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FOR ALZHEIMER'S RESEARCH
& TREATMENT

Lifestyles of the Healthy & Brain Fit

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Disclosures

None



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Learning Objectives

1. Identify 3 potentially modifiable risk factors for dementia
2. Describe 3 core lifestyle behaviors that promote brain health in aging



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Introduction

- 55 million people globally (2020)
- 139 million globally – 2050
- Disproportionately affects low-income to middle income countries



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Introduction

- Global costs 1.3 trillion (US dollars) annually
- Costs 2.8 trillion (US dollars) by 2030

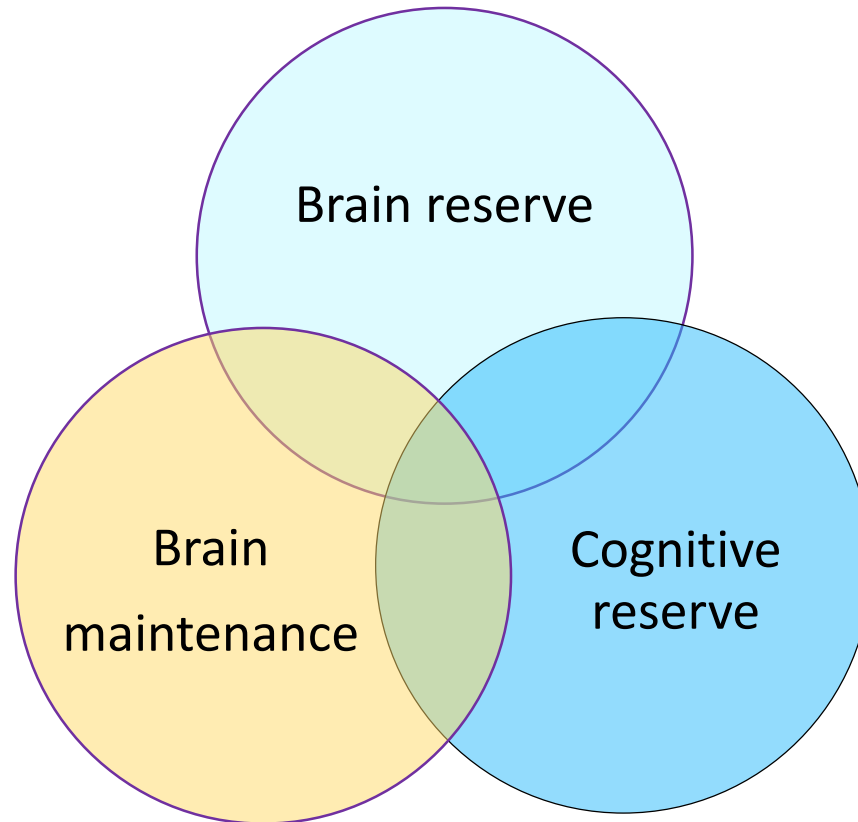
(Alzheimer's Disease International, 2023; Livingston et al., 2022)



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COGNITIVE RESILIENCE



COGNITIVE RESILIENCE

- Brain reserve – greater neurobiological capital (more neurons, more synapses)
- Cognitive reserve - neuronal network adaptability (efficiency, capacity, flexibility)
- Brain maintenance – reduced development of age-related brain changes & pathology (genetics and/or lifestyle)



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(Stern, 2021; Arenaza-Urquijo et al., 2020; Stern & Barulli, 2019)

Life Span Approach

Promotion of protective factors

1. Resistance mechanisms – avoiding pathology

Brain maintenance

2. Resilience – coping with pathology

Reserve capacity

(Pereira, et al., 2022; Arenaza-Faz et al., 2020; Livingston et al., 2020)

Life Span Approach

1. Brain maintenance – maintain or enhance the brain
2. Reserve capacity/Resilience – difference between a person's clinical picture and their neuropathology
 - 1) Neurobiological brain reserve – neurobiological capital at a given time
 - 2) Cognitive reserve

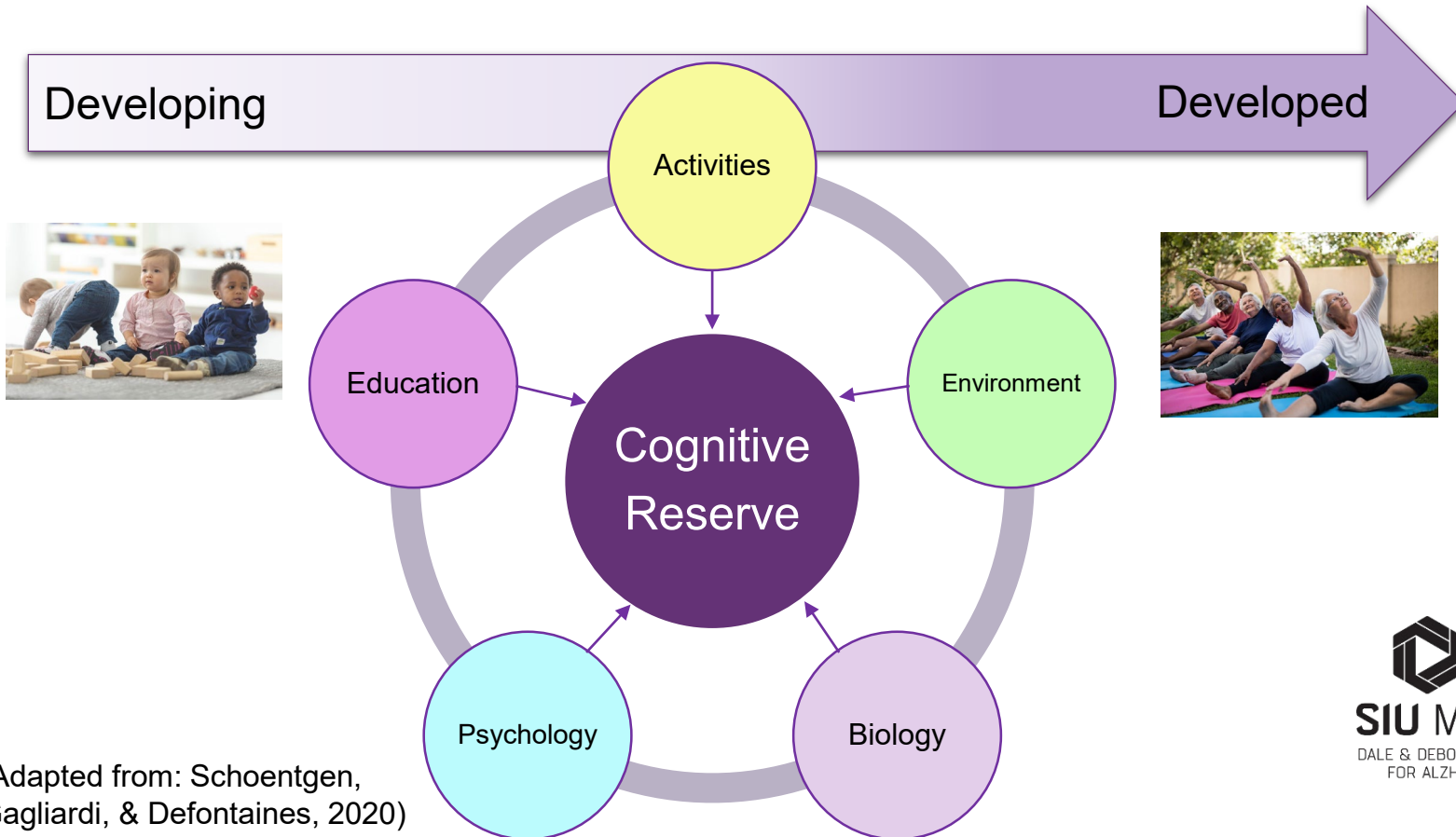
(Pereira et al., 2022)



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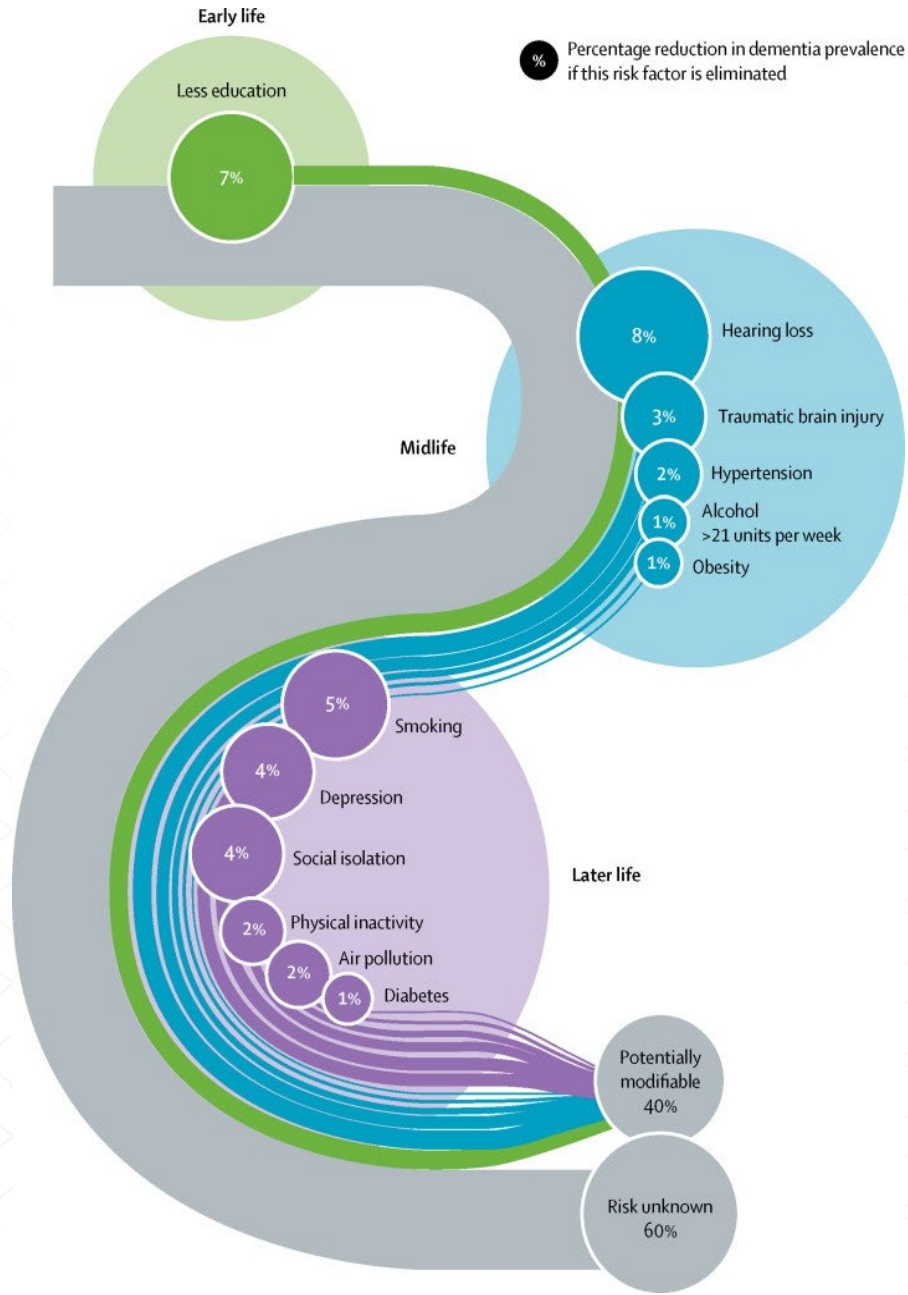
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COGNITIVE RESERVE



(Adapted from: Schoentgen, Gagliardi, & Defontaines, 2020)

Potentially Modifiable Risk Factors



Population attributable fraction (PAF) of potentially modifiable risk factors for dementia worldwide. Livingston, G. et al., 2020



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Early Life

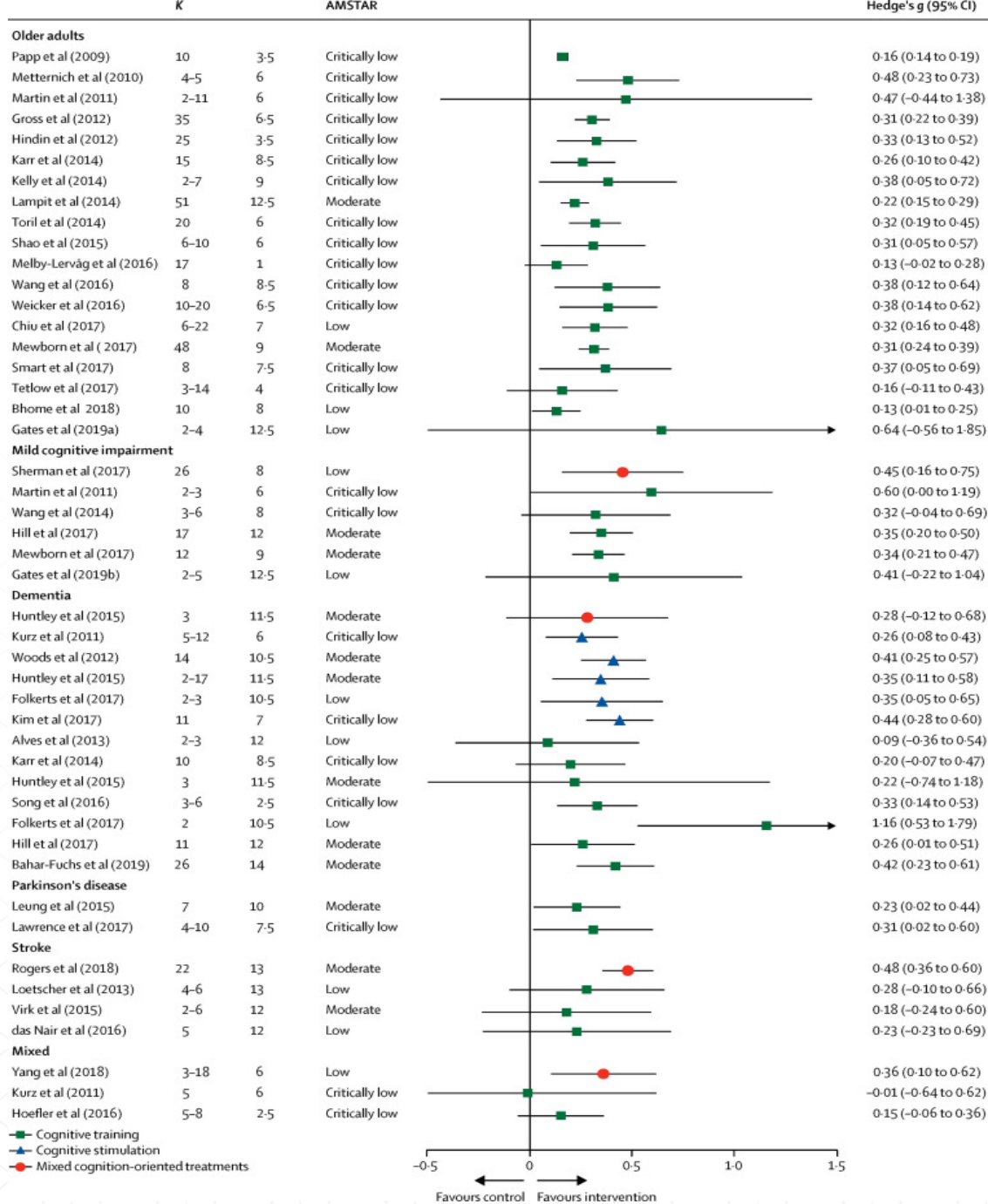
- 45 and younger
- Education – 7%
- Total 7%

(Kremen et al., 2019)



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Pooled results of meta-analyses investigating objective cognitive outcomes of cognition-oriented treatment in older adults with and without cognitive impairment. K represents the number of primary trials included in the analysis. If a review reported several effect sizes within each outcome domain, a composite was created and k denotes the range of the number of primary trials that contributed to the effect estimate. AMSTAR=A MeaSurement Tool to Assess systematic Reviews (max score 16). (Adapted from Gavelin et al. 2020). Livingston et al., 2020

Midlife

- 45 to 65 years
- Hearing loss – 8%
- Traumatic brain injury – 3%
- Hypertension – 2%

(Golub et al., 2019; Maharani et al., 2018; Redelmeier et al., 2019; McGrath et al., 2017)



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Midlife

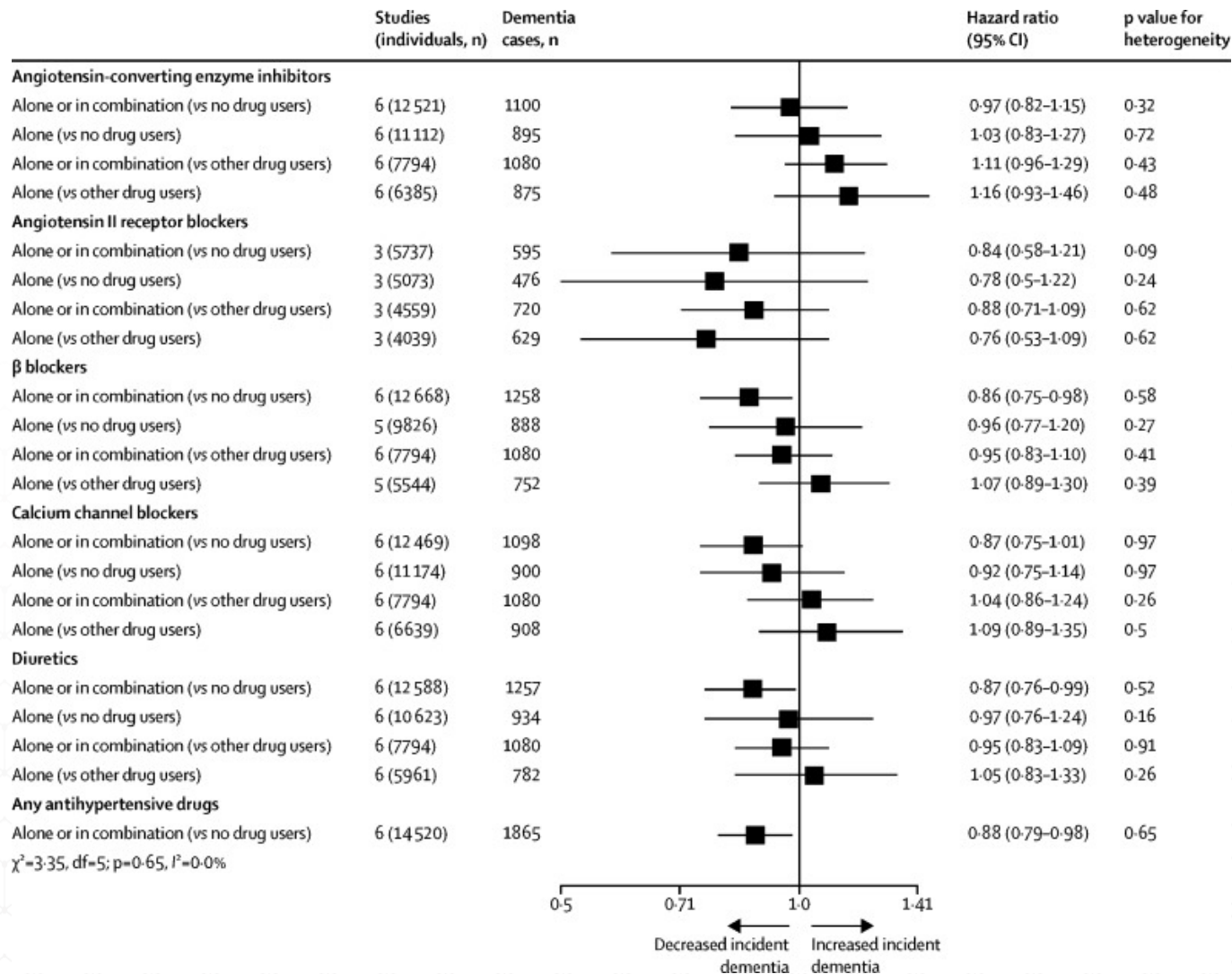
- Obesity – 1%
- Alcohol consumption – 1%
- Total 15%

(Golub et al., 2019; Maharani et al., 2018; Redelmeier et al., 2019; McGrath et al., 2017)

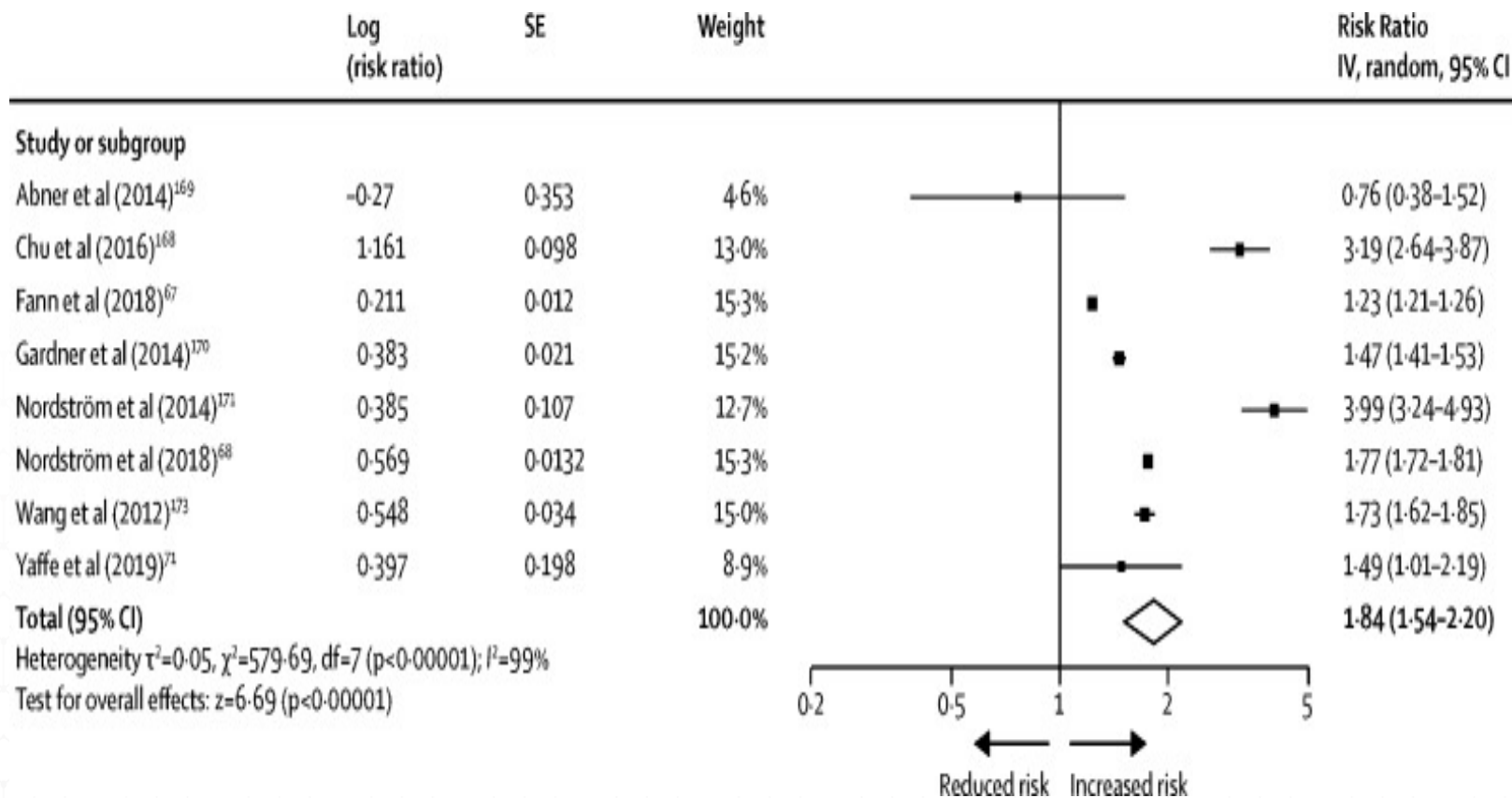


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Associations of antihypertensive medication use with incident dementia in those with high blood pressure. Adapted from Ding et al., 2020. Livingston et al., 2020

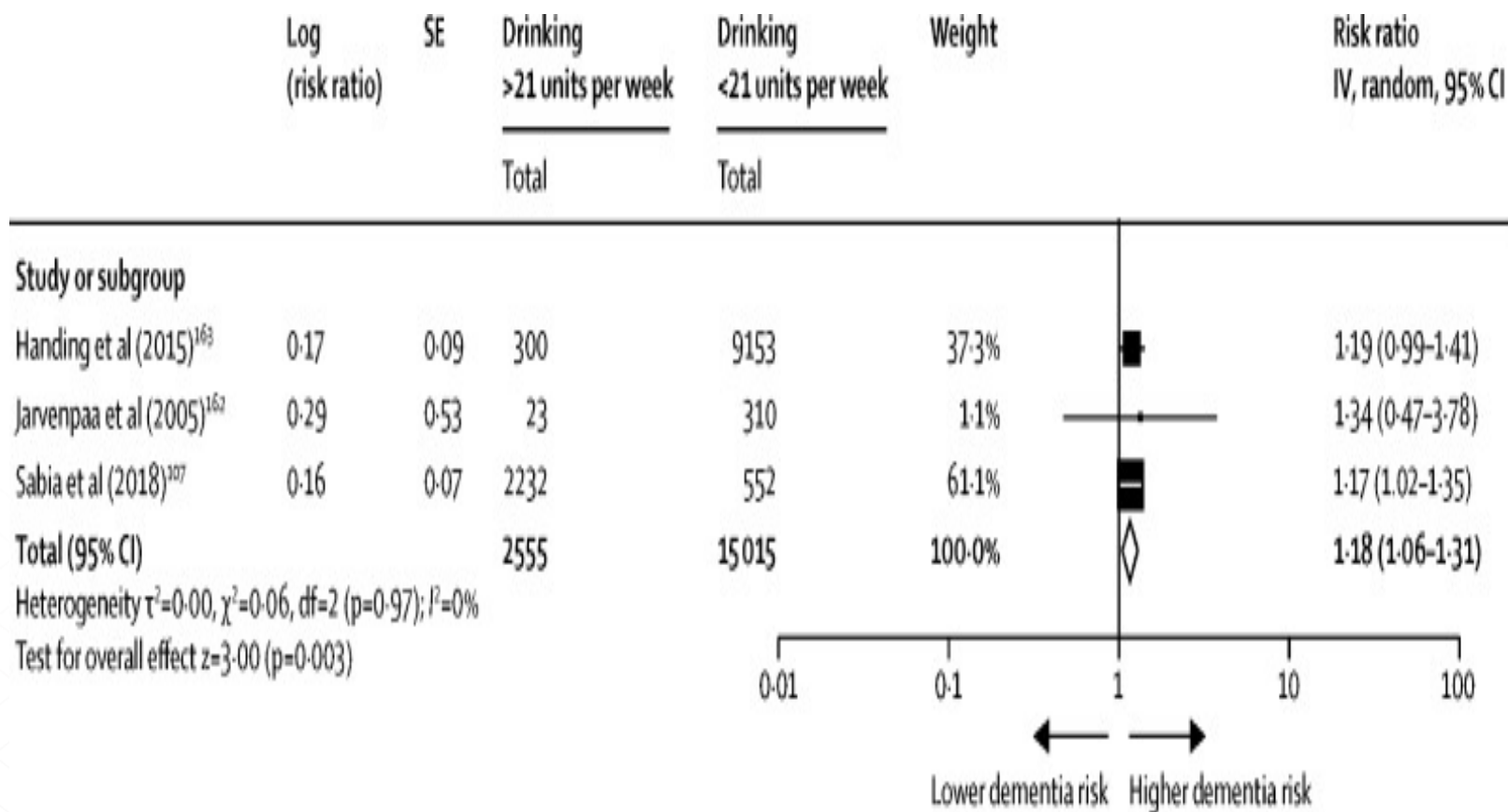


Meta-analysis of relative risk of all-cause dementia associated with all severity midlife traumatic brain injury. Livingston et al., 2020



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Meta-analysis of relative risk of dementia associated with drinking more than 21 units of alcohol per week in midlife compared to lighter consumption of alcohol. Livingston et al., 2020

Later Life

- 65 and older
- Smoking – 5%
- Depression – 4%
- Social isolation – 4%



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Later Life

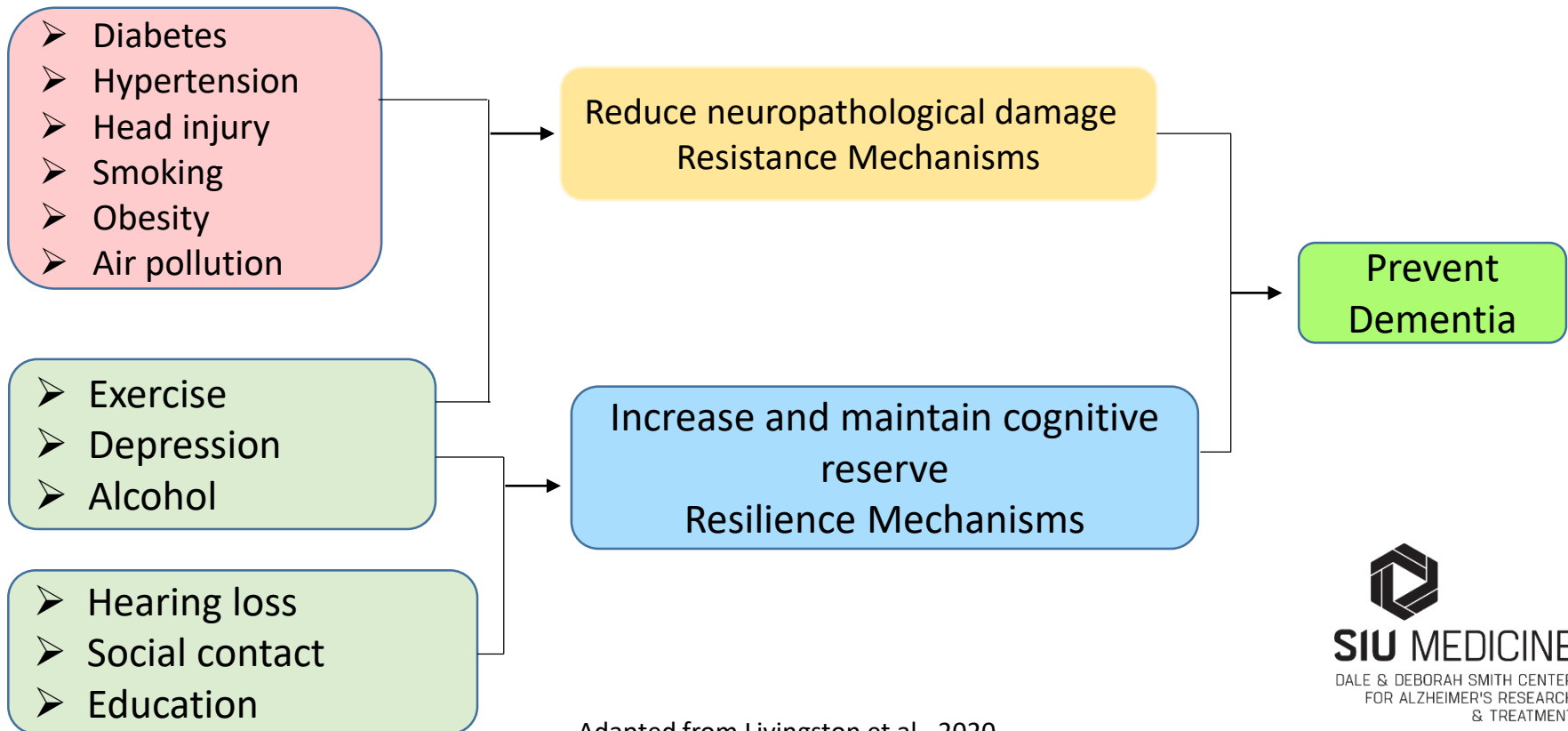
- Physical inactivity – 2%
- Air pollution – 2%
- Diabetes – 1%
- **Total 18%**



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Mechanisms



Adapted from Livingston et al., 2020

Other Factors

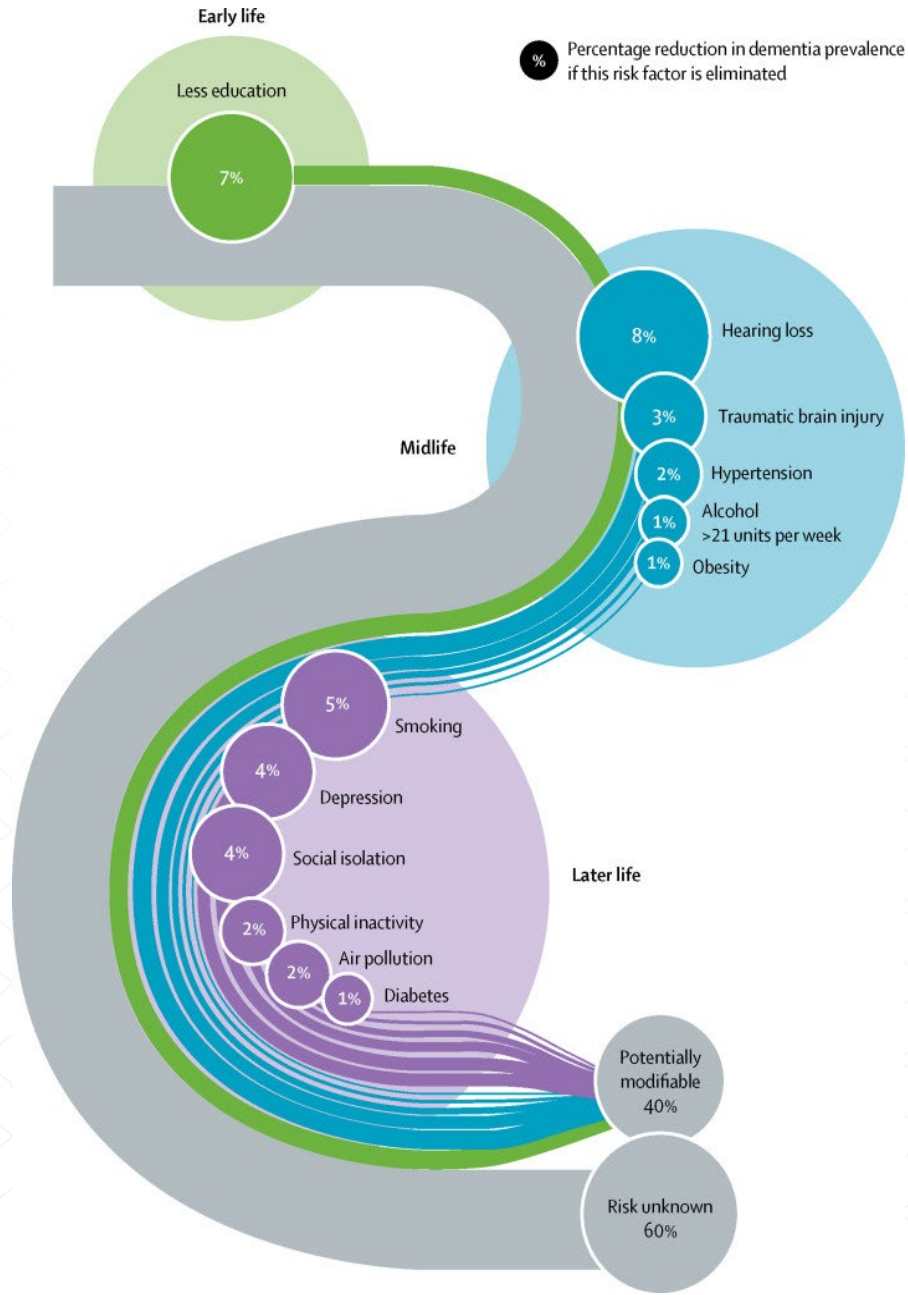
- Sleep
- Diet

(Shi et al., 2018; Radd-Vagenas et al., 2018)



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Potentially Modifiable Risk Factors



Population attributable fraction (PAF) of potentially modifiable risk factors for dementia worldwide. Livingston, G. et al., 2020



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Population Approach

- Prioritize childhood education
- Public health policies to reduce hypertension risk
- Policies that encourage social, cognitive, & physical activity across the life span



Population Approach

- Evaluate and reduce exposure risk for hearing loss
- Reduce risk of TBI in relevant settings
- Continue national and international efforts for smoking cessation and reduce exposure to smoking

Population Approach

- National and international policies to reduce air pollution
- Educational campaigns for obesity and diabetes

Individual Approach

- Treat hypertension, goal <130 mm Hg in midlife
- Use hearing aids
- Avoid consuming 21 units or more of alcohol per week
- Prevent head trauma



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Individual Approach

- Do not smoke or stop smoking
- Reduce obesity
- Reduce diabetes
- Sustain midlife and late life physical activity

Individual Approach

- Treat depression
- Eat a Mediterranean diet
- Obtain 7 to 8 hours of sleep in midlife and late life



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Questions



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