

Breastfeeding and childhood obesity

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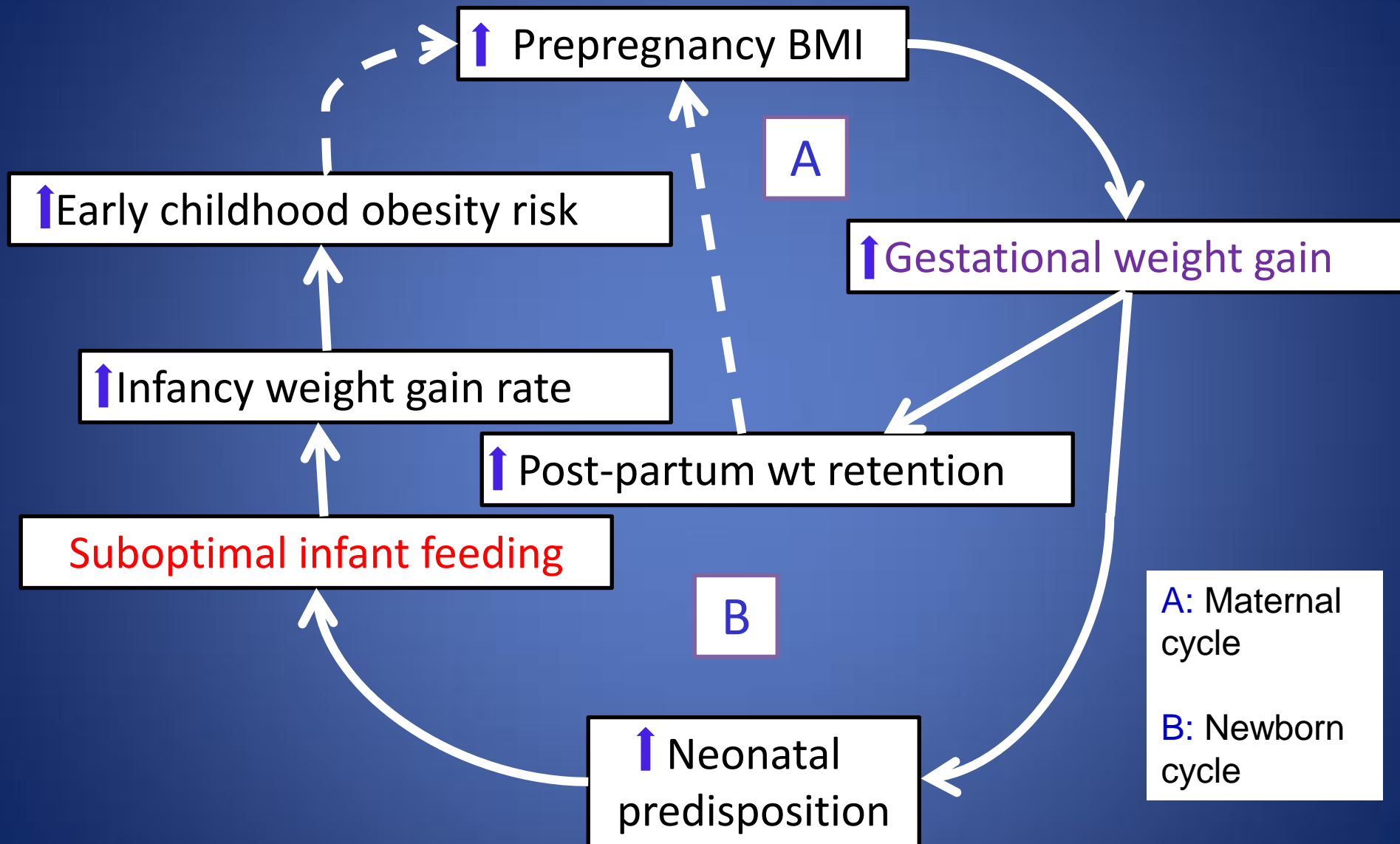
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Childhood Obesity Solutions Workshop

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Maternal-child life course obesity cycle



Why breastfeeding?

Geddes & Prescott JHL 2013

- **Energy intake self-regulation** (Pérez-Escamilla, AJCN 1995)
 - Cues related to changes in milk composition during feeding episode
 - FF mom's control more amount ingested by infant
- **Insulin profile** (Koletzco, AJCN 2009)
 - BM has lower protein content than infant formula
- **Taste preferences** (Mennella, AJCN 2013)
 - Breastfeed babies exposed to more diversity of flavors
- **Wt gain between 3-12 mo**
 - Higher in FF infants (Dewey 1998)

Long-term consequences of **breastfeeding** on cholesterol, **obesity**, systolic blood pressure, and type-2 diabetes: systematic review and meta-analysis

Horta et al. Acta Paed 2015

- Updates previous SR (thru August 2014)
- 105 studies (113 estimates)
 - Low, middle and high income countries
 - Observational, quasi-experimental & experimental
 - 37 new publications between Sep 2011 and August 2014
- Variation in BF exposure/comparison groups across studies
- Obesity assessed between 1 and > 20 years
- Meta-regression
 - Effect modification by study characteristics
- **Overweight/Obesity OR [95% CI]:0.74 [0.70-0.78]**

Table 1. Breastfeeding and the risk of overweight and obesity in later life: Random-effects meta-analyses of risk of overweight/obesity by subgroup.

Subgroup analysis	Number of estimates	Pooled odds ratio and 95% confidence interval	P-value	% heterogeneity explained
Age group				
1 to 9 years	74	0.74 (0.68; 0.79)	< 0.001	9.1
10 to 19 years	25	0.63 (0.54; 0.73)	< 0.001	
≥ 20 years	14	0.88 (0.82; 0.94)	< 0.001	
Study size				
< 500 participants	28	0.53 (0.44; 0.63)	< 0.001	16.2
500 – 1499 participants	31	0.66 (0.58; 0.75)	< 0.001	
≥ 1500 participants	46	0.81 (0.76; 0.87)	< 0.001	
Year at birth				
Before 1980	16	0.88 (0.82; 0.94)	< 0.001	13.6
After 1980	65	0.73 (0.68; 0.79)	< 0.001	
Study design				
Cohort	54	0.79 (0.73; 0.85)	< 0.001	11.6
Case-control	10	0.68 (0.48; 0.94)	0.02	
Cross-sectional	41	0.67 (0.61; 0.74)	< 0.001	
Length of recall of breastfeeding				
< 3 years	44	0.78 (0.72; 0.85)	< 0.001	4.7
≥ 3 years	61	0.70 (0.65; 0.76)	< 0.001	

Table 1. Breastfeeding and the risk of overweight and obesity in later life: Random-effects meta-analyses of risk of overweight/obesity by subgroup.

Subgroup analysis	Number of estimates	Pooled odds ratio and 95% confidence interval	P-value	% heterogeneity explained
Control for confounding				
None	28	0.69 (0.60; 0.80)	< 0.001	5.6
Adjusted for socioeconomic status only	6	0.64 (0.53; 0.76)	< 0.001	
Also adjusted for birth condition	22	0.73 (0.67; 0.79)	< 0.001	
Also adjusted for parental anthropometry	49	0.79 (0.73; 0.85)	< 0.001	
Setting				
High income country	71	0.73 (0.68; 0.78)	< 0.001	0.0
Middle/low income country	34	0.76 (0.67; 0.85)	< 0.001	
Categorization of breastfeeding				
Ever breastfed	26	0.77 (0.69; 0.86)	< 0.001	0.0
Breastfed for a given number of months	54	0.74 (0.68; 0.80)	< 0.001	
Exclusively breastfed for a given number of months	24	0.69 (0.61; 0.79)	< 0.001	
Total*	113	0.74 (0.70; 0.78)		

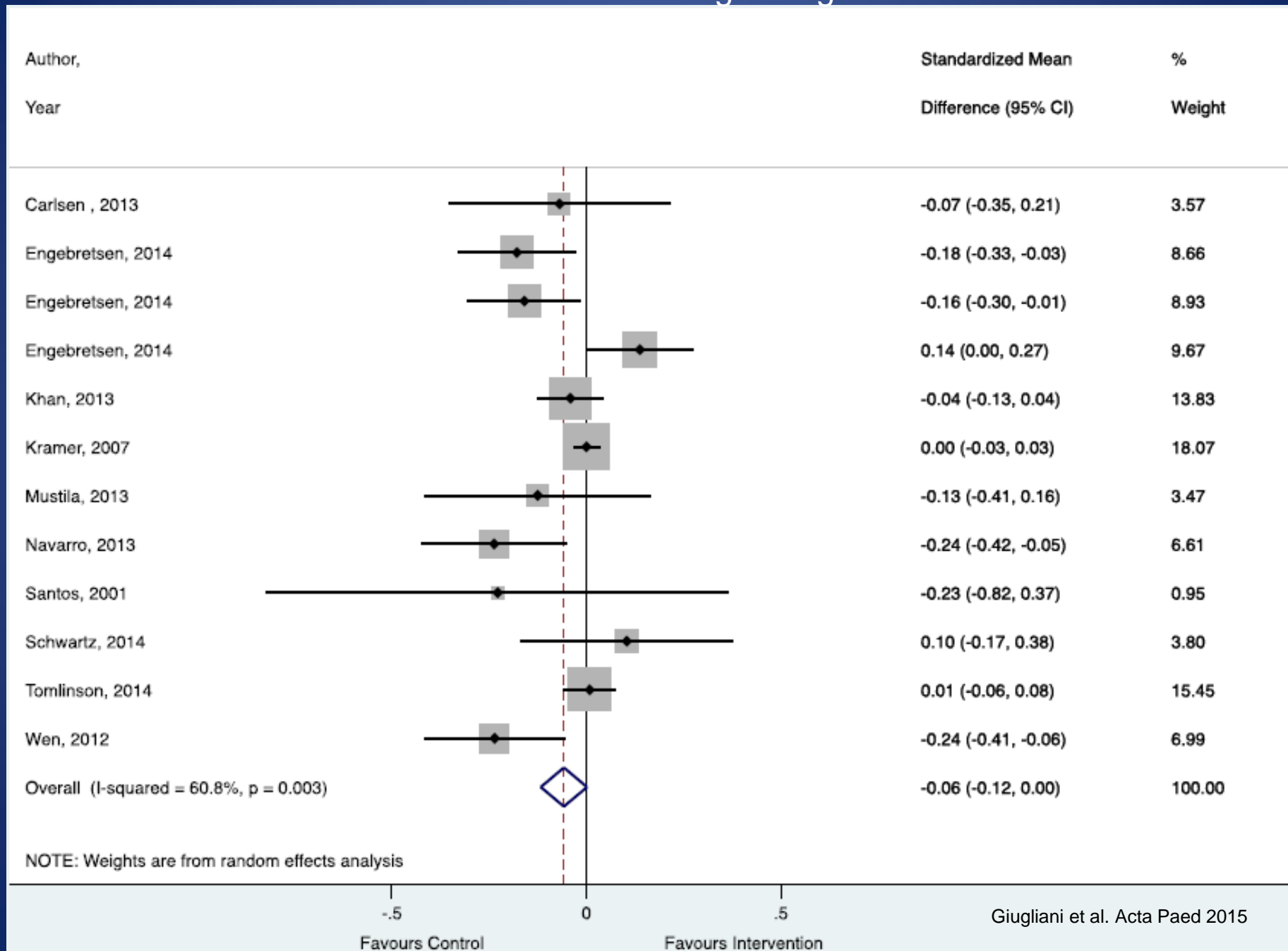
***High quality studies (n=11) OR [95% CI]: 0.87 [0.76-0.99]**

Effect of **breastfeeding** promotion interventions on **child growth**: a systematic review and meta-analyses

Giugliani et al. Acta Paed 2015

- SR updated thru December 2014
- N=35 studies
- 12 studies reported BMI or wt/ht
 - 10 RCTs, e quasi-experimental
- Countries
 - High income: Australia, Denmark, Finland
 - Middle income: Belarus, Brazil, Dominican Republic, South Africa
 - Low income: Bangladesh, Burkina Faso, Uganda
- Interventions: Facility and or community based BF promotion and support
- Age at anthropometric assessments: 3 mo to 8.5 y

Standardized mean differences in BMI or weight/length



Standardized mean differences in BMI or weight/length

Study characteristic	Standardized mean difference (95% confidence interval)	% heterogeneity explained	N
Year of publication			
< 2006	-0.23 (-0.82; 0.37)	0	1
> 2010	-0.06 (-0.12; 0.00)		11
Level of evidence			
1++	-0.08 (-0.17; 0.02)	0	5
1+/1-/2	-0.05 (-0.13; 0.03)		7
Mean age at anthropometric assessment			
≤ 6 months	-0.05 (-0.16; 0.05)	0	6
> 6 months	-0.08 (-0.17; 0.02)		6
Intervention setting			
Community	-0.09 (-0.18; 0.01)	0	7
Health facility or other	0.00 (-0.03; 0.03)		5
Country			
Low income	-0.11 (-0.20; -0.02)	44.8	3
Middle income	0.00 (-0.07; 0.07)		6
High income	-0.18 (-0.31; -0.04)		3
Sample size			
< 500	-0.15 (-0.26; -0.05)	36.3	6
≥ 500	-0.03 (-0.09; 0.04)		6
Overall	-0.06 (-0.12; 0.00)		12

Effect modification: Child genetic propensity?

Beyerlein & Von Kries (2011)

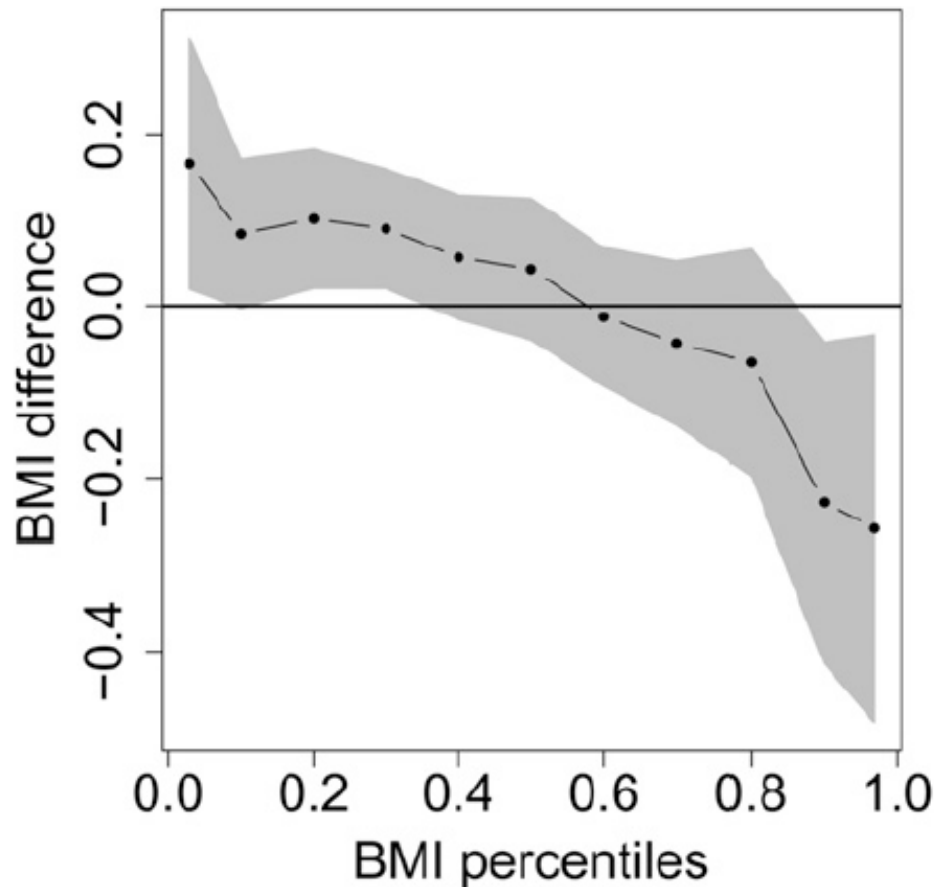
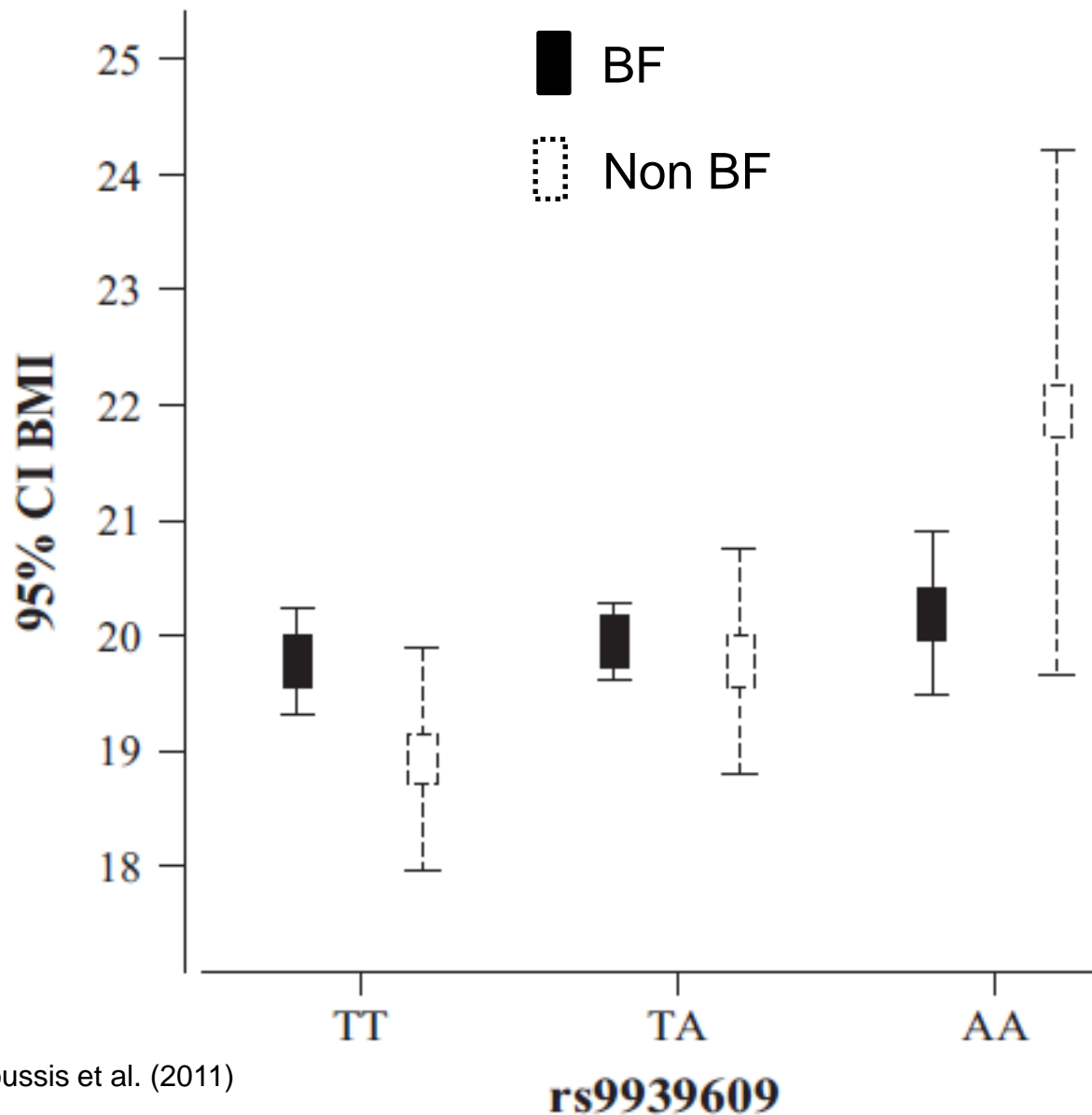


FIGURE 1. Point estimates (95% CIs) for BMI differences between breastfed and formula-fed children for specific BMI percentiles (0.03 percentile, 0.1–0.9 deciles, and 0.97 percentile) in multivariable quantile regression models including sex, age, maternal smoking in pregnancy, television watching, parental education, maternal BMI, and child's weight gain in the first 2 y. The analyses were performed with data on 14,412 preschool children in Bavaria, southern Germany, from 1999 and 2002.

Does a short breastfeeding period protect from *FTO*-induced adiposity in children?

Dedoussis et al. Int J Ped. Obes. (2011)



In non-breastfed children, carriers of the AA allele had higher adiposity indices. No differences in BMI among the *FTO* genotype groups were observed in breastfed children. **GENDAI cohort study-Greece.**

BF X FTO Interaction:

Australian boys with TA or AA genotype

- **<2 months only breast milk:** median BMI among 14 y old boys is in the overweight category
- **2 to 4 months only breast milk :** <20% of boys are in the overweight category
- **At least 5 months only breast milk :** no boys are overweight

Conclusions

- **BF associated with childhood obesity prevention in the general population**
 - Small effect size not surprising given the constellation of factors that influence obesity
 - Need prospective studies that carefully measure EBF duration
- **BF protection, promotion and support should form part of childhood obesity prevention strategies**
 - **Baby Friendly Hospital Initiative** (*Pérez-Escamilla, J Nutr 2007; CDC, MMWR 2015*)
 - **BF peer counseling** (*Chapman et al. JHL 2010*)
 - **BF protection policies** (*Hawkins et al. J Epi Comm Hlth 2013; Smith-Gagen et al. Matern Child Health J 2014*)

Research recommendations

- **BF X genetic predisposition seems promising for further epidemiologic and basic mechanistic research**
(Geddes & Prescott JHL 2013)
- Examine other maternal-child life course effect modifiers as well
 - pre-pregnancy BMI
 - gestational weight gain
 - timing of introduction and type of complementary feeding *(Daniels et al. Aust New Zealand J Publ Hlth 2015)*