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Symposium Title: *Families and Schools for Health: A Multidisciplinary Approach to Understanding and Preventing Childhood Obesity*

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Symposium title: *Families and Schools for Health: A Multidisciplinary Approach to Understanding and Preventing Childhood Obesity*

Presentation title: *An Interdisciplinary Model of Childhood Obesity: Bridging Developmental, Family, and Nutritional Science Approaches*

As the problem of childhood obesity increases, researchers have begun to recognize that more complex models are needed to guide their work. Nutritional scientists have identified some correlates of child obesity that are considered within the traditional purview of child development, such as low self-esteem and peer teasing (see reviews by Daniels, 2006, and French, Story, & Perry, 1995). Family scientists and researchers interested in weight management programs also are beginning to recognize the import of family process variables in the development or maintenance of child overweight (see recent reviews by Kitzmann, Dalton, & Buscemi, 2008, and Rhee, 2008). The purpose of this poster/presentation is to present a conceptual model based on an integration of findings from developmental science, family science, and nutritional science. Our goal is to provide an integrative conceptual framework for previous and continuing research, to spark the interest of child developmentalists who might add their expertise to the study of child obesity, and to identify mediating paths as points of entry for intervention and prevention programs needed to slow the obesity epidemic.

In a 2006 editorial for the American Dietetic Association, Baranowski, a nutritional science leader in the study of child obesity, argued that interventions designed to effect change in dietary behavior need to target mediating variables that can be manipulated, and that basic behavioral research should guide the identification and testing of such mediating variables. We believe the field of child development has much to offer in identifying key social science variables that may both predict overweight and mediate between overweight and variables

already identified in other areas of science. This type of interdisciplinary approach—that bridges multiple disciplines to answer applied questions—is being called for more and more frequently in the areas where health and social science overlap (e.g., Albrecht, Freeman, & Higginbotham, 2004; Gambescia et al., 2006; Board on Health Promotion and Disease Prevention, 2003).

Our conceptual model is presented in *Figure 1*. Realms of child development identified as being potentially significant for understanding the development and maintenance of overweight include both *family* and *peer interpersonal contexts*. Child *intrapersonal* variables proposed as mediators between these contexts and weight outcomes include negative psychological status and poor self-awareness and self-regulation. Child *behavioral* mediators include emotional and external eating and avoidant and aggressive behavior. Note also that the three interpersonal contexts (family lifestyle, family dynamics, and peer group behavior) represent three components of an intervention program implemented by our team (see Paper 5).

Child development researchers are encouraged to add their expertise to the study of child overweight by using models such as this for hypothesis generation and testing, so that, ultimately, intervention/prevention efforts may be improved.

Note: The model being presented is a substantial revision of a model originally presented as a poster at SRCD in 2006, and serves as an introduction for the subsequent four papers.

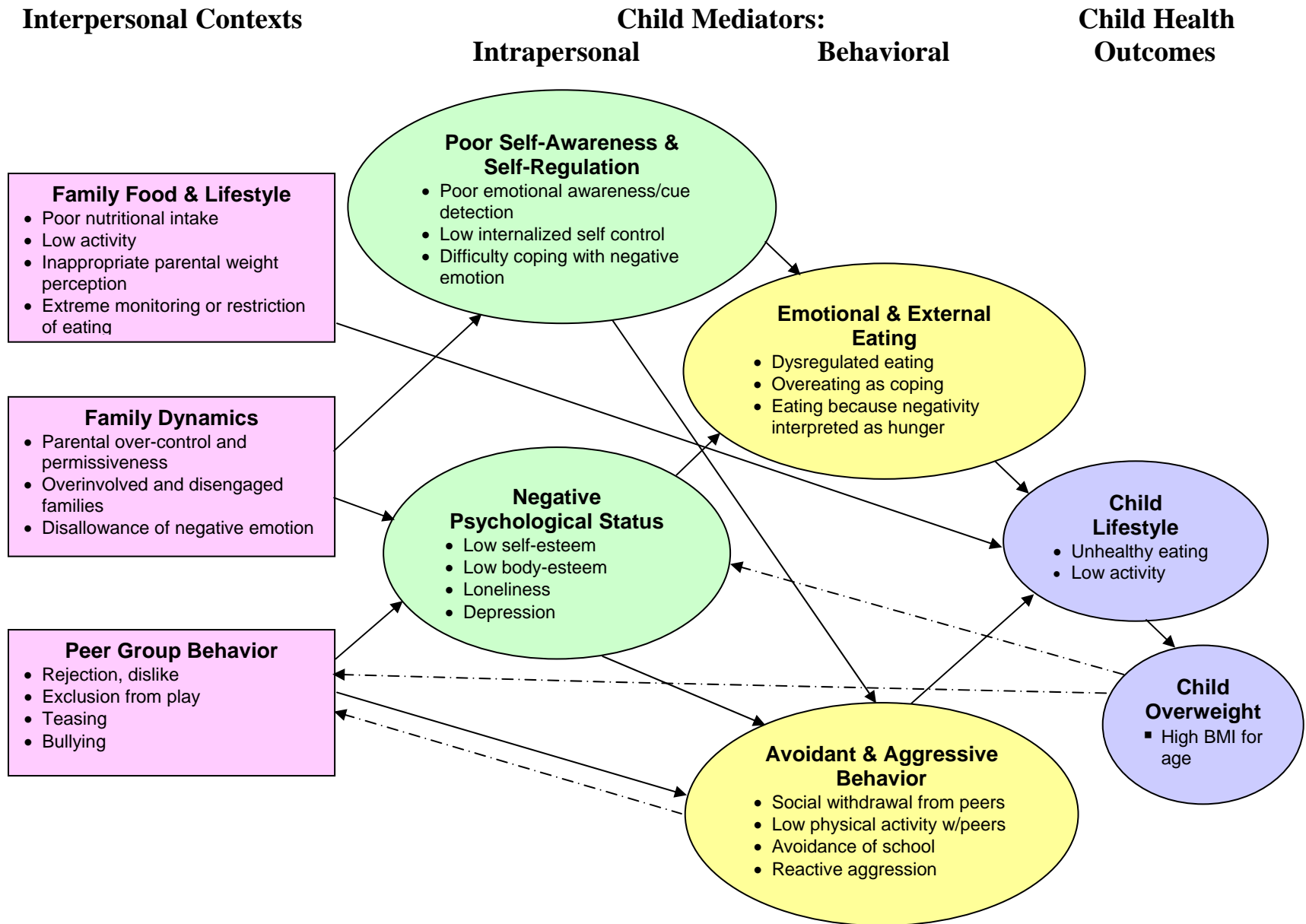


Figure 1. Conceptual model of relations among environmental contexts, child mediators, and child health outcomes.

Symposium title: *Families and Schools for Health: A Multidisciplinary Approach to Understanding and Preventing Childhood Obesity*

Presentation title: *Physical Activity and Fitness Level of Low-income Rural 3rd Grade Children*

More than 20% of U.S. children and adolescents are overweight or obese, with low-income children being at a higher risk for overweight compared to general population. Because regular physical activity is one of the key determinants of energy balance and successful maintenance of healthy weight among children, the purpose of this study was to determine the amount of moderate and vigorous activity and the fitness level of low-income 3rd grade children living in rural Oklahoma. Twelve rural schools participating in a large multidisciplinary research project, *Families and Schools for Health (FiSH)*, were randomly selected for the study.

Children's height and weight were measured and BMI-for-age percentile was calculated for each child. The modified Self-administered Physical Activity Checklist (SAPAC) was utilized to determine the amount, intensity and type of physical activity children engaged in. Children's fitness level was determined using the Curl-up, Sit & Reach, and Pacer, which are part of the FITNESSGRAM battery test. The fitness level of children was measured during regular PE classes. Descriptive statistics and Analysis of Variance were used to describe the sample and compare physical activity levels between the children based on weight status. A total of 257 children completed the modified SAPAC and/or fitness assessment, including 141 males and 116 females. Children were 9.1 ± 0.4 years old, with 193 White, 42 Native American, 8 Hispanic, 4 African American, 1 Asian and 5 "other" children. Mean BMI-for-age percentile was 67.8 ± 28.4 . Thirty-eight percent of children were at risk for overweight (BMI-for age of $\geq 85^{\text{th}} < 95^{\text{th}}$ BMI) or overweight (BMI-for-age of $\geq 95^{\text{th}}$), with 16.3% of children at risk for overweight and 21.4%

overweight. On average, children spent 90.1 ± 83.3 and 32.3 ± 47.5 minutes in moderate and vigorous activities. Analysis of Variance revealed that overweight children spent significantly less time in moderate physical activity ($p < 0.05$) and combined moderate and vigorous activity compared to other children ($p < 0.05$). Thirty one percent of children in our sample spent less than 60 minutes in moderate or vigorous physical activity. In addition, 44.5% of children who completed the fitness assessment did not meet the age- and gender-specific fitness standard for curl-up test and 35.0% did not meet the standard for the Sit & Reach test. The results of our study indicate that low-income rural children in our sample suffer from high prevalence of overweight and poor physical fitness. Furthermore, nearly one third of the children in our sample are not moderately or vigorously active for at least one hour a day as recommended by the 2005 Dietary Guidelines for Americans. Because there is a direct relationship between overweight, physical activity, and fitness, our findings suggest that school-aged children living in low-income rural areas should increase their physical activity level and engage in a minimum of 60 minutes of moderate and/or vigorous exercise on a daily basis in order to maintain a healthy weight, prevent future weight gain, and improve physical fitness.

Symposium title: *Families and Schools for Health: A Multidisciplinary Approach to Understanding and Preventing Childhood Obesity*

Presentation title: *Child Overweight and Parental Concern in First Grade: Links to Parental Feeding Behaviors, and Parenting Style*

Recent reports vary in the degree to which: (a) parental feeding practices are linked to child weight (Kroller & Warschburger, 2008; May et al., 2007), (b) parenting styles are linked to child weight (Agras, Hammer, McNicholas, & Kraemer, 2004; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006), (c) parental concern about child overweight is linked to actual child overweight (May et al.; West et al., 2008), (d) parental concern about child overweight is linked to parental feeding practices (Birch & Fisher, 2000; May et al.). In the current report we examined the match between parental concern and child overweight. Further, we tested the hypothesis that parental concern and child BMI would differentially predict parental feeding practices and authoritarian parenting style. Divergent relations of parental concern versus child overweight to parenting practices and styles would explain inconsistency in previous reports because many did not measure parental concern. We also examined the variance in child BMI explained by parental concern, feeding practices, and style.

Participants were parents and their 405 first-grade children in rural schools. Child height and weight to compute body mass index (BMI) were measured in Fall 2005 or 2006 during baseline data collection for a randomized child overweight intervention. Underweight children (BMI < 5th percentile) were excluded from this report. One question from the Child Feeding Questionnaire (CFQ, Birch et al., 2001) assessed parental concern: “How concerned are you about your child becoming overweight?” Responses were “very concerned (4)” to “unconcerned

(1)". Three subscales of the CFQ measured feeding practices: responsibility (e.g., how often are you responsible for deciding what your child's portion sizes are?); restriction; pressure to eat. Authoritarian parenting was assessed by the Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen, & Hart, 2001).

Whereas 292 children (73.4%) were normal weight ($< 85^{\text{th}}$ percentile and $\geq 5^{\text{th}}$ percentile), 59 (14.8%) were at risk for overweight ($\geq 85^{\text{th}}$ but $< 95^{\text{th}}$ percentile), and 47 (11.8%) were overweight ($\geq 95^{\text{th}}$ percentile). Weight groups were associated with parental concern, $\chi^2(6, N = 398) = 119.95, p < .000001$. Only 2/47 parents of overweight children were "unconcerned," compared to 18/59 parents of children at risk for overweight and 192/292 parents of normal weight children.

Correlations among parental concern, child weight group, feeding practices, and authoritarian parenting are presented in Table 1. Preliminary regressions evaluating the relation of parental concern and child BMI percentile to parental feeding practices and authoritarian style are presented in Table 2. Consistent with previous research, we controlled for gender in the regression analyses. In support of our hypothesis, child BMI significantly predicted responsible and pressure to eat, whereas parental concern significantly predicted restriction. Both predicted authoritarian style but in opposite directions. In analyses conducted with concern, feeding, and style as predictors of weight groups, parental concern explained 27% of the variance and feeding and style explained an additional 6% ($p = .00001$).

These results confirm the importance of controlling for parental concern about overweight. With concern controlled, feeding and styles were still significantly linked to child weight status.

Table 1. *Intercorrelations among child weight groups, parental concern, parental feeding practices, and authoritarian style*

	Child weight groups	Concern	Responsible	Restrict	Pressure	Authoritarian
Concern	0.499***					
Responsible	-0.136**	-0.101*				
Restrict	0.143**	0.258***	0.000			
Pressure	-0.283***	-0.130**	0.121*	0.253***		
Authoritarian	-0.021	0.116*	-0.054	0.176***	0.242***	
Child gender	-0.017	0.128**	0.039	-0.040	-0.108*	-0.025

* $p < 0.05$; ** $p < 0.01$; *** $p < .001$

Note. Weight groups are normal weight (=1), at risk for overweight (=2), and overweight (=3).

Table 2. Hierarchical regression predicting parental feeding or authoritarian style from concern and child weight status

Outcome Block and Predictors	Statistics			Coefficients			
	ΔR^2	df	<i>P</i>	β	B	SE	<i>P</i>
<i>Responsible</i>							
1 – Gender	.001	1, 389	.553	.030	.034	.058	.553
2 – Concern and BMI	.035	2, 387	.001				
Parental concern				-.033	-.018	.030	.544
Child BMI percent				-.172	-.004	.001	.002
<i>Restrict</i>							
1 – Gender	.001	1, 387	.536	-.031	-.041	.066	.536
2 – Concern and BMI	.083	2, 385	.000				
Parental concern				.303	.190	.034	.000
Child BMI percent				-.039	-.001	.001	.468
<i>Pressure to eat</i>							
1 – Gender	.015	1, 387	.017	-.121	-.227	.095	.017
2 – Concern and BMI	.078	2, 385	.000				
Parental concern				-.002	-.002	.049	.975
Child BMI percent				-.278	-.011	.002	.000
<i>Authoritarian</i>							
1- Gender	.000	1, 387	.749	-.016	-.013	.041	.749
2 – Concern and BMI	.026	2, 385	.007				
Parental concern				.170	.066	.021	.002
Child BMI percent				-.107	-.022	.001	.051

Note. ΔR^2 refers to the change in R^2 , the unique variance explained by each block in the regression. β is the standardized and B is the non-standardized regression coefficient. SE is the standard error of B.

Symposium title: *Families and Schools for Health: A Multidisciplinary Approach to*

Understanding and Preventing Childhood Obesity

Presentation title: *Maternal Depression and Socioeconomic Status Moderate the Parenting Style/Child Obesity Association*

The purpose of this study was to determine the relation between authoritarian and permissive parenting and child obesity and to test the moderating influence of two risk factors--maternal depression and socioeconomic status (SES)--on the association between authoritarian and permissive parenting styles and child obesity (see *Figure 1*). One hundred eighty-one mothers of first-grade children (108 boys; 73 girls; *M* age = 6.87; *SD* = .38) participated in the study. Parents were sent questionnaire packets either through the mail or through their child's school. Parents completed questionnaire packets during Spring 2006. Children's height and weight were recorded at the children's schools during Fall 2005. Child body mass index (BMI)-for-age was calculated using child height, weight, gender, and age. Child Obesity was defined as BMI-for-age at $\geq 95^{\text{th}}$ percentile. The BMI-for-age percentiles were used to create a dichotomous variable with two levels, obese ($\geq 95^{\text{th}}$ percentile; *n* = 18) and non-obese ($< 95^{\text{th}}$ percentile; *n* = 163).

SES was computed from parent education and occupational status using the four-factor Hollingshead index (Hollingshead, 1975). Authoritarian ($\alpha = .75$) and permissive parenting ($\alpha = .72$) styles were assessed using the Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson et al., 2001), a 32-item instrument scored on a 5-point scale (1=never to 5=always). Scores were computed for each parenting style by calculating the mean of the items associated

with that style. Parental depression ($\alpha = .90$) was measured by the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), a 20-item instrument scored on a 4-point (0 to 3) Likert-type scale. Based on Beekman et al. (1997), the ratings were totaled across items and a cut-off score of 16 was used to classify mothers as depressed ($n = 36$) or non-depressed ($n = 145$).

Analyses revealed a significant moderator effect for maternal depression on the relationship between permissive and child obesity ($\chi^2(1) = 3.94$, $b = 2.33$, $p = .05$, $OR = 9.28$). Significance tests for the simple slopes of permissive indicated that the simple slope for the depressed regression line was significant, $\chi^2(1) = 3.70$, $b = 1.91$, $p = .05$, $OR = 6.74$. Analyses also revealed a significant interaction between permissive and *SES*, $\chi^2(1) = 4.04$, $b = .09$, $p = .04$, $OR = 1.09$. The simple slope for the high SES regression line was significant, $\chi^2(1) = 3.80$, $b = 1.20$, $p = .05$, $OR = 3.47$, whereas the simple slope for the low SES regression line was not significant.

Results suggest that maternal depression and SES interact with permissive parenting style to predict child obesity (see *Figure 2*). For each one-point increase in permissiveness among depressed mothers, the odds of their children being obese increase by 6.74. For mothers of high SES, as permissive parenting increased so did the odds of their children being obese; whereas, for mothers of lower SES, permissive parenting was not significantly related to child obesity. Results are interpreted as indicating that maternal depression and parenting style should be addressed in conjunction with treatment of child obesity and overweight.

Figure 1. Hypothesized moderating influences of maternal depression and socioeconomic status on the relation between authoritarian and permissive parenting styles and child obesity.

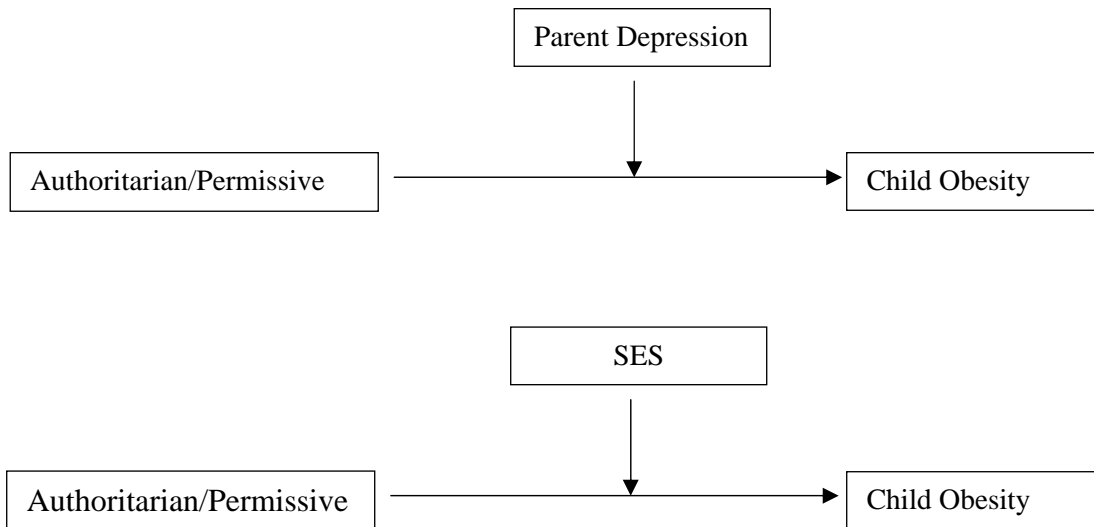


Figure 2a. Depiction of the moderating effect of depression on the relationship between permissiveness and child overweight.

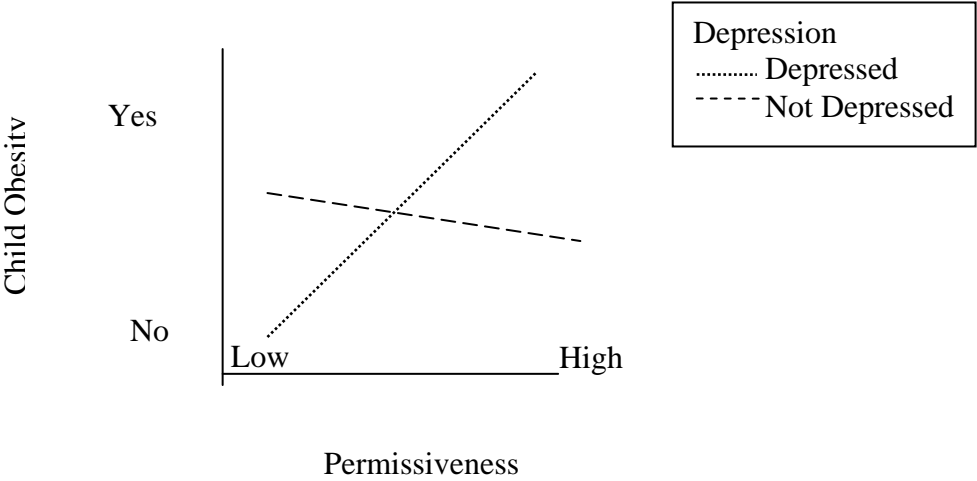
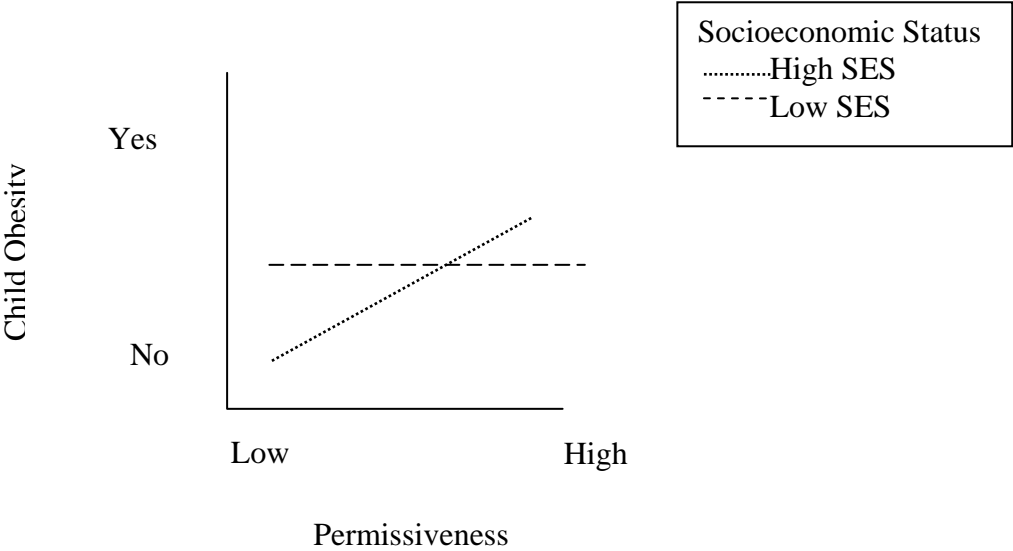


Figure 2b. Depiction of the moderating effect of socioeconomic status on the relationship between permissiveness and child overweight.



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Presentation title: *Preliminary Findings from the Families and Schools for Health (FiSH)*

Intervention

Traditional obesity interventions for children have focused on eating and exercise, and have either not been successful or have had only short-term impact (Flodmark, 2005; Haddock, Shadish, Klesges, & Stein, 1994). Family involvement, if included, has not targeted psychosocial dynamics, and peer involvement has been almost nonexistent (Kitzmann et al., 2008; Rhee, 2008). To address this lack, we designed a psychosocial intervention that targets family and peer contexts of overweight children. The current paper outlines the program and some preliminary findings.

Participants. A randomized-controlled-trial design was used to assign 29 rural schools to 5 intervention conditions. BMI was obtained for 1202 children and those at $\geq 75\%$ invited to participate. 131 participants in the current analyses were 55 1st-graders and their parents who attended $>50\%$ of sessions and 76 control group participants.

Measures. Data were obtained from multiple informants (children, peers, teachers, parents, research assistants) using multiple measures to longitudinally assess variables in our conceptual model (see Paper 1). Measures for which preliminary results are reported (below) include: child BMI (anthropometric assessment); child self-reported emotional and external eating, self- and body-esteem, loneliness, peer ridicule, parent weight-teasing; and parent-reported parenting style (e.g., authoritarianism) and response to negative child emotion (emotion-

focused, minimizing, punitive).

Intervention: Interventions ran for 12-weeks. One targeted *Family Food & Lifestyle (FL)* variables only, another added a psycho-educational component about *Family Dynamics (FD)*, and in some schools, we conducted a classroom-based *Peer Group (PG) Behavior* intervention (5 groups= *Control, FL, FL+FD, FL+PG, FL+FD+PG*). Parents and children met separately in 90-minute evening groups. The *FL* component was adapted from an empirically validated model (Epstein, 1985). Leaders provided education regarding healthy eating and exercise and utilized behavior-modification to assist families in modifying lifestyle. The *FL+FD* intervention added a family dynamics component targeting problems such as emotional expression and communication. The *PG* intervention was conducted in 20-min classroom sessions and aimed at sensitizing peers to social exclusion issues.

Results. Preliminary intervention results compare findings Wave 1 (pre-test, beginning of year) to Wave 2 (post-test, end of intervention), controlling for Wave 1 differences. Findings summarized here represent significant results from a sample of the variables for which data were collected, and suggest (1) a positive impact of the *FD* component, with improved family dynamics (self and child reported) by the end of the *FL+FD* (but not *FL*) intervention (Table 1); (2) children in the *FL* (but not *FL+FD*) condition reported increased emotional eating and decreased body-esteem, suggesting an increased awareness of problems with regard to overweight and poor eating patterns (Table 1), which could be an important step in openness to lifestyle change; and (3) the *PG* intervention improved child negative psychological status (viz., loneliness; Table 2).

Conclusions. Analysis of short- and long-term impact of intervention data will help identify the relative efficacy of each treatment component and the developmental levels at which particular

treatment effects may distinguish treatment from control group children. From these findings the program can be modified to include the most effective elements and then disseminated, particularly to rural communities.

Table 1. *Family-Level Interventions: Child Report*

Outcome	Body-esteem $\alpha = .71^a, .74^a$			Emotional Eating $\alpha = .84^a, .87^a$			Peer ridicule $\alpha = .80^a, .79^a$		
Condition (n)	FD (23) ^b	FL (31) ^b	Control(75) ^b	FD (22) ^b	FL (31) ^b	Control(75) ^b	FD (22) ^b	FL (32) ^b	Control(76) ^b
Baseline	1.322 ± .146	1.288 ± .144	1.291 ± .143	1.173 ± .824	.985 ± .629	1.038 ± .657	1.413 ± .587	1.242 ± .419	1.207 ± .433
Post-Intervention	1.333 ± .128	1.300 ± .149	1.279 ± .139	.997 ± .697	1.370 ± .832	.970 ± .620	1.185 ± .339	1.250 ± .484	1.253 ± .531
Time X condition ^c	FD vs. Con: F = 3.25, NS FD vs. FL: F = .01, NS	FL vs. Con: F = 4.52, P < .05		FD vs. Con: F = .49, NS FD vs. FL: F = 6.56, P < .05	FL vs. Con: F = 9.00, P < .01		FD vs. Con: F = 4.15, P < .05 FD vs. FL: F = 1.81, NS	FL vs. Con: F = .11, NS	
Outcome	Maternal teasing			Paternal teasing			BMI Percentile		
Condition	FD (23) ^b	FL (33) ^b	Control(76) ^b	FD (23) ^b	FL (33) ^b	Control(67) ^b	FD (23) ^b	FL (33) ^b	Control(76) ^b
Baseline	1.783 ± .850	1.152 ± .508	1.197 ± .490	1.850 ± .988	1.333 ± .736	1.119 ± .409	89.91 ± 7.05	91.11 ± 8.08	89.71 ± 7.39
Post-Intervention	1.261 ± .619	1.182 ± .528	1.355 ± .687	1.350 ± .671	1.364 ± .653	1.194 ± .557	89.51 ± 9.19	89.84 ± 9.78	88.54 ± 10.39
Time X Condition	FD vs. Con: F = 11.33, P < .01 FD vs. FL: F = 8.33, P < .01	FL vs. Con: F = .66, NS		FD vs. Con: F = 8.71, P < .01 FD vs. FL: F = 5.59, P < .05	FL vs. Con: F = .09, NS		FD vs. Con: F = .27, NS FD vs. FL: F = .49, NS	FL vs. Con: F = .01, NS	

^a Internal consistencies refer to Wave 1 and Wave 2, respectively. ^b Values below are means ± SD; values to the left in parentheses are sample sizes. Higher scores indicate poorer body-esteem, more emotional eating, more ridicule, and more teasing. ^c F-values are for the test of the interaction effect of condition and baseline versus post-intervention; degrees of freedom range from (1,52) to (1,198).

Table 2. *Family- and Peer-Level Interventions: Parent and Child Report*

Findings suggest...	Findings	Sample	Stat Value	p value
FD intervention effects over time (attended >6 sessions; similar effects not seen in FL or Control)	↓ Minimizing emotional reactions (parent report)	12	F=4.18	.06
	↑ Emotion focused reactions (parent report)	12	F=3.26	.10
Amenability of child negative psychosocial status to improve with exposure to a classroom-based social inclusion curriculum	Children who were in the 12-session Peer Group (PG) intervention at school were significantly less lonely in Wave 2 than children in Control classrooms (controlling for Wave 1 differences)	535 (first cohort; half of full sample)	F = 3.66	.05