

# Nutrition, Family Stress and Preschool Children's Behavior Problems

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Singapore Longitudinal EARly Development Study

# Research Questions and Background

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- **Whether household food insecurity has a causal impact on preschool children's behavior problems in Singapore? What is the mediating mechanism?**
- Singapore is ranked as the most food-secure nation in the world while around 10.4% of Singapore households ever suffer from insufficient food in 2019 (Nagpaul et al., 2020).
- Household food insecurity is detrimental to children's physical as well as mental health such as **behavior problems** (Kimbrow and Denney, 2015; Slack and Yoo, 2005). Food deprivation may affect children's **nutrition**, **parents' depressive feelings** and their **parenting styles**, which affects children's behavior problems (McLoyd, 1990; Melchior et al., 2012).
- **An intergenerational transmission of disadvantages** through food security

# Hypotheses

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**H1:** Food insecurity has a **causal impact** on preschool children's behavior problems in Singapore.

## **Mediating mechanisms**

**H2.** Food insecurity is associated with children's **nutrient intake** – high in fat, refined sugar, and low in fruit, vegetable, and fiber – which in turn impacts their behavior.

**H3.** Food insecurity is linked to children's behavior problems through **family stress process** – create emotional stress which affect parenting behavior – which in turn affect children's behavior problems.



## Singapore Longitudinal **EARly** Development Study

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

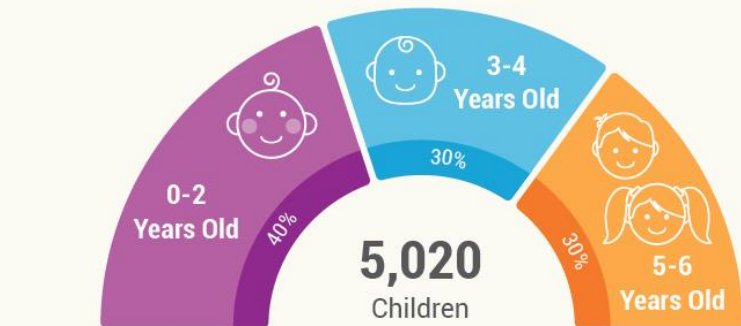
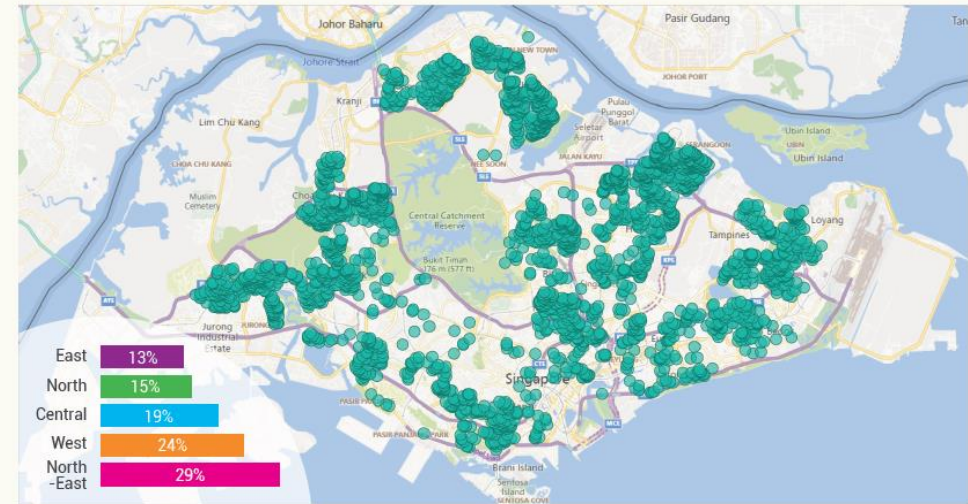
**HOUSED BY:**  
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**Wave I: 2018-2019**

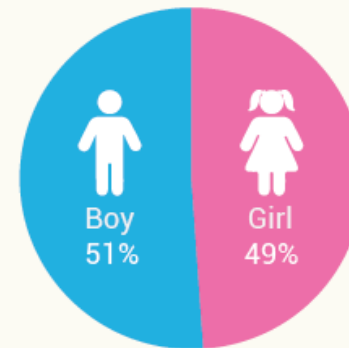
For more information: <https://fass.nus.edu.sg/cfpr/sgleads/>

## WHO ARE THE SG LEADS FAMILIES?

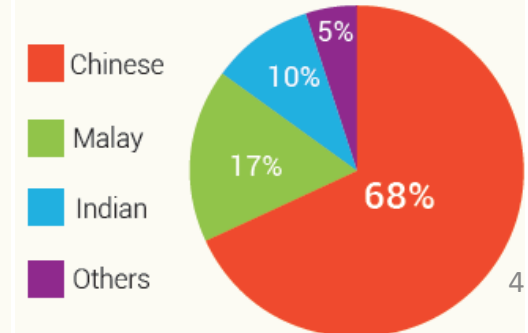
A nationally representative sample of **5,020** Singaporean children under 7 in **3,484** households across the island.



### Child's Gender



### Child's Race



# Methodology

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## Sample

- SG LEADS provides the **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.
- Analytic Sample: SG LEADS wave 1 **children aged 3 to 6 (N=2,914)**.

## Variables

- **DV: Externalizing and Internalizing Behavior Problem Index (BPI)**
- **IV: Household food insecurity** was measured by three items capturing the families' worry about the current food levels, the future food levels and the capacity to afford balanced meals. (e.g., "I/We worried whether my/our food would run out before I/we got money to buy more")
- **Mediators: nutrient intake, the primary caregiver's depressive affect, warm parenting and punitive parenting**

# Propensity score analysis

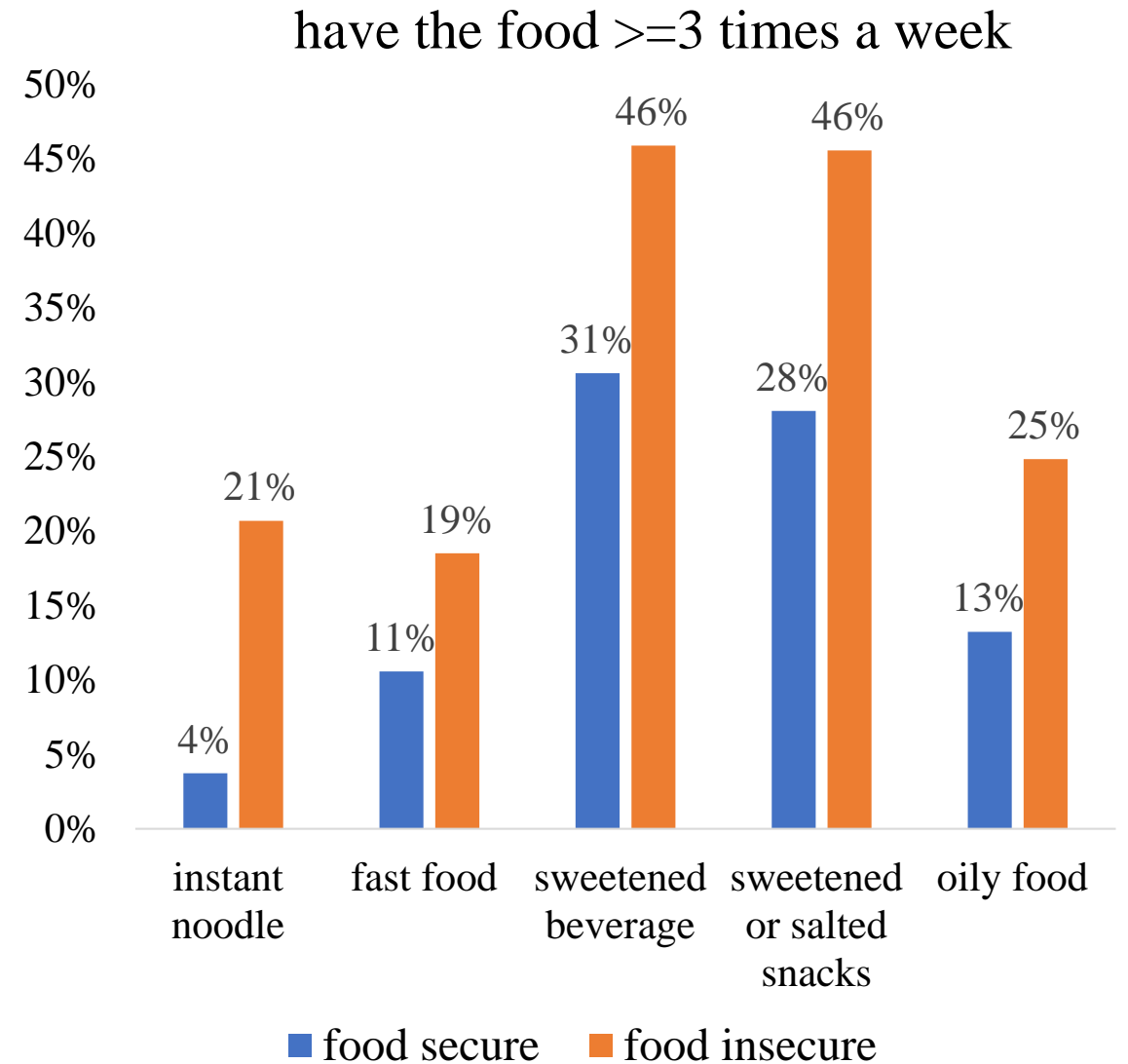
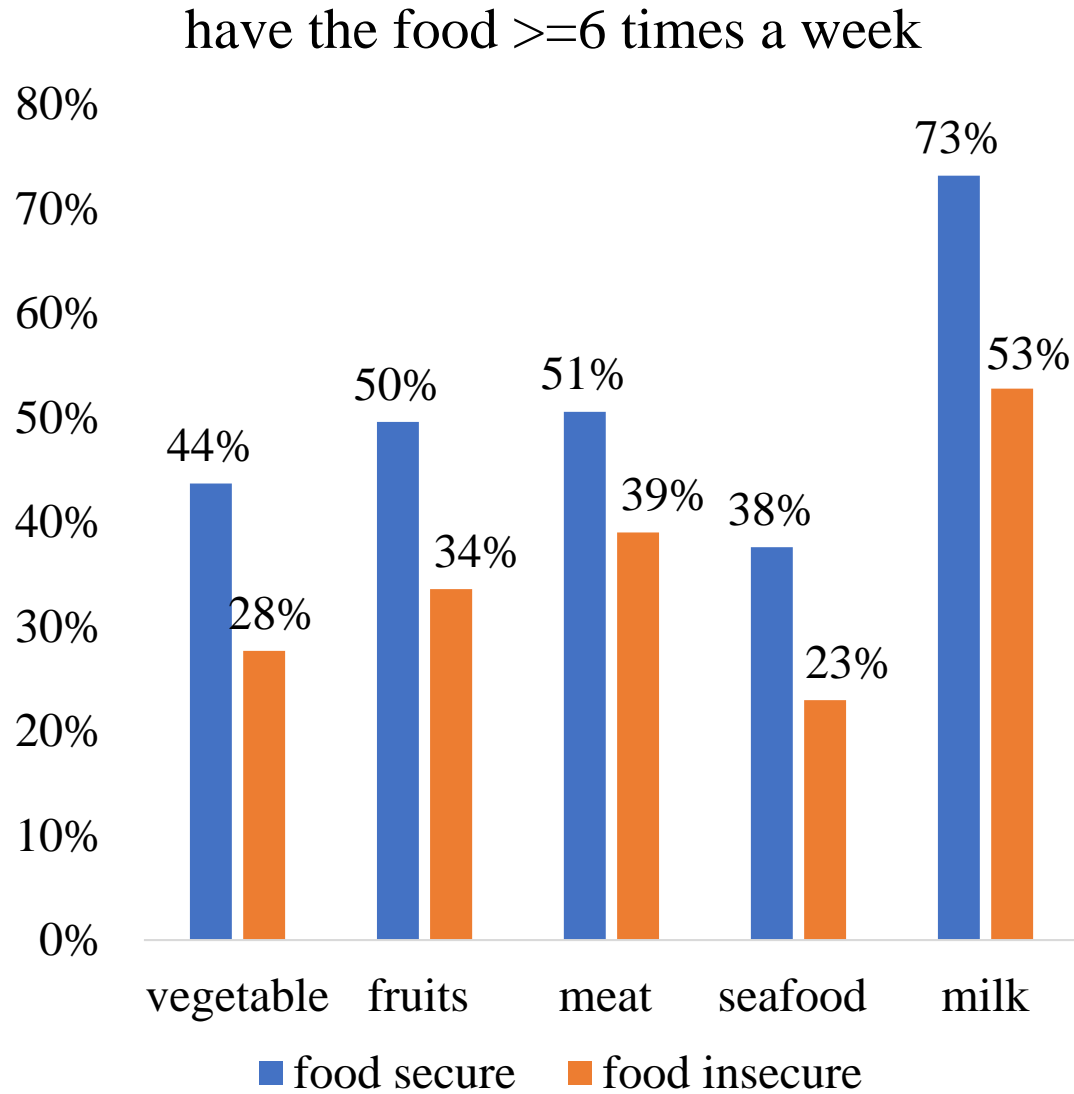
- We used optimal full matching; optimal variable matching and optimal pair matching.
- optimal full matching shows the lowest total distance without loss of cases, and the highest bias reduction on the covariates followed by pair matching and variable matching 1 (at least 1, at most 4).

Table 1. Results of OLS model and propensity score matching

Models	Estimated average treatment effect	Cohen's D
<b>Externalizing BPI</b>		
Model 1. OLS regression	0.173 ***	
Model 2. Optimal matching (full) with Hodges-Lehmann aligned rank test	<b>0.219*** a</b>	<b>0.301</b>
Model 3. Regressing difference-score of outcome on difference-scores of covariates after pair matching	<b>0.102 *** a</b>	
<b>Internalizing BPI</b>		
Model 4. OLS regression	0.071 ***	
Model 5. Optimal matching (full) with Hodges-Lehmann aligned rank test	<b>0.065*** a</b>	<b>0.247</b>
Model 6. Regressing difference-score of outcome on difference-scores of covariates after pair matching	<b>0.146 *** a</b>	

\* p<.05, \*\* p<.01, \*\*\* p<.001    <sup>a</sup> one-tailed test

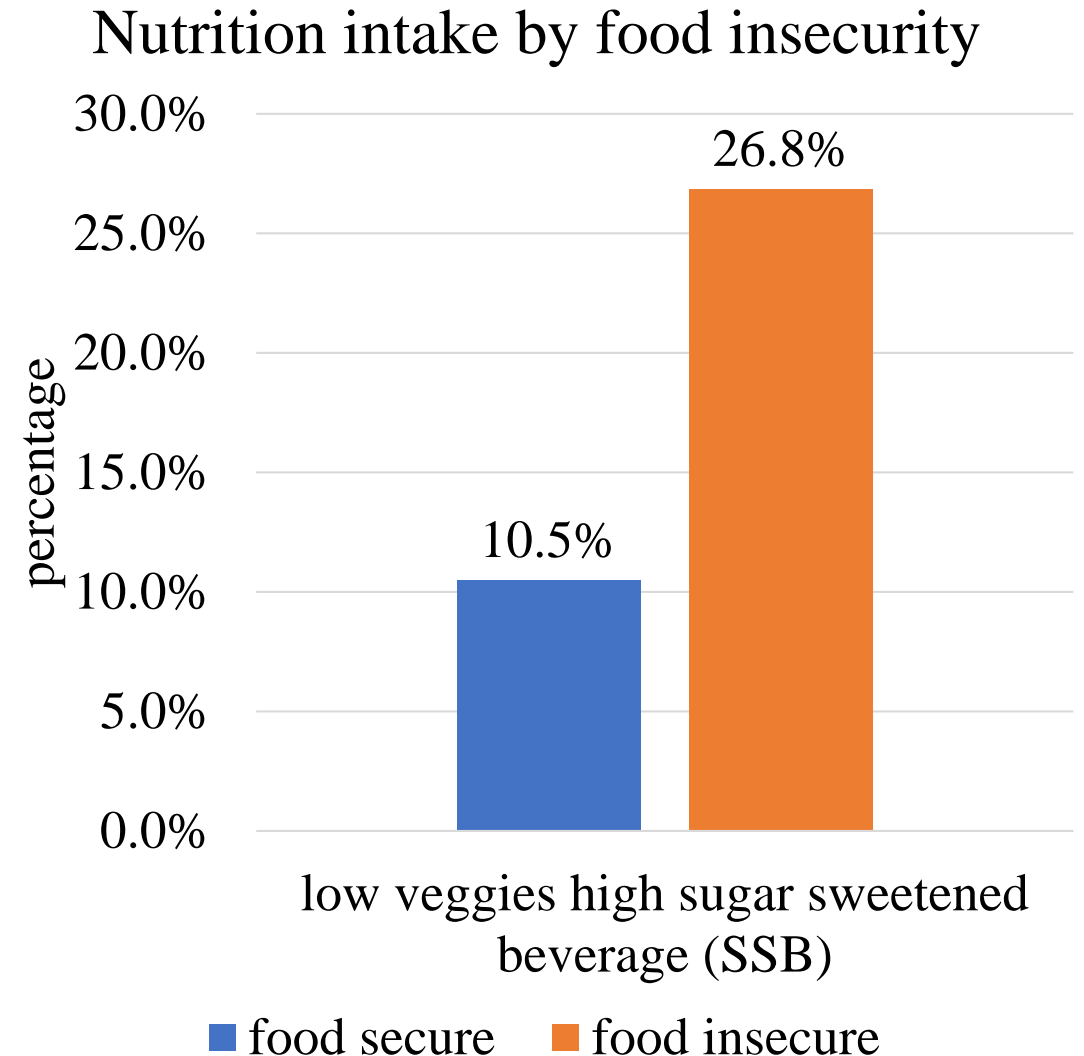
# Mediating mechanism – nutrition



*Notes: all the group comparison presented here are significant at the  $p < 0.05$  level*

# Mediating mechanism – nutrition

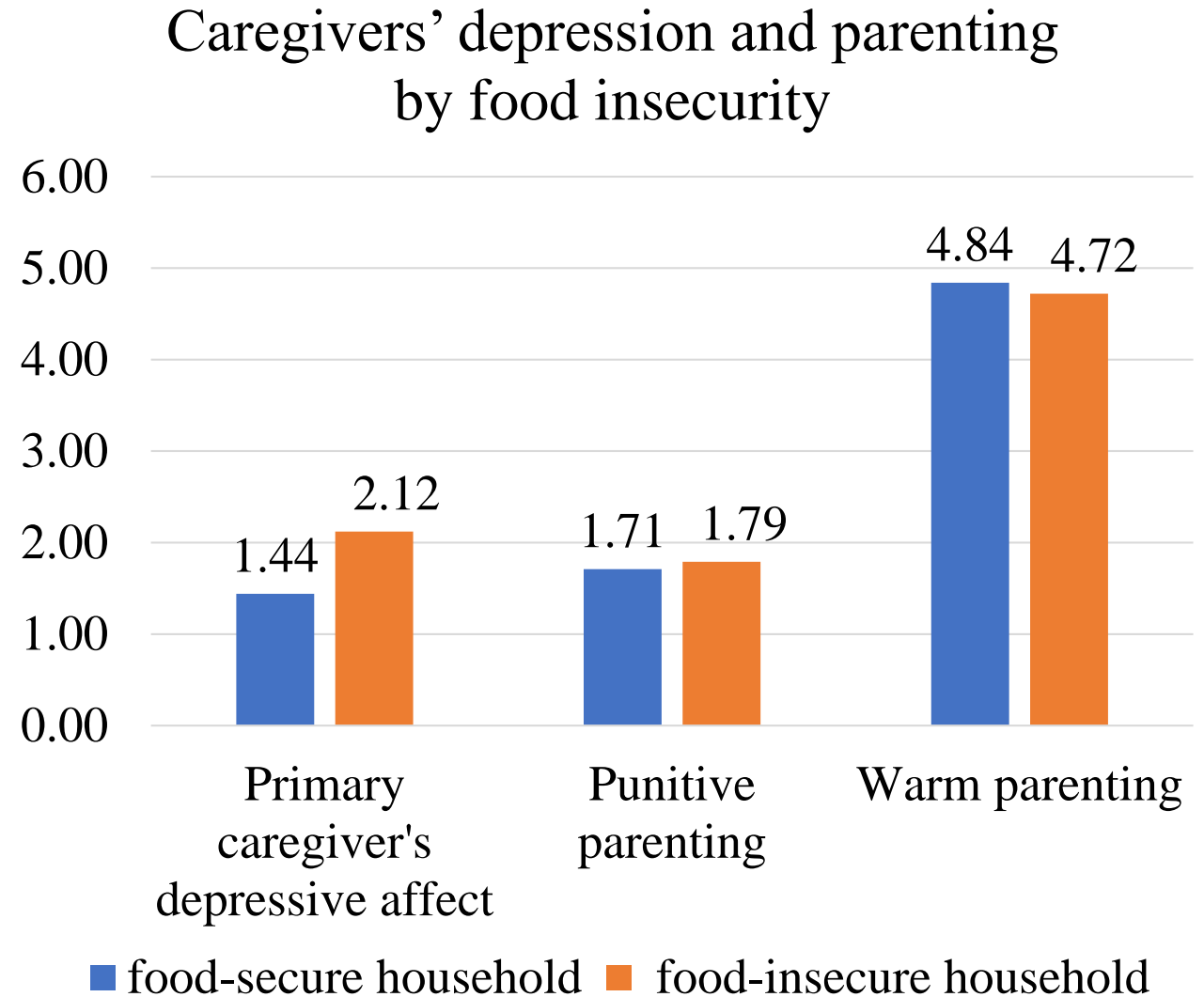
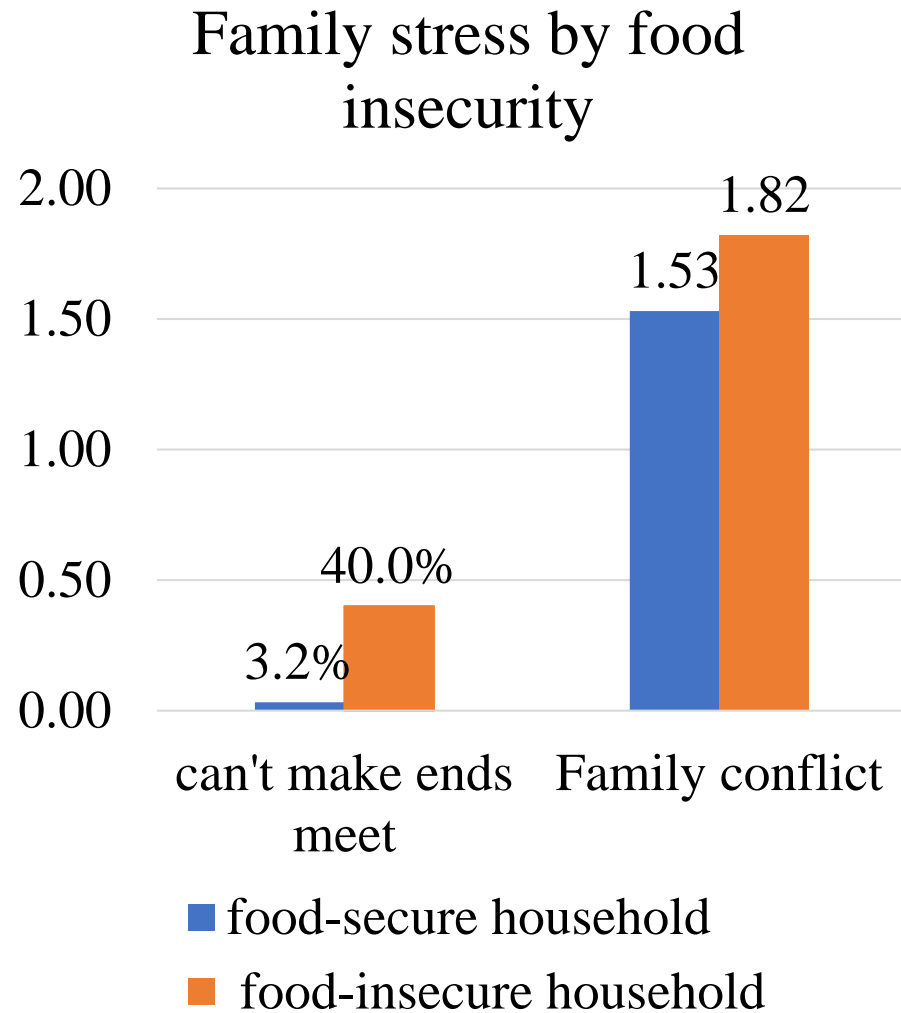
- Food-insecure children may have diets that are **high in fat, refined sugar and sodium, and low in fruit, vegetable, and fiber** (Pilgrim et al., 2012).
- High consumption of refined sugar and iron-deficiency anemia may be associated with hyperkinesia, inattention and **poor memory** (McCann et al., 2007; Melchior et al., 2012; Pelsser et al., 2011).



low veggies high sugar sweetened beverage is defined as having vegetable and fruit  $\leq 5$  times a week, and having sugar sweetened beverage  $\geq 3$  times a week. The difference is statistically significant.



# Mediating mechanism – family stress



*Notes: all the group comparison presented here are significant at the  $p < 0.05$  level*

# Mediating mechanisms– nutrition and family stress

Table 2. OLS Results of Externalizing Behavior Problems

	Model 1	Model 2 (Nutrition)	Model 3 (family stress)	Model 4 (Full model)
Food insecurity	<b>0.173***</b> (0.0276)	<b>0.166***</b> (0.0276)	<b>0.0892***</b> (0.0276)	0.0867*** (0.0274)
low veggies high sweetened beverage		<b>0.0725***</b> (0.0250)		0.0354 (0.0222)
Primary caregiver's depressive affect			<b>0.0577***</b> (0.0138)	0.0567*** (0.0138)
Punitive parenting			<b>0.184***</b> (0.0133)	0.184*** (0.0133)
Warm parenting			<b>-0.0658***</b> (0.0176)	-0.0645*** (0.0176)
Controls	Yes	Yes	Yes	Yes
Observations	2,914	2,914	2,914	2,914
R-squared	0.062	0.066	0.278	0.279

Model 1 and model 2 Controls include child's age, gender, ethnicity, children's health, primary caregiver's education, family income quartile, family economic pressure; Model 3 further controls for family conflicts and primary caregiver's self-control.

# Mediating mechanisms– family stress

Table 1b. OLS Results of Internalizing Behavior Problems

internalizing BPI	Model 1	Model 2 (nutrition)	Model 3 (family stress)	Model 4 (full model)
Food insecurity	<b>0.139***</b> (0.0250)	<b>0.135***</b> (0.0254)	<b>0.0820***</b> (0.0244)	0.0812*** (0.0246)
low veggies high SSB		<b>0.0344**</b> (0.0174)		0.0110 (0.0164)
Primary caregiver's depressive affect			<b>0.0299***</b> (0.0112)	0.0295*** (0.0113)
Punitive parenting			<b>0.0331***</b> (0.0117)	0.0329*** (0.0118)
Warm parenting			<b>-0.0660***</b> (0.0189)	-0.0656*** (0.0190)
Controls	Yes	Yes	Yes	Yes
Observations	2,914	2,914	2,914	2,914
R-squared	0.073	0.075	0.175	0.175

Model 1 and model 2 Controls include child's age, gender, ethnicity, children's health, primary caregiver's education, family income quartile, family economic pressure; Model 3 further controls for family conflicts and primary caregiver's self-control.

# Summary and Discussion

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- The negative impact of household food insecurity has emerged at the preschool period, regardless of the children's food-insecure status.
- Exposure to household food insecurity moderately increases young children's externalizing and internalizing behavior problems.
- Food insecurity may affect children's nutrition, which further affects their behavior problems.
- The household food insecurity exerts a negative impact through the family stress process – create emotional stress which impacts parenting behavior – which in turn affect children's behavior problems.

# Summary and Discussion

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- This study sheds light on the **intergenerational roots of disadvantages** shown in early childhood. Net of family income and parental education, household food insecurity shows a negative impact on young children's behavior.
- Food insecurity has multidimensional impacts on child development including physical health, mental health and cognitive development.
- Disadvantages shown in early childhood may be accumulated and have a **long-term impact** on their adulthood.
- Interventions are needed to alleviate such **intergenerational transmission of inequality**.

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- **Implications of COVID-19** - more households may become food-insecure. However, due to social embarrassment and unawareness of food support, only a small proportion of food-insecure households have sought help (Nagpaulet al., 2020). We may also see **a rise in children's behavior problems**.
  - Important to pay attention to the social-psychological impact of food insecurity. It is a lack of choice and access to socially acceptable means of securing adequate food, which may foster **a feeling of shame, frustration, hopeless and a sense of exclusion**(Hamelin, Beaudry, & Habicht, 2002; Lorenz, 2012).



Thank you!

