Composition and dynamics of social networks among older Singaporeans
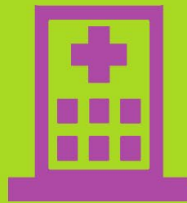
Dr. Pildoo Sung, Research Fellow

Centre for Ageing Research & Education, Duke-NUS Medical School

31 March 2023, 9am – 10.30am

Social isolation and loneliness among older people are harmful:
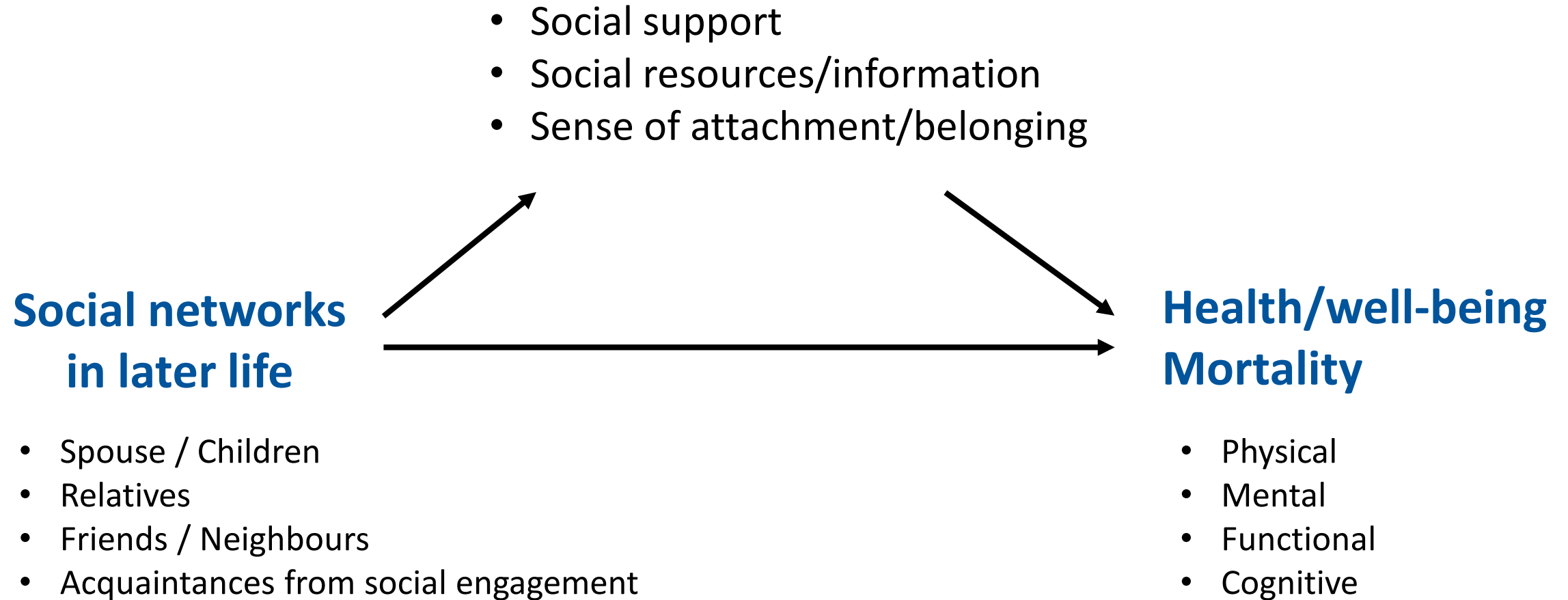
- They **shorten** older people's lives
- They **damage** their physical and mental health
- They **reduce** their quality of life

Social Isolation and Loneliness (who.int)

- Social support
- Social resources/information
- Sense of attachment/belonging

Social networks in later life

- Spouse / Children
- Relatives
- Friends / Neighbours
- Acquaintances from social engagement

Health/well-being Mortality

- Physical
- Mental
- Functional
- Cognitive

1. Measuring social networks

- How can we consider multiple indicators of social networks comprehensively?

2. Social network Dynamics

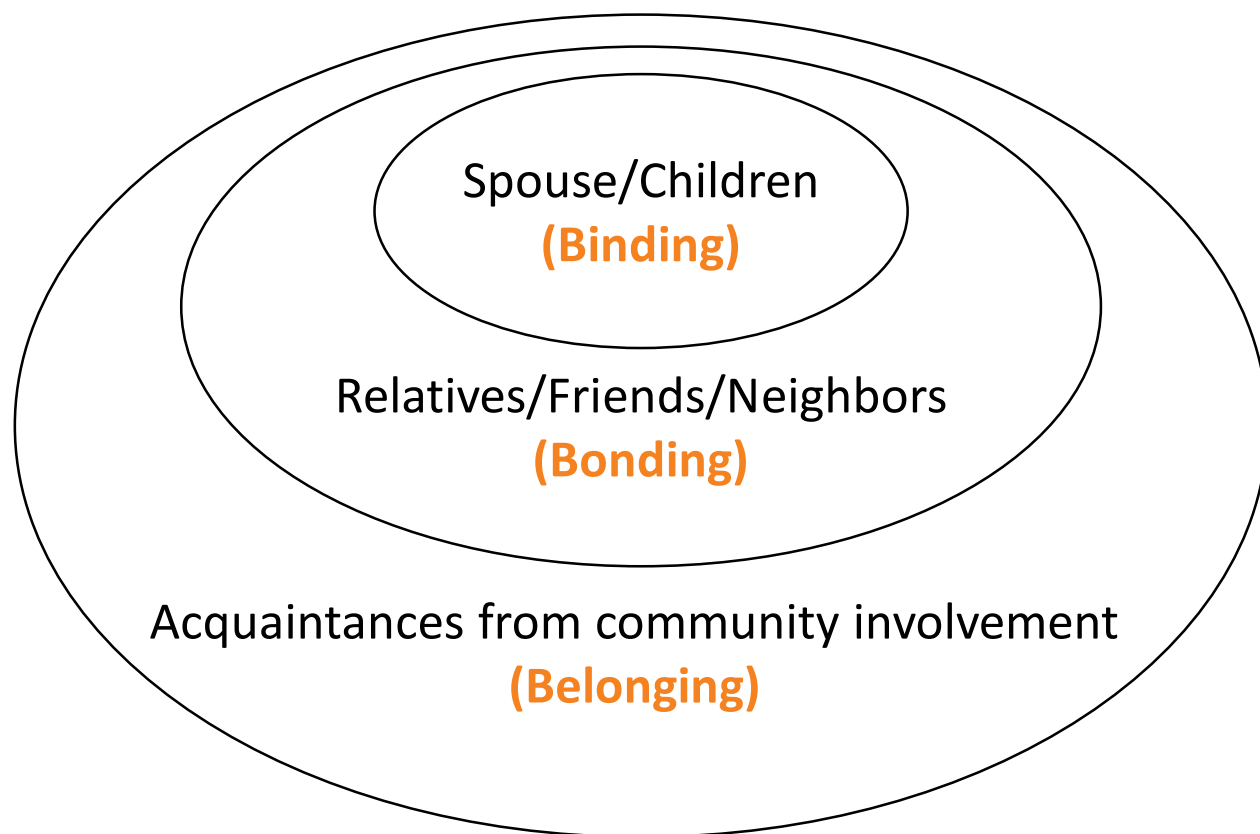- How do older adults' social networks change over time?

3. Antecedents and Consequences

- How does health influence changes in social networks?
- How do changes in social networks impact health?

RQ1: How can we consider multiple social network indicators in a comprehensive and sophisticated manner?

- A typical approach: '**variable**' centered
  - Focus on a single indicator or sum up indicators to create an aggregate score
  - May overlook the interplay between various indicators

- A clustering approach: '**person**' centered
  - Cluster a group of persons with similar social network characteristics
  - Group characteristics indicate an existence of distinct types/profiles of social networks within a population

RQ1: How can we consider multiple social network indicators in a comprehensive and sophisticated manner?

Spouse/Children
(Binding)

Relatives/Friends/Neighbors
(Bonding)

Acquaintances from community involvement
(Belonging)

Common types/profiles of social networks in later life

- Diverse & socially engaged
- Friend-focused
- Family-oriented
- Restricted

RQ2: The patterns of change in older adults' social networks over time

1. Disengagement and Selectivity

Based on Disengagement theory, Socioemotional selectivity theory, and Social convoy models

- Life transitions (e.g., retirement, bereavement) leading to social disconnectedness

- Focus on emotionally close relationships due to the awareness of limited time left
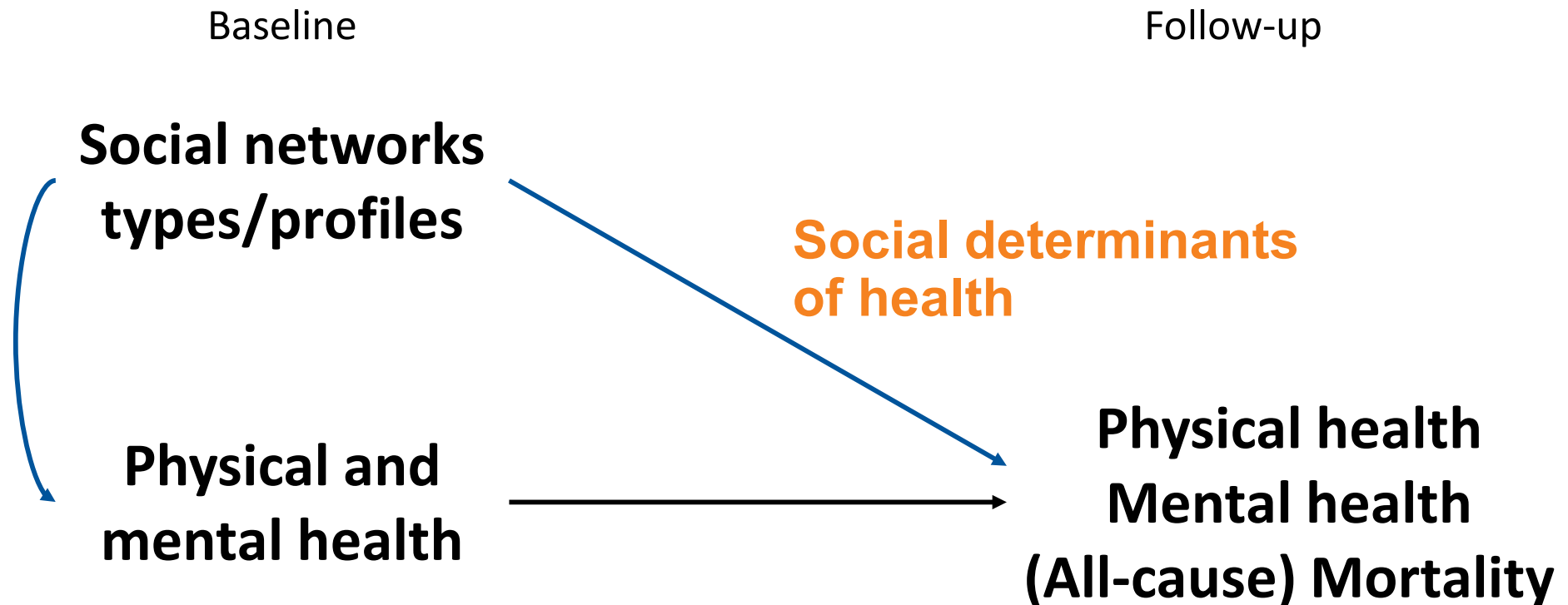
RQ2: The patterns of change in older adults' social networks over time
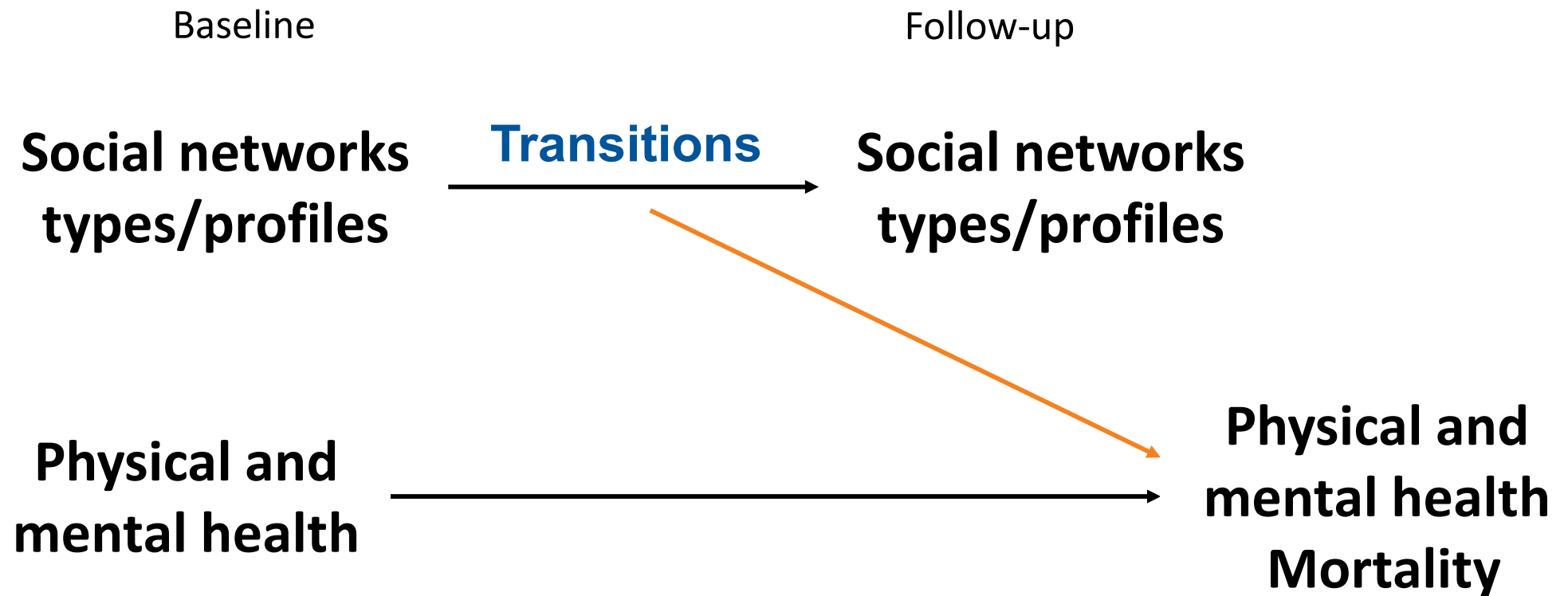
2. Fluctuation and Continuity

Sequential gains and losses based on adaptation and rebalancing, leading to relative stability and continuity in social networks

- Continuity theory: role stability and behavior continuity across the life course

- Activity theory: engagement in new social activities for compensation (e.g., volunteering after retirement)

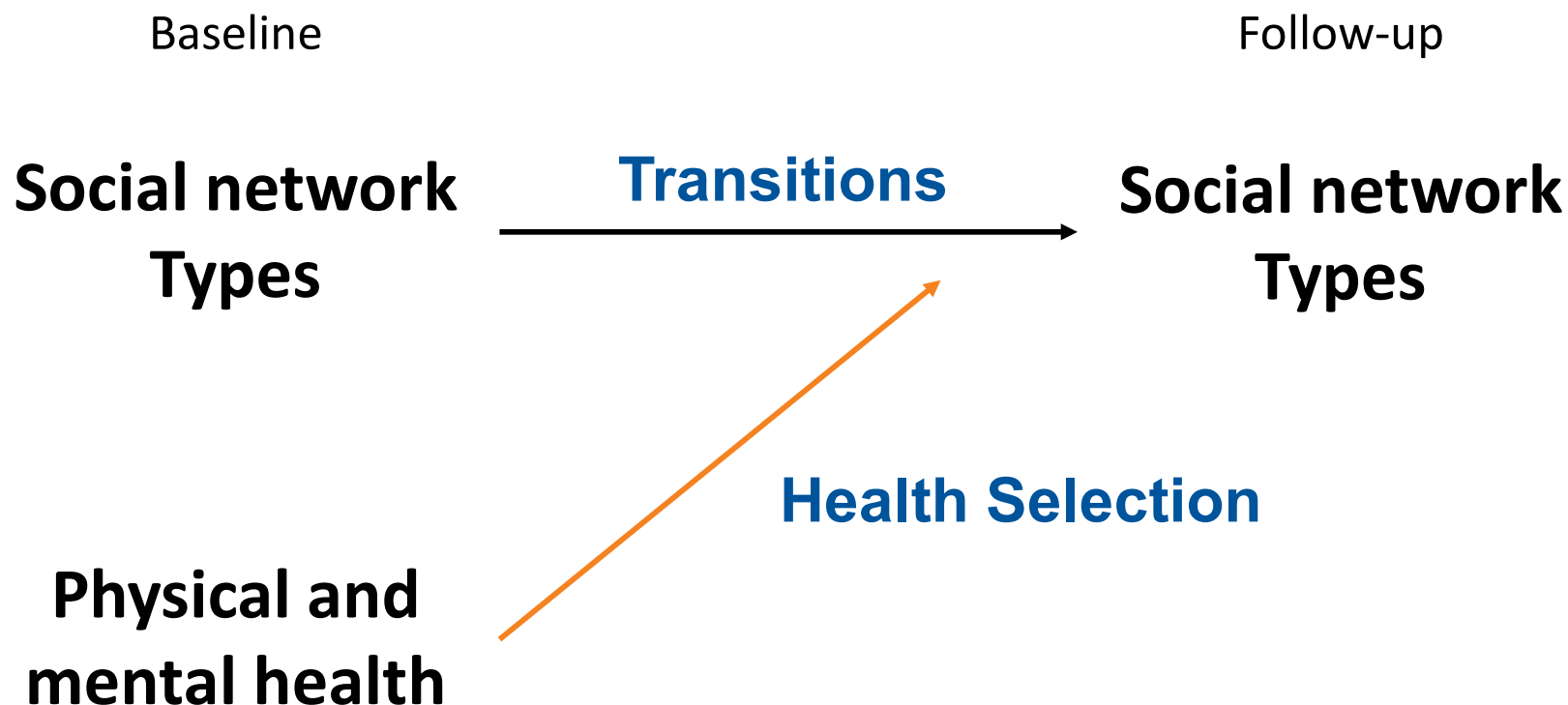# RQ3: Antecedents and Consequences of social network changes

Baseline

Follow-up

Social networks types/profiles

Social determinants of health

Physical and mental health

Physical health
Mental health
(All-cause) Mortality

RQ3: Antecedents and Consequences of social network changes

Baseline

Follow-up

Social networks types/profiles → **Transitions** → **Social networks types/profiles**

Physical and mental health → **Physical and mental health Mortality**

RQ3: Antecedents and Consequences of social network changes

Baseline

Follow-up

Social network Types → **Transitions** → **Social network Types**

Health Selection

Physical and mental health

Transitions in Social Network Types over Time among Older Adults

Pildoo Sung[a]   Rahul Malhotra[a, b]   Grand H.-L. Cheng[c]
Angelique Wei-Ming Chan[a, b]

[a]Centre for Ageing Research and Education, Duke-NUS Medical School, Singapore, Singapore;
[b]Health Services and Systems Research, Duke-NUS Medical School, Singapore, Singapore;
[c]School of Arts and Social Sciences, The Open University of Hong Kong, Hong Kong, Hong Kong SAR

https://www.karger.com/Article/FullText/521213

Transitions between social network profiles and their relation with all-cause mortality among older adults

Grand H.-L. Cheng [a, *], Pildoo Sung [b], Angelique Chan [b, c], Stefan Ma [d], Rahul Malhotra [b, c]

[a] School of Arts and Social Sciences, Hong Kong Metropolitan University, Hong Kong[1]
[b] Centre for Ageing Research and Education, Duke-NUS Medical School, Singapore
[c] Health Services and Systems Research, Duke-NUS Medical School, Singapore
[d] Epidemiology and Disease Control Division, Ministry of Health, Singapore

https://www.sciencedirect.com/science/article/pii/S0277953621009497?via%3Dihub

Sung, P., Malhotra, R., Cheng, G. H. L., & Chan, A. W. M. (2022). **Transitions in social network types over time among older adults.** *Gerontology, 68(7), 817-828. https://doi.org/10.1159/000521213*

This study investigated

1) **Distinct types of social networks** among older adults in Singapore, in 2016/7 (baseline) and 2019 (follow-up);

2) **Stability and change in social network types** between the two time points;

3) **The impact of health on changes in social network types**.
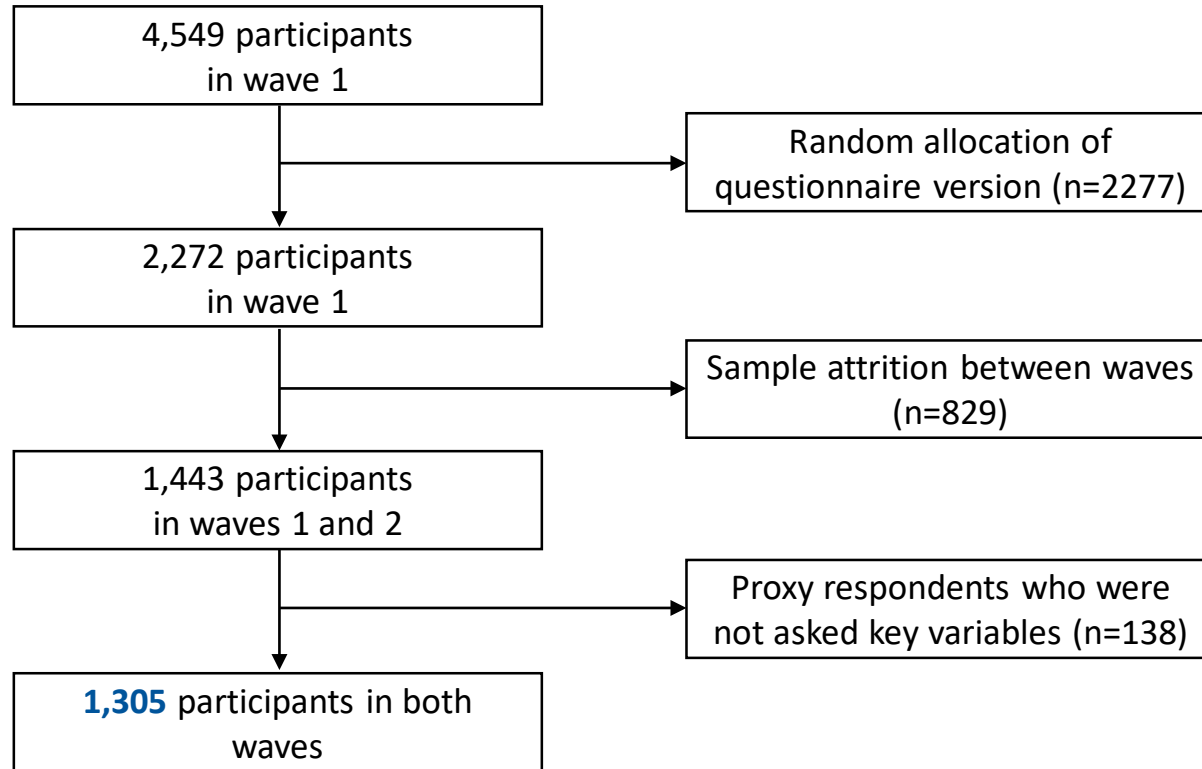
Flow chart of analytic samples

```
┌─────────────────────┐
│ 4,549 participants  │
│ in wave 1           │
└─────────────────────┘
          │              ┌──────────────────────────────┐
          │─────────────▶│ Random allocation of          │
          │              │ questionnaire version (n=2277)│
          ▼              └──────────────────────────────┘
┌─────────────────────┐
│ 2,272 participants  │
│ in wave 1           │
└─────────────────────┘
          │              ┌──────────────────────────────┐
          │─────────────▶│ Sample attrition between waves│
          │              │ (n=829)                       │
          ▼              └──────────────────────────────┘
┌─────────────────────┐
│ 1,443 participants  │
│ in waves 1 and 2    │
└─────────────────────┘
          │              ┌──────────────────────────────┐
          │─────────────▶│ Proxy respondents who were    │
          │              │ not asked key variables (n=138)│
          ▼              └──────────────────────────────┘
┌─────────────────────┐
│ 1,305 participants in both │
│ waves               │
└─────────────────────┘
```

- Data were from the two waves of a nationally representative longitudinal survey of community-dwelling older Singapore citizens and permanent residents (THE SIGNS Study) aged 60 years or above.

- The analytic sample consisted of 1,305 older adults who participated in both waves in 2016-2017 and 2019.
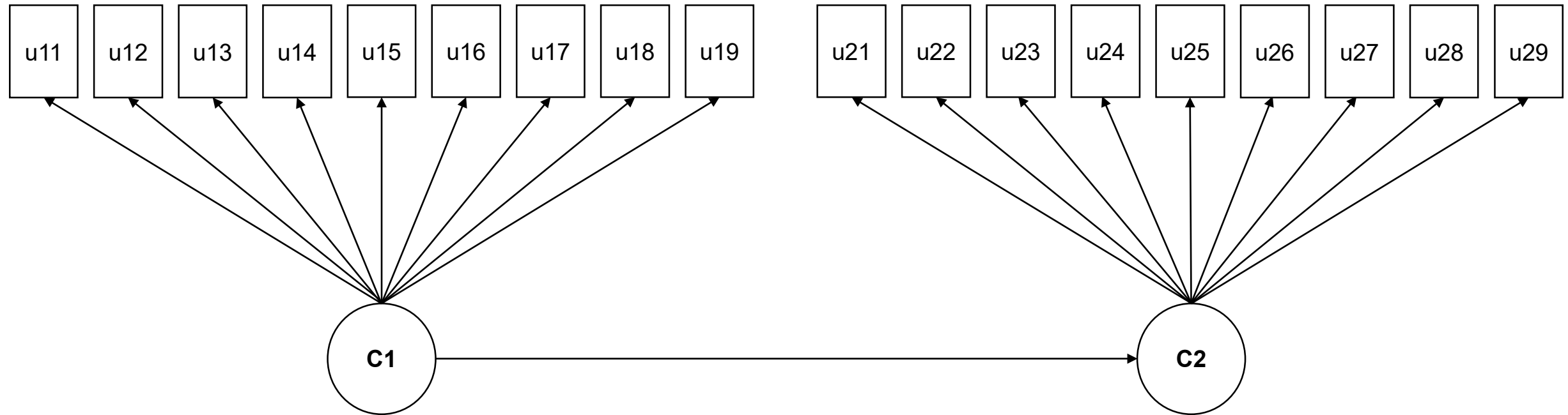
- **Nine social network indicators**:

  (1) live alone, (2) married, (3) have a living child,
  (4) have 3 or more relatives, (5) frequent contacts with relatives,
  (6) have 3 or more friends, (7) frequent contacts with friends,
  (8) attend community events, and (9) attend religious services weekly

- **Health status**: chronic conditions, functional difficulties (ADL+IADL), and depressive symptoms (CES-D)

- **Controls**: Age, gender, ethnicity, education, working status, housing type (a proxy for SES in Singapore)

- **Latent transition analysis (LTA)** explored social network types and their transition patterns over time

    1) Determine an optimal number of latent types at each wave using Latent Class Analysis (LCA)
    2) Compare LTA models with measurement invariance and non-invariance
    3) Select the final analytic model and estimate transition probabilities
    4) Assign individuals into the most likely transition patterns based on the highest posterior probabilities

- **Multinomial logistic regression** examines the impact of health on transitions, taking other control measures into account

Note. C1=Social network types at wave 1; C2= Social network types at wave 2;
u11-u19=Nine social network indicators at wave 1; u21-u29=Nine social network indicators at wave 2;
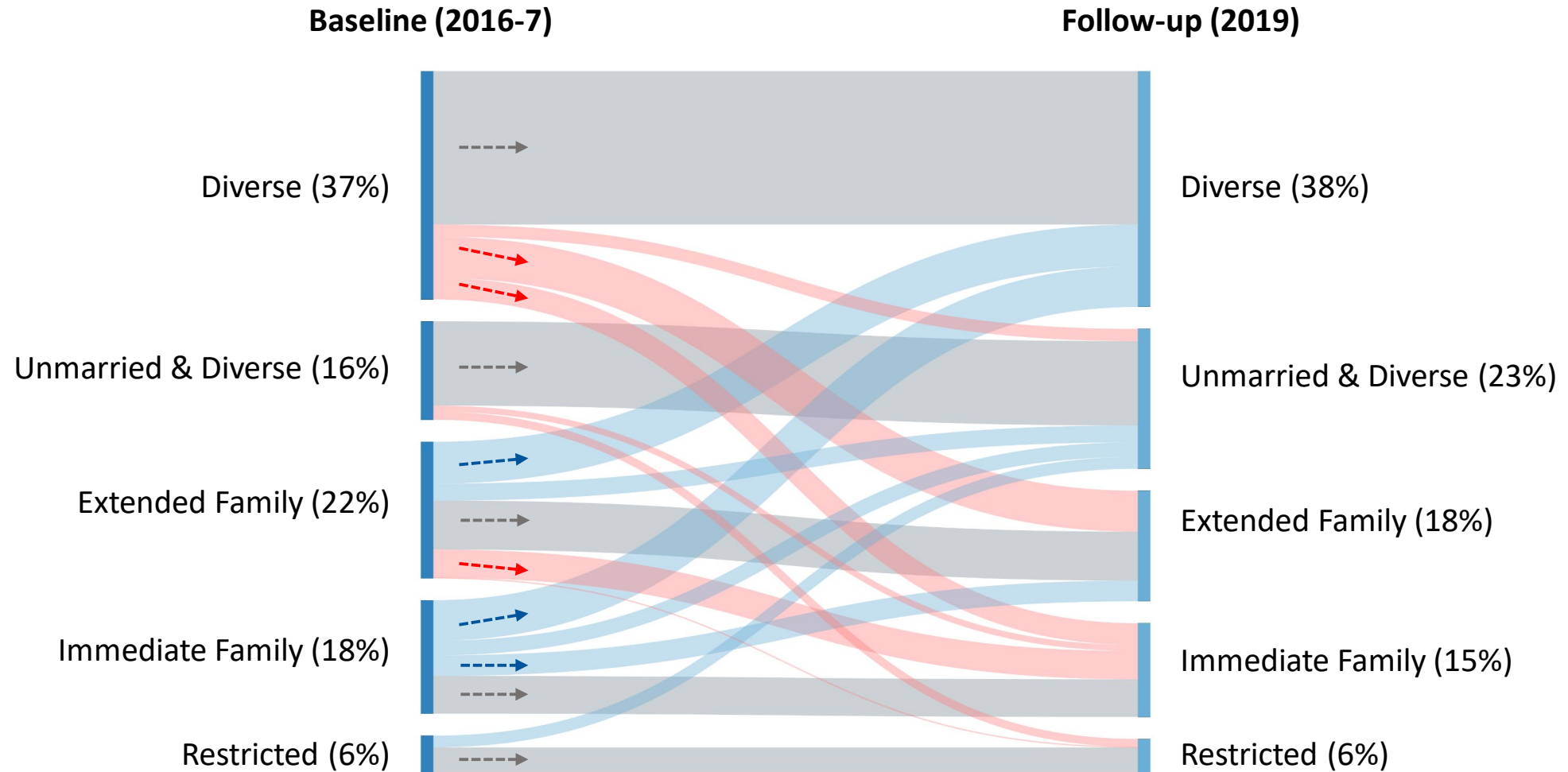
Five social network types
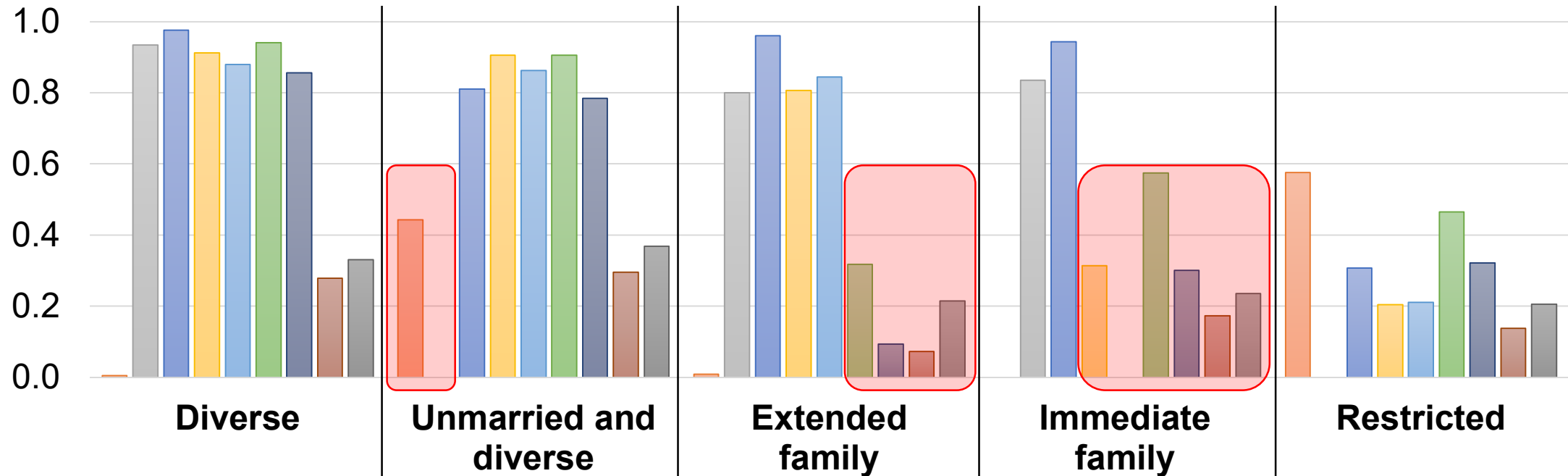
Legend:
- 1. Living alone
- 2. Married
- 3. Have one or more living children
- 4. Three or more relatives to contact
- 5. Frequent contact with relatives
- 6. Three or more friends to contact
- 7. Frequent contact with friends
- 8. Ever attend community events
- 9. Weekly attend religious services

Categories: Diverse, Unmarried and diverse, Extended family, Immediate family, Restricted

Transition between waves (2016/7 – 2019)

Baseline (2016-7)

Follow-up (2019)

Diverse (37%)

Diverse (38%)

Unmarried & Diverse (16%)

Unmarried & Diverse (23%)

Extended Family (22%)

Extended Family (18%)

Immediate Family (18%)

Immediate Family (15%)

Restricted (6%)

Restricted (6%)

57% retained; 19% contracted; 24% expanded

Health and transitions

	Model 1		Model 2	
	Network contraction: **Transition to less diverse types**		Network expansion: **Transition to more diverse types**	
	RR [a]	95% CI [b]	RR	95% CI
Change in health from baseline to follow-up				
Change in the number of chronic diseases	0.89	[0.76,1.03]	0.99	[0.87,1.14]
Change in the number of functional difficulties	**1.14***	[1.01,1.30]	1.05	[0.93,1.19]
Change in depressive symptoms	**1.09***	[1.04,1.15]	0.96	[0.90,1.02]
Health status at baseline				
Chronic conditions	1.00	[0.90,1.11]	1.05	[0.96,1.15]
Functional difficulties	0.91	[0.79,1.05]	1.06	[0.94,1.19]
Depressive symptoms	**1.07***	[1.01,1.14]	1.01	[0.95,1.07]

[a] RR: Risk Ratio; [b] CI: Confidence interval

Five social network types in Singapore

- Importance of extended family networks
- Emergence of the *unmarried and diverse* type

Transition in social network types

- About half changed their social network composition
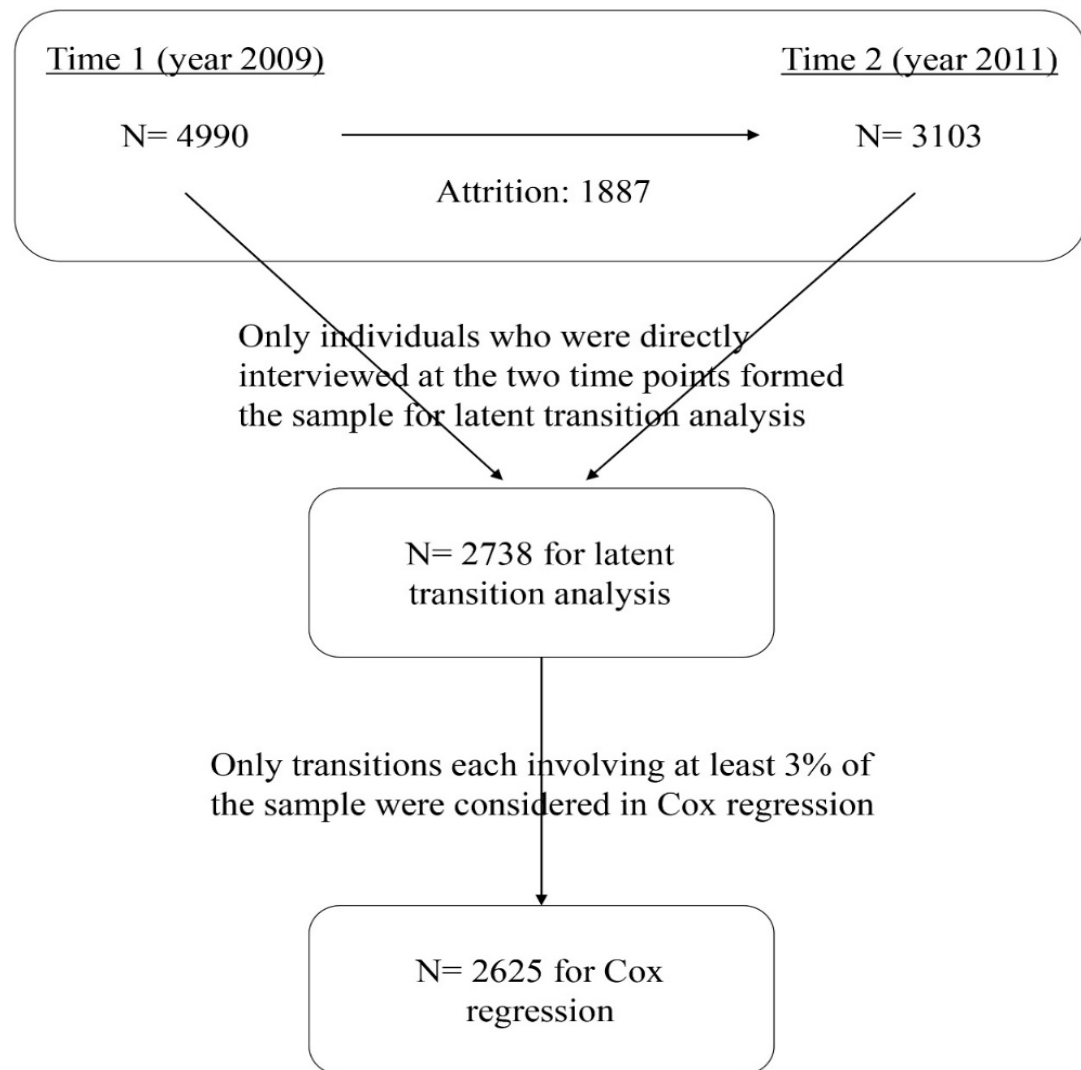- More people expanded their networks than contracted them

The impact of health on social network contraction

- Older adults with declining functional and mental health were more likely to contract their social networks over time

Cheng, G. H. L., Sung, P., Chan, A., Ma, S., & Malhotra, R. (2022). **Transitions between social network profiles and their relation with all-cause mortality among older adults**. *Social Science & Medicine, 292, 114617. https://doi.org/10.1016/j.socscimed.2021.114617*

This study aimed to

1) Identify distinct profiles of social networks among older adults in Singapore in 2009 and 2011;

2) Explore transitions in social network types between 2009 and 2011;

3) Examine the association of such transitions with subsequent mortality risk in 2015.

Time 1 (year 2009)   Time 2 (year 2011)
N= 4990   N= 3103
Attrition: 1887

Only individuals who were directly interviewed at the two time points formed the sample for latent transition analysis

N= 2738 for latent transition analysis

Only transitions each involving at least 3% of the sample were considered in Cox regression

N= 2625 for Cox regression

- Two waves of data from the Panel on Health and Ageing of Singaporean Elderly (PHASE), collected in 2009 and 2011.

- Mortality data for the PHASE participants in 2015 were obtained from the Singapore Registry of Births and Deaths

- **Nine social network indicators**:

  (1) Married, (2) has household members, (3) have 3 or more relatives,
  (4) frequent contacts with relatives, (5) have 3 or more friends,
  (6) frequent contacts with friends, (7) attend community organizations,
 (8) attend religious services weekly, (9) working

- **Mortality**: 328 (12.0%) older adults passed away in the approximately 4-year period from T2 to the end of 2015.

- **Controls**: Age, gender, ethnicity, education, housing type, 10 health variables (depression, cognition, ADL/IADL, Vision/hearing impairment, overall health, smoking, exercising)

- **Latent transition analysis (LTA)** explored social network profiles and their transition patterns between 2009 and 2011

- Individuals were then assigned into the most likely transition patterns based on the highest posterior probabilities

- **Adjusted Cox regression** associated the identified transitions with all-cause mortality risk over the following four years.

Six social network profiles from PHASE
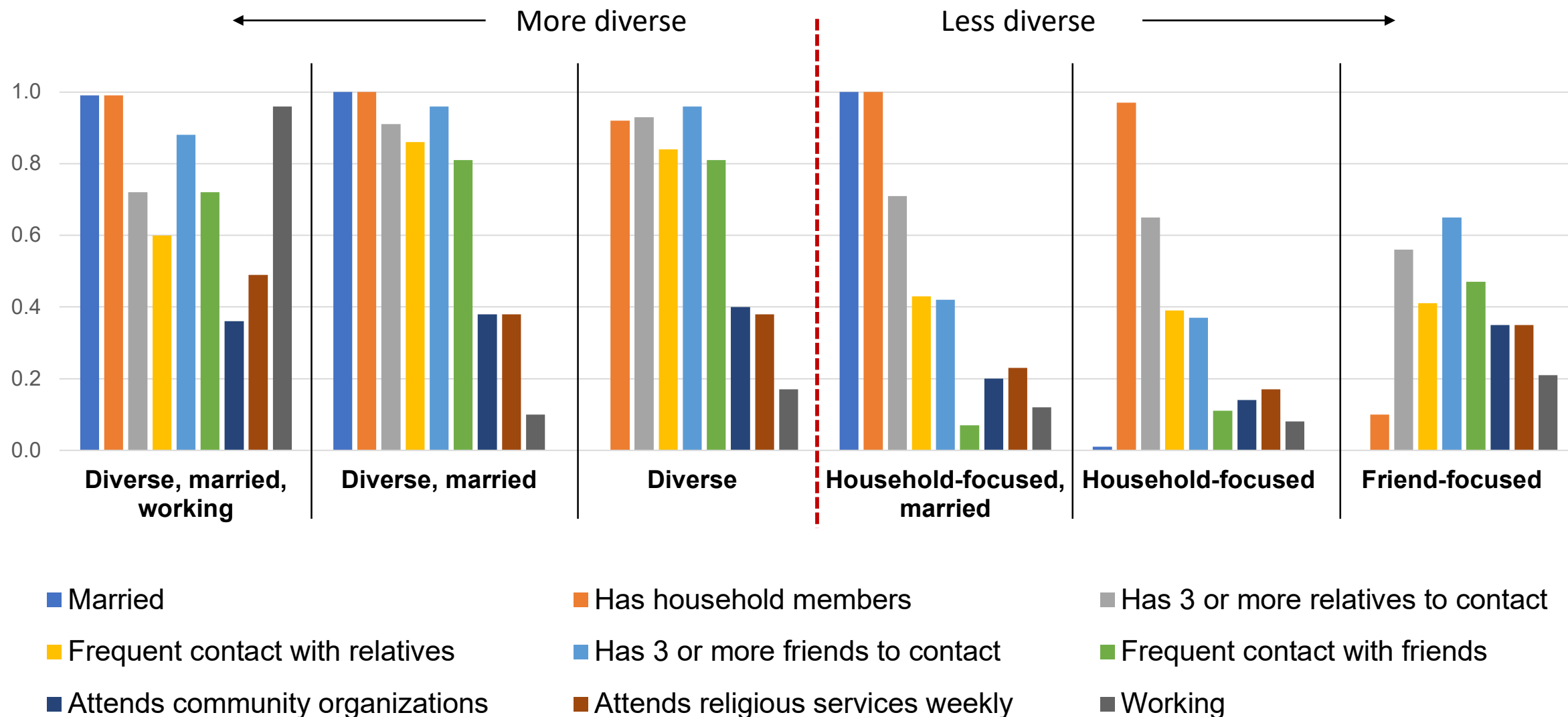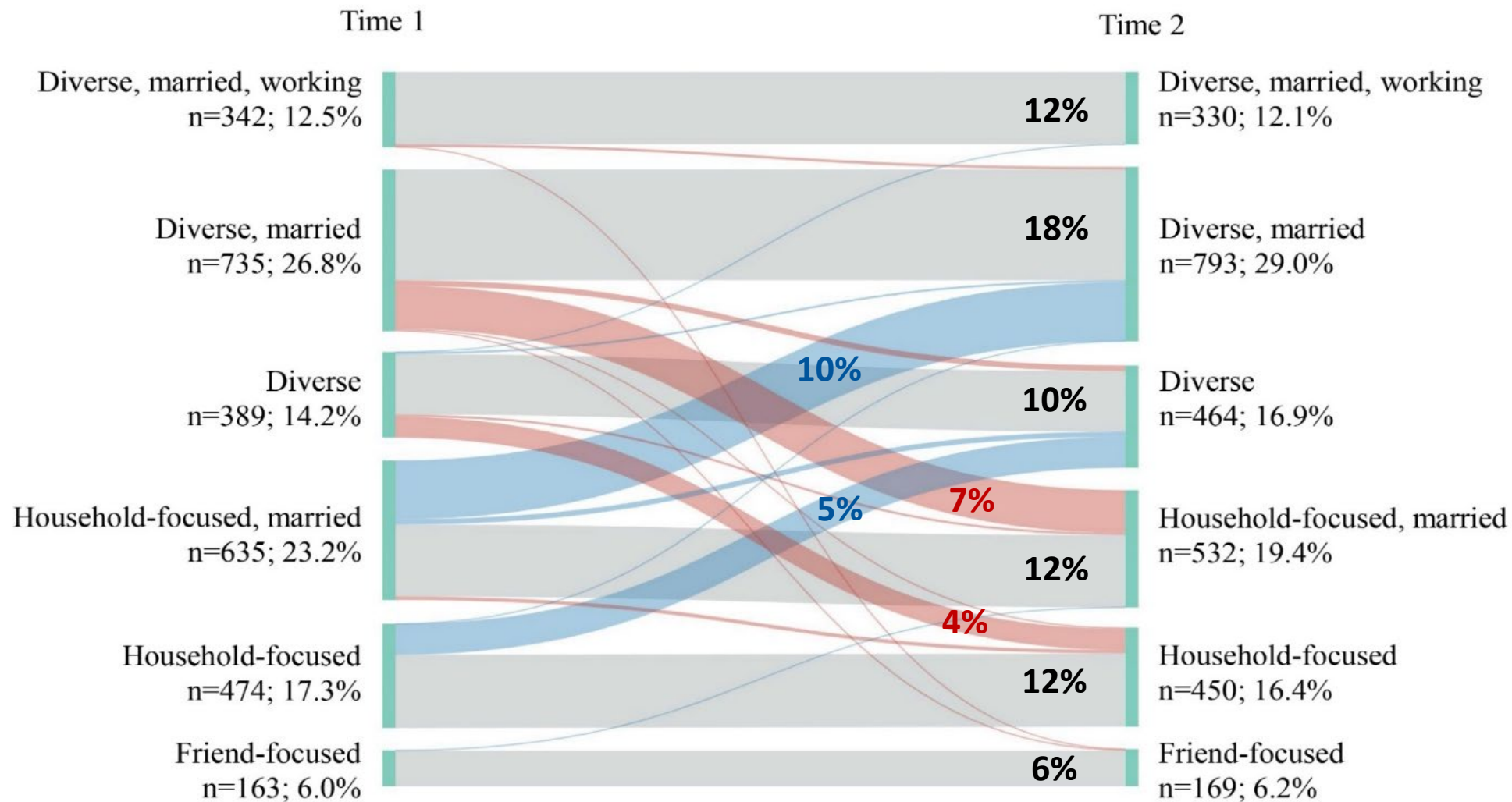
Transitions between social network profiles over time

From (Time 1)	To (Time 2)	Hazard ratio	CI$_{95}$
Sustain diversified interaction			
Diverse, married, working	**Diverse, married, working**	**Reference**	**Reference**
Diverse, married	Diverse, married	1.49	0.83 – 2.66
Diverse	Diverse	1.86	0.98 – 3.53
Sustain restricted interaction			
Household-focused, married	Household-focused, married	**2.13**	**1.20 – 3.77**
Household-focused	Household-focused	**1.87**	**1.01 – 3.46**
Friend-focused	Friend-focused	**2.05**	**1.04 – 4.02**
Shift from diversified interaction to restricted interaction			
Diverse, married	Household-focused, married	**2.13**	**1.13 – 4.05**
Diverse	Household-focused	**2.18**	**1.01 – 4.70**
Shift from restricted interaction to diversified interaction			
Household-focused, married	Diverse, married	**1.96**	**1.07 – 3.59**
Household-focused	Diverse	1.62	0.79 – 3.31

N=2625; CI: Confidence interval. Other covariates were adjusted for.

Six social network profiles

- Three relatively diverse, three relatively restricted profiles

Transitions in social network types

- About 30% of older adults changed their profiles
- More people expanded their networks than contracted them.

Social network transitions and all-cause mortality

- Retaining social network diversity: a relatively low mortality risks
- Retaining restricted social networks or transitioning from diverse to restricted: a relatively higher mortality risk
- Transitioning from *Household-focused, married* to *Diverse, married:* a high mortality risk

Policy implications and ongoing extensions

Helping older adults to maintain diverse social networks with immediate and extended family, friends, and acquaintances

- Provide helping hands to socially isolated older adults (about 6% in two studies)

- Provide befriending services by trained volunteers for at-risk older adults

- Promote older adults' digital access and literacy

Elderly people may feel lonely, isolated even while living with family: Study

The study found that 6 per cent of the seniors were socially disconnected. ST PHOTO: GIN TAY

27 AUG 2021

"The research defined participants who are socially disconnected as those who responded in the lowest 10 per cent of a scale of perceived social support, and who spent less than one hour a week in groups of more than three with people outside of their family.

It found that **6 per cent of the seniors were socially disconnected**."

Barrenetxea, J., Yang, Y., Pan, A., Feng, Q., & Koh, W. P. (2022). Social Disconnection and Living Arrangements among Older Adults: The Singapore Chinese Health Study. *Gerontology, 68(3), 330-338.*

Help older adults to engage in economic and social activities

- Continued incentives provided to older adults and their (extended) family members to live nearby

- further extension of the retirement age, and

- promoting productive social engagement such as volunteerism and lifelong learning

Social isolation and loneliness can be reduced through:

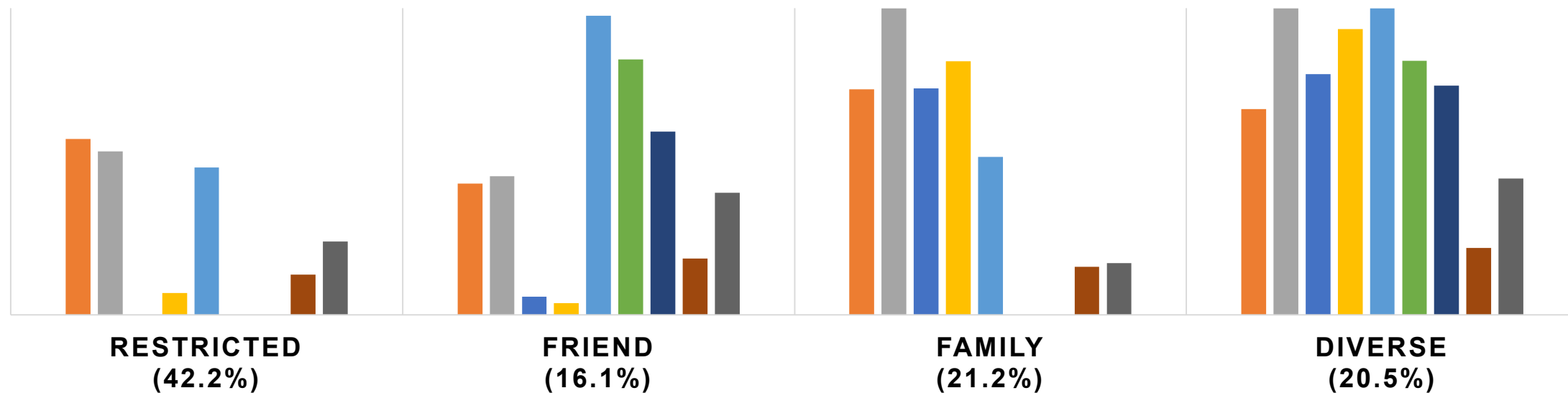- Face-to-face or digital contact
- Promoting age-friendly environments
- Laws and policies that foster social connections

Social Isolation and Loneliness (who.int)

- **Social network types and their transitions among caregivers**

  – Is social network composition among caregivers similar to that of older adults?

- **Social connectedness (objective) and loneliness (subjective) combined**

  – How are loneliness and social networks combined in shaping social isolation profiles?

  – How do social isolation profiles change over time among older Singaporeans?

# Caregiver social network types and mental health: the mediating role of psychological resilience

(Presented in KSA 2022; Manuscript under review)

DukeNUS Medical School | Centre for Ageing Research & Education

RESTRICTED (42.2%)

FRIEND (16.1%)

FAMILY (21.2%)

DIVERSE (20.5%)

- Married
- 3+ Relatives to talk about private matter
- 3+ Friends to contact
- 3+ Friends to call on for help
- Religious service attendance, weekly

- 3+ Relatives to contact
- 3+ Relatives to call on for help
- 3+ Friends to talk about private matter
- Community engagement, monthly

Psychological resilience

0.21**   -0.33***

**Diverse social network type
(versus restricted type)**   **Depressive symptoms**
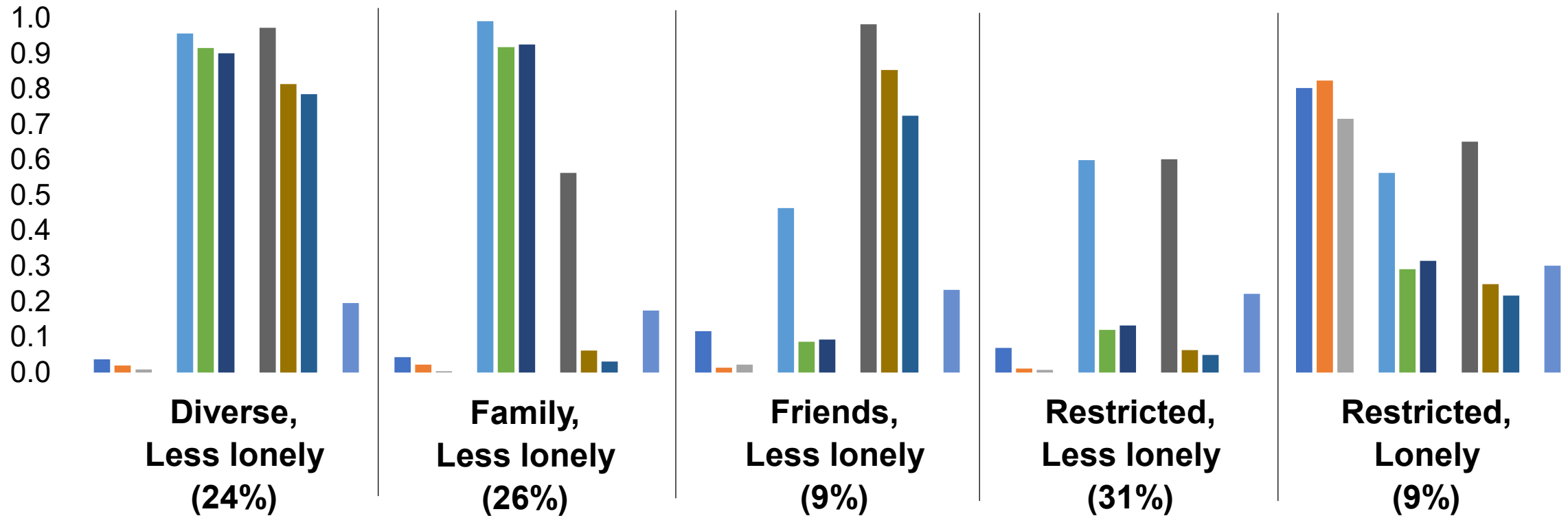
-0.11
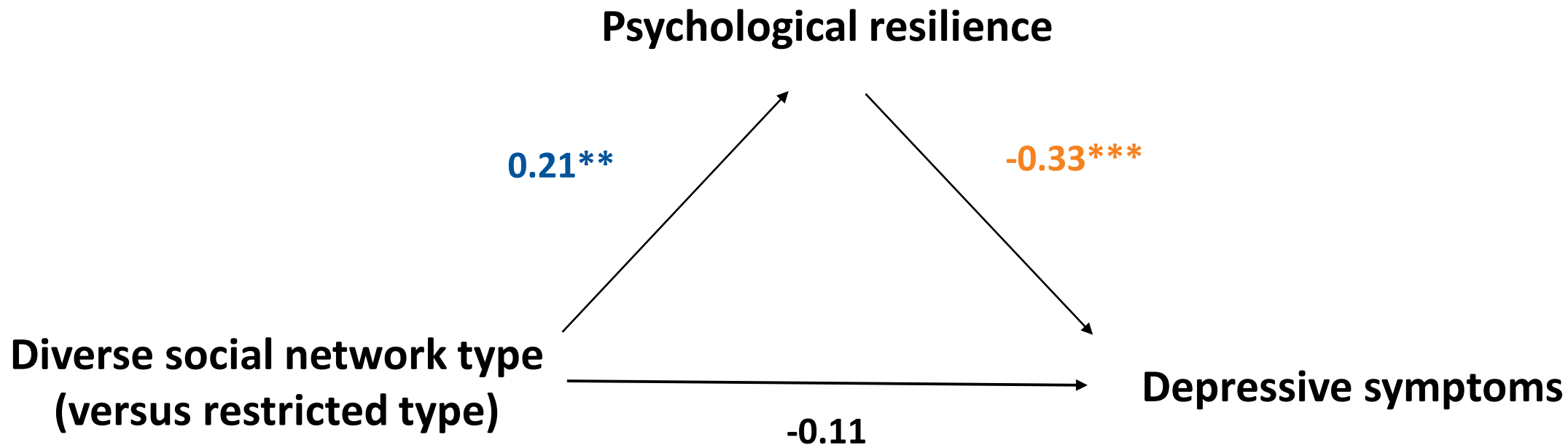
- A diverse social networks type is associated with lower depressive symptoms through increased psychological resilience.

Stability and change in social isolation profiles over time among older adults

(Presented in IARU 2022; Manuscript in preparation)

Transition in social isolation profiles over time

Wave 1 (2016-7)

Diverse, less lonely
(N=319; 24.4%)

Family, less lonely
(N=336; 25.8%)

Friends, less lonely
(N=121; 9.3%)

Restricted, less lonely
(N=406; 31.1%)

Restricted, lonely
(N=123; 9.4%)

Wave 2 (2019)

Diverse, less lonely
(N=302; 23.1%)

Family, less lonely
(N=256; 19.6%)

Friends, less lonely
(N=80; 6.1%)

Restricted, less lonely
(N=540; 41.4%)

Restricted, lonely
(N=127; 9.7%)
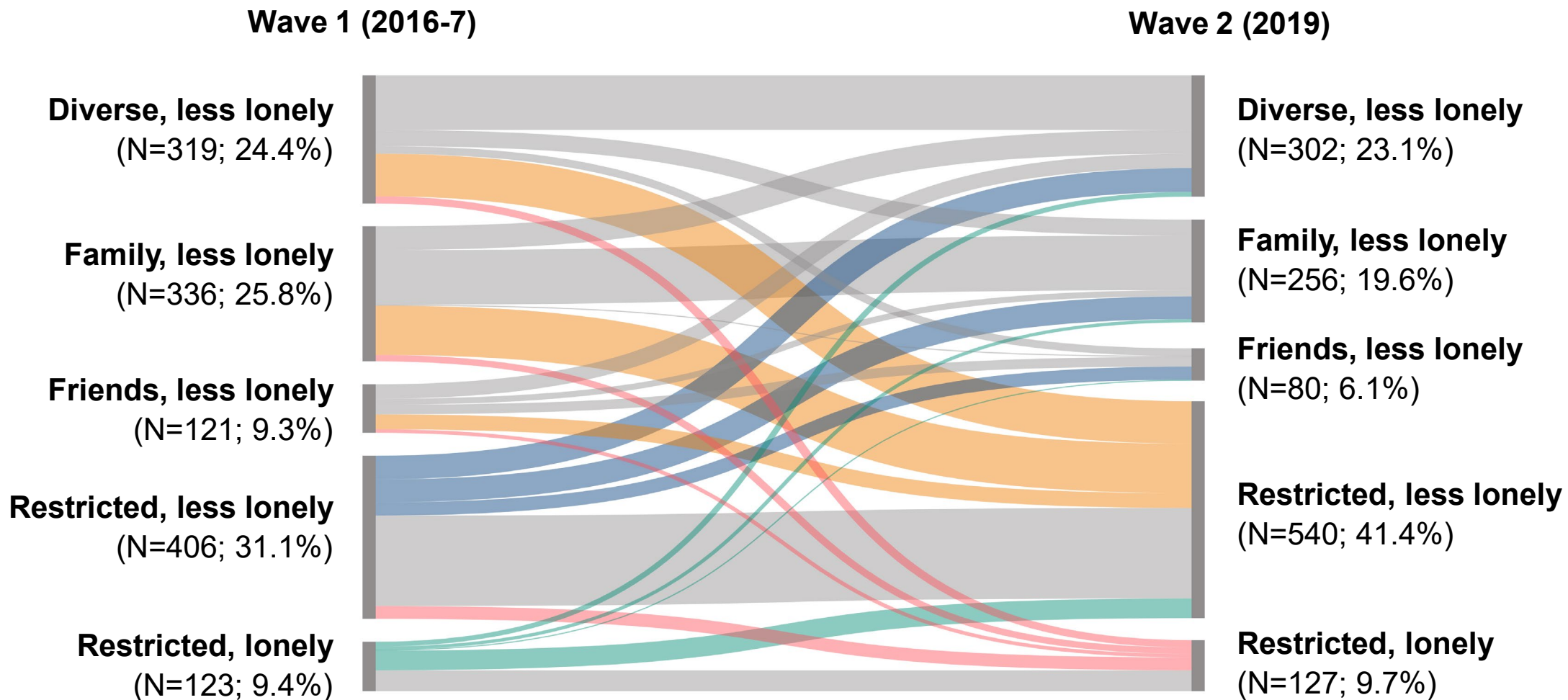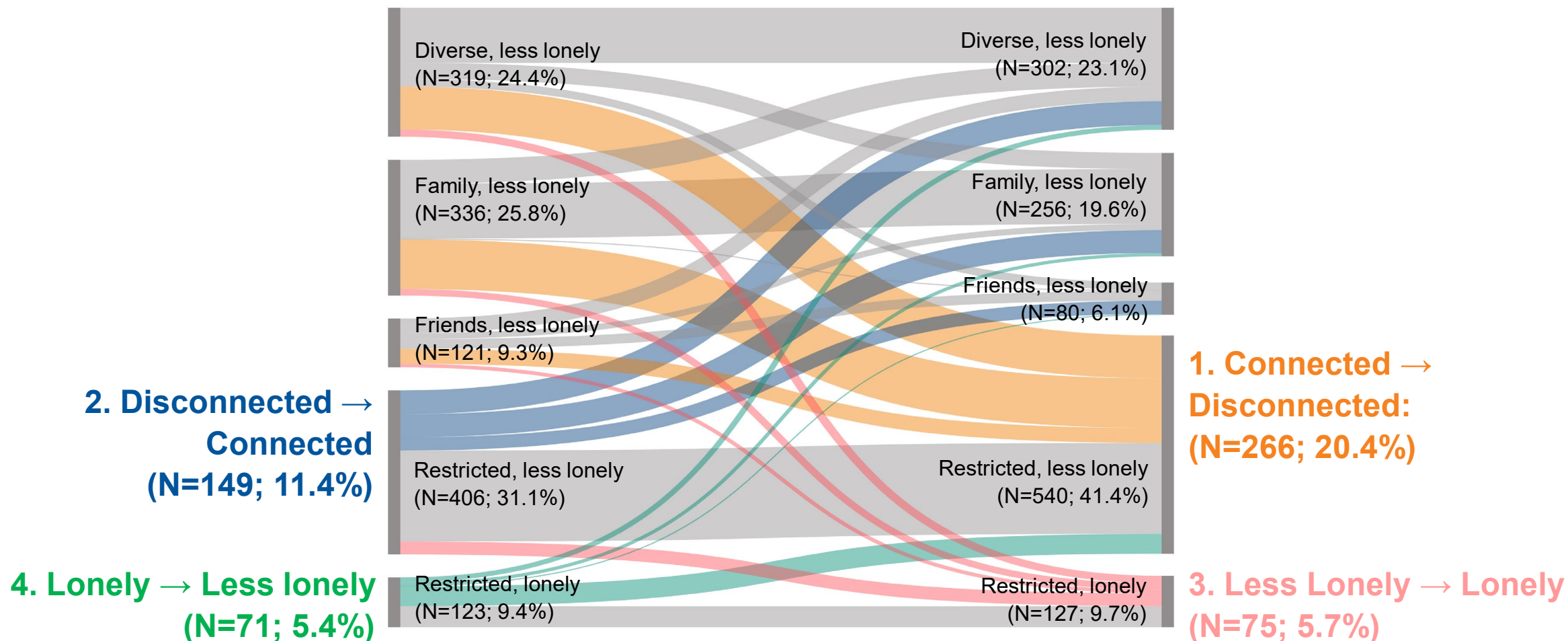
44% retained; 56% transitioned

Transition in social isolation profiles over time

- Importance of social networks in later life

- Heterogeneity in social network composition among older Singaporeans

- Stability and change in social network types over time

- Change in social network types and health antecedents/consequences

- Some policy implications

- Extension to caregivers and loneliness

Funding Acknowledgment

PHASE: Waves 1, 2, and 3 of the Panel on Health and Aging of Singaporean Elderly (PHASE) were funded or supported by the following sources: Ministry of Social and Family Development, Singapore; Singapore Ministry of Health's National Medical Research Council (NMRC) under its Singapore Translational Research Investigator Award (STAR) "Establishing a Practical and Theoretical Foundation for Comprehensive and Integrated Community, Policy and Academic Efforts to Improve Dementia Care in Singapore" (NMRC-STAR-0005-2009), and its Clinician Scientist—Individual Research Grant - New Investigator Grant "Singapore Assessment for Frailty in Elderly-Building upon the Panel on Health and Aging of Singaporean Elderly" (NMRC-CNIG-1124-2014); and Duke-NUS Geriatric Research Fund.

THE SIGNS Study: Transitions in Health, Employment, Social engagement and Inter-Generational transfers in Singapore Study (THE SIGNS Study) – I and II were supported by Singapore's Ministry of Health (MOH) under the agreement number MOH-NUS RL2015-053.

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