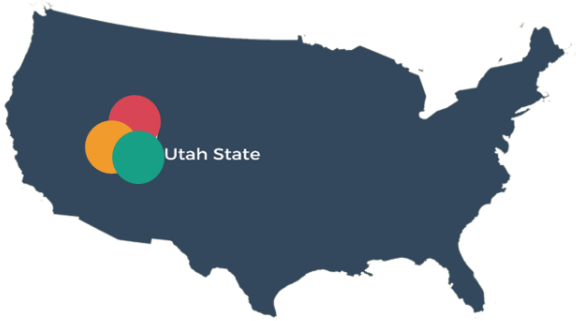
Scientifically Evaluated

146 participants recruited



104 assigned to treatment group

Trialled in for 6 months



Intervention included app and wearable

Intervention Program

To provide health education that summarised evidence-based lifestyle recommendations.

Smartphone App

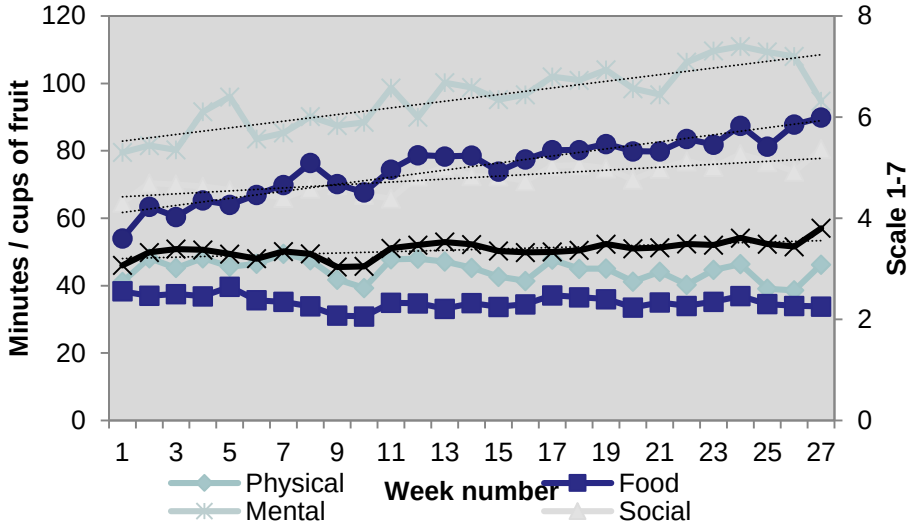
To deliver educational material, encourage engagement and track lifestyle behaviors.

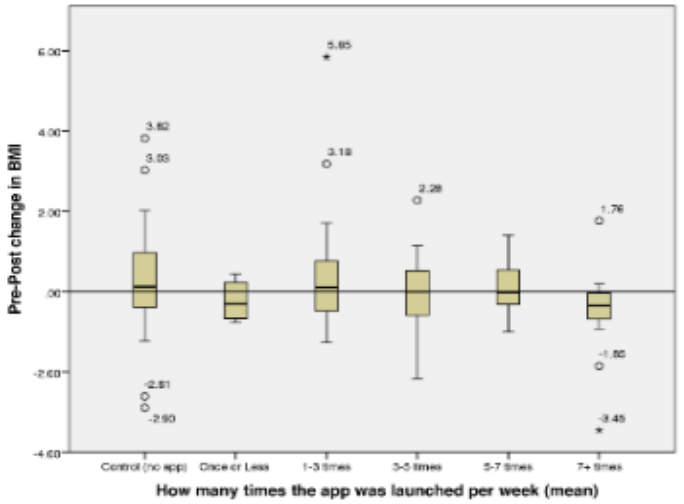
Activity Monitor

Provided with a wearable wrist worn activity monitor - Nike Fuelband SE (donated by Nike)

Results Summary

- Everyone who used the app showed *adoption of new, healthy behaviors* compared to those who did not.
- *Increase* in intrinsic motivation, *Decrease* in memory concerns, *Increase* in social engagement, *Increase* in Hdl cholesterol.
- The *more* often the app was launched, the *greater* the change.
- Those who used the app everyday showed the *greatest change*.

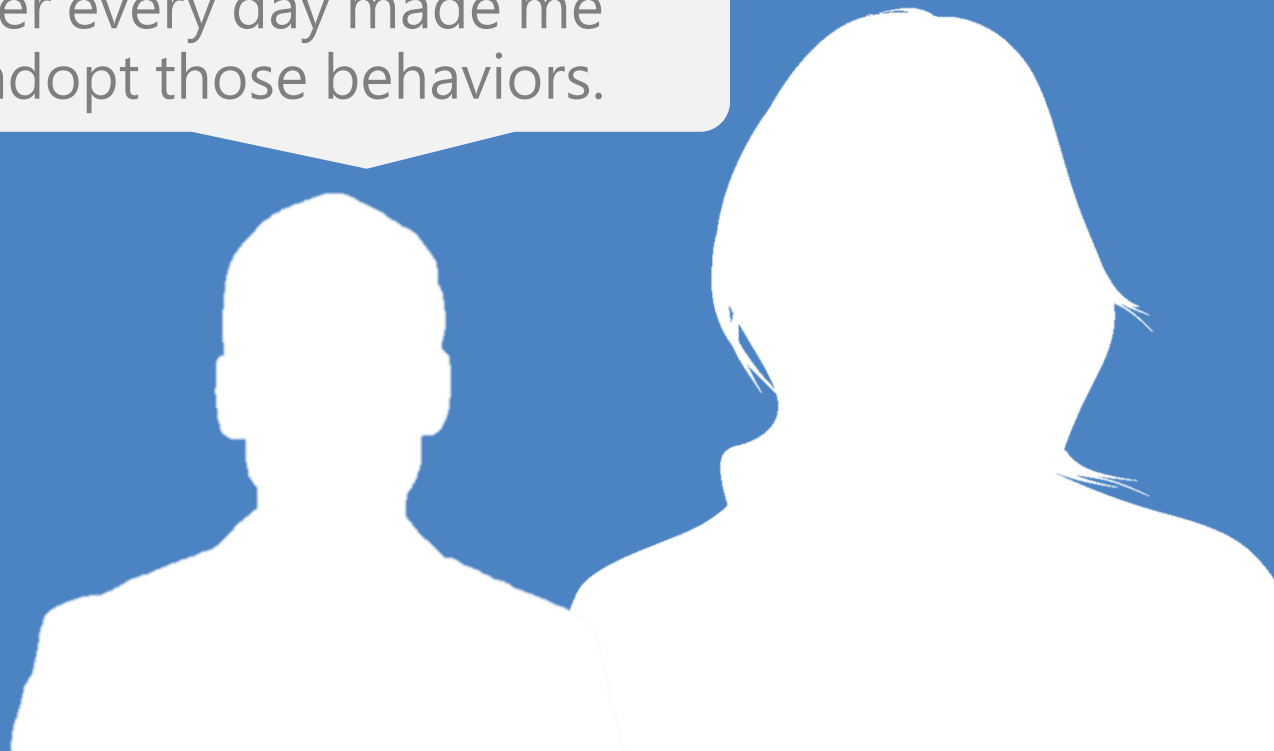




Feedback from Users

I **love** the app. I look at it almost **every night**...I found it very helpful and **I love the tips.**

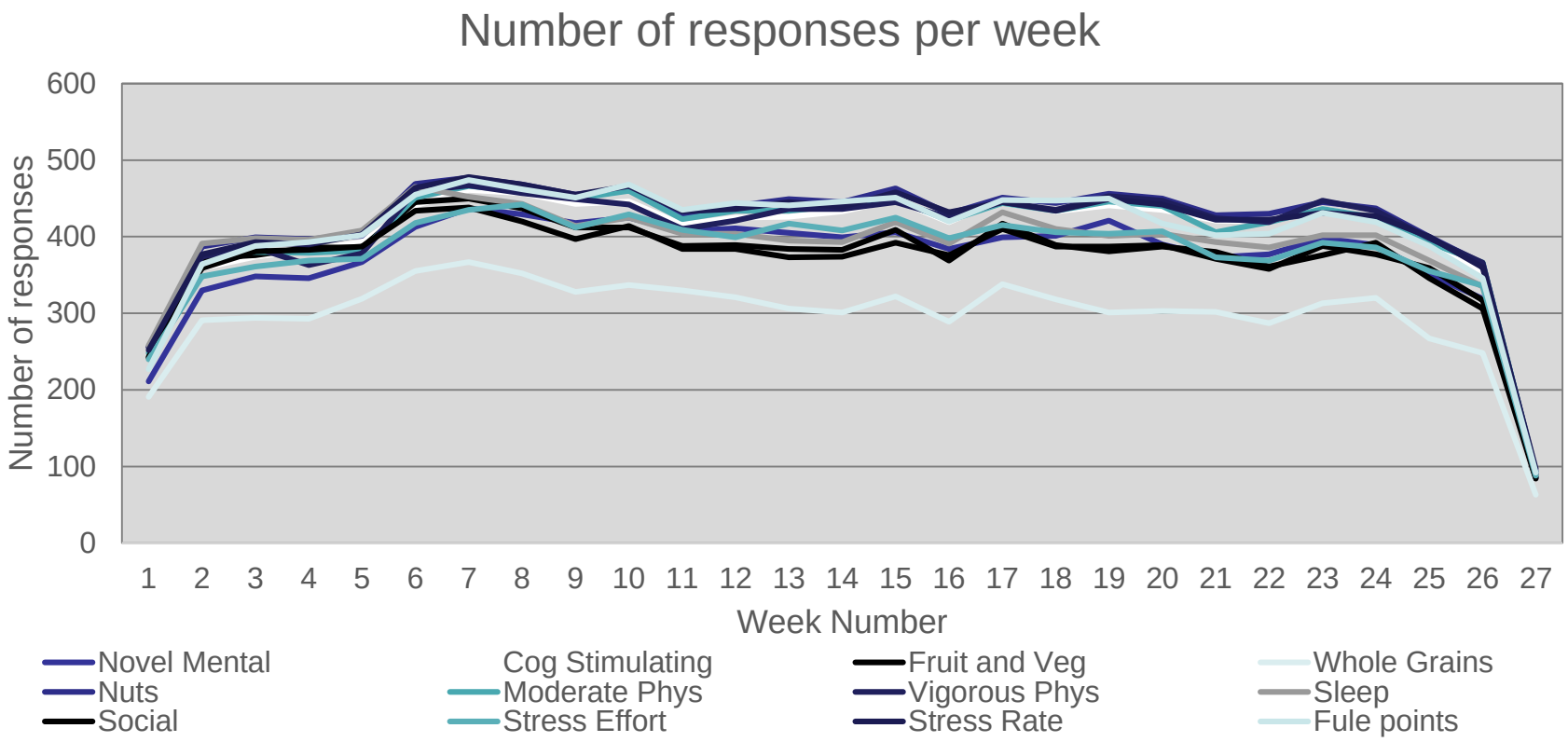
Having that reminder every day made me **consciously try** to adopt those behaviors.



Ulster University

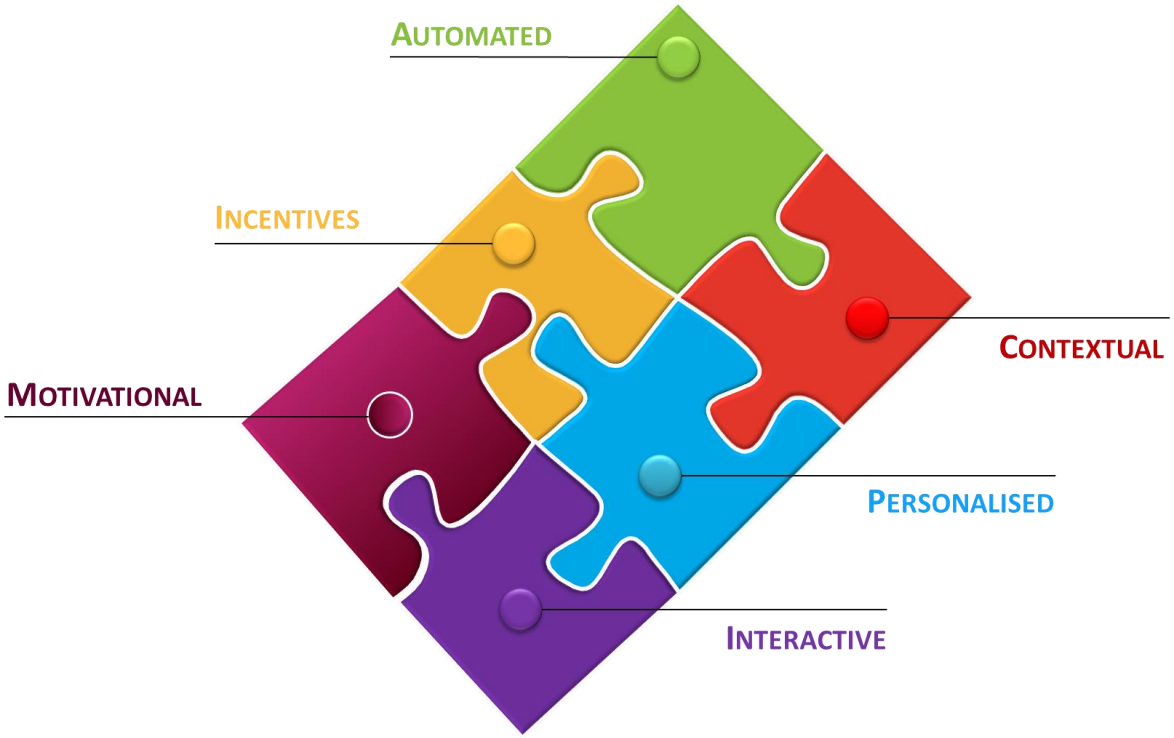
Other Findings

Sustained engagement



Future work with GM

Improve the effectiveness of the solution through increased intelligence.



Technology as a Facilitator

Instant Accessibility

Rapid Spread of information

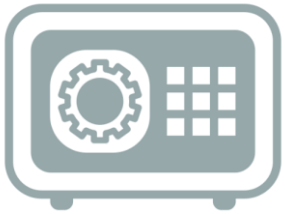
Highly interactive and engaging

Reach large diverse audience

Sharing of knowledge and experiences

Social Support

Highly Personalised



Maintain Anonymity

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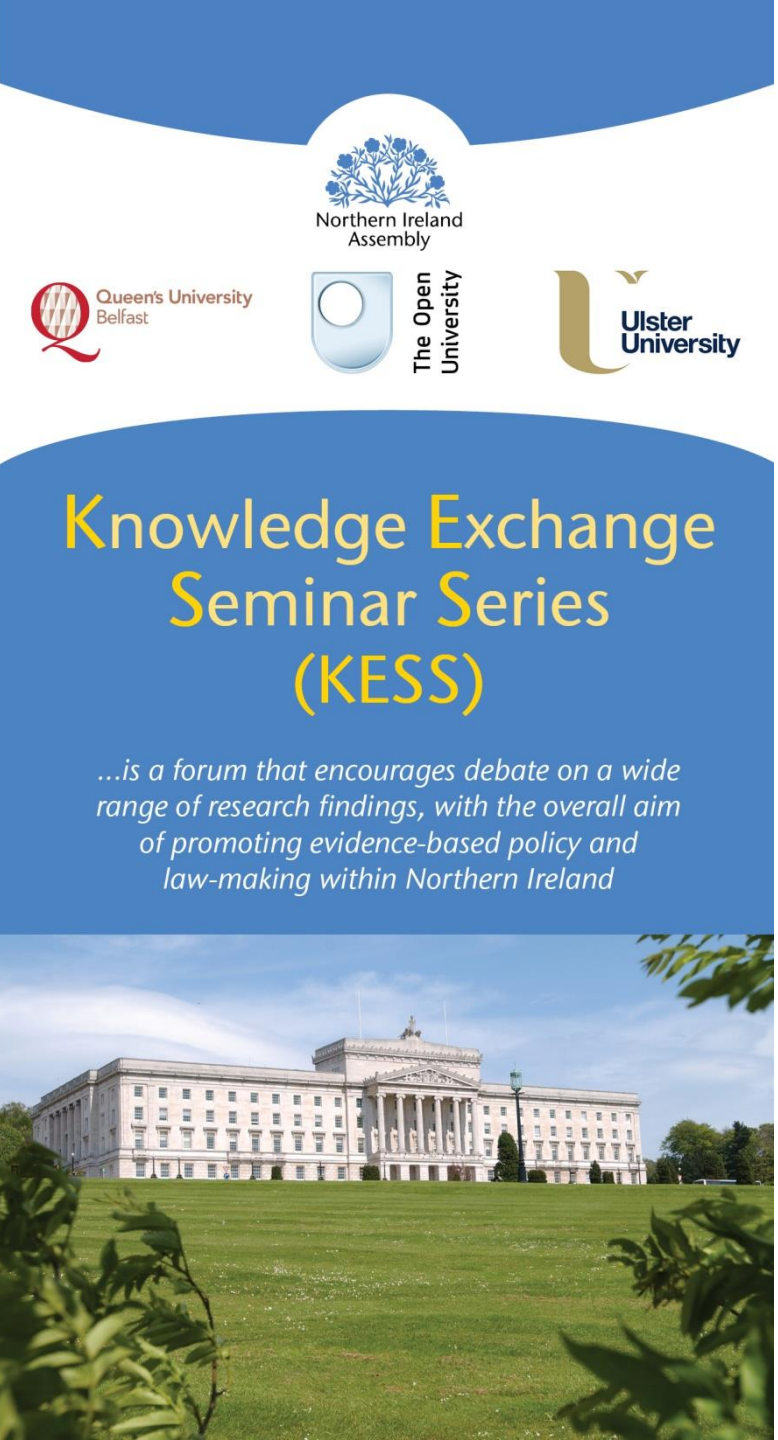
Summary

- We need to implement risk reduction/ prevention strategies specifically for dementia.
  - This includes raising awareness of the impact of modifiable lifestyle factors
- The interventions should be multi-domain
- They should be tailored for various population/ cultural backgrounds as well as personalised specifically for the individual
- Technology is a key facilitator to reaching large, diverse populations
- We should seek to leverage technology within public health particularly for behaviour change interventions



Questions

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Knowledge Exchange Seminar Series (KESS)

...is a forum that encourages debate on a wide range of research findings, with the overall aim of promoting evidence-based policy and law-making within Northern Ireland