

Achievement Gaps Before School in Singapore: Family SES, Parenting and Young Children's Delay of Gratification

Wei-Jun Jean Yeung and Chen Xuejiao

Centre of Family and Population Research (CFPR)

National University of Singapore

Contact us at: ariywj@nus.edu.sg, fascx@nus.edu.sg



Importance of Early Childhood Development

- Child development in the first few years of life is characterized as **rapid development**, great **susceptibility** and **malleability**.
- Development during early childhood has **a long-lasting influence** on children's life chances in their adulthood (Duncan, et al., 1998; Piek, Dawson, Smith, & Gasson, 2008; Yoshikawa, 1995).
- There are great **individual differences** in cognitive development among preschool children due to various **social and family factors** (Duncan et al., 1998; Yeung et al., 2002).

Objectives and research questions

- How large are children's achievement gaps before they start formal schooling?
- What are the factors that contribute to these gaps in early cognitive development?

Singapore context of intergenerational roots of achievement gap

- Singapore is a **culturally** (multi-racial) **and socioeconomically diverse society** (wealthy with an increasing income inequality) .
- Singaporeans have **high value in education and family** (Seng, 1994; Tan and Yates, 2011, Göransson's, 2015)
- Children grow up poor are more likely to be low achievers than their better-off counterparts. It may form a vicious cycle of the **intergenerational transmission of disadvantages**.

Mediating mechanisms of family SES on child development

family investment model

- parental material and non-material investment

family stress model

- The caregiver's depressive affect, parenting style

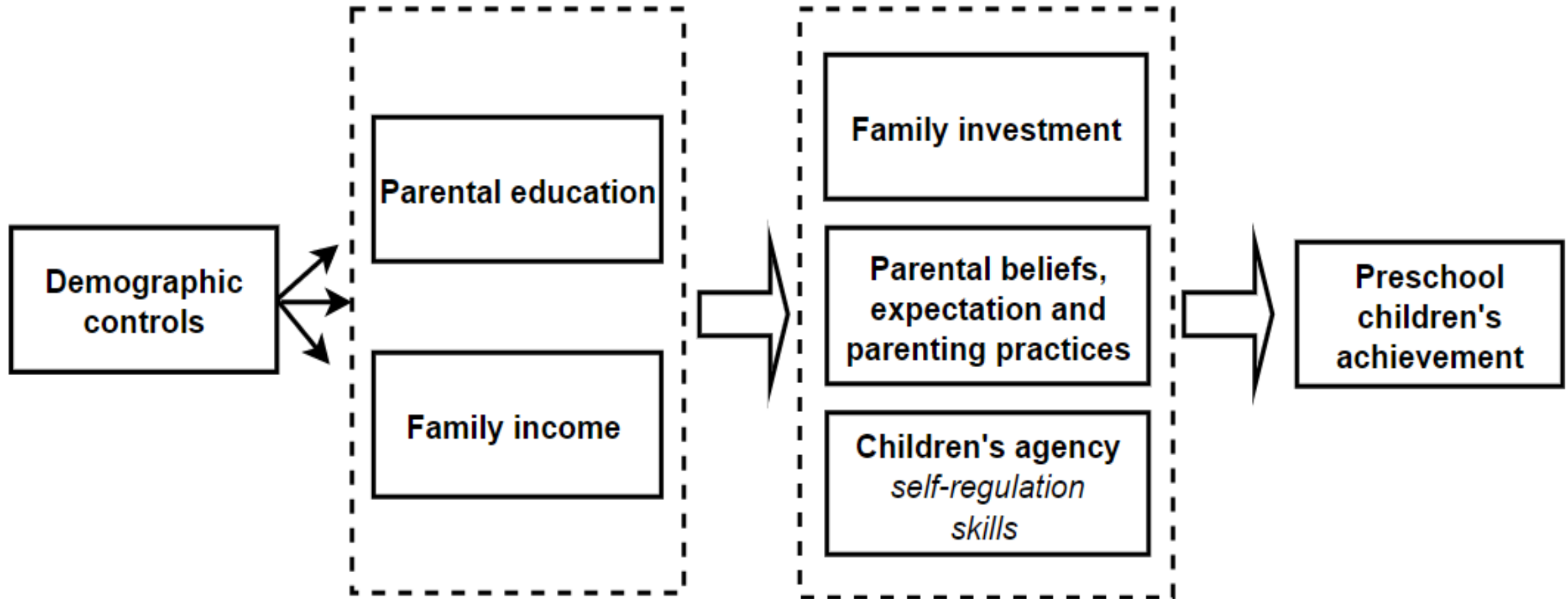
parental beliefs and expectations

- E.g., parental values and educational aspirations on their children

Gaps in the literature

- young children are usually regarded as passive recipients of environmental influences.
- The associations between parental beliefs, parenting behavior, and, subsequently, children's agency, have not been well examined.
- insufficient attention on Asian context such as Singapore.

Conceptual Framework of this study





Singapore Longitudinal **EARly** Development Study

PRINCIPAL INVESTIGATOR:
Professor Wei-Jun Jean Yeung
Department of Sociology
National University of Singapore

FUNDED BY:
Ministry of Education Social Science Research Thematic Grant
(MOE 2016 – SSRTG – 044)

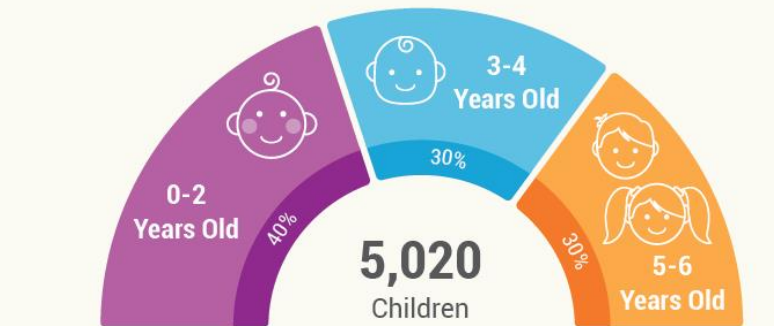
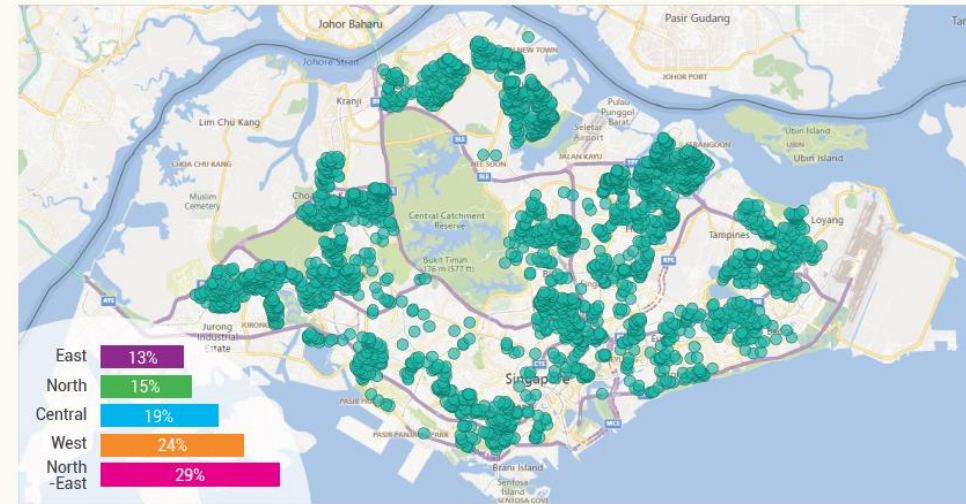
HOUSED BY:
Centre for Family and Population Research
Faculty of Arts and Social Sciences
National University of Singapore

Wave I: 2018-19

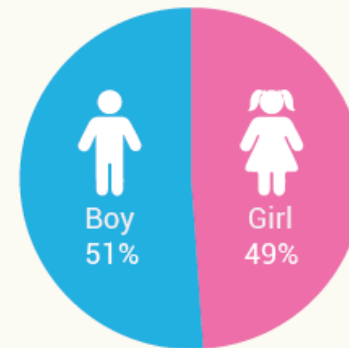
For more information : <https://fass.nus.edu.sg/cfpr/sgleads/>

WHO ARE THE SG LEADS FAMILIES?

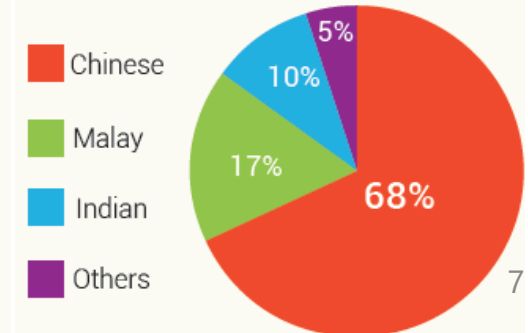
A nationally representative sample of **5,020** Singaporean children under 7 in **3,484** households across the island.



Child's Gender



Child's Race



Data and sample



Singapore Longitudinal EARly Development Study

- First nationally representative sample of families with children aged 0-6 in Singapore.
- The survey adopted a multi-stage stratified probability sampling and oversampled low-income groups.
- Face-to-face in-home interviews with the child's primary caregiver (mostly the mother) were conducted.
- **Analytic Sample: SG LEADS wave 1 children aged 3 to 6 (N=2,951).**
- Sampling weights are used to adjust the selection probability.

Measures

Dependent variables

Children's achievement is measured by an international standardized test: **Woodcock-Johnson Test of Achievement IV (WJ-ACH IV)**.

- **Applied problems z-score** (SG-Normed)
- **Letter-word identification z-score** (SG-Normed)

Independent variables

- **log transformed total family income**
- **parental education** (the highest educational level of biological/adoptive father and mother).

Mediators

Family investment

- Economic pressure (Can't make ends meet at the end of the month)
- physical home environment (e.g., clean, crowded)
- have savings for children's education (1=yes)
- children have access to computer (1=yes)
- Shared activities (e.g., shared book-reading, library visits)

Parental beliefs, aspirations, and parenting practices

- value of children (score of emotional value (e.g., bring love and companionship), minus score of instrumental value (e.g., old-age security))
- primary caregiver's educational expectation on their children
- rule settings on children's homework and afterschool activities

Children's Delay of gratification

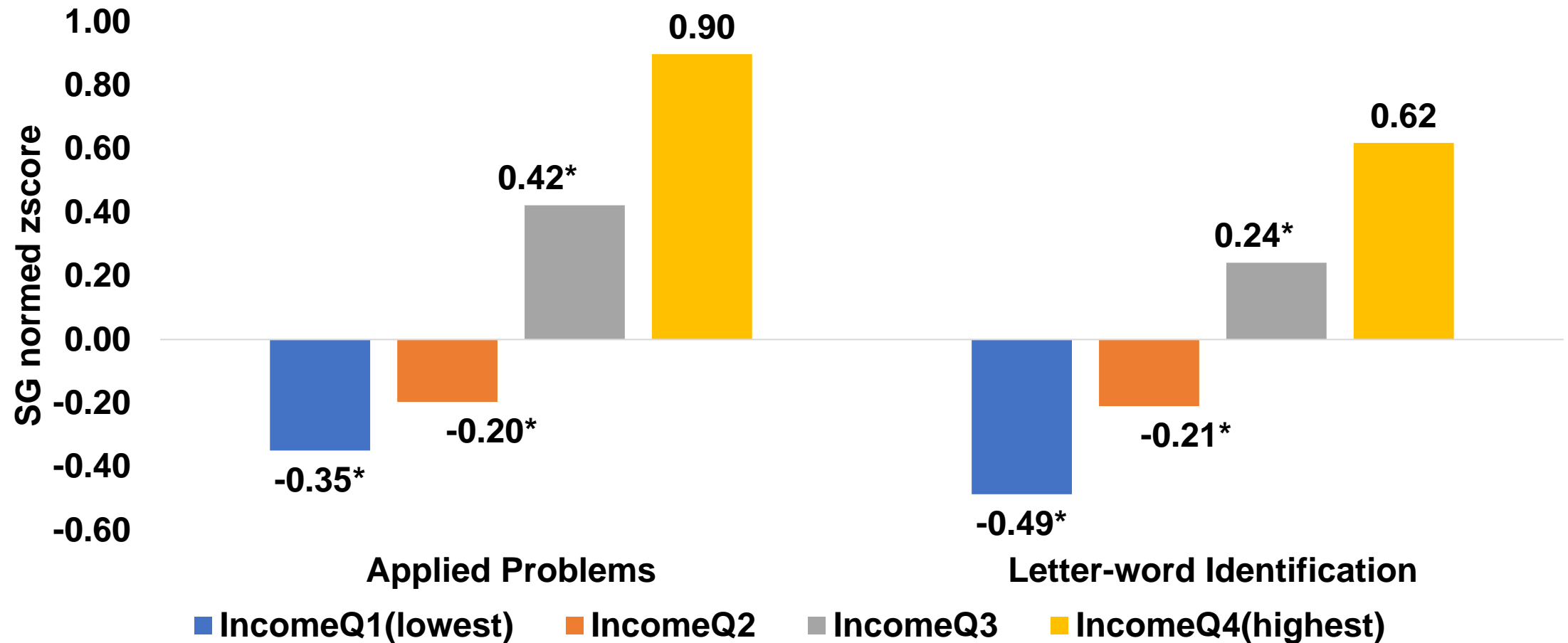
- 9 test-trials adopted from Prencipe and Zelazo's (2005) delay of gratification choice paradigm
- Children choose between getting a small reward immediately (0 score) and getting a large reward later at the end of the game (1 score)

Analytical strategy

We used structural equation modeling (**SEM**) with the **full information maximum-likelihood (FIML)** method.

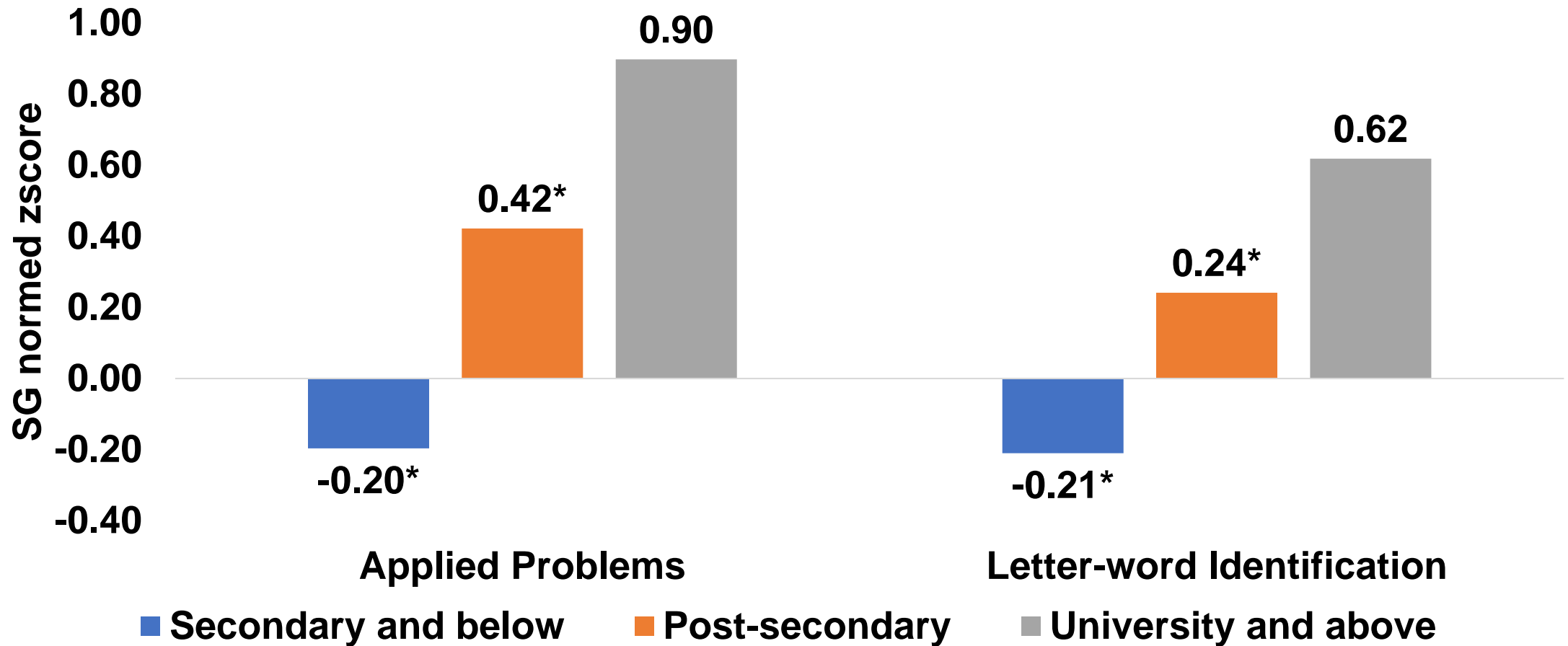
We applied **clustered standard errors** to account for the unobserved household effect for households with more than one child participated in this study.

Achievement gap by family income



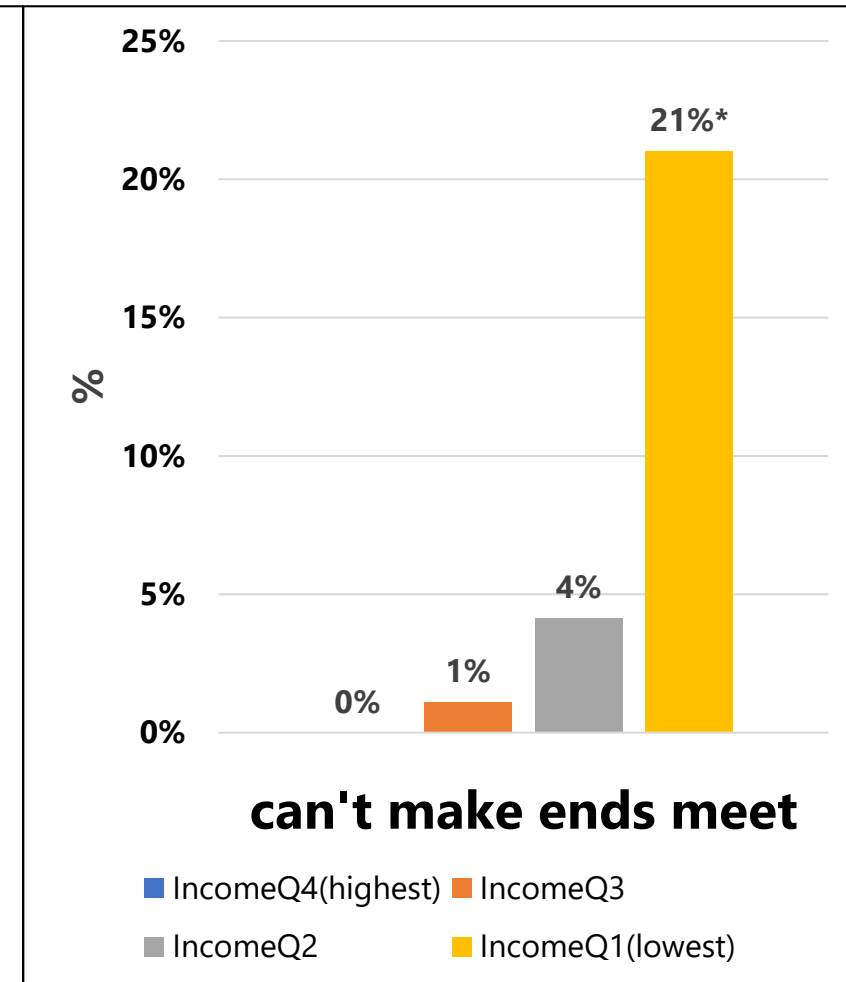
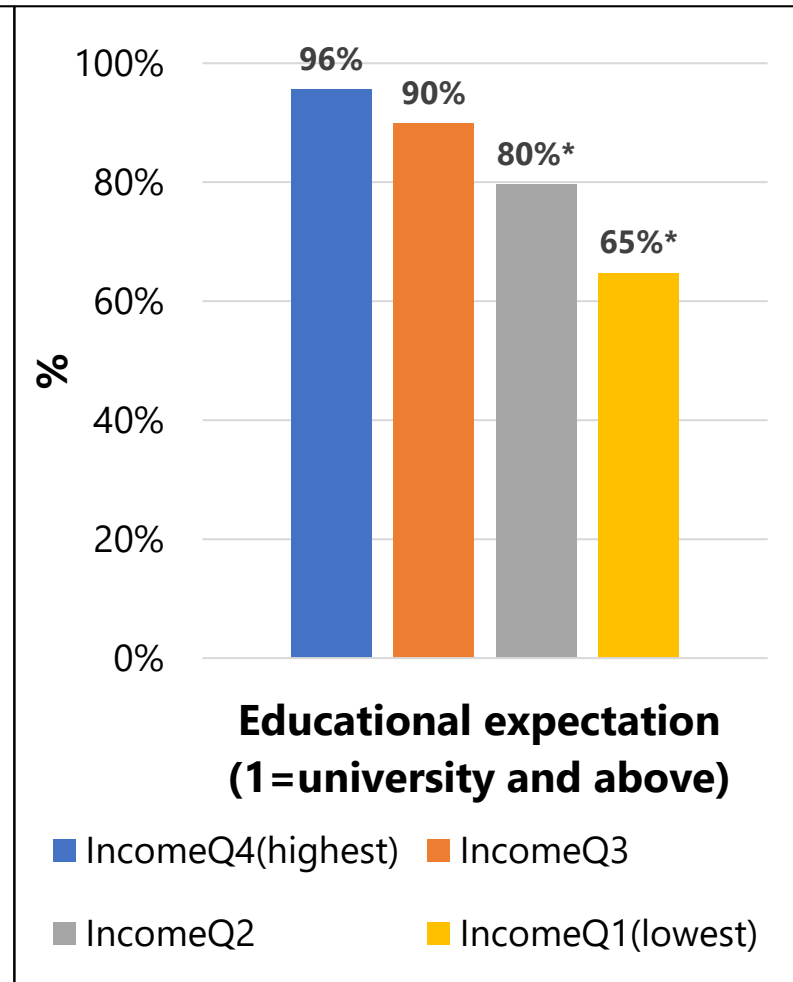
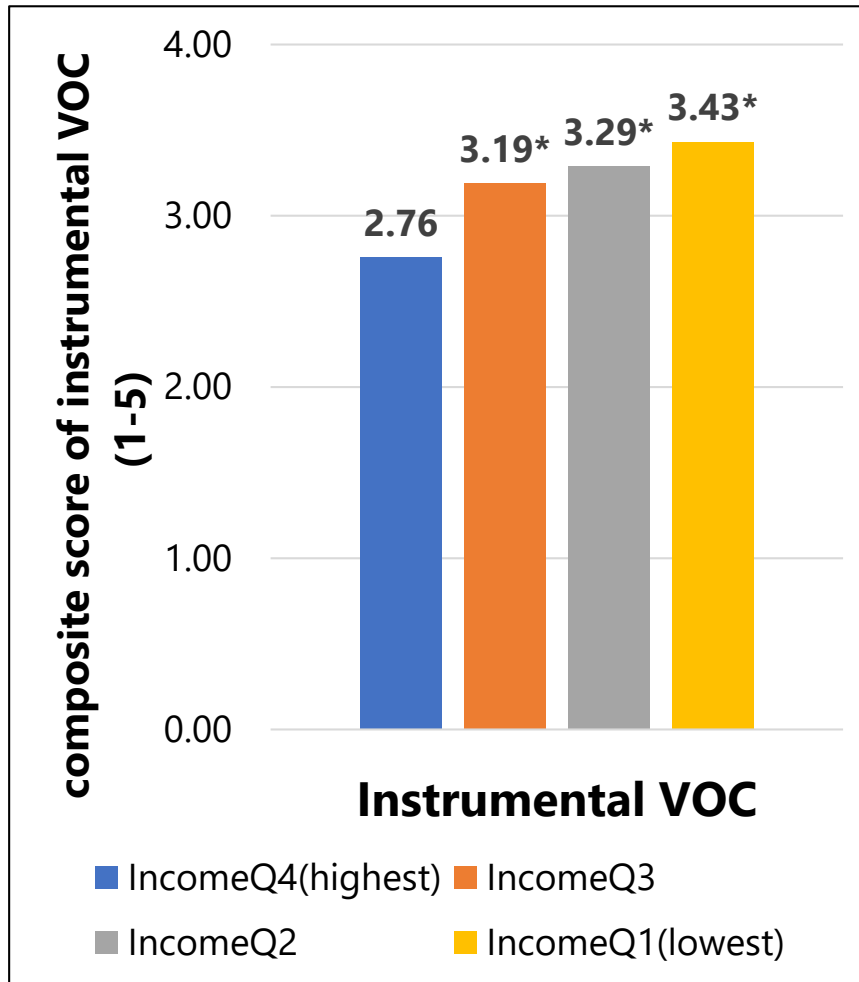
*Denotes the difference between that group and incomeQ4 is statistically significant. Group difference presented here do not control for other variables.

Achievement gap by parental education

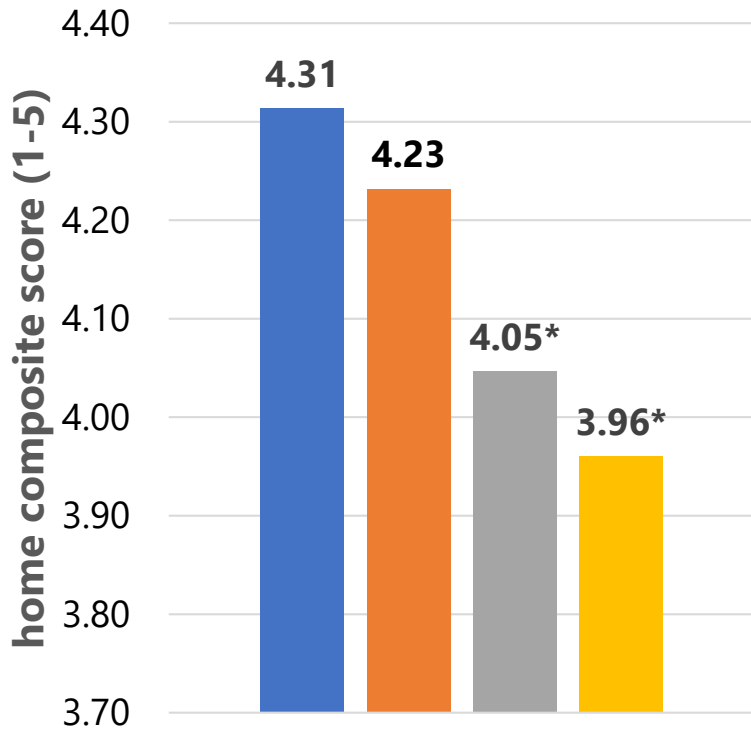


*Denotes the difference between that group and University and above is statistically significant. Group difference presented here do not control for other variables.

Variation by family income for selected mediators

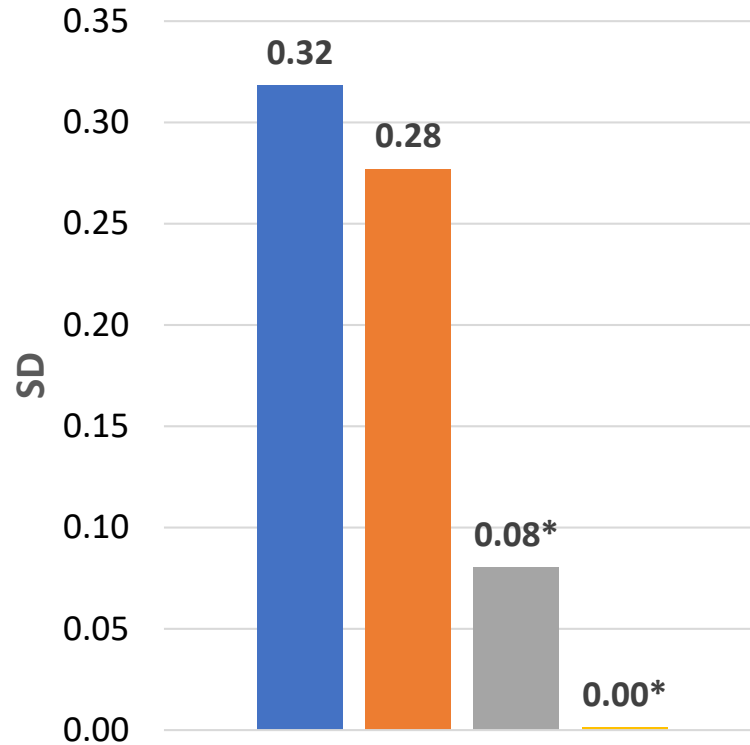


Variation by family income for selected mediators



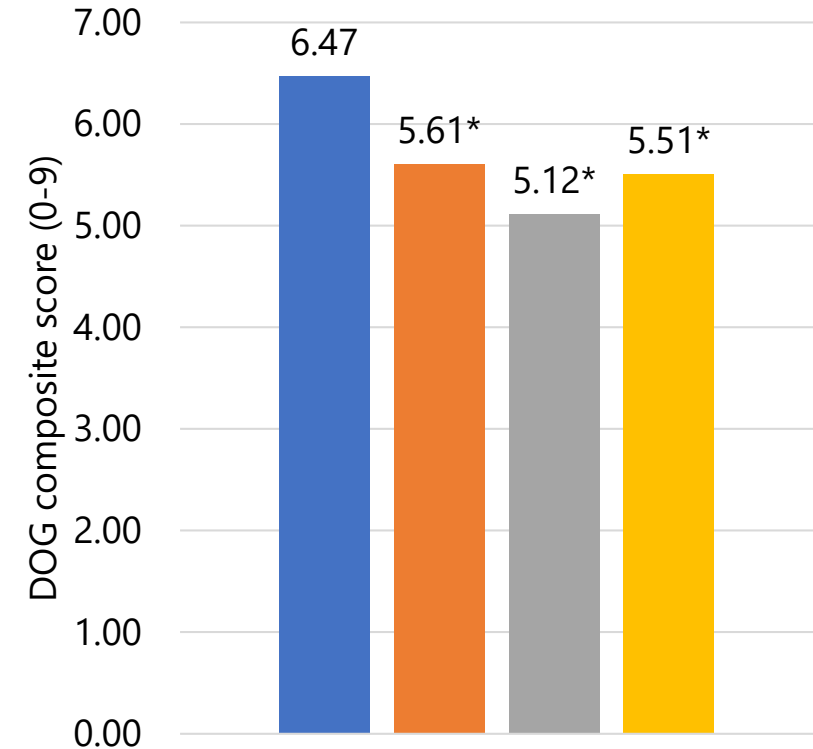
Home environment

■ IncomeQ4(highest) ■ IncomeQ3
■ IncomeQ2 ■ IncomeQ1(lowest)



Shared activities (zscore)

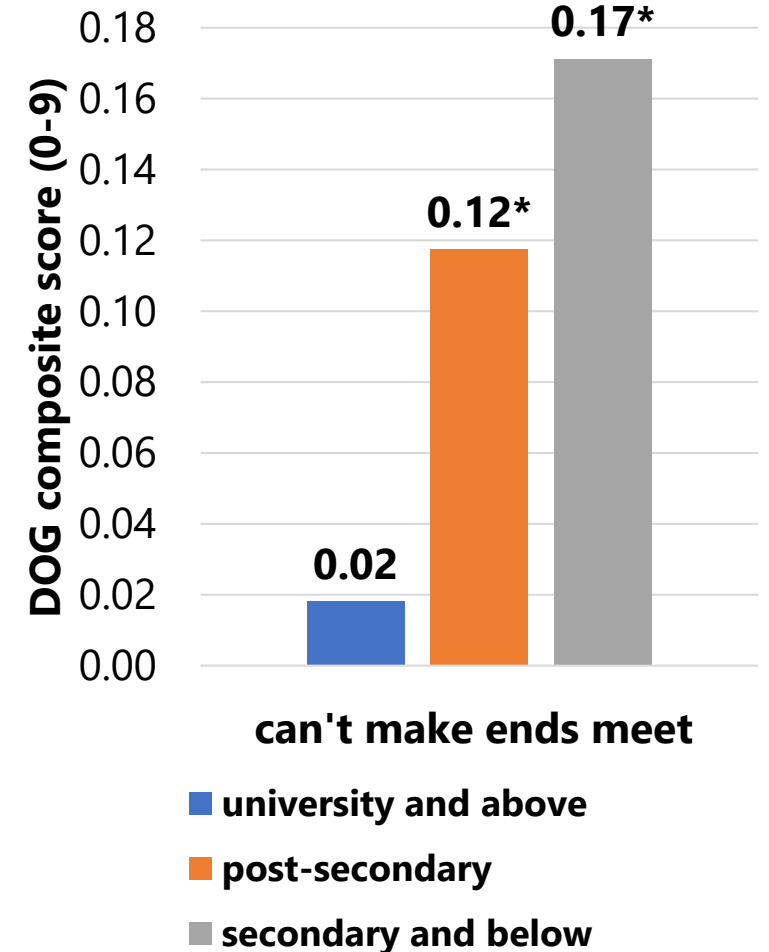
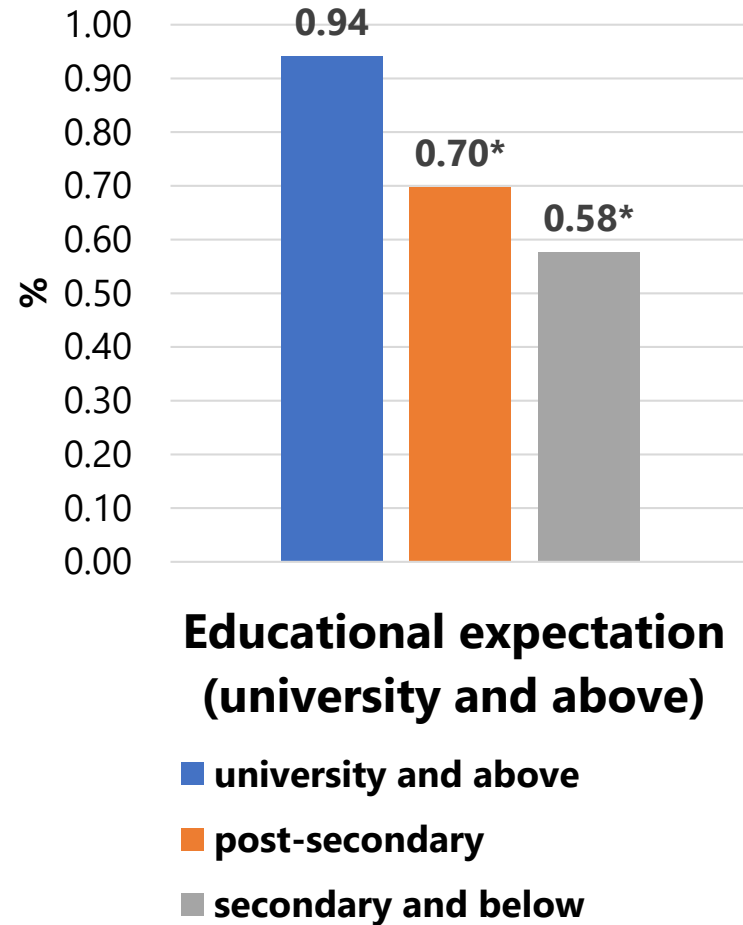
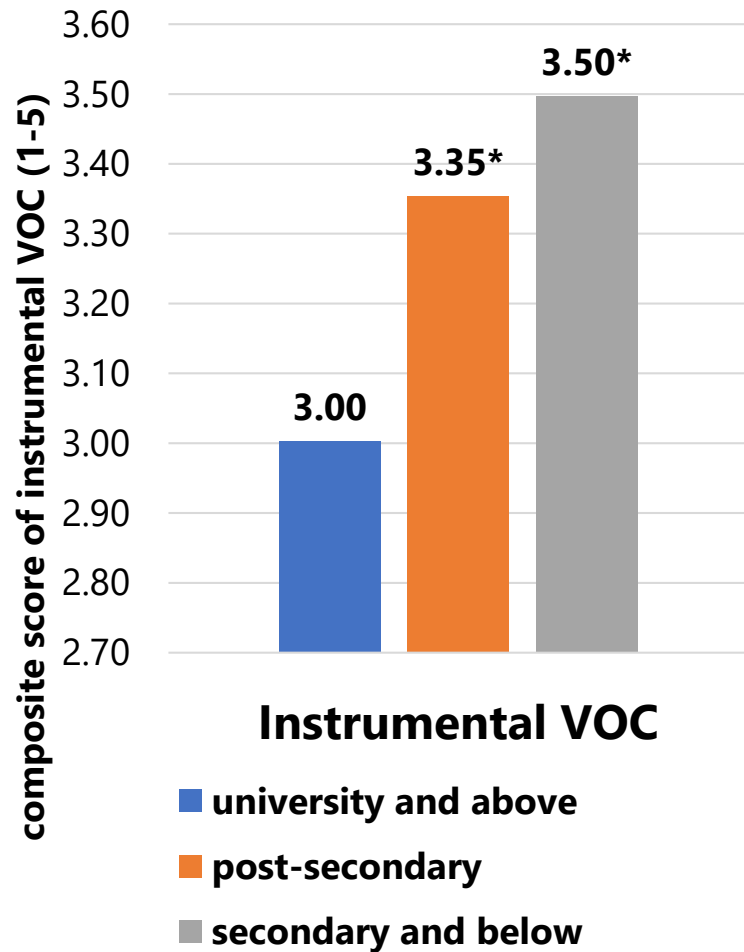
■ IncomeQ4(highest) ■ IncomeQ3
■ IncomeQ2 ■ IncomeQ1(lowest)



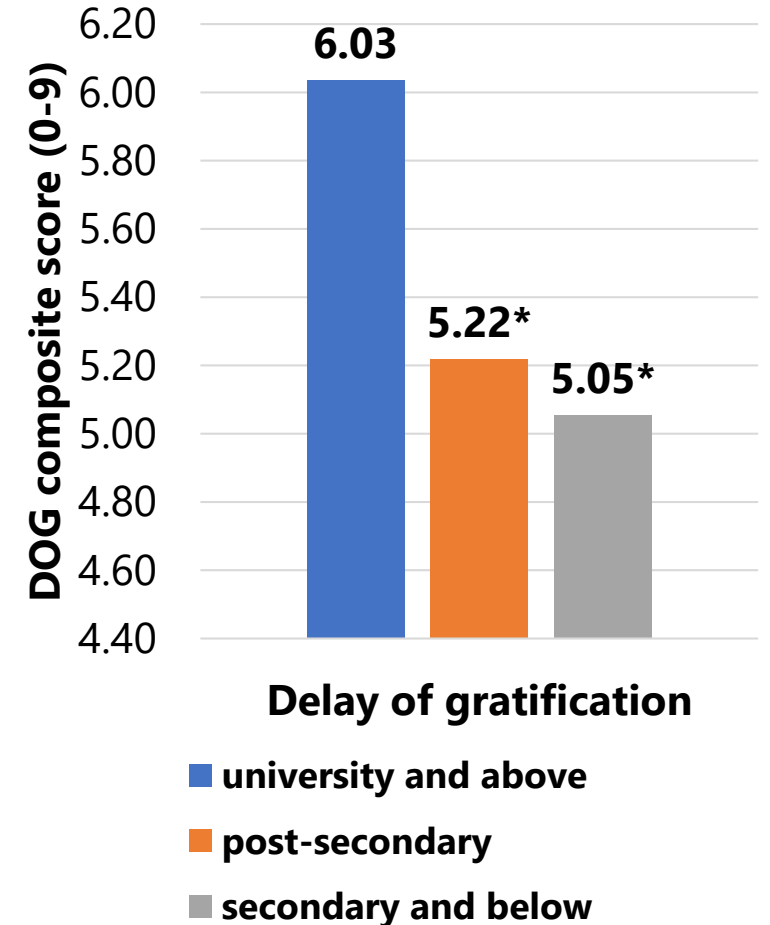
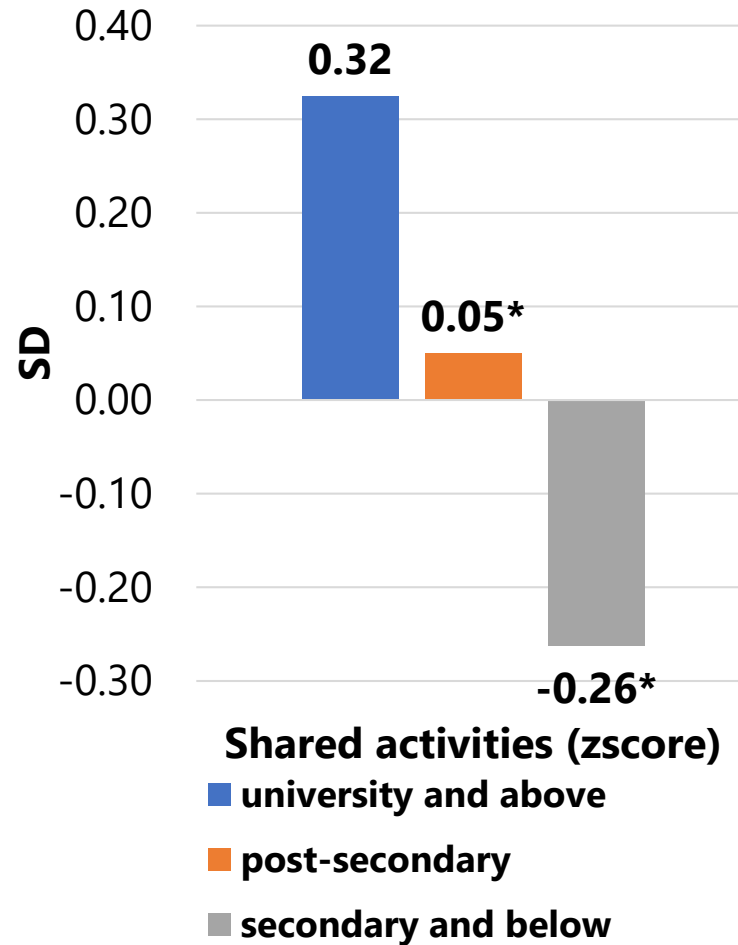
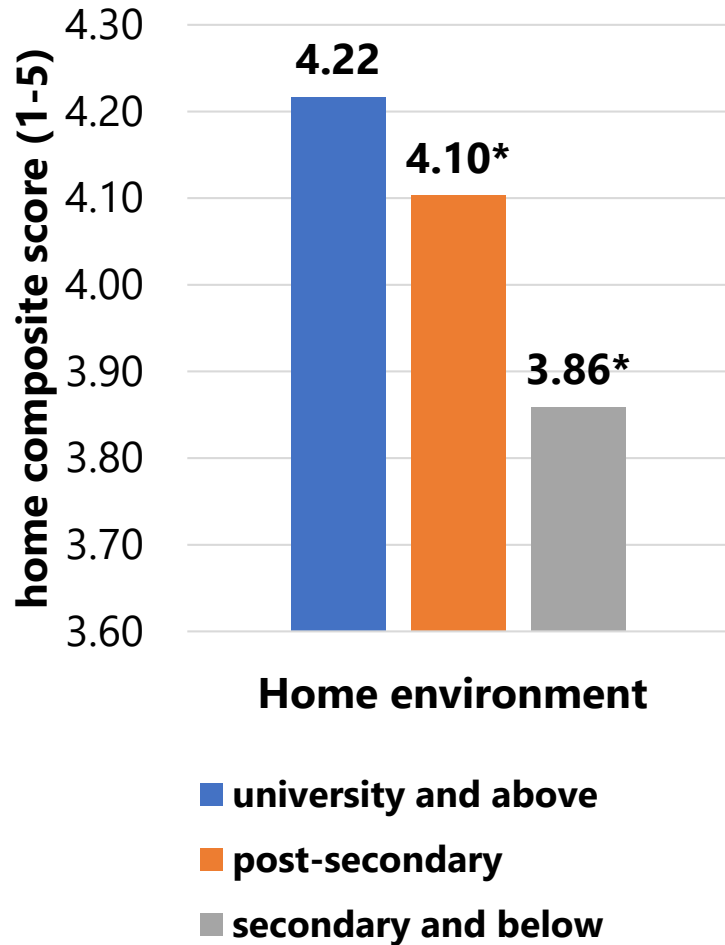
Delay of gratification

■ IncomeQ4(highest) ■ IncomeQ3
■ IncomeQ2 ■ IncomeQ1(lowest)

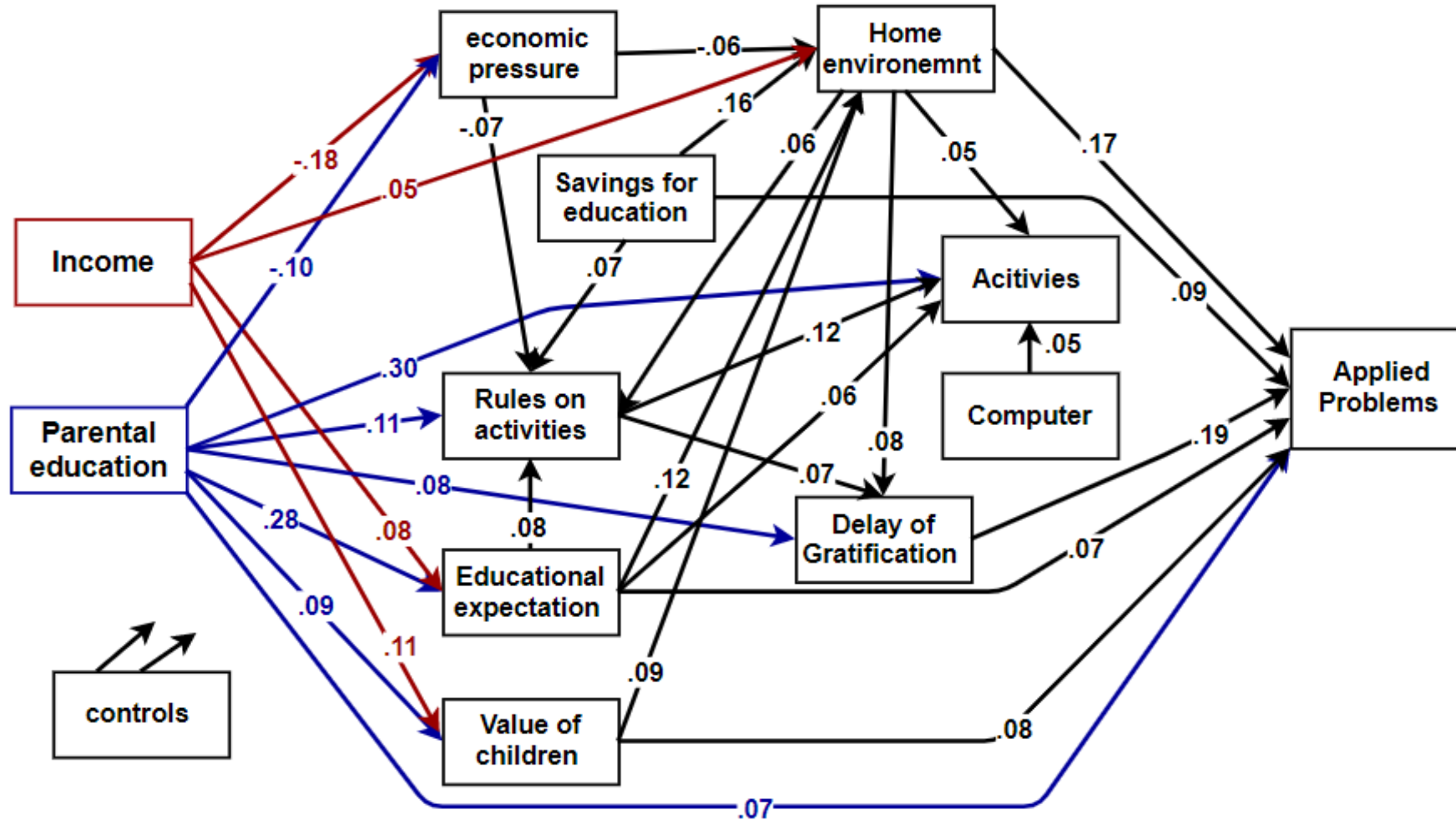
Variation by parental education for selected variables



Variation by parental education for selected variables



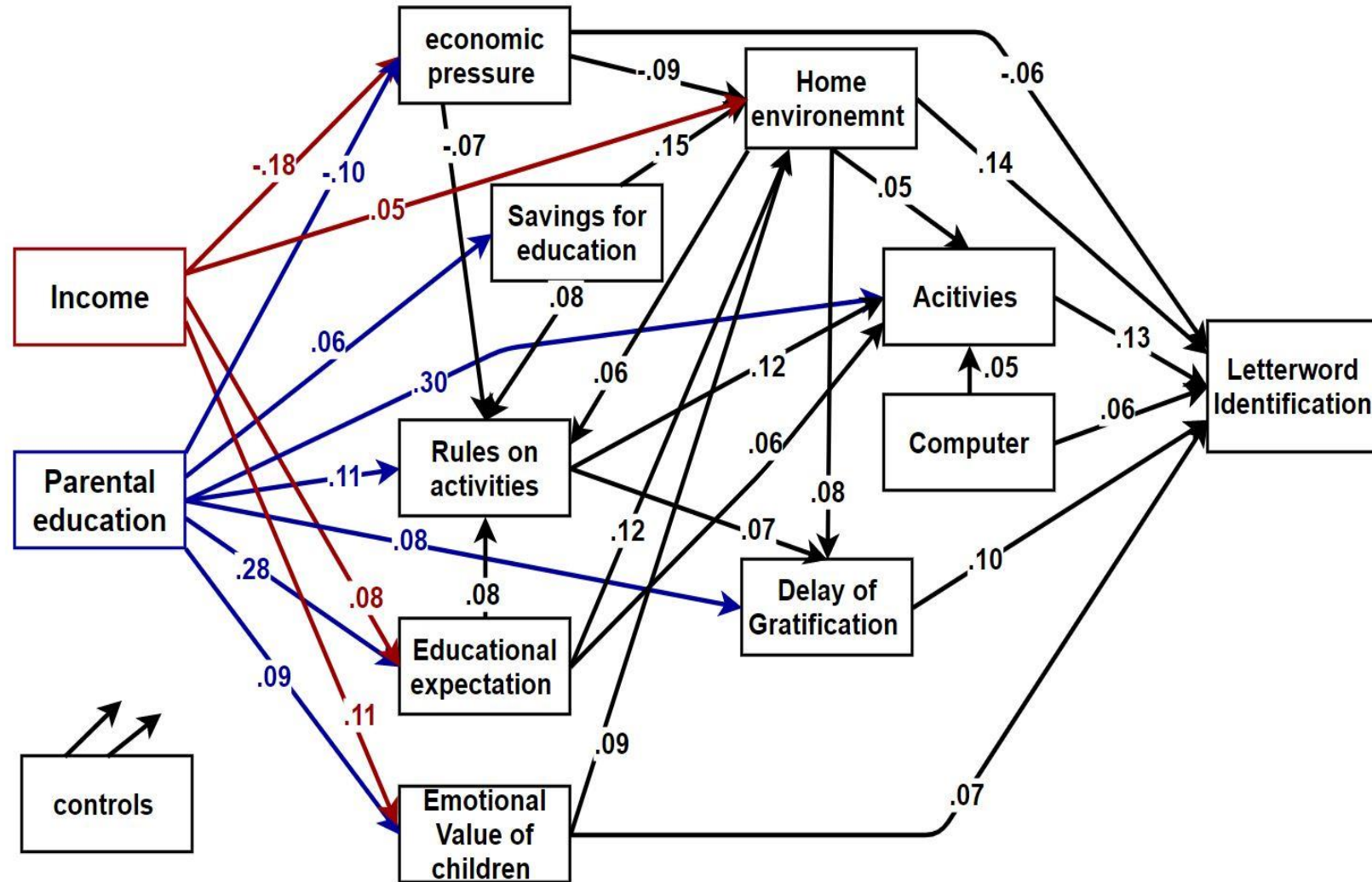
Applied problems



- A continuous form of Income and education are use in SEM models

Note: standardized coefficients are present in solid lines ($p < .05$). Lines start from Income are highlighted in red, lines start from parental education are highlighted in blue. $\chi^2/df=25.5$, CFI= 0.97, TLI=.92, RMSEA=.03, SRMR=.02

Letter-word Identification



Notes: standardized coefficients are present in solid lines ($p < .05$). Lines start from Income are highlighted in red, lines start from parental education are highlighted in blue. $\chi^2/df=24.4$, CFI= .97, TLI=.91, RMSEA=.03, SRMR=.02

Direct, indirect and total effects of selected variables (standardized coefficients)

| | Applied Problems | | | Letter-word Identification | | |
|--|------------------|-----------------|--------------|----------------------------|-----------------|--------------|
| | Direct effect | Indirect effect | Total effect | Direct effect | Indirect effect | Total effect |
| Income (log-transformed) | .02 | .02 | .04* | .00 | .02* | .02 |
| Parental education | .02 | .09* | .11* | .07* | .09* | .16* |
| Family economic pressure and investment | | | | | | |
| Can't make ends meet | -.02 | -.01* | -.03 | -.06* | -.01* | -.07* |
| Physical home environment | .18* | .02* | .20* | .14* | .02* | .16* |
| Shared activities | .03 | no path | .03 | .13* | no path | .13* |
| PCG's values, educational aspiration, and parenting | | | | | | |
| Emotional value of children | .08* | .01* | .10* | .06* | .01* | .07* |
| Educational expectation | .07* | .03* | .10* | .03 | .03* | .06* |
| Delay of gratification | .19* | no path | .19* | .10* | no path | .10* |
| Child has chronic conditions | -.07* | -.02* | -.08* | -.08* | -.01* | -.09* |

* Denotes $p < 0.05$

Summary

- We find a large achievement gap among preschool children.
- **parental education** has a larger impact than income on children's test score, it works both directly and indirectly.
- Income and education have direct effect on the numeracy score but not on the verbal score.
- **The three different mediating pathways** are all significant including the parental beliefs and values. They explain the impact of family SES on children's test scores.
- For numeracy scores, children's delay of gratification has the largest total effect, While for verbal scores, home environment and shared activities show the largest total effect.
- **Family economic deprivation**, which is affected by family income and parental education, is detrimental to children's test scores net of family SES.

Discussion

- We shed light on **three different mediating pathways** of family SES on children's achievement, and their associations.
- This study Incorporates **children's agency in early childhood research**.
- Parents setting rules for children and providing an organized and stimulating home environment are related to a child's Delay of gratification.
- This study underscores the intergenerational roots of disadvantages shown in early childhood. **It will cause a vicious cycle of transmission of disadvantages if left unattended.**



Thank you for your attention!

Control variables

- Child's age
- Gender (1=boy)
- Ethnicity (Chinese(ref.), Malay, Indian and others)
- **The primary caregiver's cognitive ability** (Woodcock Johnson-IV-ACH passage comprehension subset).
- The child's **primary language is not English**
- The child does not attend school
- The child has at least one chronic condition
- Number of Siblings
- Household size

Direct, indirect and total effects of covariates (standardized coefficients)

| | Applied Problems | | | Letter-word Identification | | |
|--------------------------------|------------------|-----------------|--------------|----------------------------|-----------------|--------------|
| | Direct effect | Indirect effect | Total effect | Direct effect | Indirect effect | Total effect |
| Covariates | | | | | | |
| Child's age | -.04 | .06* | .03 | -.03 | .05* | .02 |
| Boy | .04 | -.01* | .03 | .03 | -.01* | .02 |
| Child's race (ref. Chinese) | | | | | | |
| Malay | -.08* | -.05* | -.13* | -.08* | -.02* | -.10* |
| Indian | -.03 | -.04* | -.08* | .02 | -.03* | -.01 |
| Others | .01 | -.02 | -.01 | .07 | -.01* | .06 |
| Primary language not English | -.03 | no path | -.03 | -.02 | no path | -.02 |
| Not in school | -.04 | no path | -.04 | -.06* | no path | -.06* |
| Have chronic conditions | -.07* | -.02* | -.08* | -.08* | -.01* | -.09* |
| No of siblings | -.04 | -.01* | -.05 | -.09* | -.02* | -.11* |
| Household size | -.02 | .00 | -.02 | .02 | .01* | .02 |
| PCG's cognitive ability | .14* | .04* | .18* | .07* | .04 | .11* |

* Denotes $p < 0.05$

Sensitivity analysis with broad scores

- We conducted sensitivity analysis for children's broad mathematics scores (a combination of WJ Applied Problems and Calculation scores) and reading scores (a combination of WJ Letter-word Identification and Passage comprehension scores) among children aged 5 to 6 (n=1,457).
- The overall patterns are consistent with the current results of the two individual scores with some variations in the effect size.
- Most of the direct impact of family income and education on broad mathematics and reading scores were close to .1 of a SD ($p < .05$), stronger than the results on the two individual scores (mostly .02 of a SD, and non-significant).
- The direct effect of economic pressure, shared-activities, value of children are larger, while the direct impact of the primary caregiver's cognitive ability is smaller than that of the individual scores. The magnitude of indirect effects and other variables is similar for both broad scores and individual scores.