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Introduction

- Adherence to behavioral prevention intervention program is a prerequisite
- Many behavioral trials that reported poor participants attendance may result in less desired outcomes
- Inconsistent findings on factors associated with attendance with regard to age, education, gender, marital status, income, depressive symptoms and weight status (e.g. for weight gain prevention intervention)
- Intent-to-treat philosophy (ITT) estimates the intervention effect, but ignores attendance. In contrast, Complier Average Causal Effect (CACE) model accounts for compliance to interventions
- This study extended our previous study based on ITT that did not find an intervention effect at 6 month follow up and assessed whether there was a significant intervention effect on promotion of physical activity and reduction of BMI (mothers) or BMI zscore (toddlers) among mother-toddler dyads who complied to the intervention with CACE analyses

Methods

Study Design

- Toddler Obesity Prevention (TOPS) intervention, a randomized controlled trial among 277 mothers (mean age=27.3 yrs) and their toddlers (mean age=20.1 months) in 2009-2013.
- Three groups:
 - Tot-Tops (n=92): Responsive parenting intervention to provide healthy toddler meal and promote toddler physical activity (PA)
 - Mom-Tops (n=94): Maternal lifestyle intervention focusing on maternal diet and PA
 - Attention control group (n=91): Home safety intervention with no mention of diet or PA
- Each intervention included **eight** sessions (four group sessions, three individual telephone coaching sessions and a final group session) over 4 months, based on the Triple-P (Positive Parenting Program) model (Sanders, Kirby, Tellegen, & Day, 2014)

Measures

- Outcomes: (baseline, 6 months)
 - Maternal and toddler physical activity-- ankle accelerometry (Phillips Respironics, Inc.)
 - Maternal BMI; BMI-for-age z scores and percentiles for toddlers calculated based on WHO standards (WHO, 2006)
- Baseline characteristics:
 - Age; race/ethnicity (AA vs. other), marriage (Married vs. other), education (<HS graduate vs. >= HS graduate), income (<100% poverty level vs. higher), and toddler sex (M vs. F).
 - Depressive symptoms: Beck Depression Inventory (BDI); higher score indicating more symptoms
 - Parental BMI
- Compliers defined as >=5 sessions out of 8 (49.5% compliers in Mom-Tops, 54% in Tot-Tops)

Statistical analysis

- Baseline characteristics in relation to adherence within each intervention group
- Poisson Regression Models were used to estimate the rate ratios of attendance with regard to baseline predictors (Chen, Qian, Shi, & Franklin, 2018).
- **Complier Average Causal Effect Model (latent change score combined with mixture modeling)**

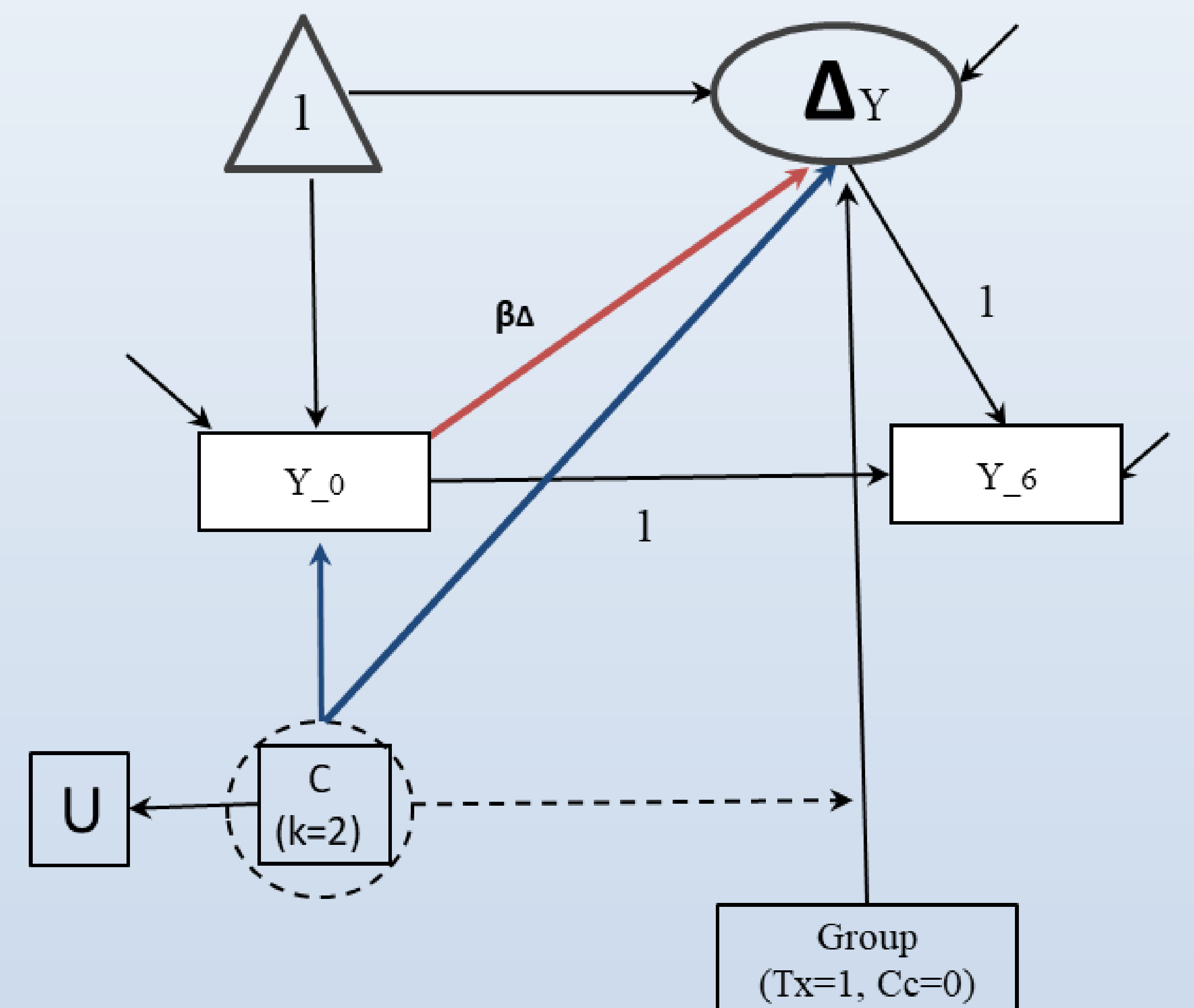


Figure 1. Univariate CACE latent change score model

Results

- Mean number of attendance is 3.8 (SD=3.1) in the Mom-Tops and 4.2 (SD=3.4) in the Tot-Tops
- Low education is associated with low attendance in both groups
- Poverty was related to high attendance while being non-married, depressive symptoms and high parental BMI are associated with low attendance in Tot-Tops group only.
- For MVPA, there was no intervention effect at 6 months in ITT analysis. However, there were significant intervention effects on promoting MVPA of both mothers and toddlers in Mom-Tops group (vs. control), but the effect was significant only for toddlers, not for mothers in Tot-Tops group based on the CACE analyses
- No effects on BMI for mothers or BMI zscore for toddlers were found in either Mom-Tops or Tot-Tops group

Table 1. Rate ratio estimates of attendance among intervention groups

Covariates	Mom-TOPS		Tot-TOPS	
	RR (95% CI)	p-value	RR (95% CI)	p-value
<i>Maternal characteristics</i>				
Age	1.02(0.99, 1.04)	0.286	1.02(1.00, 1.05)	0.112
Poverty (< 100% poverty level)	1.24(0.81, 1.91)	0.335	1.50(1.01, 2.23)	0.044
Lower than high school graduate	0.55(0.33, 0.91)	0.019	0.53(0.30, 0.95)	0.032
African American	0.88(0.57, 1.35)	0.548	0.83(0.58, 1.19)	0.316
Not married	1.14(0.70, 1.86)	0.596	0.59(0.42, 0.83)	0.003
Depressive symptoms	1.02(1.00, 1.03)	0.063	0.97(0.94, 1.00)	0.05
Baseline BMI	0.99(0.97, 1.01)	0.274	0.98(0.96, 1.00)	0.044
<i>Toddler characteristics</i>				
Age	1.03(1, 1.06)	0.078	1.00(0.97, 1.03)	0.988

Table 2 Estimates of TOPS intervention effects from baseline to 6 months by CACE modeling, n=277

Effects	Mom-Tops vs. Control group		Tot-Tops vs. Control group	
	CACE	ITT	CACE	ITT
	Est. (SE)	Est. (SE)	Est. (SE)	Est. (SE)
Toddler MVPA, min/day	67.03 (18.25)***	9.96(10.1)	77.81 (19.73)***	18.67(9.96)
Mother MVPA, min/day	11.36(4.89) *	2.38(4.56)	3.47 (4.34)	0.84(4.58)
Toddler BMI, z score	0.27 (0.24)	0.15(0.13)	0.04 (0.19)	0.18(0.13)
Mother BMI score	-0.29 (0.74)	-0.30(0.34)	-0.41(0.35)	-0.29(0.34)

Note: *: p<.05; **: p<.01; ***: p<.001; Mom's age, marital status, poverty level, racial/ethnicity, education, baseline depressive symptoms and toddler's age were included in models

Discussion

- CACE modeling extended ITT analysis by assessing the intervention efficacy.
- The intervention effects on MVPA among the participants who complied to the intervention suggest that compliance has played critical role in the success of the intervention programs
- Behavioral intervention programs may consider the integration of promotion of compliance, especially among the mothers with high depressive symptoms and high BMI.