

# **Compared to What?**

## **Variation in the Impacts of Head Start by Alternative Child-Care Setting**

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*Secondary Analysis of Variation in Impacts of Head Start Center*

# Variation in child-care setting

	Three-Year Olds		Four-Year Olds	
	Control	Treatment	Control	Treatment
<b>Head Start</b>	<b>12%</b>	<b>77%</b>	<b>9%</b>	<b>68%</b>
<b>Center-based care</b>	<b>21%</b>	<b>5%</b>	<b>29%</b>	<b>10%</b>
<b>Home-based care</b>	<b>47%</b>	<b>9%</b>	<b>39%</b>	<b>9%</b>
Parent care	33%	7%	30%	7%
Non-relative's home	5%	1%	4%	1%
Relative's home	5%	1%	3%	1%
Own home w/ relative	4%	0%	2%	0%
Own home w/ non-relative	0%	0%	0%	0%
<b>Missing</b>	<b>20%</b>	<b>10%</b>	<b>22%</b>	<b>12%</b>

# Variation in alternative child-care setting

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- **Research Question:** How does the impact of Head Start vary depending on the setting in which children would otherwise be receiving care?
- **Relevance to policy:** Answers to this question may inform future efforts to target high quality, comprehensive services such as Head Start to those children and families who potentially stand to benefit the most from participating.
- **Relevance to early childhood research methodology:** Study may also inform downward trend over time observed in the average impacts of early child care programs (Duncan & Magnuson, 2013).

# Analytic framework

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Research Question: How does the impact of Head Start vary depending on the setting in which the child would otherwise be receiving care?

- **Focal care setting:** care setting where the child spent a minimum of five hours between the hours of 8 am and 6 pm, Monday through Friday (in Year 1 of HSIS)
- **Collapse care type into three categories of interest:**
  - Head Start
  - Other center-based care
  - Home-based care
- **Outcome:** PPVT

# Analytic framework

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- Principal Stratification (Frangakis & Rubin, 2002): analytic framework for considering causal effects of the treatment within latent subgroups defined by potential values of a post-treatment variable
- To define principal stratum membership for each child in this context, we ask:
  - In what care setting do we observe the child?
  - In what care setting would the child have been in the counterfactual experimental condition?
- Answers to these two questions together define our principal strata of interest

# Defining principal strata

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		<b>T = 0</b>		
		<b>Head Start</b>	<b>Center-based care</b>	<b>Home-based care</b>
<b>T = 1</b>	<b>Head Start</b>			
	<b>Center-based care</b>			
	<b>Home-based care</b>			

# Defining principal strata

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		<b>T = 0</b>		
		<b>Head Start</b>	<b>Center-based care</b>	<b>Home-based care</b>
<b>T = 1</b>	<b>Head Start</b>	Always Head Start		
	<b>Center-based care</b>		Always center-based care	
	<b>Home-based care</b>			Always home-based care

# Defining principal strata

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		<b>T = 0</b>		
		<b>Head Start</b>	<b>Center-based care</b>	<b>Home-based care</b>
<b>T = 1</b>	<b>Head Start</b>	Always Head Start	Center-based compliers	Home-based compliers
	<b>Center-based care</b>		Always center-based care	
	<b>Home-based care</b>			Always home-based care

# Defining principal strata

		T = 0		
		Head Start	Center-based care	Home-based care
T = 1	Head Start	Always Head Start	Center-based compliers	Home-based compliers
	Center-based care		Always center-based care	
	Home-based care			Always home-based care

## Assume Away Grey Cells

Monotonicity (analogous to the “no defiers” assumption in IV)

## Assume Away Blue Cells

Stability of choice (offer of HS won't switch you from home to center or vice-versa)

# Defining principal strata

		T = 0		
		Head Start	Center-based care	Home-based care
T = 1	Head Start	Always Head Start	Center-based compliers	Home-based compliers
	Center-based care		Always center-based care	
	Home-based care			Always home-based care

We assume that treatment effects are zero for those children who are not *induced* into Head Start by the randomized offer to enroll (exclusion restriction)

Key analytic goal: Estimate treatment effects in these two strata

# Estimation strategy

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- Model-based analytic strategy:
  - Approach capitalizes on assumptions and available information (covariate and outcome data) to predict stratum membership
  - Two random-effect models (both at center-level):
    - Outcome model
    - Stratum-membership model
- Estimation – effective iteration between two steps:
  - Predict stratum membership
  - Estimate outcome model parameters, assuming stratum membership to be known
- Software: Bayesian modeling language Stan

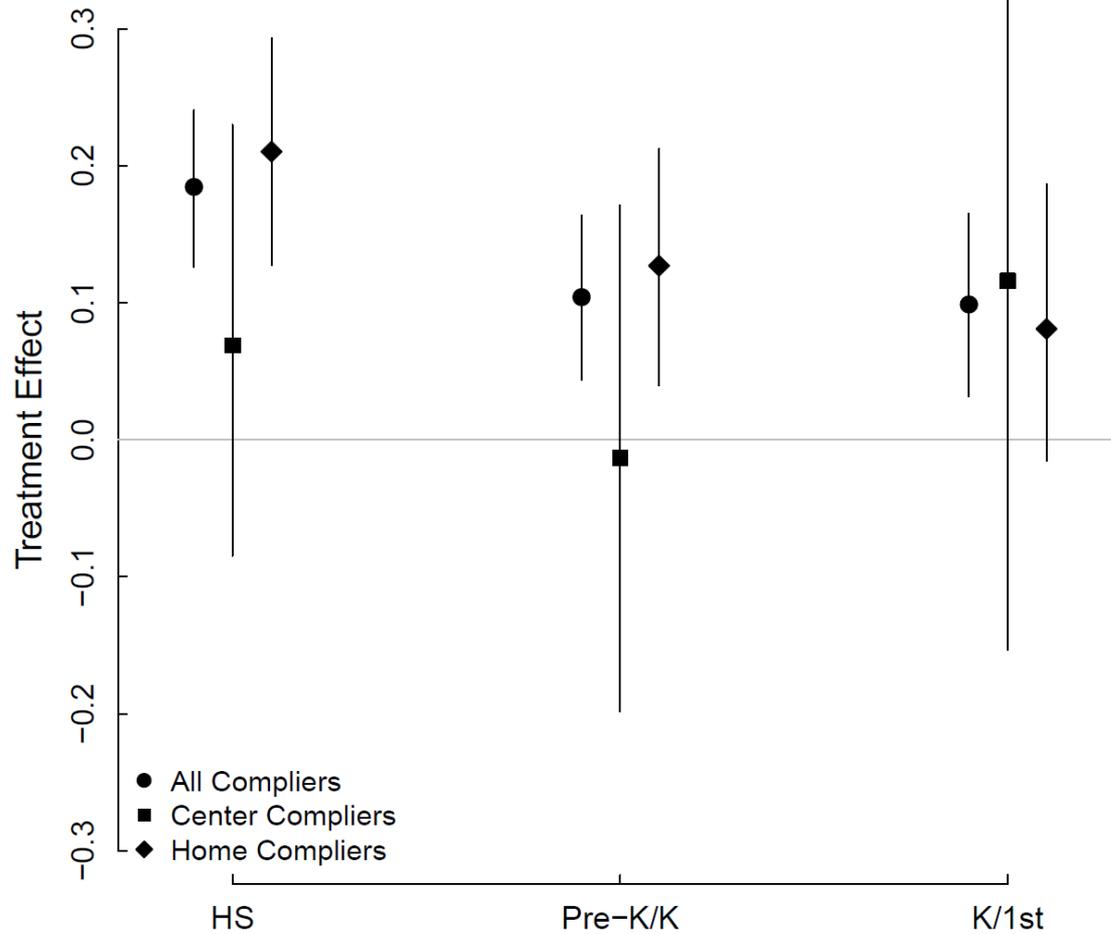
# Results: Distribution of stratum membership

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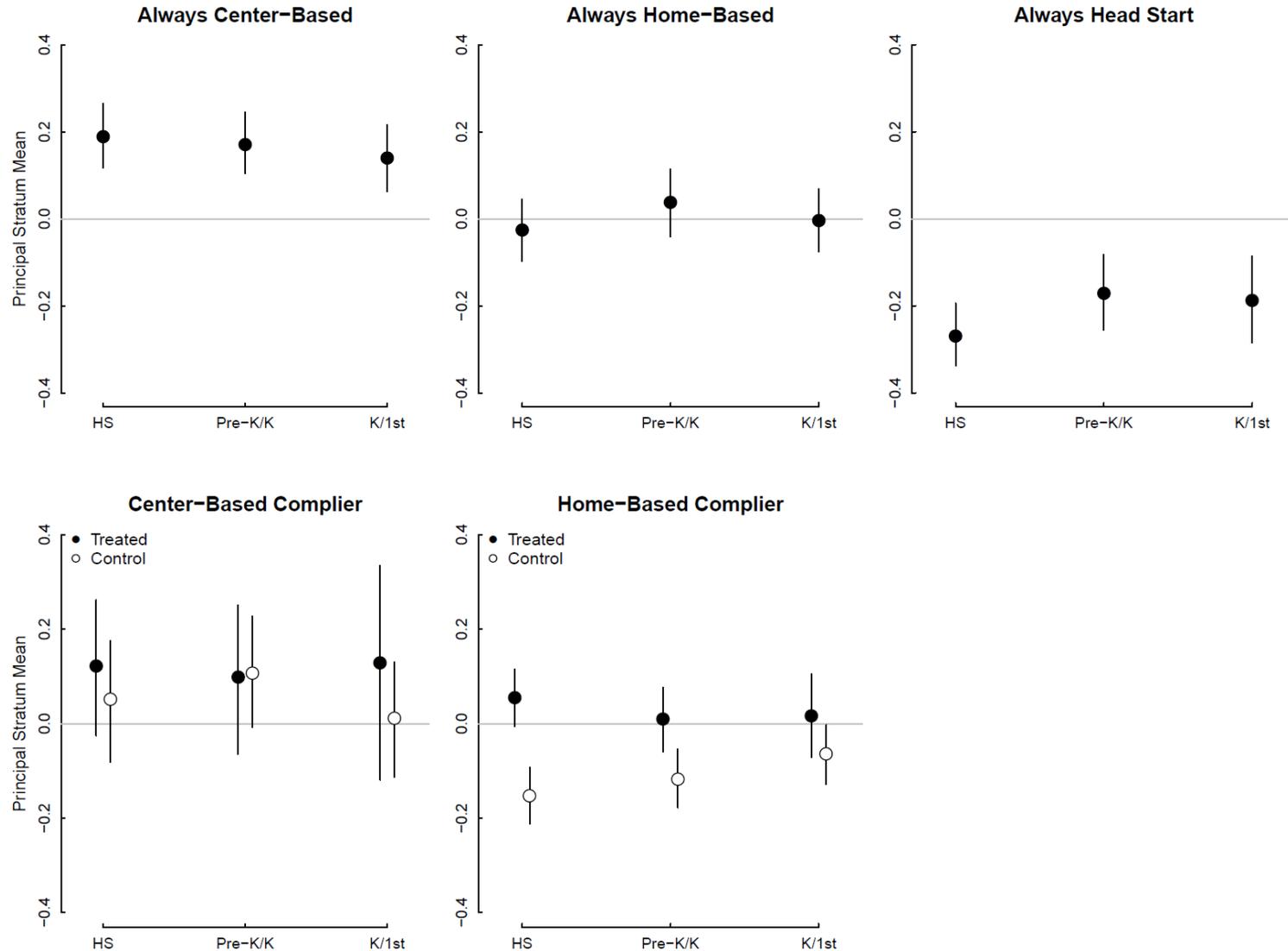
		T = 0		
		Head Start	Center-based care	Home-based care
T = 1	Head Start	11%	20%	45%
	Center-based care		11%	
	Home-based care			12%

# Results: Treatment effect on PPVT (pooled)

Treatment Effect by Stratum

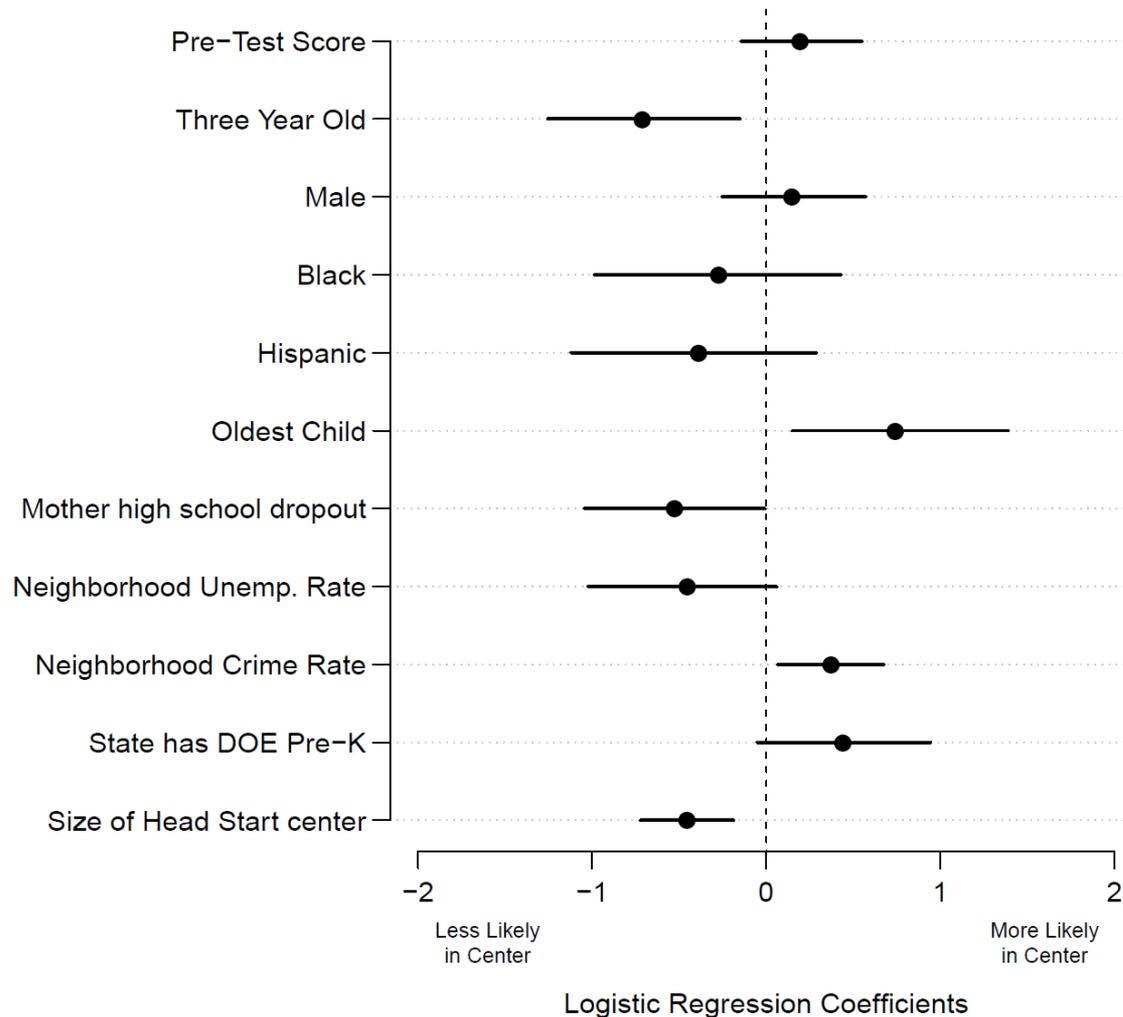


# Results: Treatment effect on PPVT (pooled)



# Results: covariates related to stratum membership

Predicting Center Compliers v. Non-Center Compliers



# Conclusions

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- Positive impacts of Head Start are primarily for those children who would otherwise be in a home-based care setting (e.g., home with a parent or other relative)
- Positive impacts for home-based compliers dissipate after first year, due to control group “catch up” rather than treatment group “fade out”

# Implications for policy and practice

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- Requirements for PS analysis:
  - Plausibility of assumptions to reduce number of strata
  - In this analysis, well-behaved outcome distribution
  - Benefit from covariates that predict stratum membership
- Planning for PS-type analyses in the future:
  - Principal strata defined by post-randomization experiences / choices
  - In future experiments, can we take steps to anticipate choices / experiences of interest and gather data on individuals' anticipated reactions?