

JC JoyAge International Symposium
3 Jul 2024

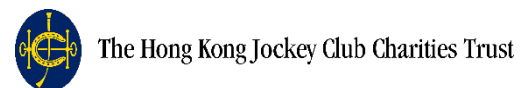


Effectiveness and cost-effectiveness of a collaborative stepped-care model for late-life mental health—JC JoyAge

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Tracy Lu



Initiated and Funded by:



Partner Institution:



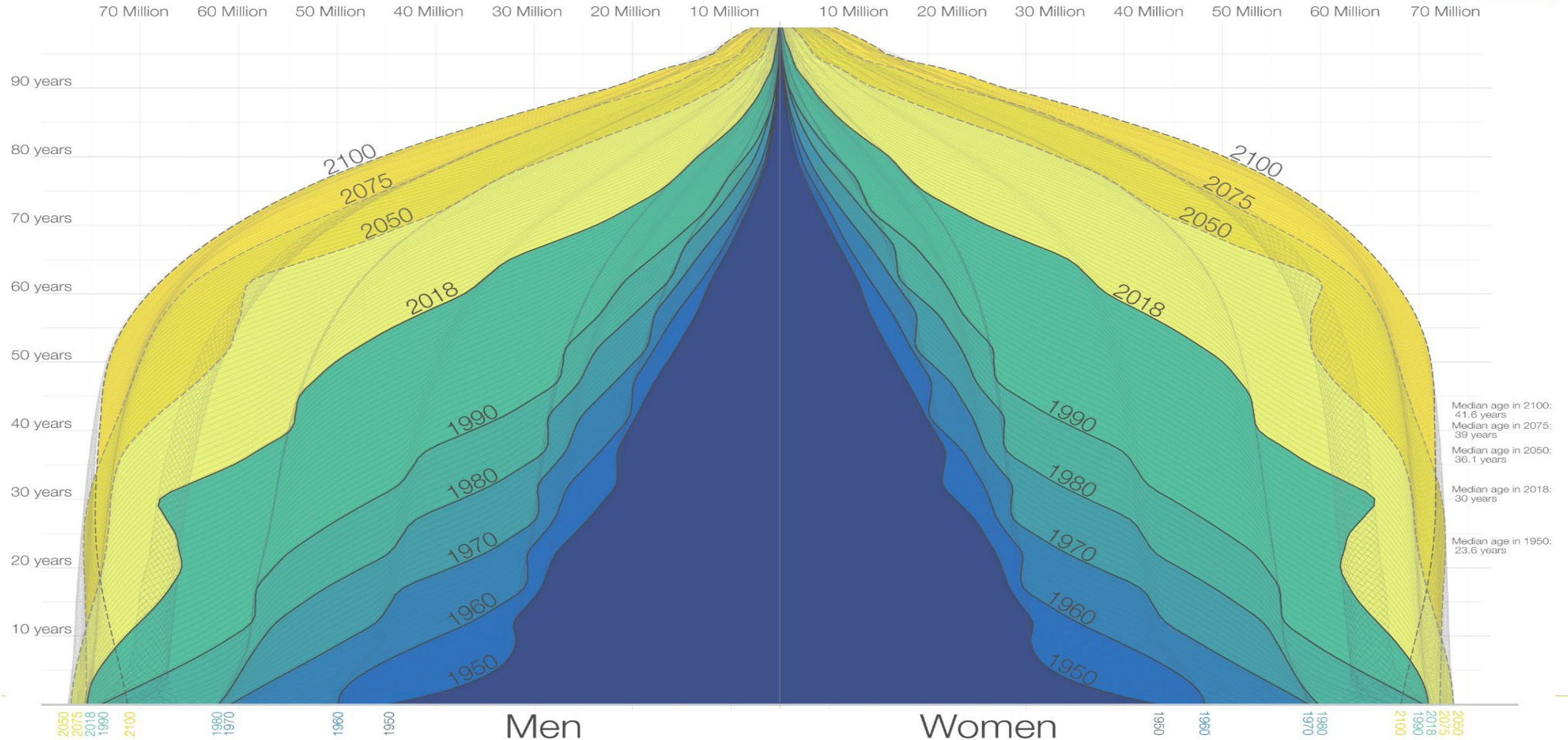
- Introduction – achievement and challenge
- JoyAge – intervention and study
- JoyAge – effectiveness findings
- Economic pressures and responses
- JoyAge – cost-effectiveness findings
- Conclusions



Introduction – achievements and challenges



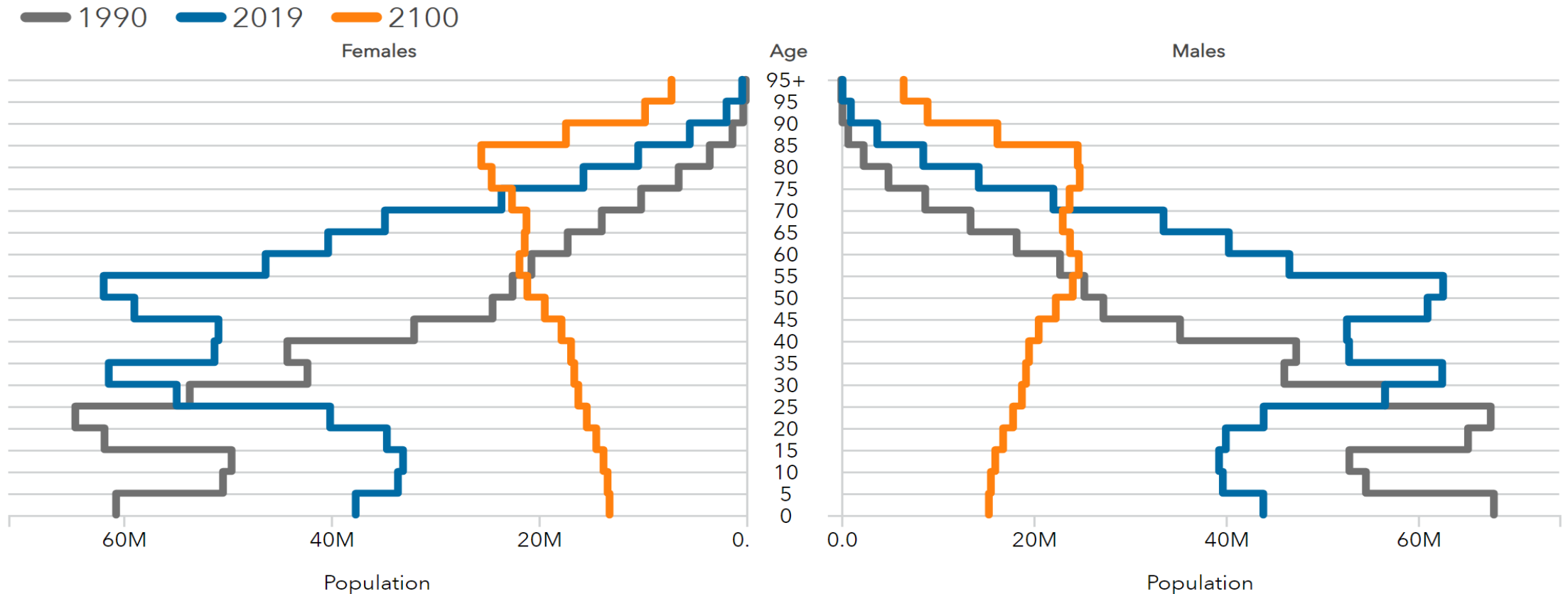
Ageing of the world population



Data source: United Nations Population Division – World Population Prospects 2017; Medium Variant.
The data visualization is available at [OurWorldinData.org](https://www.ourworldindata.org), where you find more research on how the world is changing and why.

Licensed under CC-BY by the author Max Roser.

China: How many older versus younger people are in the population? How will these patterns change?



- Population age structure for males and females in 1990, 2019 (reference scenario), and 2100 (reference scenario). Forecasted data based on Global Burden of Disease 2017 results.

See related publication: [https://doi.org/10.1016/S0140-6736\(20\)30677-2](https://doi.org/10.1016/S0140-6736(20)30677-2)

Achievements

- On average people live longer ...
- ... and with better health.

Challenges

- Older people have higher risks of ill-health ...
- ... leading to long-term disability and illness
- Greater need for health & social care support
- Greater reliance on family and community



Depression in older age groups

- Global prevalence of depression in older adults (age cut-off usually aged >59 or >64 years) is **28.4%**

(From a systematic review and meta-analysis by Hu et al *Psychiatry Research* 2022.)



But very often, these mental health problems are missed or ignored:

- Seen as 'normal ageing' or ascribed to physical illness or dementia
- Older adults less likely than younger adults to recognise depressive symptoms
- Economic impacts are small (compared to younger adults) and largely hidden
- General stigma and neglect of mental illness
- Depression does not kill many people – not prioritised by decision makers

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Risk factors for depression in older people

Physical factors

Colasanti et al *Arch Ger Ger* 2010

- Chronic disease (e.g. diabetes, ischaemic heart disease, heart failure, COPD)
- Acute myocardial infarction
- Organic brain disease: dementia, stroke, Parkinson's disease...
- Endocrine/metabolic disorders
- Malignancy
- Chronic pain and disability

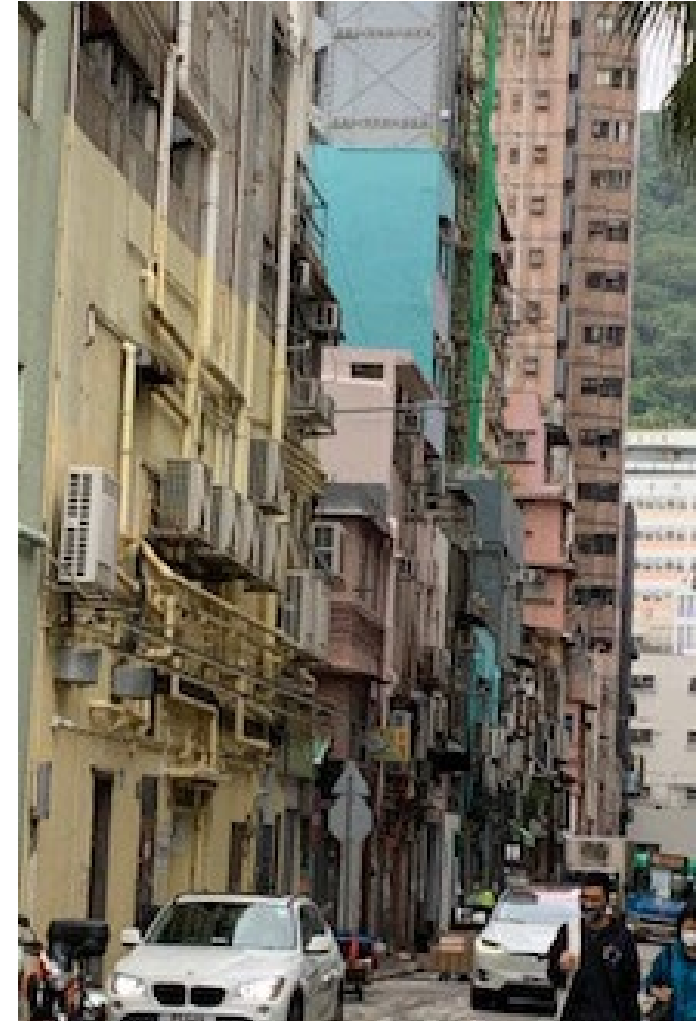


Psychosocial factors

- Social isolation
- Change in financial circumstances
- Being a carer
- Change of role and loss of social status
- Bereavement and loss
- Difficulty in adapting to illness / pain / disability
- Poor defences against anxiety about death
- History of depression
- Being in institutional care

What are the consequences?

- Low rates of diagnosis and treatment, even in high-income countries
- Distress and suffering – lower wellbeing
- Exacerbates effects of co-occurring physical health problems – e.g., by undermining adherence to medication or other treatments ...
- ... and therefore increases risk of frailty
- Shortens life expectancy, including from suicide
- Increases burden on family and other carers



JoyAge – intervention and study





A Hong Kong story



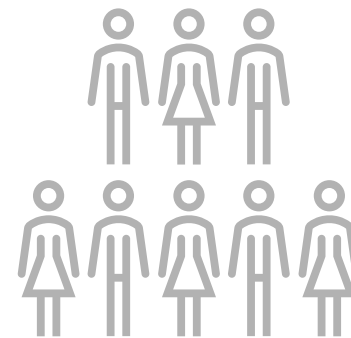
co-produced by stakeholders



since 2016 (went through COVID)



a real-world trial – academic-community partnership



served & trained 15,000+ people



informing global MH development

What is JC JoyAge?

a personal reflection...



賽馬會樂齡同行計劃 JC JoyAge
Jockey Club Holistic Support Project for Elderly Mental Wellness

Initiated and Funded by:



The Hong Kong Jockey Club Charities Trust

Partner Institution:



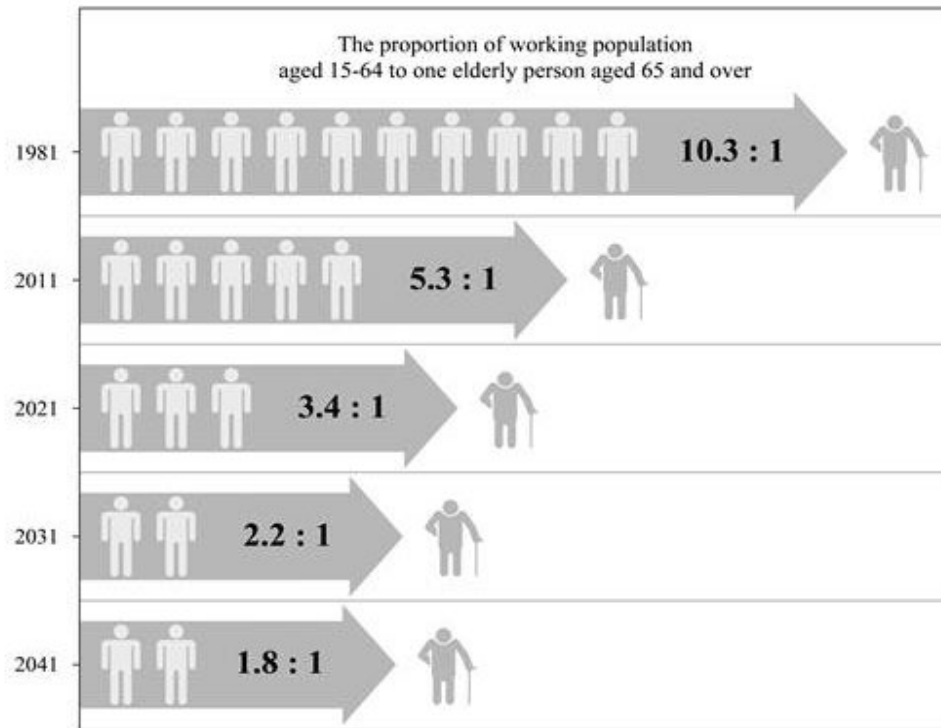
HKU
SWSA

Department of Social Work and Social Administration
The University of Hong Kong
香港大學社會工作及社會行政學系

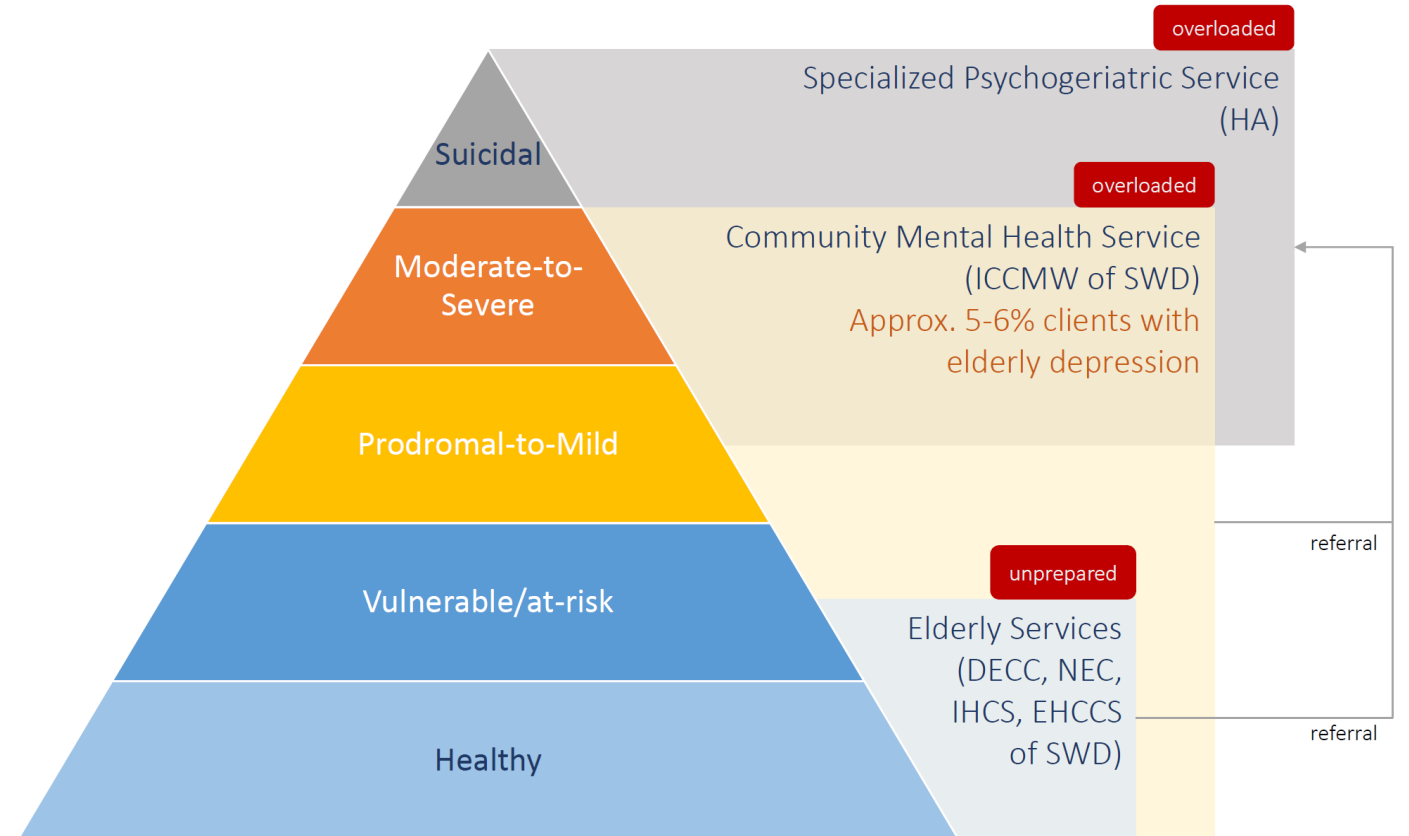
Why a HK Model?

a walk down memory lane...

- Human resources in MH services
- Service silos
- Evidence on stepped care for prevention?



HKSAR Government.
<http://www.budget.gov.hk/2013/eng/budget27.html>



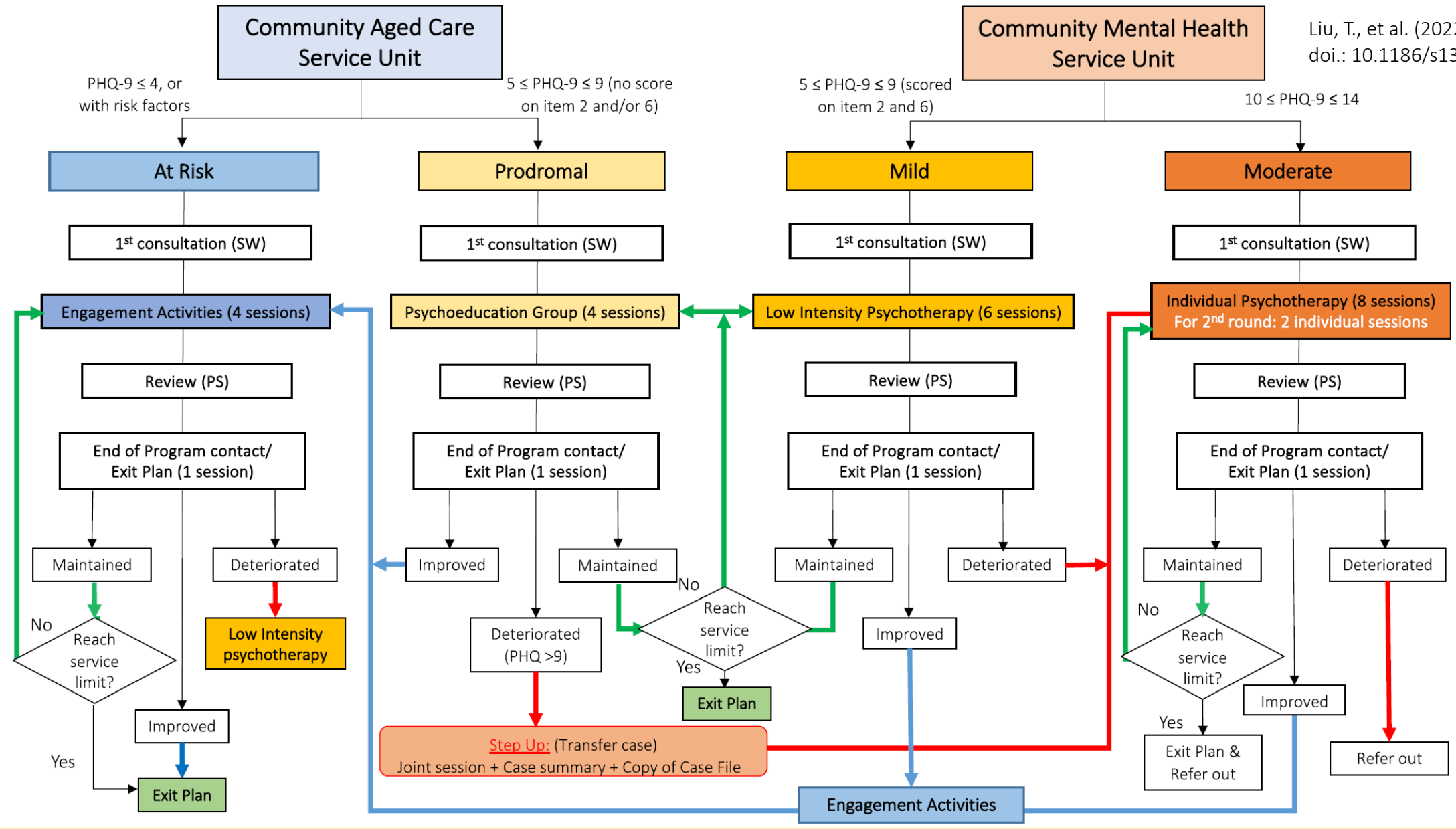
Client group	Criteria	Intervention	Service unit(s)	Service period
At Risk	PHQ9 \leq 4 or with risk factors	Selective prevention: engagement activity + PS	Community aged care	2–9 months
Prodromal	5 \leq PHQ \leq 9 without score on item 2 or 6	Indicated prevention: psycho education + PS	Community aged care	3–9 months
Mild	5 \leq PHQ \leq 9 and scored on item 2 and 6	Indicated prevention: group psychotherapy + PS	Community mental health care	3–9 months
Moderate	10 \leq PHQ \leq 14	Individual psychotherapy + PS	Community mental health care	6–12 months
Moderately severe and above*	PHQ \geq 15	Care as usual	Traditional mental health service, HA	N. A

Liu, T., et al. (2022). *Trials*. doi.: 10.1186/s13063-022-06122-1

*Beyond the scope of the current project, mainly referral for appropriate services
PHQ Patient Health Questionnaire, PS Peer Supporter, HA Hospital Authority

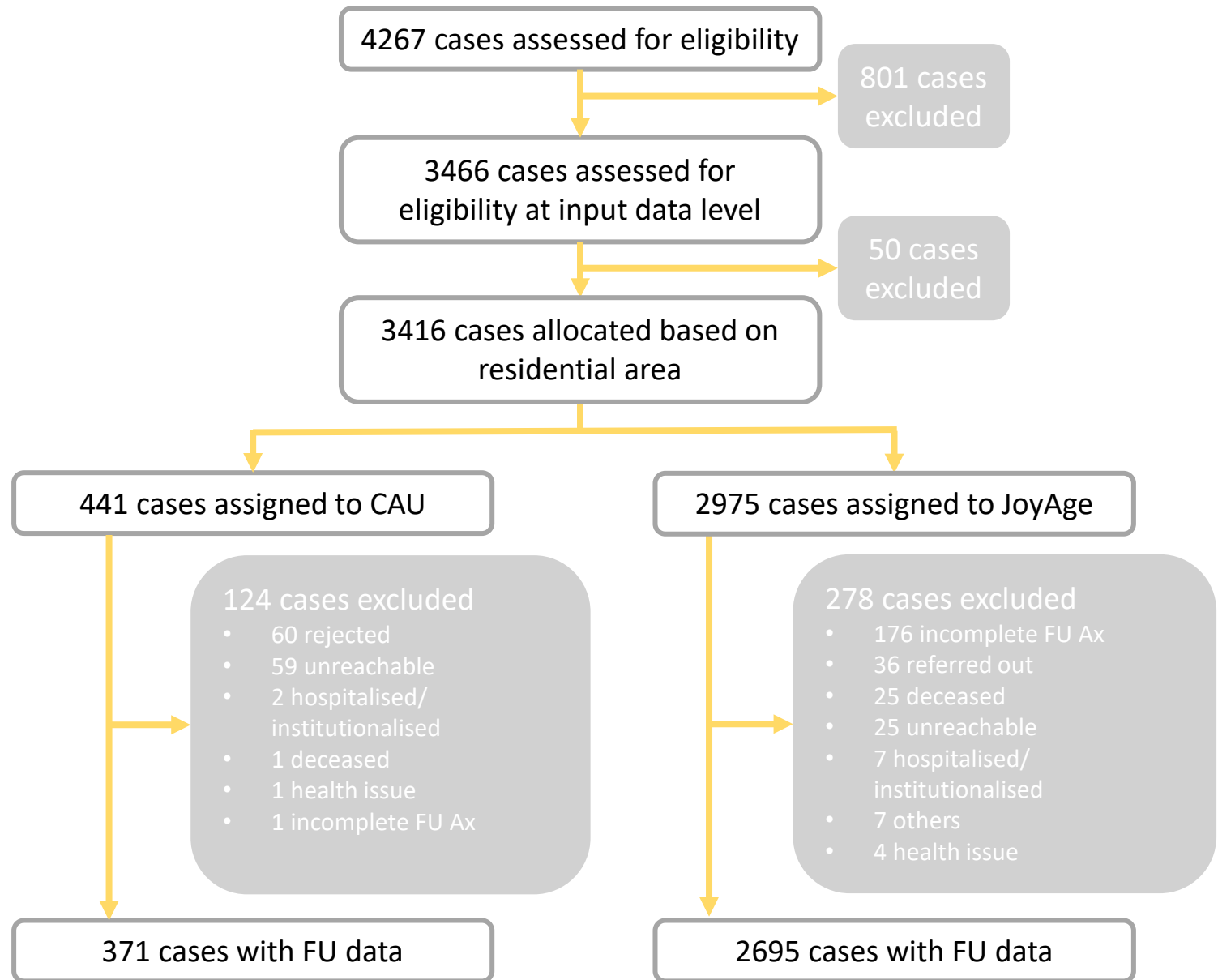
Intervention Model





The Study

- pragmatic non-randomised controlled trial
- Single-blinded (allocation ratio 4:1)
- JoyAge (n=2975) vs CAU (n=441)
- Baseline & 12 months
- Outcomes: PHQ-9, GAD-7, UCLA-3
- ClinicalTrials.gov Identifier: NCT03593889



JoyAge – effectiveness findings



Sample

	Overall (N=3416)	CAU (N=441)	JoyAge (N=2975)	CAU vs. JoyAge
	N (%) / mean (SD)			t/Chi-square
Age, years	76.90 (8.20)	75.56 (8.56)	77.10 (8.12)	-3.70*
Sex, female	2686 (78.6)	335 (76.0)	2351 (79.0)	2.14
Education				
Marital status				0.52
Married/Cohabiting	1377 (40.3)	171 (38.8)	1206 (40.5)	
Others	2006 (58.7)	266 (60.3)	1740 (58.5)	
Economic status				1.06
Means-tested welfare benefit	1040 (30.4)	125 (28.3)	915 (30.8)	
Non-recipients	2376 (69.6)	316 (71.7)	2060 (69.2)	
Living arrangements				10.49**
Living alone	1423 (41.7)	215 (48.8)	1208 (40.6)	
Living with someone	1993 (58.3)	226 (51.2)	1767 (59.4)	
Mobility				12.39*
Independently mobile	2186 (64.0)	256 (58.0)	1930 (64.9)	
Able to move with self-help tools	1129 (33.1)	174 (39.5)	955 (32.1)	
Reliant on others/in bed	48 (1.6)	2 (0.5)	46 (1.5)	
PHQ-9 (0-20)	6.27 (3.76)	6.02 (4.81)	6.31 (3.58)	-1.50***
GAD-7 (0-21)	4.30 (4.34)	3.90 (4.35)	4.36 (4.45)	-2.05
UCLA-3 (0-9)	3.90 (2.94)	3.36 (3.09)	3.98 (2.91)	-4.13**



Outcome Changes

- Multilevel linear mixed models
- Controlled for a priori covariates
- All $p < .001$

Depressive symptoms

- AMD 1.61, 95% CI 1.36–1.86
- SMD 0.43, 95% CI 0.36–0.49

Anxiety symptoms (GAD-7)

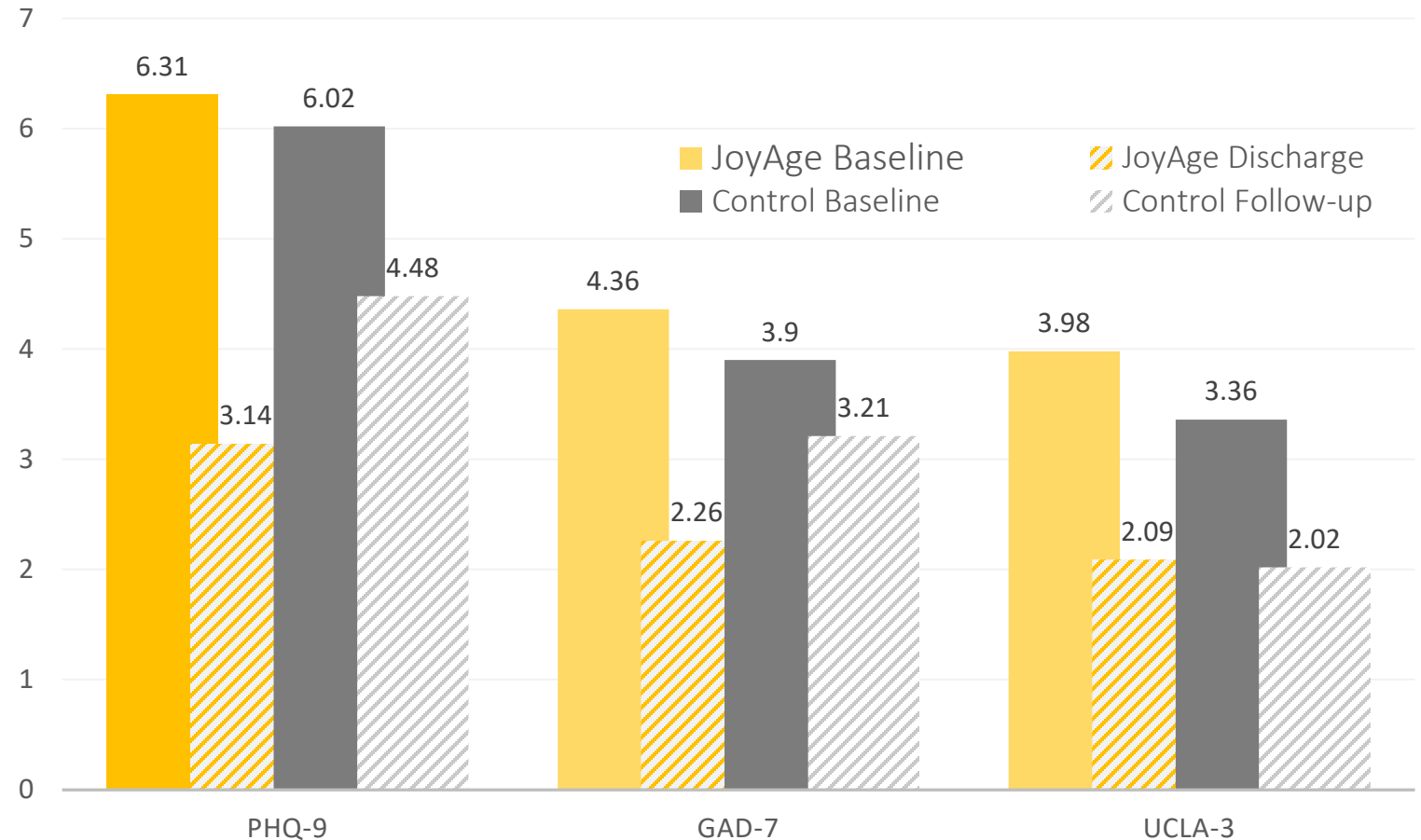
- AMD 1.27, 95% CI 1.01–1.53
- SMD 0.29, 95% CI 0.23–0.35

Loneliness (UCLA-3)

- AMD 1.18, 95% CI 1.00–1.36
- SMD 0.40, 95% CI 0.34–0.46

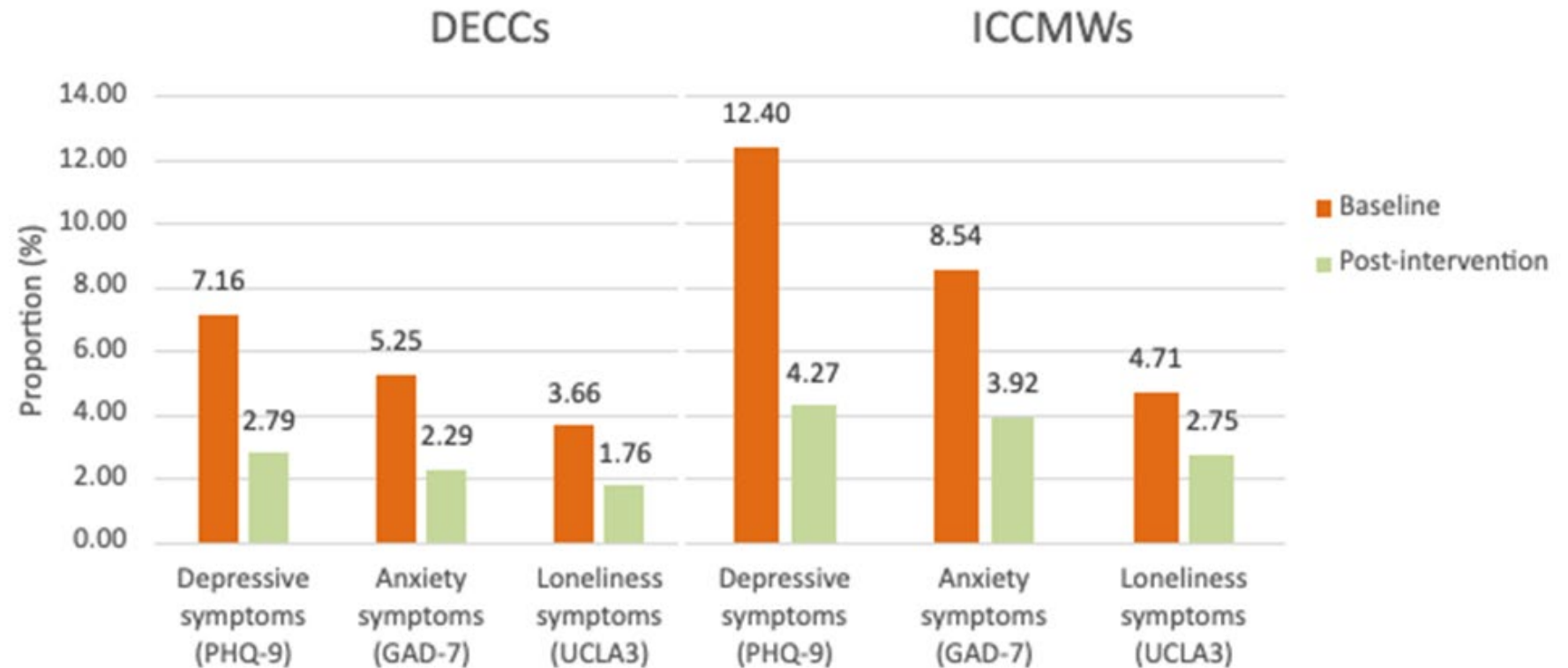
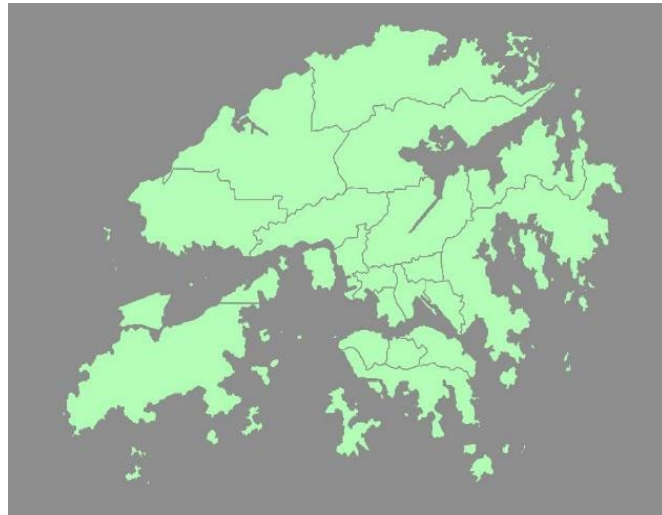
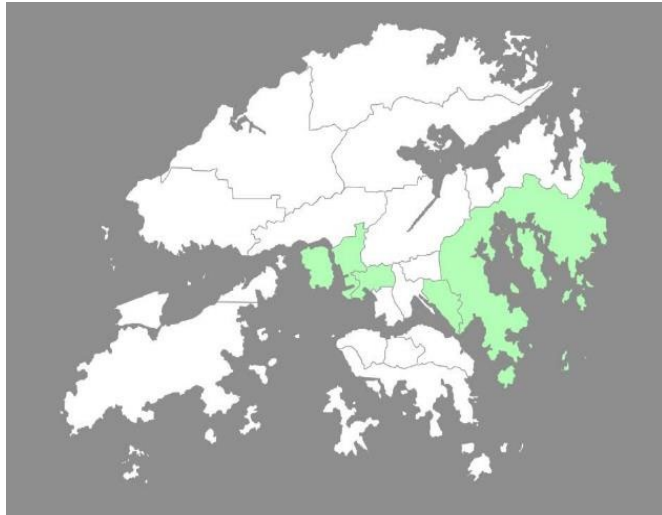
AMD=adjusted mean difference

SMD=standardised mean difference



Scaled Up Effectiveness?

(n=8494)



Economic pressures and responses



Why is economics relevant?

Scarcity

- not enough resources to meet every need, agree to every request, or accommodate every preference.

Choices must be made:

Is this service, therapy or policy **effective**?

Is it **affordable**?

Is it **cost-effective**?



What does cost-effectiveness mean?

If the policy/practice question is:

‘Is this service or therapy effective?’

... then the economic question is:

‘Is it worth it?’



Does the **effectiveness** (= improvements in health, quality of life etc.) justify the **cost** (= expenditure on the intervention and all other services, plus lost productivity, opportunity cost of carer time etc.)



What does cost-effectiveness mean?

If an intervention (service / therapy / etc.) is more effective and also more costly ... then what does it cost to achieve the outcome gain?

And ... **Is it worth it?**

Health economists calculate a ratio of costs to effectiveness:

$$\frac{(C_2 - C_1)}{(E_2 - E_1)} = \textit{incremental cost-effectiveness ratio}$$

$$(E_2 - E_1)$$

= the difference in costs between two alternatives divided by the difference in effectiveness

= what does it cost to achieve one additional unit of outcome?

How to decide whether something is cost-effective?

- Show decision-makers the cost and effectiveness findings and ask them to choose the preferred option.
- Or ask them their **willingness to pay** for the outcomes – e.g., how much to extend length of life by 1 month? Or to achieve 1 additional depression-free day?
- Compare the *incremental cost-effectiveness ratio* with a pre-set **threshold** (e.g., in England, NICE uses **cost per QALY** to compare across disorders / diseases: current guide threshold is between £20,000 and £30,000 per additional quality-adjusted life year (QALY) – a generic measure of outcome.



Why don't we just choose the lowest cost option?

- Because the function of a health care system is **to prevent illness and improve health** ... and not to cut costs!
- Of course, there needs to be an **efficiency** aim – to get the best value for money ...
- ... but this means *balancing* outcomes with costs – to achieve best **value for money**.
- And there is also usually an **equity / fairness** aim – to ensure that disadvantaged groups can access good quality services.
- This is especially important in relation to **older people with mental health problems**.



JoyAge – cost-effectiveness findings



Measurements

Depression free days (DFD)

- Measured by PHQ-9

Quality-adjusted life year (QALYs)

- Measured by EQ-5D-5L
- Converted to EQ-5D index value using localized utility score (Wong et al., 2018)

One-year health and social costs

- Measured by a localized Client Service Receipt Inventory (**CSRI**) (CSRI; Beecham & Knapp, 1992)
- Covering psychiatric health care and non-psychiatric health care, rehabilitation, social care.

One-year intervention costs

- covering staff cost, covering both professional (social workers) and non-professional roles (peer supporters) and non-staff cost

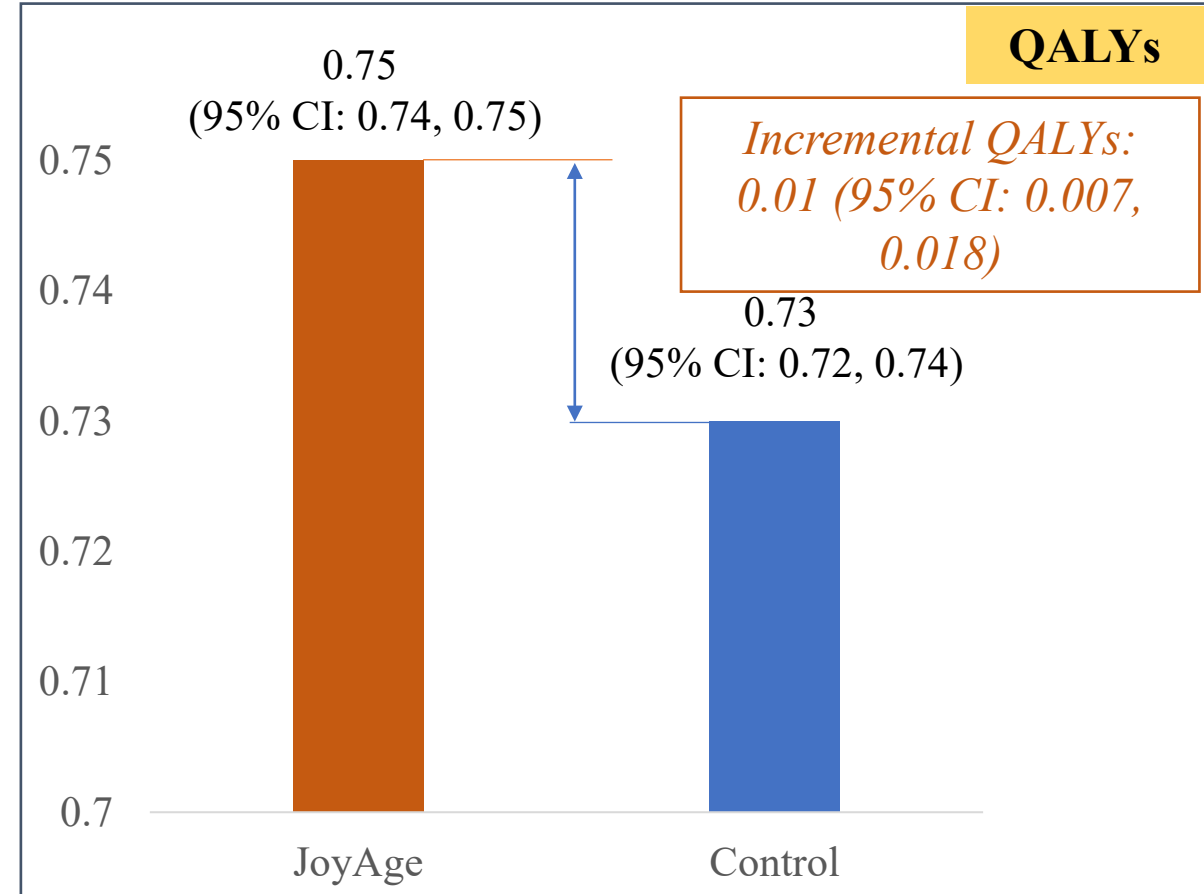
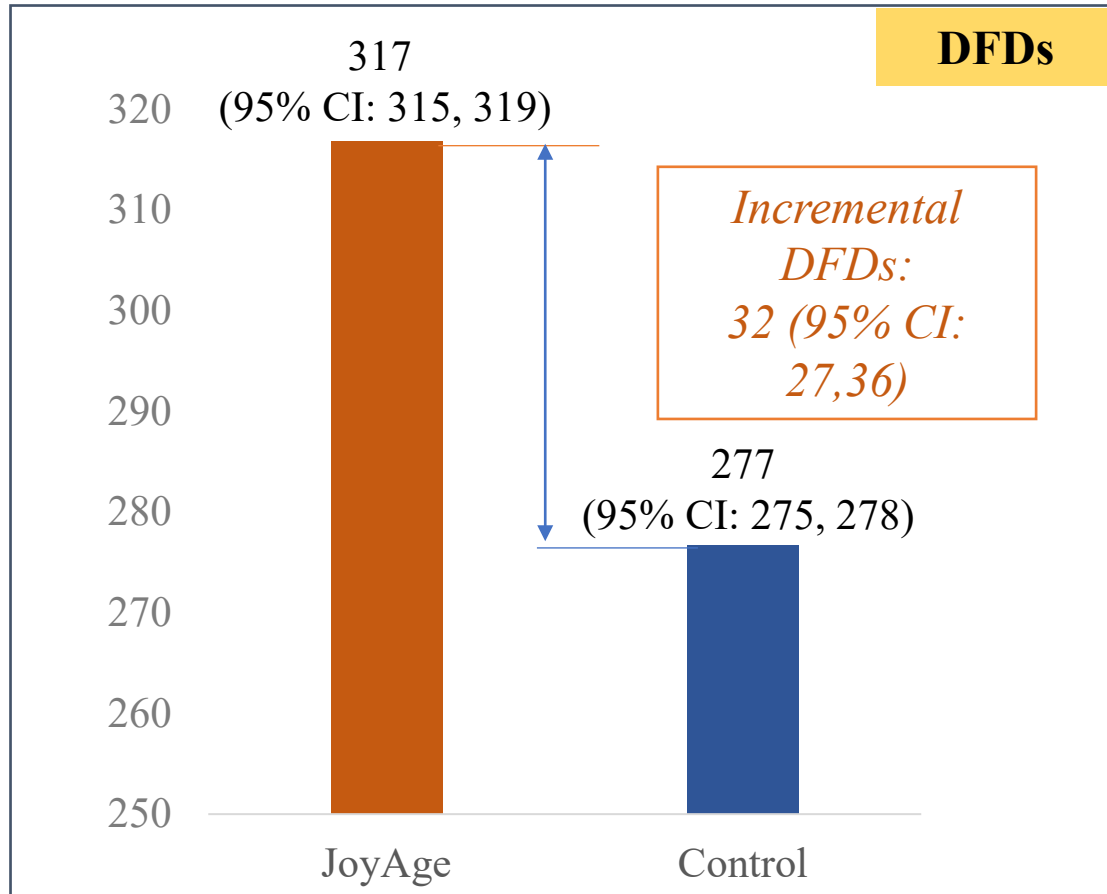


Economic evaluation analysis

$$\text{ICER} = \frac{\text{Adjusted difference in cost}}{\text{Adjusted difference in health effects (DFDs/QALYs) between intervention and control group}} = \frac{\text{Incremental cost}}{\text{Incremental DFDs/QALYs gained}}$$



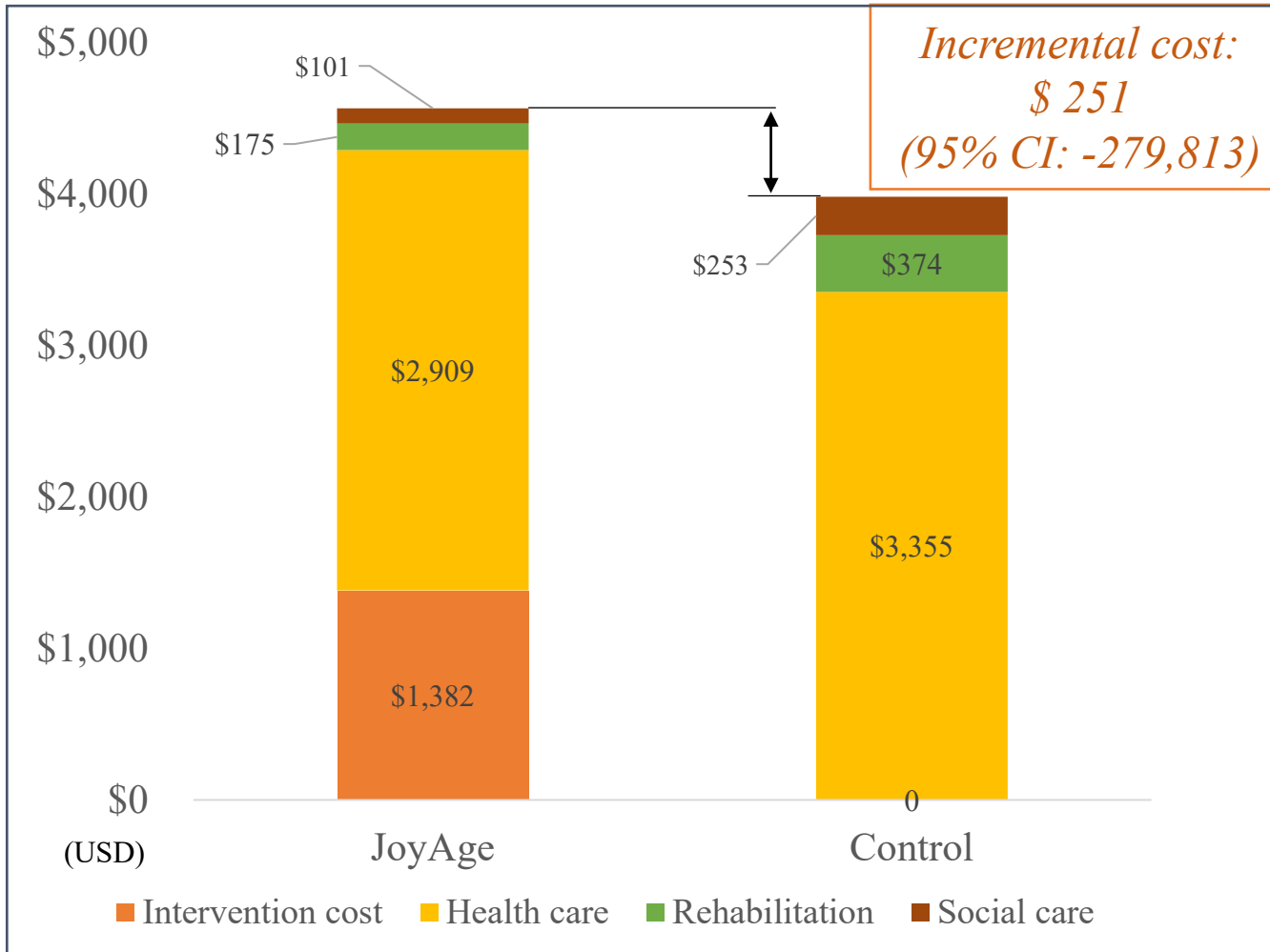
JoyAge gained more DFDs and QALYs



Notes: The incremental effectiveness in DFDs and QALYs was estimated based on the adjusted difference between JoyAge and control groups by controlling for age, gender, marital status, education, cognitive function, chronic diseases, a history of depression/anxiety, EQ5D utility index, PHQ-9, GAD-7 and UCLA-3 at baseline. CI=Confidence Interval. The DFDs and QALYs gained in JoyAge and control groups were estimated based on the controlling variables using regressions and generalized linear models, respectively.



Comparable cost: JoyAge vs TAU



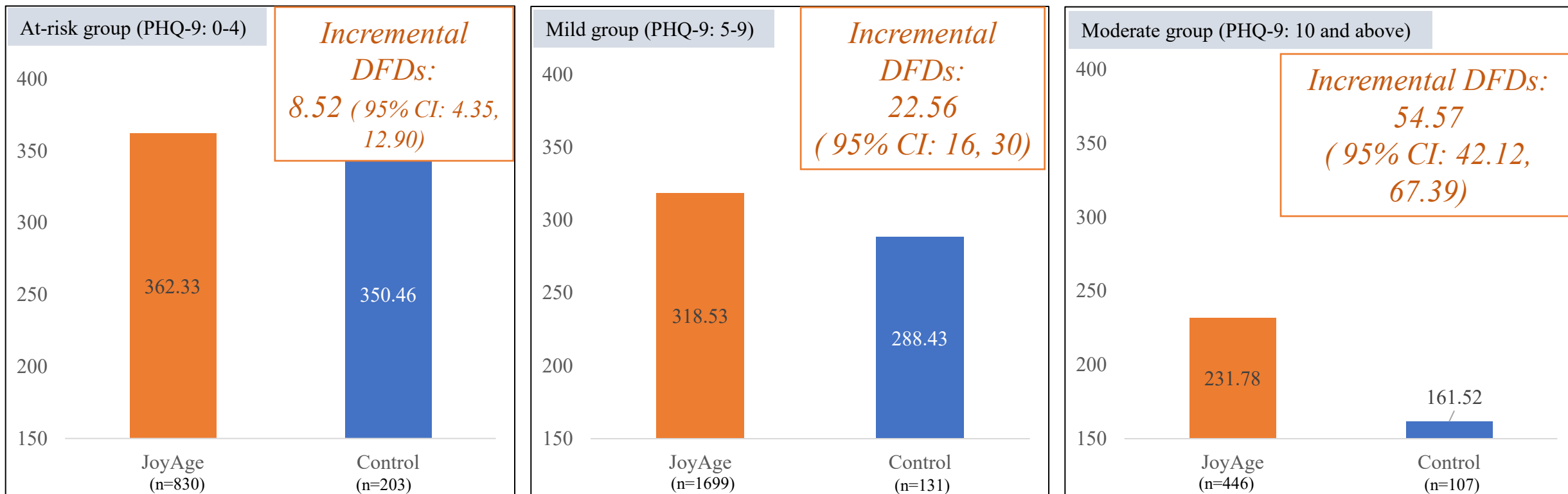
1. The **intervention** cost per participant was **\$ 1,382** in the JoyAge group.
2. The **one-year overall care expenditures** in the JoyAge group was \$ 3,191, **comparable** to the control group (\$ 3,899, $p = 0.204$)
3. The **one-year overall costs** in the JoyAge group was \$ 4,542, **comparable** to the control group ($p=0.251$).

Notes: The incremental cost was estimated based on the adjusted difference between JoyAge and control groups by controlling for age, gender, marital status, education, cognitive function, chronic diseases, a history of depression/anxiety, EQ5D utility index, PHQ-9, GAD-7 and UCLA-3 at baseline. CI=Confidence Interval.



Subgroup analysis: Effectiveness (DFDs)

1. All subgroups in JoyAge gained more DFDs compared to the control group;
2. The moderate and mild groups benefited the most

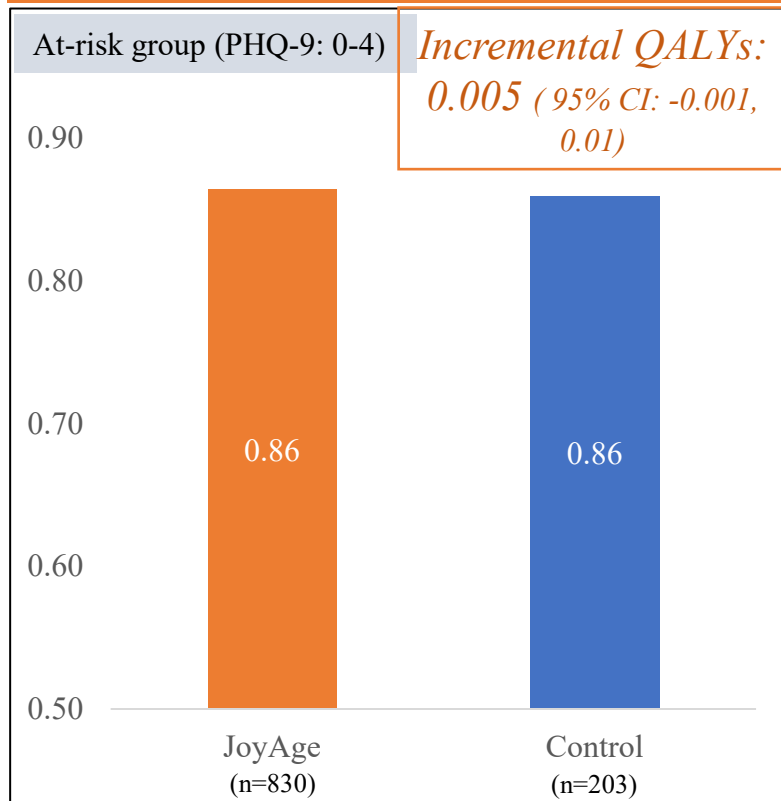


Notes: The incremental effectiveness in DFDs and QALYs was estimated based on the adjusted difference between JoyAge and control groups by controlling for age, gender, marital status, education, cognitive function, chronic diseases, a history of depression/anxiety, EQ5D utility index, PHQ-9, GAD-7 and UCLA-3 at baseline. CI=Confidence Interval.

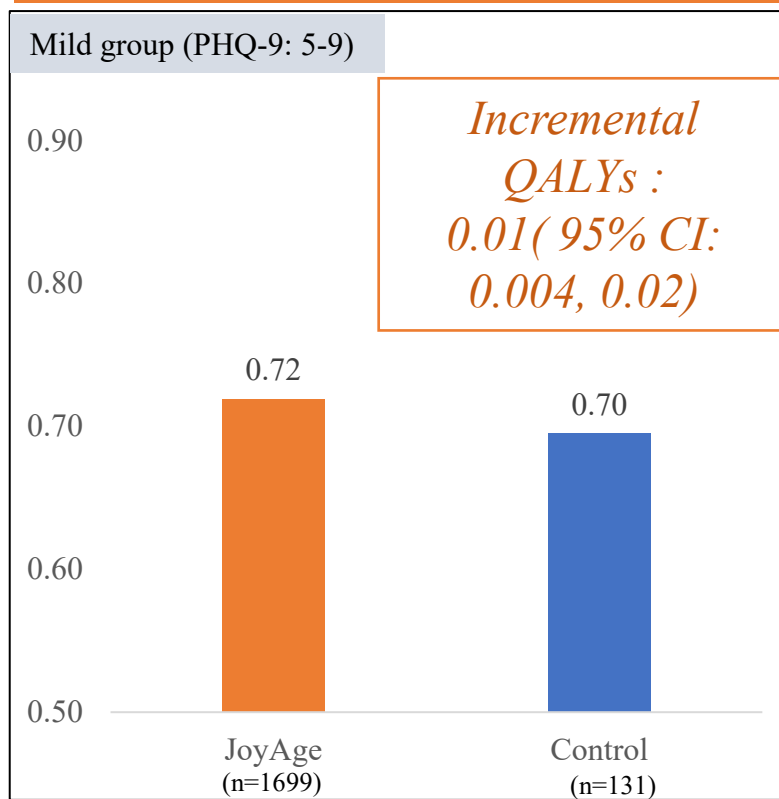


Subgroup analysis: Effectiveness (QALYs)

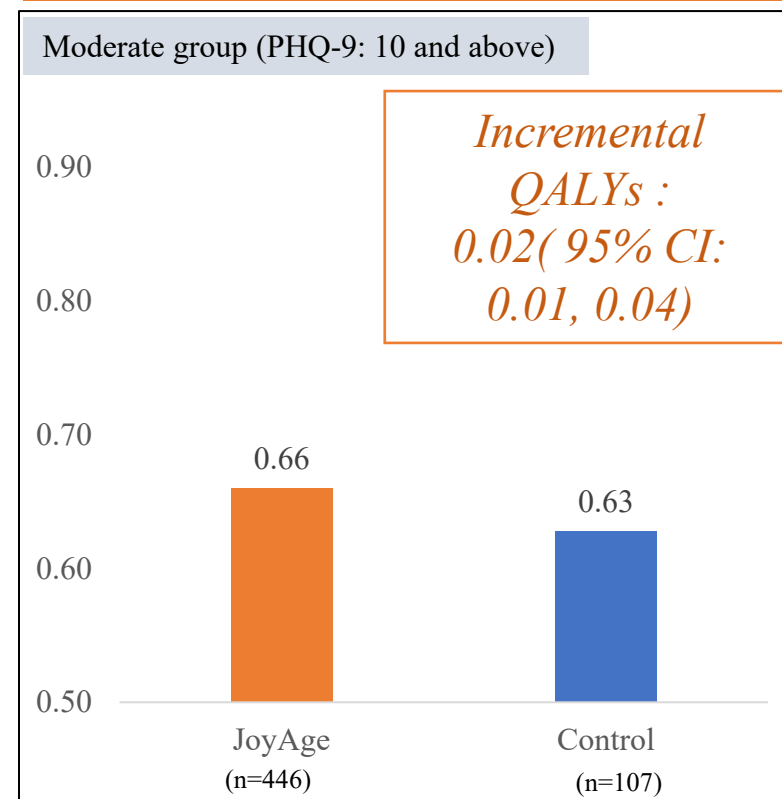
QALYs gained were similar in JoyAge selective prevention group compared to the TAU



JoyAge indicated prevention group gained more QALYs than TAU



JoyAge treatment group benefited the most in terms of the QALYs gained

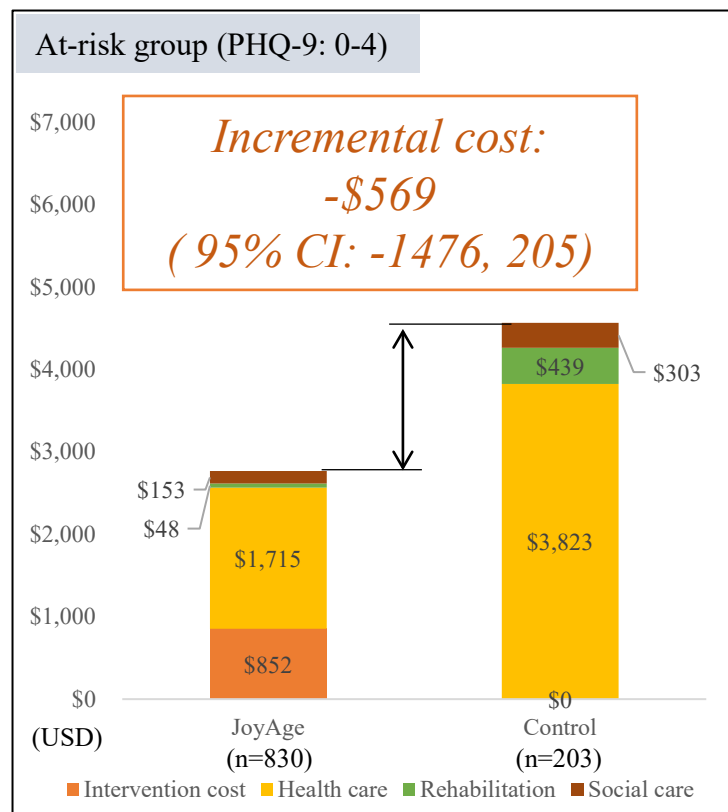


Notes: The incremental effectiveness in DFDs and QALYs was estimated based on the adjusted difference between JoyAge and control groups by controlling for age, gender, marital status, education, cognitive function, chronic diseases, a history of depression/anxiety, EQ5D utility index, PHQ-9, GAD-7 and UCLA-3 at baseline. CI=Confidence Interval.

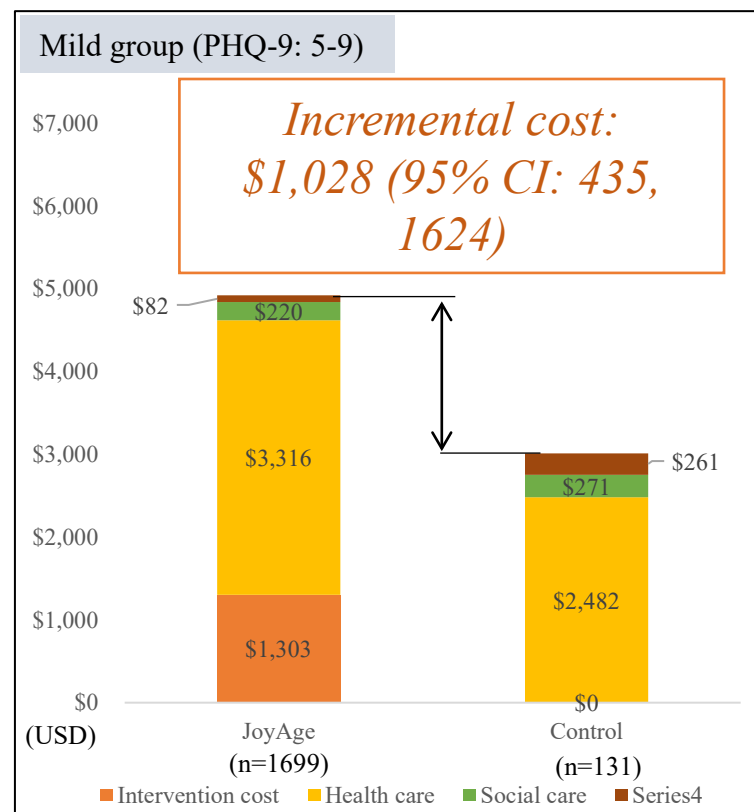


Subgroup analysis: Costs

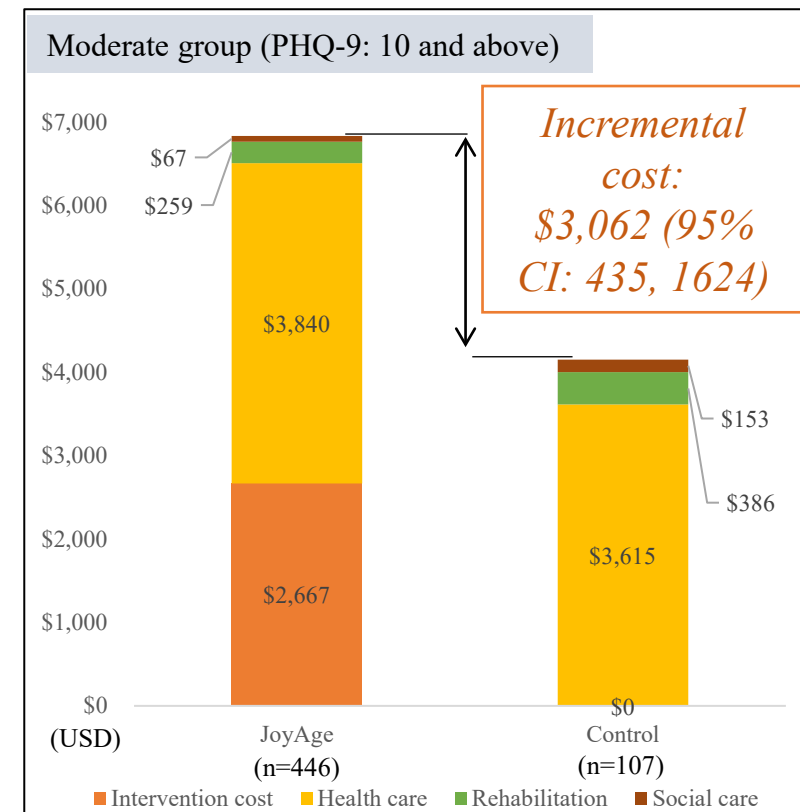
JoyAge selective prevention group is cost-saving



JoyAge indicated prevention group is more expensive



JoyAge treatment group is more expensive



Notes: The incremental cost was estimated based on the adjusted difference between JoyAge and control groups (by subgroup analysis) by controlling for age, gender, marital status, education, cognitive function, chronic diseases, a history of depression/anxiety, EQ5D utility index, PHQ-9, GAD-7 and UCLA-3 at baseline. CI=Confidence Interval.



Incremental cost-effectiveness ratio (ICER)

JoyAge intervention as a whole:

USD 9 per DFD (95% CI: -9 to 27)

USD 20,063 per QALY (95% CI: -23527 to 82287)

**JoyAge selective
prevention**

Dominant

**JoyAge indicated
prevention**

USD 46 per DFD
(95% CI: 18, 83)

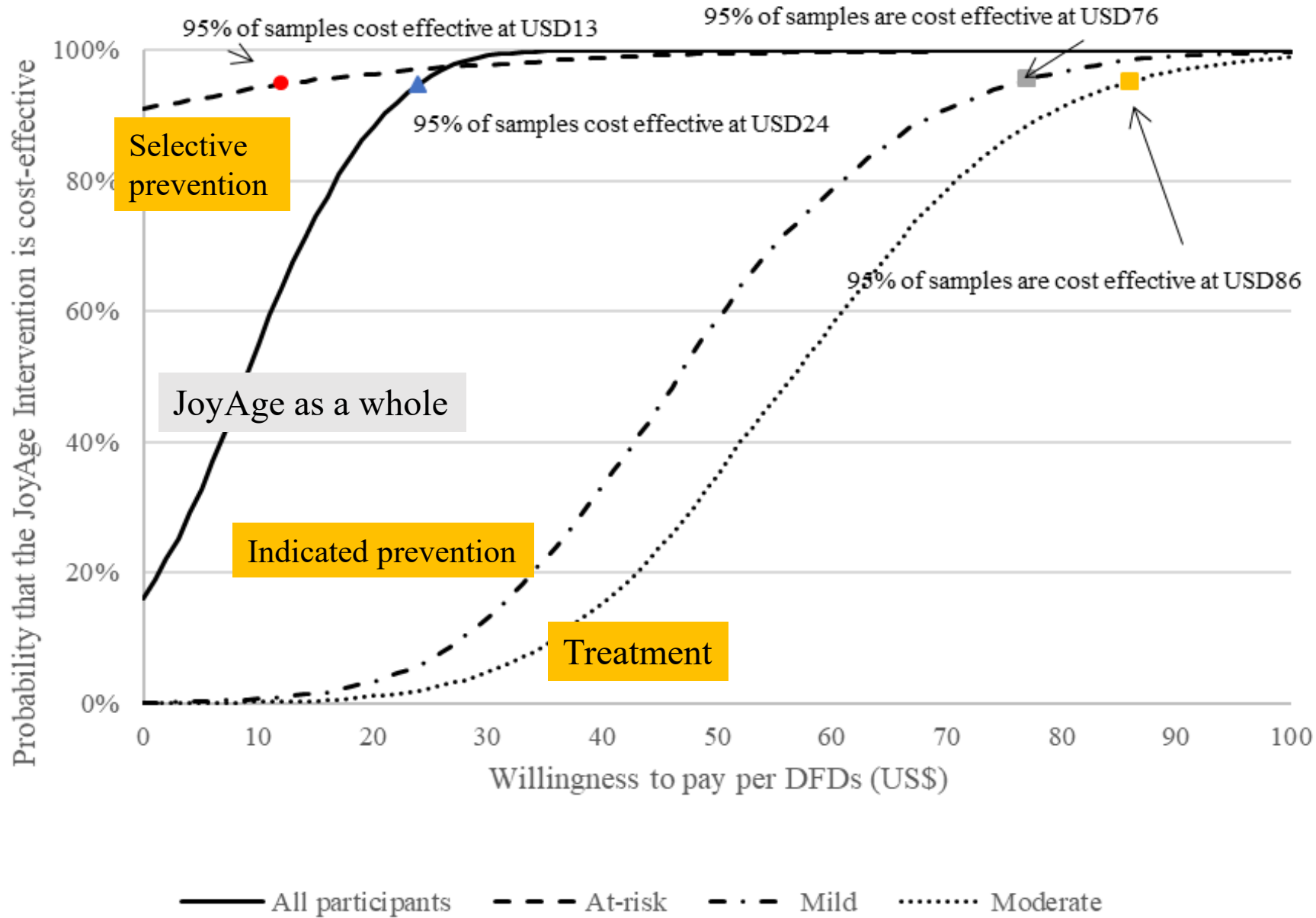
USD 82,109 per QALY
(95% CI: 26087, 306726)

JoyAge treatment

USD 56 per DFD
(95% CI: 25, 92)

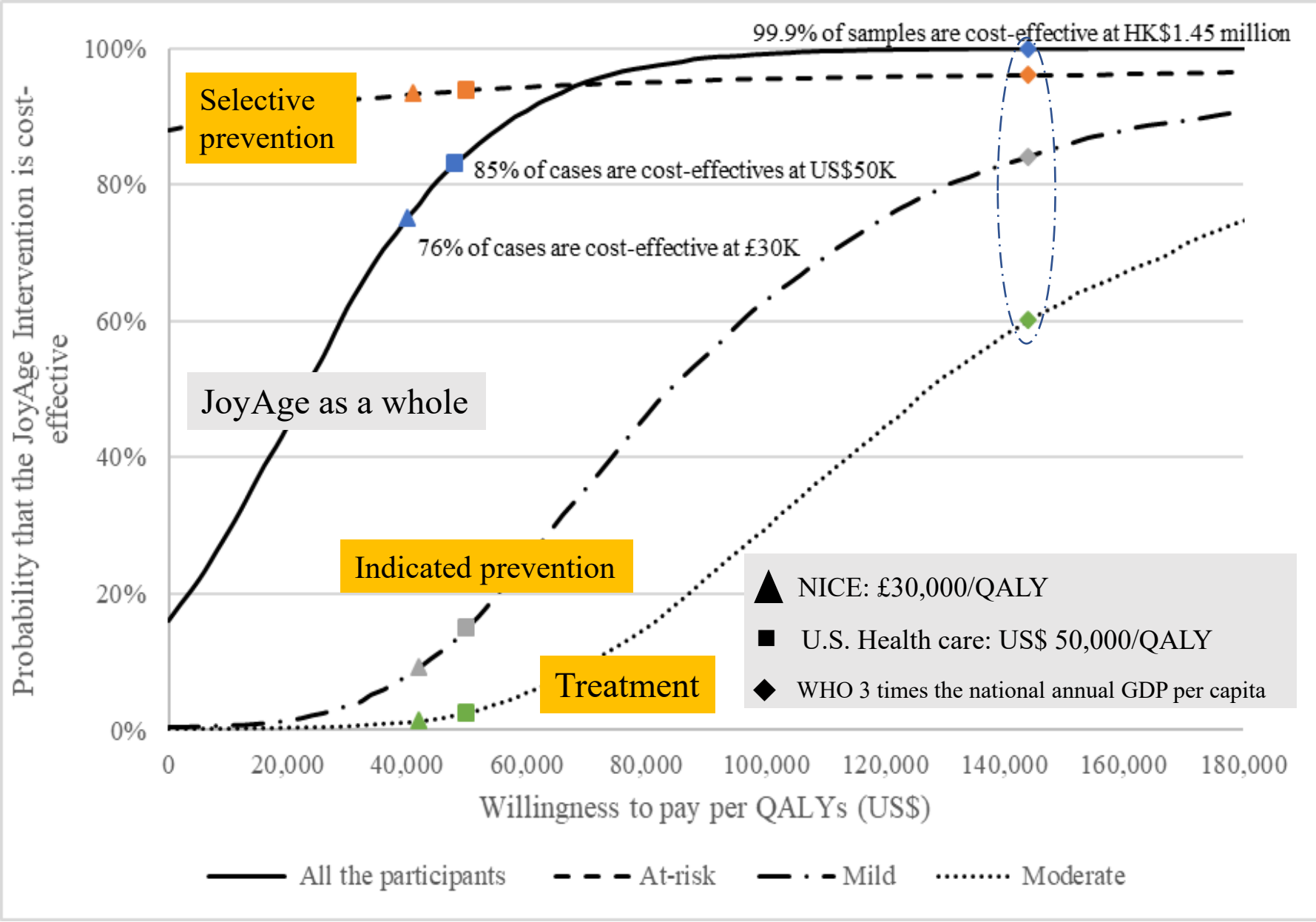
**USD 128,969 per
QALY**
(95% CI: - 50025, 478746)





- The JoyAge intervention offered **good value for money** at the WTP ceilings of USD24 per DFD.
- Selective prevention **Dominant**
- Indicated prevention & Treatment interventions
 - **high probability (95%)** of being **cost-effective** when considering the WTP thresholds of USD 76 and USD 86 respectively





The JoyAge intervention

- **cost-effective** when considering different WTP thresholds per QALYs

Selective prevention
Dominant

Indicated prevention & Treatment interventions

- **cost-effective** when applying the thresholds from WHO guidelines



Summary of cost-effectiveness findings

- The JoyAge intervention, on the whole, is cost-effective, successfully yielding additional DFDs and QALYs.
 - The JoyAge intervention offered good value for money at the WTP ceilings of US\$24 per DFD.
 - For QALYs, there were high probabilities (76%~99.9%) that the JoyAge intervention was cost-effective as per the thresholds from NICE, U.S. Health Care, and WHO.
- JoyAge Selective prevention is a “dominant” strategy.
- The moderate and mild groups benefited the most from the JoyAge intervention in terms of DFDs and QALYs gained, although the treatment and indicated prevention were more expensive.



Conclusions



In conclusion ...

- JC JoyAge is an approach **tailored to Hong Kong** service and population contexts – turning challenges into strengths.
- It is **effective** in reducing anxiety, depression and loneliness symptoms – potentially to **prevent major depressive disorder**
- It also improves **quality of life**
- JoyAge is **slightly more expensive** than usual care – price of 2 coffees...
- ... but is **cost-effective** by standard criteria.
- The **scaled-up** JoyAge model looks to be equally effective ...
- ... and will need **ongoing monitoring and possible adaptation.**



Thank you for your attention!

