Combining pre-school quality interventions with parenting education: A cluster-randomized trial

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Outline

- **Motivation and context**
- **Study Design**
- **Impacts at 18-month follow-up**
- **Impacts at 36-month follow-up**
- **Discussion**

Motivation and Context

- Majority of children in poor countries do not have access to early education (preschool) programs, with access within countries uneven (*UNESCO 2015; Black et al. under review*).

- Those who do, attend informal facilities that are often staffed by teachers with low levels of education and minimal formal training.

Motivation and Context

- This lack of adequate preparation is a risk factor for poor performance in primary school (Behrman et al. 2006).

- These schooling losses accumulate to large deficits in adulthood, e.g. almost 20% of adult income (Grantham McGregor et al. 2007).

Motivation and Context

- Malawi fits squarely into this context:
  - One third of population below 8 years old,
  - One of the highest rates of stunting (47%) in the world,
  - Poor performance in regional testing (SACMEQ).

- Growing access to ECD services through community-based childcare centers (CBCCs).

CBCCs in Malawi

- Primary method of ECD service delivery in rural Malawi
- Community-initiated and -owned
- Volunteer part-time teachers

- Untrained teachers with low-levels of education
- Lack of play and learning materials
- Sustainability challenges

How does one approach this sector?

- Evidence suggests that attending preschools improves outcomes (Martinez et al. 2012; Berlinski et al. 2008, 2009; Engle et al. 2011, among others)

- Evidence also suggests that improving quality in existing preschools can be effective (Nonoyama-Tarumi & Bredenburg, 2009, among others)
  - But, an evaluation of Chile's un Buen Comienzo, a large-scale randomized trial, finds no effects on child outcomes.

Study Design (*C-RCT with 199 CBCCs*)

Figure 2: Summary of Interventions

Control Group (T1): *49 CBCCs* • Play and Learning Materials (kit of basic play and learning materials and kitchen supplies)	**Treatment 2 (T2):** *50 CBCCs* • Play and Learning Materials • Teacher training and mentoring (enhanced five-week residential training program for CGs including fieldwork and mentoring)
Treatment 3 (T3): *49 CBCCs* • Play and Learning Materials • Teacher training and mentoring • Teacher incentives (small monthly cash payments to encourage retention and performance)	**Treatment 4 (T4):** *51 CBCCs* • Play and Learning Materials • Teacher training and mentoring • Parenting Education (12 group sessions for parents with their children focused on practical activities)

Study Design (sampling and randomization)

- **CBCC sample**
  - All eligible and operating CBCCs in four districts
- **Child sample**
  - 12 children per CBCC, aged 3-5 equally divided into four strata by age and sex (*2,120 children in total*)
- **Block-stratified random assignment by**
  - *district*,
  - *mean height-for-age z-score*, and
  - *Mean PPVT score*

Data Sources

1. Child measures

Appendix Table 1: Schedule of Child Assessments

Measure	*Time of Data Collection*		
	Baseline	18-Months	36-Months
Anthropometric measurements (Height & Weight)	X		
Malawi Developmental Assessment Tool (MDAT)	X	X	
Peabody Picture Vocabulary Test (PPVT-IV)	X		X
Leiter-R Sustained Attention (LSA)	X		X
Strengths and Difficulties Questionnaire (SDQ)	X	X	X
KABC-II			X
Early Grade Math Assessment (EGMA)			X

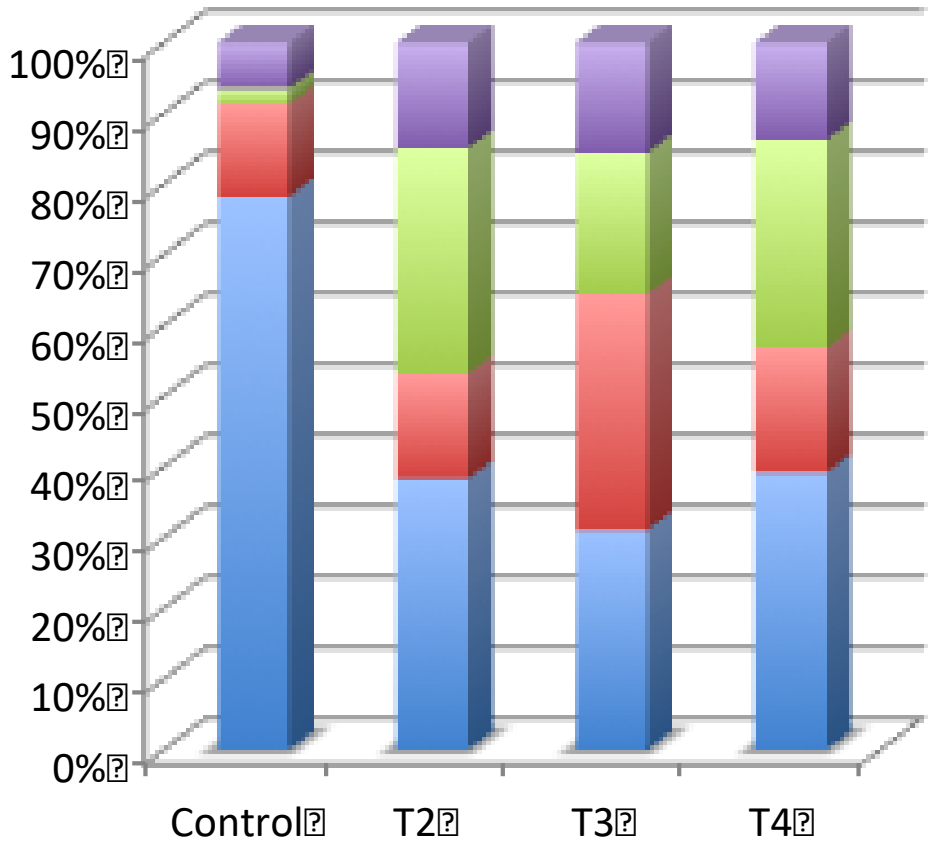
Child Level Assessments…

Data Sources

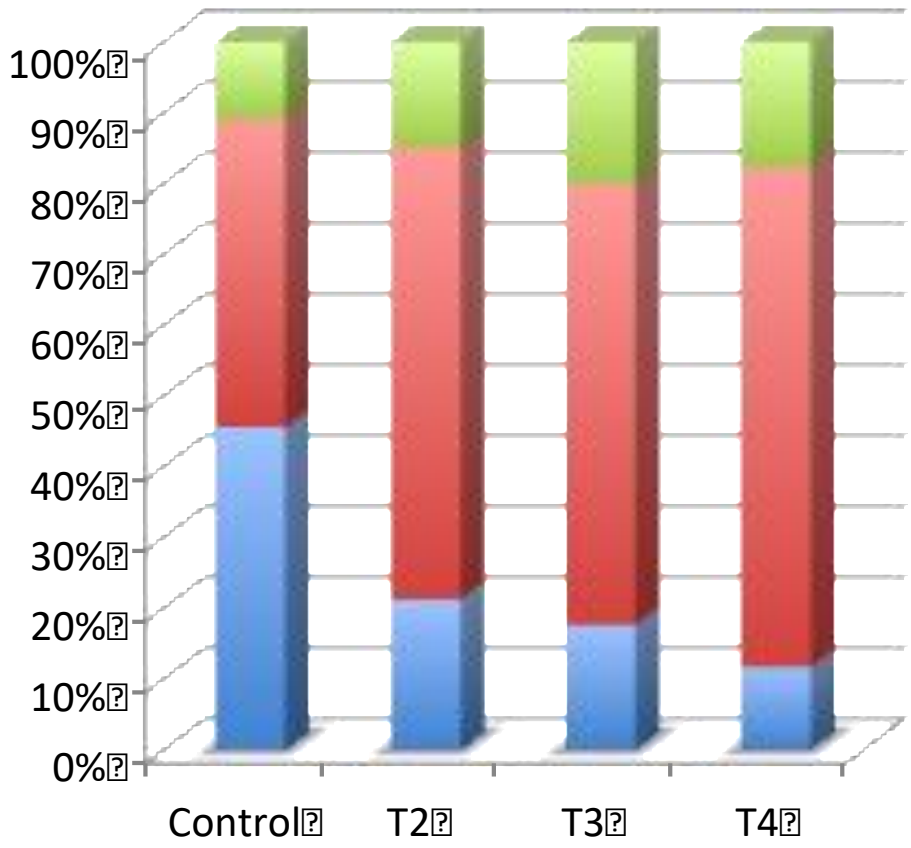
2. Primary caregiver measures
    1. CESD
    2. PSI
    3. Support for learning and positive parenting

3. CBCC measures
    1. CBCC questionnaire
    2. Classroom observations

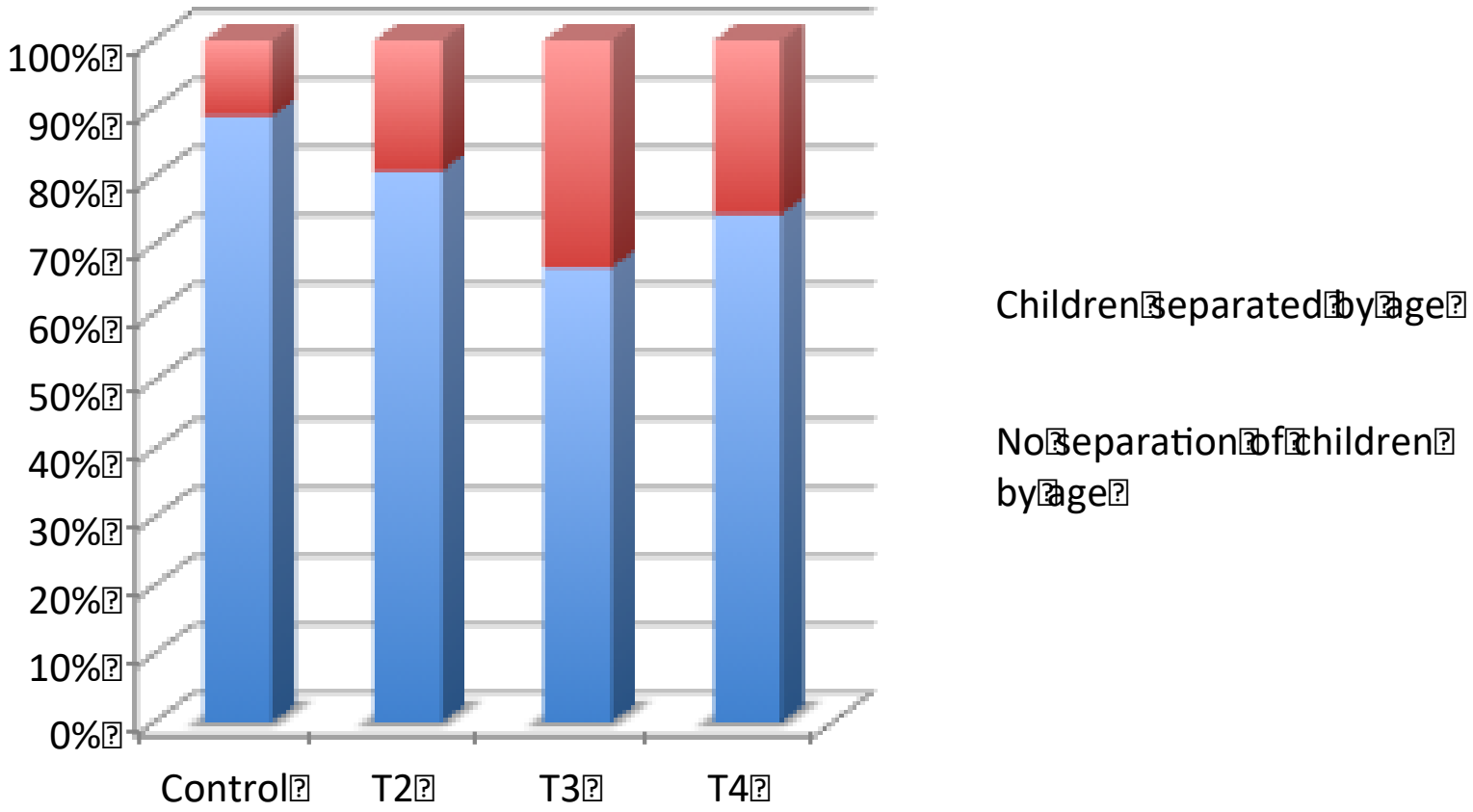
Use of activity corners (18-month follow-up)



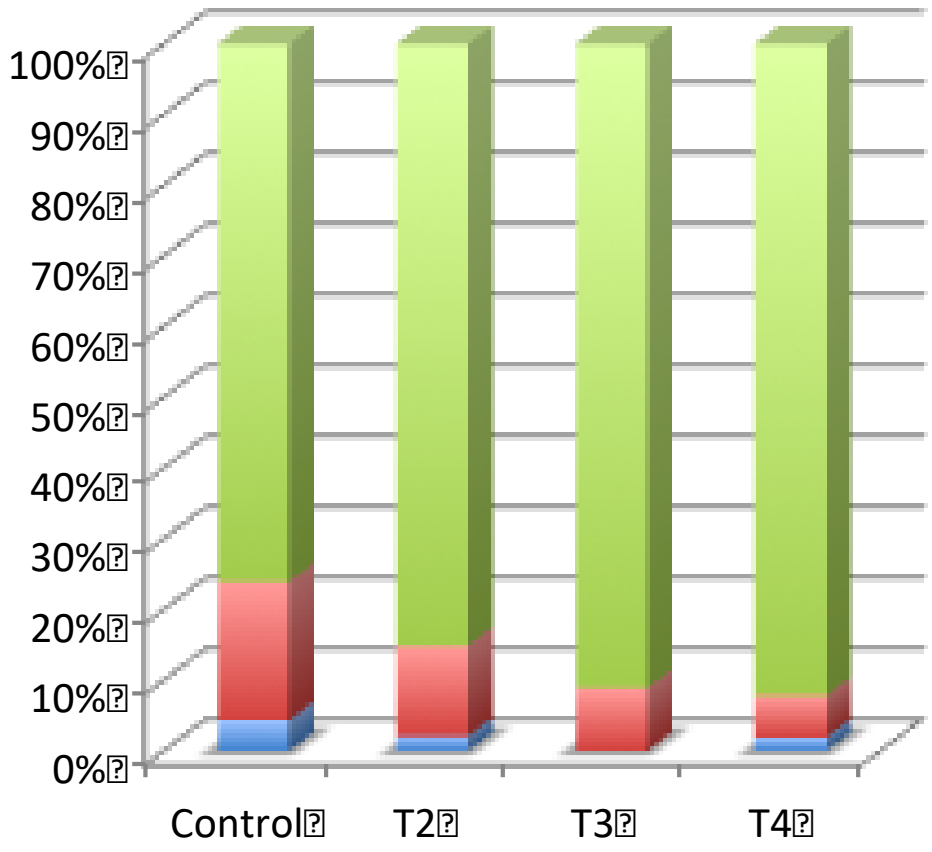
Caregiver position during engagement



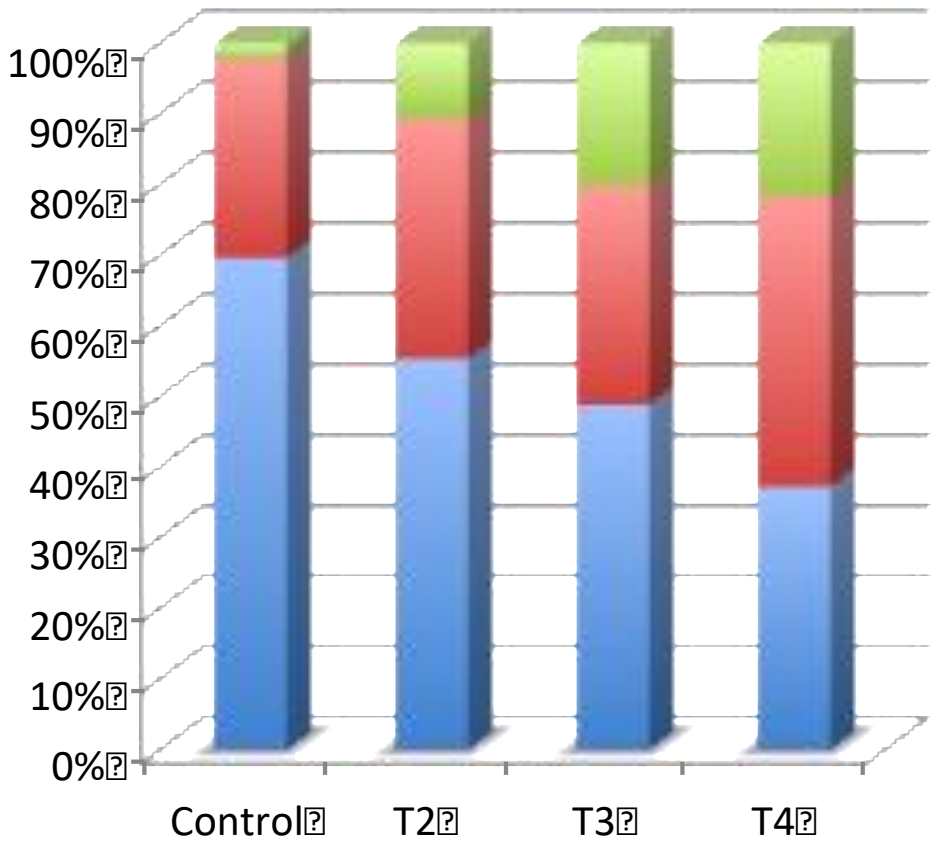
Grouping Children by Age



Use of Punitive Methods to Control Behavior



Nature of Fine Motor (FM) Activities

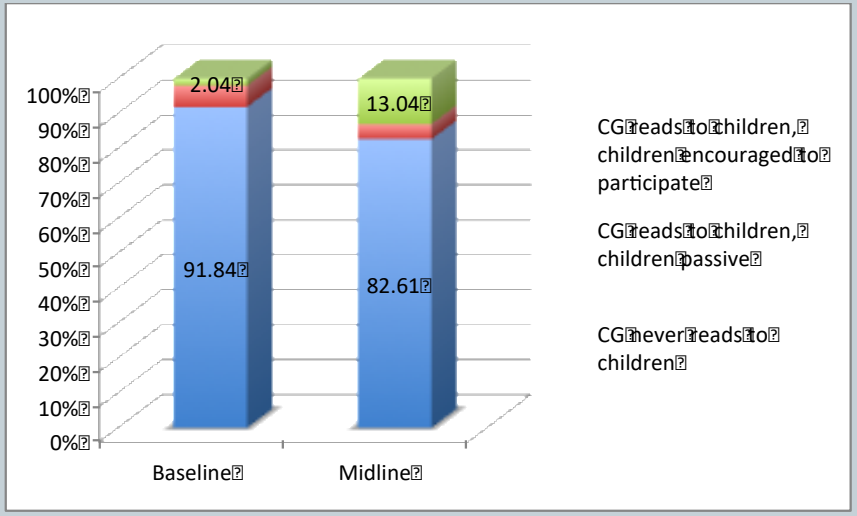


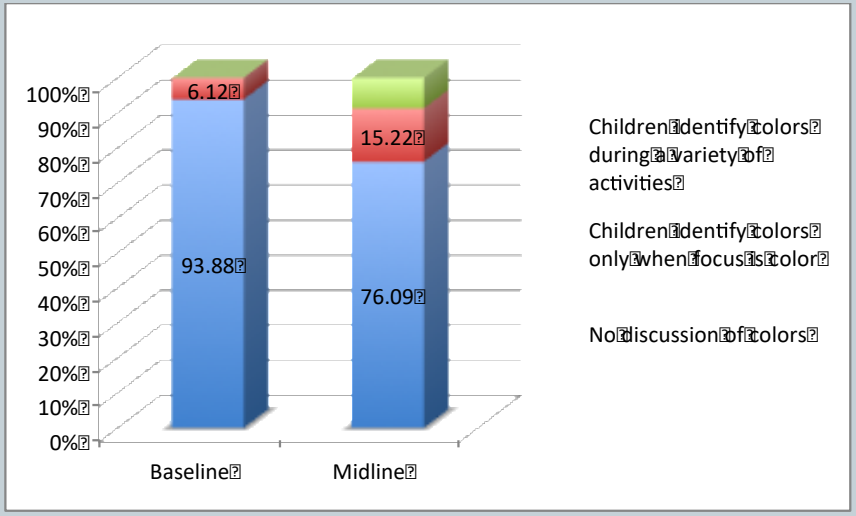
A variety of FM activities is observed

Children engage in one kind of FM activity

No opportunity for FM activities

Control Group Time Trend: Reading and Identifying Colors





18-month follow-up

TABLE 3: Impacts on MDAT Scores - 18-Month Follow-Up

		Dependent Variable: MDAT Score					
		Overall		Language/Hearing Skills		Fine Motor/Cognitive Skills	
		(1)	(2)	(3)	(4)	(5)	(6)
T2 (teacher training)		-0.092	-0.063	-0.041	-0.031	-0.134*	-0.106*
		(0.080)	(0.060)	(0.079)	(0.063)	(0.074)	(0.059)
T3 (T2 + teacher incentives)		0.013	-0.003	0.088	0.085	-0.081	-0.115*
		(0.081)	(0.067)	(0.084)	(0.072)	(0.075)	(0.065)
T4 (T2 + parenting training)		0.115	0.126*	0.183**	0.185**	0.008	0.012
		(0.086)	(0.067)	(0.087)	(0.071)	(0.075)	(0.061)
Lagged Dependent Variable (baseline)			0.510***		0.426***		0.444***
			(0.033)		(0.031)		(0.034)
Test for Equality of Parameters (p-value)	T2=T3	0.191	0.370	0.131	0.107	0.454	0.883
	T2=T4	0.007***	0.002***	0.005***	0.001***	0.033**	0.049**
	T3=T4	0.195	0.057*	0.266	0.167	0.199	0.045**
District-bin Fixed Effects?		Yes	Yes	Yes	Yes	Yes	Yes
Lagged Dependent Variable and Age Dummies?		No	Yes	No	Yes	No	Yes
Number of observations		1,936	1,936	1,936	1,936	1,936	1,936

Notes: Parameter estimates statistically different than zero at 99% (***), 95% (**), and 90% (*) confidence. Child-level OLS regressions using standardized test scores at the 18-month follow-up and baseline covariates with standard errors (SE) in parentheses. SE are clustered at the CBCC level and observations are weighted using sampling weights and tracking weights (for 42 observations randomly assigned to tracking).

TABLE 4: Impacts on SDQ - 18-Month Follow-Up

		Dependent variable:			
		Standardized SDQ Index		Standardized SDQ Prosocial Index	
Variables		**(1)**	**(2)**	**(3)**	**(4)**
T2 (teacher training)		0.039	0.062	0.098	0.111
		(0.065)	(0.061)	(0.079)	(0.078)
T3 (T2 + teacher incentives)		-0.098	-0.088	0.018	0.027
		(0.062)	(0.062)	(0.083)	(0.081)
T4 (T2 + parenting training)		-0.105*	-0.072	0.261***	0.252***
		(0.056)	(0.053)	(0.080)	(0.078)
Lagged Dependent Variable (baseline)			0.317***		0.143***
			(0.026)		(0.027)
Missing Lagged Dependent Variable (baseline)			0.076		0.032
			(0.099)		(0.086)
Test for Equality of Parameters (p-value)	T2=T3	0.037**	0.021**	0.325	0.310
	T2=T4	0.019**	0.021**	0.028**	0.052*
	T3=T4	0.897	0.781	0.003***	0.006***
District-bin Fixed Effects?		Yes	Yes	Yes	Yes
Lagged Dependent Variable and Age Dummies?		No	Yes	No	Yes
Number of observations		1,938	1,938	1,938	1,938

Notes: Parameter estimates statistically different than zero at 99% (***), 95% (**), and 90% (*) confidence. Child-level OLS regressions using standardized SDQ indices at the 18-month follow-up and baseline covariates with standard errors (SE) in parentheses. SE are clustered at the CBCC level and observations are weighted using sampling weights and tracking weights (for 42 observations randomly assigned to tracking).

TABLE 5: Impacts on Parenting Quality - 18-Month Follow-Up

		Dependent variable:							
				Parenting Quality Subcomponents:					
		Parenting Quality Index		Stimulation Index		Positive Practices Index		Parenting Stress Index (Inverted)	
Variables		**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
T2 (caregiver training)		-0.023	-0.018	-0.043	-0.022	-0.023	-0.028	0.018	-0.004
		(0.078)	(0.079)	(0.072)	(0.073)	(0.067)	(0.067)	(0.078)	(0.078)
T3 (T2 + caregiver incentives)		0.104	0.128	0.043	0.056	0.046	0.052	0.090	0.097
		(0.081)	(0.082)	(0.085)	(0.085)	(0.067)	(0.063)	(0.076)	(0.077)
T4 (T2 + parenting training)		0.267***	0.258***	0.294***	0.294***	0.104	0.097	0.088	0.078
		(0.074)	(0.073)	(0.075)	(0.073)	(0.064)	(0.061)	(0.072)	(0.073)
Baseline Control Variable (Baseline)			0.247***		0.246***		0.179***		-0.135***
			(0.028)		(0.030)		(0.025)		(0.027)
F-test for Equality of Parameters - p-value	T2=T3	0.109	0.072*	0.287	0.325	0.255	0.177	0.300	0.140
	T2=T4	0.000***	0.000***	0.000***	0.000***	0.024**	0.027**	0.281	0.213
	T3=T4	0.032**	0.088*	0.002***	0.003***	0.327	0.415	0.980	0.757
District-bin Fixed Effects?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged Dependent Variable and Age Dummies?		No	Yes	No	Yes	No	Yes	No	Yes
Number of observations		1,938	1,938	1,937	1,937	1,934	1,934	1,938	1,938

TABLE 6: Impacts on CBCC Outcomes - 18-Month Follow-Up

Variables	Dependent variable: Classroom Observation Index (1)	(2)	Total Enrollment (reported) (3)	(4)	Number of STC-trained Teachers (5)
T2 (caregiver training)	0.554**	0.555**	10.989	10.892**	1.492***
	(0.278)	(0.279)	(6.725)	(5.318)	(0.138)
T3 (T2 + caregiver incentives)	1.214***	1.205***	7.667	6.760	1.612***
	(0.281)	(0.286)	(6.815)	(5.390)	(0.140)
T4 (T2 + parenting training)	1.006***	0.996***	17.727***	13.418**	1.554***
	(0.270)	(0.277)	(6.534)	(5.190)	(0.135)
Lagged Dependent Variable (Baseline)		0.014		0.640***	
		(0.076)		(0.071)	
Mean (standard deviation) of dependent variable for the control group	0.000		63.289		0.000
	(1.000)		(25.003)		(0.000)
F-test for Equality of Parameters - p-value T2=T3	0.019**	0.024**	0.623	0.440	0.389
T2=T4	0.094*	0.112	0.297	0.622	0.645
T3=T4	0.446	0.445	0.129	0.205	0.668
District-bin Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Lagged Dependent Variable?	No	Yes	No	Yes	No
Number of observations	189	189	187	187	189

A few interesting findings about each domain…

1. The heterogeneity of program impacts on MDAT by baseline characteristics.

A few interesting findings about each domain…

1. The heterogeneity of program impacts on MDAT by baseline characteristics.

2. The primary caregivers more likely to report reading books to their children; chat and play with them; teach them to learn letters/numbers/shapes/colors.
    1. These effects are not heterogeneous by education → mothers with a PSLC in Malawi don't do many of these activities on their own (and many also have stunted children)

Summary (Teacher characteristics)

- Intervention schools have 1.5 more trained teachers at the 18-month follow-up.

- The intervention also caused the education level of the typical teacher in a CBCC to increase:
  - Leavers less likely to have a PSLC
  - Newcomers more likely to have a PSLC

36-month follow-up

Ouch!

TABLE 8: Impacts on Child Assessments - 36-Month Follow-Up

		Dependent variable: Assessment Score							
		Peabody Picture Vocabulary Test		Leiter Sustained Attention		Kaufman Assessment Battery for Children		Early Grade Math Assessment	
Variables		**(1)**	**(2)**	**(1)**	**(2)**	**(5)**	**(6)**	**(7)**	**(8)**
T2 (caregiver training)		0.077	0.057	-0.036	-0.038	0.015	0.034	-0.101	-0.083
		(0.095)	(0.092)	(0.079)	(0.076)	(0.085)	(0.085)	(0.075)	(0.065)
T3 (T2 + caregiver incentives)		0.161	0.146	0.044	0.023	0.051	0.046	-0.028	-0.031
		(0.109)	(0.104)	(0.075)	(0.068)	(0.085)	(0.086)	(0.075)	(0.066)
T4 (T2 + parenting training)		0.113	0.108	-0.005	-0.020	0.046	0.081	-0.040	-0.021
		(0.103)	(0.099)	(0.092)	(0.084)	(0.091)	(0.089)	(0.074)	(0.065)
Lagged Dependent Variable (Baseline)			0.203***		0.363***				
			(0.023)		(0.032)				
Malawi Developmental Assessment Tool: Fine Motor / Perception Skills (Baseline)							0.373***		0.384***
							(0.038)		(0.038)
F-test for Equality of Parameters - p-value	T2=T3	0.377	0.333	0.276	0.383	0.648	0.887	0.337	0.443
	T2=T4	0.686	0.556	0.692	0.815	0.690	0.553	0.405	0.366
	T3=T4	0.635	0.697	0.521	0.536	0.956	0.653	0.868	0.883
District-bin Fixed Effects?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Control Variable and Age Dummies?		No	Yes	No	Yes	No	Yes	No	Yes
Number of observations		2,009	2,009	2,029	2,029	2,027	2,027	2,027	2,027

TABLE 9: Impacts on Child's Behavioral Problems - 36-Month Follow-Up

		Dependent variable: Strengths and Difficulties Questionnaire Score			
		Total Difficulties (Inverted)		Prosocial	
Variables		**(1)**	**(2)**	**(3)**	**(4)**
T2 (caregiver training)		0.124**	0.099*	-0.059	-0.052
		(0.060)	(0.058)	(0.068)	(0.067)
T3 (T2 + caregiver incentives)		0.081	0.100	-0.005	-0.012
		(0.071)	(0.069)	(0.072)	(0.070)
T4 (T2 + parenting training)		-0.046	-0.048	0.020	0.002
		(0.063)	(0.060)	(0.074)	(0.071)
Lagged Dependent Variable (Baseline)			0.244***		0.107***
			(0.025)		(0.023)
Missing Lagged Dependent Variable (Baseline)			0.112		-0.209*
			(0.089)		(0.107)
F-test for Equality of Parameters (p-value)	T2=T3	0.511	0.985	0.386	0.525
	T2=T4	0.003***	0.006***	0.214	0.383
	T3=T4	0.057*	0.025**	0.720	0.833
District-bin Fixed Effects?		Yes	Yes	Yes	Yes
Lagged Dependent Variable and Age Dummies?		No	Yes	No	Yes
Number of observations		2,022	2,022	2,022	2,022

TABLE 10: Impacts on Parenting Quality - 36-Month Follow-Up

		Dependent variable:			
		Stimulation Index		Positive Practices Index	
Variables		**(1)**	**(2)**	**(3)**	**(4)**
T2 (caregiver training)		-0.045	-0.036	-0.051	-0.064
		(0.076)	(0.073)	(0.071)	(0.072)
T3 (T2 + caregiver incentives)		0.062	0.061	0.002	-0.013
		(0.082)	(0.081)	(0.067)	(0.068)
T4 (T2 + parenting training)		0.172**	0.164**	-0.067	-0.071
		(0.082)	(0.077)	(0.067)	(0.067)
Lagged Dependent Variable (Baseline)			0.207***		0.110***
			(0.030)		(0.032)
F-test for Equality of Parameters - p-value	T2=T3	0.138	0.180	0.454	0.444
	T2=T4	0.003***	0.005***	0.821	0.917
	T3=T4	0.150	0.186	0.315	0.379
District-bin Fixed Effects?		Yes	Yes	Yes	Yes
Lagged Dependent Variable and Age Dummies?		No	Yes	No	Yes
Number of observations		2,033	2,033	2,030	2,030

TABLE 11: Impacts on CBCC Outcomes - 36-Month Follow-Up

		Dependent variable:				
		Classroom Observation Index		Total Enrollment (reported)		Number of STC-trained Teachers
Variables		**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
T2 (caregiver training)		0.284	0.301	4.597	5.845	1.272***
		(0.303)	(0.305)	(7.963)	(6.795)	(0.143)
T3 (T2 + caregiver incentives)		0.335	0.324	-1.589	1.049	1.233***
		(0.290)	(0.292)	(7.624)	(6.514)	(0.137)
T4 (T2 + parenting training)		0.167	0.135	10.259	7.426	1.237***
		(0.291)	(0.298)	(7.645)	(6.534)	(0.137)
Lagged Dependent Variable (Baseline)			0.046		0.614***	
			(0.089)		(0.089)	
Mean (standard deviation) of dependent variable for the control group		0.000		67.545		0.000
		(1.000)		(42.738)		(0.000)
F-test for Equality of Parameters - p-value	T2=T3	0.864	0.940	0.432	0.475	0.782
	T2=T4	0.697	0.601	0.476	0.816	0.801
	T3=T4	0.557	0.517	0.118	0.326	0.981
District-bin Fixed Effects?		Yes	Yes	Yes	Yes	Yes
Lagged Dependent Variable?		No	Yes	No	Yes	No
Number of observations		178	178	178	178	178

Discussion

- Some promising 18-month effects, especially in the combined teacher training and parenting arm, have dissipated by the 36-month follow-up.
  - Not an issue of power
- Recent paper from Chile (Yoshikawa et al. 2015) shows similar results (changes at school not translating into improvements in child assessments).
- In light of the Araujo et al. (2016) findings, do we need to think more carefully about recruitment vs. training?

Discussion

- Apparently, this finding is not uncommon in this literature at all –Abecedarian, Perry Preschool, and Head start studies (Yoshikawa et al. 2013)
  - Convergence of test scores by primary school (especially in poorer settings) with long-term effects on earnings and criminal behavior…
- We're showing this for a case when parenting education is added to the mix:
  - Could a tweaked version be cost-effective?

Next steps…

- So, people are telling us to re-interview the sample about 10-12 years later…
- We may start by interviewing them next year – when the children will be aged 9-11…
- Possible next intervention: replicate the parenting intervention, but then randomly expose children to different quality primary schooling → "scaffolding"

CGs from baseline who had left by midline

	Control	Treatment	Total
No PSLC	24%	39%	35%
PSLC	36%	29%	31%
Total	32%	32%	32%

MDAT Fine motor skills

MDAT language and hearing skills

Heterogeneity of impacts

Variables	MDAT: Overall (1)	MDAT: Language/Hearing Skills (2)	MDAT: Fine Motor/Cognitive Skills (3)
T2 (caregiver training)	-0.056	-0.025	-0.096
	(0.061)	(0.063)	(0.061)
T3 (T2 + caregiver incentives)	-0.002	0.078	-0.103
	(0.067)	(0.071)	(0.066)
T4 (T2 + parenting training)	0.112	0.172**	-0.000
	(0.069)	(0.071)	(0.063)
T2 x Primary Caregiver has a PSLC (Baseline)	-0.077	-0.070	-0.009
	(0.142)	(0.144)	(0.163)
T3 x Primary Caregiver has a PSLC (Baseline)	-0.048	-0.144	0.074
	(0.137)	(0.151)	(0.145)
T4 x Primary Caregiver has a PSLC (Baseline)	0.268	0.510*	-0.044
	(0.194)	(0.267)	(0.155)
T2 x HAZ (Baseline)	-0.127*	-0.103	-0.124
	(0.067)	(0.063)	(0.078)
T3 x HAZ (Baseline)	-0.084	-0.087	-0.066
	(0.057)	(0.056)	(0.068)
T4 x HAZ (Baseline)	-0.083	-0.122**	-0.028
	(0.060)	(0.057)	(0.070)

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Heterogeneity of impacts

Variables	MDAT: Overall (1)	MDAT: Language/Hearing Skills (2)	MDAT: Fine Motor/Cognitive Skills (3)
T2 (caregiver training)	-0.056	-0.025	-0.096
	(0.061)	(0.063)	(0.061)
T3 (T2 + caregiver incentives)	-0.002	0.078	-0.103
	(0.067)	(0.071)	(0.066)
T4 (T2 + parenting training)	0.112	0.172**	-0.000
	(0.069)	(0.071)	(0.063)
T2 x Primary Caregiver has a PSLC (Baseline)	-0.077	-0.070	-0.009
	(0.142)	(0.144)	(0.163)
T3 x Primary Caregiver has a PSLC (Baseline)	-0.048	-0.144	0.074
	(0.137)	(0.151)	(0.145)
T4 x Primary Caregiver has a PSLC (Baseline)	0.268	0.510*	-0.044
	(0.194)	(0.267)	(0.155)
T2 x HAZ (Baseline)	-0.127*	-0.103	-0.124
	(0.067)	(0.063)	(0.078)
T3 x HAZ (Baseline)	-0.084	-0.087	-0.066
	(0.057)	(0.056)	(0.068)
T4 x HAZ (Baseline)	-0.083	-0.122**	-0.028
	(0.060)	(0.057)	(0.070)