Racial Differences in Transition to Obesity among School-aged Children and the Role of Family Backgrounds

(SOC 952 Term Paper)

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ABSTRACT

Research have identified that Hispanic children 3 times more likely to being obese than White kids at age 3. Their BMI also grow faster than their White counterparts during the summer when the school is not in session. Hispanic parents' cultural norms are proposed to be responsible for their overweight children. However, kids experience a natural growth during the elementary years, and their weights may transit between normal and overweight. Furthermore, it is unclear whether Hispanic parents still hold the similar values when their kids are exposed to a variety of health risks. In this study, I examine racial differences in the transition of overweight and normal weight, and examine the effect of family income and children's extra-curriculum activities out of school hours on the transition. Using ECLS-K longitudinal studies, I found that Hispanic children not only were at higher risks of being overweight at the beginning of elementary schools years, and their disadvantages deteriorated around six years later. More extra-curriculum activities and being more physically active may significantly reduce the odds of being persistently overweight and lower the odds of transiting into overweight. Mothers' belief on "Chubby is healthy" may make enormously damages to their children's body weights. In addition, general family and mothers' characteristics have no significant effect on children's body weight transition during their childhood, confirming previous studies on the racial differences in overweight among children aged 6 to 12.

Introduction

Childhood obesity becomes a serious population health problem in the United States over the past thirty years, and exacerbates since the late 1990s. There are unprecedented burgeoning prevalence of children obesity and salient racial differences. Among school-aged children aged 6–11 years, the prevalence of overweight (95 percentile of CDC BMI) increased from 4.0% to 18.8% (NHANES).[1] The prevalence of overweight for Hispanic boys increased from 13.3% to 25.3% between 1970 and 2003, and increased from 9.8% to 19.4% for girls. By contrast, the prevalence of overweight increased from 6.1% to 18.5% for White boys and from 5.2% to 16.9% for White girls. Furthermore, recent studies have identified that Hispanic children were nearly twice likely to be overweight than White children at age of 3 years (Kimbro, Brooks-Gunn, McLanahan 2007). In addition, they were heavier at the beginning of kindergarten and gained weight faster during the summer session before entering into first grade (Von Hippel, Powell, Downey and Rowland 2007). Therefore, Hispanic children are exposed to higher risks of overweight epidemics and worse health conditions.

Overweight children are more likely to develop type 2 diabetes (Goran and colleagues 2004), and other conditions potential for developing cardiovascular disease (Fagot-Campgna 2000), and more likely to become overweight adults (Dietz WH 1998). In addition, overweight children may have a poorer quality of life, lower self-esteem (Strauss 2000), and lower attainment in adulthood (Murasko 2007).

There are no consistent explanations for racial differences in the prevalence of overweight among school-aged children. Some studies found that Hispanic children may ingest more fat than do White children and Hispanic mothers frequently do not identify their overweight children as being overweight. Particularly, cultural belief of "Chubby children are healthy" among Hispanic mom may result in overweight among their children (Kimbro, Brooks-Gunn and McLanahan 2007). On the other hand, some studies

[1] http://www.cdc.gov/nccdphp/dnpa/obesity/childhood/prevalence.htm.

found that household income, parental education, and other socioeconomic status had no significant impact on frequency of family participation in physical activity or household availability of higher-calorie foods (Kimbro, Brooks-Gunn and McLanahan 2007, McArthur, Anguiano and Gross 2004).

Pervious studies have born two limitations. First, they focused on the static points of on-set overweight, yet fail to treat children overweight as a progressive process, which may consist of different transition periods between age 2 to age 12 years (Nadar et al. 2007). Therefore, the possible effects of some household characteristics on the transition are ignored. Second, Hispanic mothers' cultural belief are seldom directly assessed, and thusly lack the empirical evidences to be confirmative. In addition, such belief may be also confounded with inadequate reorganization of overweight, and may be subject to changes when their children are bothered by their overweight.

In this study, I will further the existing research by examining racial differences in transition to overweight and identifying mechanism through which family background exert its influence on children's transition between normal weight and overweight. I use Early Childhood Longitudinal Studies-Kindergarten through fifth grade public-use data file. I aim to find that Hispanic children have a higher risk of transit to overweight, and strong cultural belief and less extra-curriculum activities hampered by family income would be partly responsible for their higher risks.

Racial differences in children obesity

Researches on childhood obesity try to understand the timing of on-site overweight, the major causes of overweight and possible prevention programs both in the clinic settings and broader population level. Previous research has shown that overweight problems in children began as early as age 3 years (Kimbro et al 2007), on-set during the elementary school years and persisted between age 2 years to 12 years (Gable et al. 2007, Nader et al 2007). Recent research found that children overweight at age 12 years can be predicted

by their overweight at age 24, 36, or 54 months during preschool and age 5, 7 and 9 years during the elementary school period (Nadar et al. 2007). In sum, studies on the timing of overweight in children have been informative to the possible transition process from normal weights to overweight during the early childhood.

Studies on major causes of early on-set of childhood overweight have summarized that calorie intake, sedentary practice and physical activities are the main direct determinants for childhood obesity (IOM 2004). Parents have an indirect influence on children's weight by preparing meals, by promoting certain values and attitudes, by rewarding or reinforcing specific behaviors, and by serving as role models (IOM 2004). In particular, a number of researches have established associations between children overweight with mothers' demographic characteristics, social status and health behaviors (including weight, age at focal birth, family structure, income, smoking during pregnancy, breastfeeding, grocery shopping, meal preparing, supervision on children's TV watching and physical exercise, perception of body image and neighborhood safety etc).

However, current studies on the timing of overweight and its determinants have not fully addressed two critical questions. First, previous researches focus on the static point of on-set overweight, yet fail to treat children overweight as a progressive process, which may consist of different transition periods between age 2 to age 12 years. For example, some children may gain weight very early and persisted, some children may start only after enrolled at kindergarten, while other children may become overweight only at age 10 years. These transitions from normal weight to overweight at different ages may be associated with diverging factors. Therefore, the variations can only be captured by examining the transition rates between each data point and their possible determinants. In addition, some children's weights may reverse between age 2 to 12 years, and return to normal weight at some intermediate years. Thus, ignoring the possible reverse patterns may mask the actual transition process.

Second, there are unclear mechanisms through which family backgrounds influence the on-site overweight. Some studies found that mothers' characteristics and household

characteristics did not account for racial/ethnic differences in overweight, while future study should take into account of cultural belief of “chubby children are healthier” among Hispanic mothers (Kimbro, Brooks-Gunn and McLanahan 2007). However, it is not sure how this cultural belief actually has influence and how it persist when their children’ health and growth are jeopardized by their excessive body weight. Furthermore, a number of studies suggest that children’s physical activities outside the school hours are particularly important to protect them from overweight (Sherman et al.2001). Rich parents can afford expensive extra-curriculum activities for their kids lead to suggestions that family income and poverty level may exert their influences on children’s overweight (Sherman et al.2001).

In sum, previous researches have identified children overweight started very early and associated with parental characteristics and have suggested that household characteristics, particularly cultural belief among Hispanic mothers may be responsible for their overweigh children. This study makes a contribution by examining the risk and determinants of various transitions to overweight of school-aged children at critical points during the elementary school years and take into account the role of children’s extra-curriculum activities and mothers’ cultural beliefs.

Hypothesis

Based upon review of existing research, I proposed the following hypothesis. (1) Hispanic kids are more likely to persist with overweight, have a higher risk of transit from normal weight to overweight, and lower chances of losing weight between kindergarten and fifth grade than White children; (2) Greater income level, extra-curriculum activities and being more physical active are partially responsible for Hispanic children’s growing disadvantages.

Data

Data for the analysis presented here come from the ECLS-K, which is being conducted by the Department of Education to provide information on children's status at entry into kindergarten and on their progression through school on a number of educational outcomes. The nationally representative sample consists of a cohort of children who entered kindergarten in the fall of 1998. The ECLS-K used a multistage probability design in which the primary sampling units (PSUs) were geographic areas that consisted of counties or groups of counties. Schools were the second-stage units that were sampled within these PSUs, and students were the final stage units selected within schools. Details of the sampling procedures have been published previously. The original sample at fall semester of kindergarten included 21,260 kindergartners from 1,280 schools. Various types of information have been collected on the children at six different times in the study (ie, during the fall [1998; wave 1] and spring [1999; wave 2] of the children's kindergarten year, in the fall [1999; wave 3] and spring [2000; wave 4] of their year in first grade, spring [2002; wave 5] of their year in third grade and spring [2004, wave 6] of their year in fifth grade).

Because ECLS-K only collect 30% of sample at fall of first grade [wave 2], I exclude this wave for the current analysis. My main analytic sample (N=11820) consists of all individuals with complete information on the variables described below.

Measurement

Dependent variable: transition of children's BMI

ECLS-K administer measured children's height and weight at six waves by using the Shorr Board (for measuring height), and a digital bathroom scale. Because BMI continuous scores are calculated using the methods for adults, and ignore the age and gender differences which are critical for children, CDC methods are more sensitive to children's natural growth. Therefore, using information on age, gender, height, weight and measure of height and weight, children's BMI z-score and percentile are calculated

according to Using 2000 Centers for Disease Control Growth Charts. CDC classifies (1) children who are below the 5th percentile as "underweight" for their gender or age group, (2) children who are between 5th and 85th percentile as "normal weight"; (3) children who are between 85th and 95th percentile as "at risk of overweight"; (4) children who are above the 95th percentile as "overweight". Kimbro et al.(2007) argued that "overweight" and "obese" for the last categories more accurately reflected the severity of the childhood obesity problem following the recommendations of the American Obesity Association (p.299). Here, in this study, I classify children above 85^{th} percentiles as "overweight", and those below 85^{th} percentiles as "normal weight".

The dependent variable for this analysis is a categorical variable with 4 categories: (1) keep normal weight across five waves; (2) keep overweight across six waves; (3); and transit from normal weight to overweight; (4) transit from overweight to normal weight.

This classification of transition of children' BMI across waves can reflect the incidences of transitions across waves, and show racial differences. However, this classification may not reflect the dynamic changes in children's BMI status within each wave. Therefore, I supplement the multinomial analysis by survival analysis. The survival analysis aims to examine the risks of being overweight among normal children. So, the dependant variable in survival analysis is the waiting time before a failure (being overweight) occurs. Figure 1 shows racial differences of survival probabilities. Hispanic children are less likely to have normal weights than White children, and are also increasingly become overweight across time. This survival graph confirms the patterns observed from the tabulation of the categorical dependent variable.

Explanatory variables

The main explanatory variables in the multinomial and survival analysis are parent reported children's birth weight, children's physically active during free time, total numbers of extra-curriculum activities, mother's cultural beliefs and family background including household income, mother's race, mother's education and overall socioeconomic status.

Extra-curriculum activities: Parent are asked to report their children's extra-curriculum activities at spring of kindergarten, spring first grade, spring third grade and spring fifth grade during parental interview. These extra-curriculum activities include dance lessons, athletic event, organized performing, organized club, art lesson, and music lessons. I construct a summary measure for numbers of extra-curriculum activities to reflect the volume of children' extra-curriculum activities across five waves. Most of these extra-curriculum activities involve children's physical activity and also may require parental financial investment. However, ECLS-K did not collect information on average time of children's engagement in extra-curriculum activities per week or per month.

Being more physically active: Parents are asked to evaluate whether their children are more physically active than other children during free time respectively at spring of kindergarten, third grade and fifth grade. I construct a summary measure to indicate the total times of children been evaluated as more physically active during free time

Cultural belief about "Chubby child is healthy": ECLS-K did not ask mothers directly about their belief on "Chubby child". Yet, parents are asked to evaluate their children's overall health status in a five Likert-scale "Excellent, very good, good, fair and poor" at fall of kindergarten, spring of first grade, third grade and fifth grade. One way to assess the cultural belief that chubby children are healthier is to combine the information on parent's evaluation of children's health and children's actual weights. If a mother rates her child in good health (including excellent, very good and good) even if their children are overweight, I classify her as supporting cultural belief about "Chubby is healthy".[2] Then I construct a summary variable, measure the total times of mother's beliefs across five waves.

Although this measure can be informative on some aspects of parental attitudes toward their children's weight, it may be subject to proxy report bias. For example, parents may

[2] I also tried to another way to code this variable. If a mother rates her child in excellent health, even if their children are overweight, I classify her as supporting cultural belief about "Chubby is healthy". This coding strategy did not yield a better estimate.

reluctant to report their children' health as poor, since over 90% of children are evaluated as in good health in ECLS-K across waves. In addition, parental perceptions of children's health are not only influenced by their children's weight, but also by other salient disabilities and health problems. If an overweight child has not showed any symptoms of discomforts and can perform functions normally, his parent may evaluate him as being excellent health, although the child himself may be bothered very much by his weight. Therefore, caution should be made when we interpret the effect of this cultural belief.

Family backgrounds: ECLS-K asked parent to report "what are total income of all persons in your household over the past year, including salaries or other earnings, interest, retirement, and so on for all household members?", and construct a composite variable for family income by imputing values for those observations with missing data. This study takes natural log of family income with 0 skewness (Ln(actual income-constant $7,174 dollars)).

I construct two measures of children's body weight, one for continuous, and the other indicate child's birth weight is high (>=8.8 lbs). Mother's education is a dichotomous variable, equals to 1 if she got bachelor or above degree, and 0 otherwise. Children's overall socioeconomic status is also a dichotomous variable, equals to 1 if his family SES is high (above 75th percentile), and 0 otherwise. Mother's race is also indicated by a dichotomous variable, equals to 1 if she is Hispanic and otherwise

Models

I use Multinomial logistic model to estimate the probability of being persistently overweight, onset of overweight and losing weight, rather than keeping normal weights across five waves for a kindergarten cohort.

$$\Pr(Y_i = m \mid x) = \frac{\exp(\alpha_m + \beta_m X_i^{'})}{\sum_{j=1}^{J} \exp(\alpha_j + \beta_j X_i^{'})}, \quad \text{m=0,1,2,3. J=4}$$

$$\log\left[\frac{\Pr(Y=m)}{\Pr(Y=0)}\right]=\alpha_m+\beta_m X_i$$

0 = Keeping normal weights between kindergarten and fifth grade,

1 = Being persistently overweight between kindergarten and fifth grade,

2 =Have ever transit from normal weight at kindergarten to overweight in later waves,

3 =Have ever transit from overweight at kindergarten to normal in later waves.

$X_i^{'}$ include the explanatory variables: being Hispanic, Male, Living with two parents, Numbers of sibling, Born in U.S., Family Income(log), Mom's College graduate, Hispanic Mom, Birth weight, Having high birth weight, Numbers of extra-curriculum activities ever participated, Numbers of being more physically active than peers, Numbers of believing Chubby as healthy among moms.

Cox proportional hazards model is fitted to supplements the multinomial logistic regression by examining the dynamic transitions from normal weights and its associated risks for explanatory variables. Any one of the transitions from normal weight to overweight across five waves in this survival analysis is treated as a failure. Cox model takes more transitions between each waves into account, and thusly more dynamic than the dependent variable in multinomial analysis.

$$h(t)=h_0(t)\exp\left\{X_t^{'}(t)\,\beta\right\}$$

Where h(t) estimates the hazard of transit to overweight at time t for a subject. $X_t^{'}$(t) represent covariates matrix at time t. β is the estimated coefficient. The exponentiated coefficient may be interpreted as relative risks for categorical covariates and as multiplicative effect for continuous covariates (Powers and Xie 2000)

Results

Attrition and missing values are common for ECLS-K. Around 40% of the original sample was lost at the fifth grade, and around 20% of children who lack of complete information on height and weight at two waves. Among the children who have persisted

through five waves with complete data on height and weight, around 90% of children have no complete information on parent and family characteristics. Therefore, attrition in this sample is assumed to be random, and observations with missing values on height and weight are deleted from this analysis. Future study will explore possible analytical strategies to ameliorate these problems.

Table 1 presents descriptive statistics for the entire sample and for each racial/ethnic groups separately. There are 8,317 children with complete BMI 85th percentile across five waves. 56% of them kept normal weight, 21% of them kept to be overweight, 17% had become overweight, and 5% lost weight. The percentages of Hispanic children who are persistently overweight are 60% more than White children, and they are 30% more likely to transits to overweight between kindergarten and fifth grade.

Furthermore, Figure 1 shows a similar pattern of racial difference on the probability of becoming overweight between kindergarten and fifth grade. Figure 1A shows the percentages of overweight among Hispanic children are persistently larger than that of White children, and the racial gaps widened as children grow from age 6 to age 12. After controlling for SES status, there are persistent racial differences in the percentage of ever being obese. Among the children from high SES family, 38% white children did so, while 48% Hispanic children did so. Among the children from low SES family, 47% white children have ever been overweight, while 56% Hispanic children did so.

Figure 1B shows the racial differences in the probability of survival to be normal weight within five waves. Hispanic children in any waves have a higher risk to transit from normal weight to overweight than White children. Therefore, these patterns show Hispanic children have persistently been overweight, more likely to become overweight, and less likely to lose weight between kindergarten and fifth grade

Racial differences in explanatory variables are also salient. White kids on average participate in 7 activities, while Hispanic kids only participated in 4 of them. Around 15% of Hispanic children never participated any of these extra-curriculum activities,

three times more than White kids. And White kids are twice likely to participate in more than 10 extra-curriculum activities than Hispanic children. In addition, children living above poverty are also twice more likely to participate in these extra-curriculum activities than those poor children.

The racial differences in the propensity to being physically active are not salient. Around 50% of children have never been more physically active during free time, 40% of them periodically been more physically active, and 10% always more physically active than peers. Yet, White kids are twice more likely to being always physically active than Hispanic kids during free time across waves

Finally, Hispanic mothers are about 30% more to evaluate their overweight children as being good health than White mothers. The mean family income was $55, 257 dollars. The family income for White children was around twice of that for Hispanic children.

Model estimation

I adopted a stepwise procedure in model selection by comparing the reported deviance. I began with a model only including Hispanic and found that Hispanic children are about twice (exp(0.7)=2.1) likely to be persistently overweight than White kids, and around 1.6 times to become overweight. This simple model confirms our descriptive analysis. Second, I controlled family background and found that deviance reduced slightly, but most of the family and mothers' characteristics were not significant. The Hispanic boys living in a Low-SES family would be 1.5 timely likely to being overweight all through his childhood than a White boy living in a Low-SES family. Third, I further controlled for child's one pound increase in birth weight will significantly increase the odds ratio of being persistently overweight around 2%, as similar effect predicted by high birth weight. However, birth weight seemed to weigh less in predicting the transition from normal weight to overweight. And few reductions of deviation suggested that model controlling for child's birth weight was not better than previous model. Finally, I controlled children's extra-curriculum activities, being more physically active, mother's belief about

"Chubby is healthy" and family income (log with 0 skewness). The enormous reductions in deviance suggest that this model fit the data best. I thusly present the prediction from this model in the Table 2.

Table 2 shows the results of the multinomial logistic regression predicting the probability of being persistently overweight, becoming overweight and return to normal weight, relative to keeping normal weight. Relative to keeping normal weight, Hispanic children on average was still more then twice likely to being persistently overweight between age 6 and age 12 than White kids, with 95% confidence interval [1.06, 5.62], which suggested the persistent disadvantaged health condition for Hispanic children. There are no significant differences in gender, native-born or foreign born, birth weight and other child's characteristics. Secondly, although living with a college graduate mom, having siblings, with two parents with high SES can reduce the odds ratios of being persistently overweight or becoming overweight, these family characteristics are not significant. This prediction echoed the finding from previous studies. The effect of family income is not in line with my hypothesis. Before controlling for children's physical activities and mothers' cultural beliefs, family income may significantly reduce the odds of being persistently overweight by 20 percent (95% C.I. [0.1,0.5]) and reduce the odds of becoming overweight by around 10 percent (95% C.I.[0.09,0.5]). However, family income lost its significance in predicting when children's activities and mother's beliefs have been controlled.

The estimated effects of children's extra-curriculum activities, more physically active and mothers' cultural beliefs are consistent with my hypothesis. On average, children's extra-curriculum activities, more physically active than peers may lower the probability of being persistently overweight and becoming overweight during elementary school years, relative to keeping normal weight. I found that one more extra-curriculum activity would reduce the odds of being persistently overweight by about 13 percent (95% C.I. [0.09, 0.17]), and reduce the odds of becoming overweight by about 7 percent (95% C.I. [0.03, 0.11]) if other factors keep constant. The effects of being more physically active on children's body weight were even larger. One more time of being more physically active

may reduce the odds of being persistently overweight by 33 percent (95% C.I. [0.19, 0.45]) and decreased the odds of becoming overweight by about 18% percent (95% C.I. [0.05, 0.30]). However, these positive effects of children's physical activities may be off-set by the enormously negative effect of mother's cultural beliefs about "Chubby is healthy". For example, one more times of mother's cultural belief may increase the odds of being overweight or becoming overweight by more than 100 percent. Here, the enormously large effect of mothers' belief may be inappropriate and may result from construction as a continuous variable. I also test the effect of beliefs vs. no beliefs, the estimated effect of cultural beliefs are still enormously large. Therefore, these estimates confirm the previous propositions and suggest that mothers' beliefs may have great influences on their children's health, although the effect sizes are uncertain.

In addition, I add interaction term between Hispanic mom and mothers' beliefs, between Hispanic and children's extra activities and physically active. These interactions did not improve the model fit and they are not significant, which indicate that the effects of Hispanic mothers' beliefs are not significantly different from White moms, and there were no significantly different effect of physical activities between racial/ethnic groups.

Table 3 shows the results of Cox proportional hazard model as supplementary evidences of the effect of children's activities on the risks of becoming overweight within five waves. The Cox model yielded a similar effect estimate as the multinomial logistic regression, and indicated that one more extra-curriculum activity might reduce the odds of becoming overweight by about 7 percent (95% C.I. [0.03, 0.11]), keeping other factors constant. However, children's being more physically active did not significantly lower their risks of becoming overweight. In addition, one more pound of increase in body weight may increased the risks of becoming overweight by 6 percent, and living in a family with high SES may lower the overweight risks by percent. And other family characteristics did not have significant effect on the risks of transiting to overweight.

In short, the hypothesis on the effects of children' extra-curriculum activities, being more physically active and mothers' cultural beliefs has been confirmed by the multinomial

logistic regression and supplementary survival analysis. The estimated effects of family and mothers' characteristics are consistent with previous research.

Discussion

This analysis confirms that Hispanic children not only at higher risks of being overweight at the beginning of elementary schools years, and their disadvantages deteriorated around six years later. They are twice more likely to be persistently overweight, and 1.6 times more likely to becoming overweight than White children between kindergarten and fifth grade, relative to staying normal weight. Furthermore, Hispanic children may gain weights faster than White children during the same six years of schooling as previous study suggested.

Results from multinomial logistic regression suggested that children's extra-curriculum activities, being more physically active might significantly reduce the odds of being persistently overweight and lower the odds of transiting into overweight for children in elementary schools between kindergarten and fifth grade. Supplementary survival analysis yielded a similar effect of children's extra-curriculum activities. These estimates suggested that children's physical activities can be a significant protecting force from obesity, which was in line with previous studies (Sherman et al.2001). Therefore, this analysis provides supporting evidence that obesity prevention programs for children should incorporate more opportunities and facilities for children to get exercise.

I constructed a proxy to measure the cultural beliefs shared most by Hispanic mothers "Chubby is healthy" was directly tested in this analysis. The sign of effect indicates that such belief did harmful to children by increasing the odds of being persistently overweight and becoming overweight, if keeping other factors constant. Therefore, the proposed effect of such beliefs raised by Kimbro et al.(2007) has been confirmed. However, the enormously large effect estimated from multinomial logistic regression may be due to inappropriate construct of belief variable and other unobserved factors. In addition, a substantially large amount of White moms also evaluated their overweight

children as in excellent health, which may also confound the estimated effect. Future study design should ask the mothers directly about their attitudes, and collected information on their actual practices regarding chubby children' weight problems.

The non significant effect of family background and mother's characteristics are also consistent with previous studies, which suggested shrinking disparities in the association between children obesity and socioeconomic status (Wang and Zhang 2004). However, the effect of family income was once significant before I controlled for children's extra-curriculum activities and mothers' cultural beliefs, suggesting that children living in poor family may have a higher risk of being persistently overweight or of becoming overweight than rich kids, if they both never participated any physical activities.

Study Limitation

This analysis has several limitations. First, ECLS-K did not collect information on children's nutritional intakes, therefore, the possible effect of food and nutritional intakes are not assessed here. Second, because the ECLS-K data were collected using a multistage sample of kindergarten students nested within schools, the analytic approach needed to accommodate this clustered data structure. Multilevel models would be a better choice than simple multinomial logistic model. Third, ECLS-K did not measure mothers' cultural belief directly, the construction of proxy in this analysis may subject to proxy report bias. Finally, attrition and missing values are assumed to be random and no advance methods have been taken to deal with them.

Conclusion

In this analysis, I use Early Childhood Longitudinal Study –Kindergarten cohort data to examine the racial differences in the children's transition between normal weights and overweight during their elementary school years. I found that Hispanic children not only were at higher risks of being overweight at the beginning of elementary schools years,

and their disadvantages deteriorated around six years later. They are twice more likely to be persistently overweight, and 1.6 times Racial differences are salient, and accumulatively disadvantaged. More extra-curriculum activities and being more physically active may significantly reduce the odds of being persistently overweight and lower the odds of transiting into overweight. Mothers' belief on "Chubby is healthy" may make enormously damages to their children's body weights. In addition, general family and mothers' characteristics have no significant effect on children's body weight transition during their childhood, confirming previous studies on the racial differences in overweight among children aged 6 to 12.

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Table 1-Descriptive Statistics for Children and Family, by Race/Ethnicity: Early Childhood longitudinal Study, 1998-2004

	Total N=8317 Mean	White N=6290 Mean	Hispanic N=2027 Mean
Child's BMI transition	0.71	0.67	0.84
persist normal	0.57	0.60	0.46
persist overweight	0.21	0.18	0.29
become overweight	0.17	0.16	0.20
become normal	0.05	0.05	0.05
Child's characteristics			
Male	0.51	0.51	0.50
Birth weight	7.50	7.56	7.30
High birth weight(>8.8lb)	0.13	0.14	0.10
Extra-curriculum activities	6.13	6.83	3.96
More physically active	0.78	0.81	0.72
Born in U.S.	0.98	0.99	0.93
Family's characteristics			
Belief in chubby as healthy	1.08	1.02	1.26
Family Income (log)	10.88	11.01	10.46
Living w/ two parents	0.86	0.88	0.80
Numbers of siblings	1.45	1.41	1.58
Mom gains bachelor or above	0.27	0.32	0.10
Mom is Hispanic	0.21	0.01	0.86
High SES (>75th percentile)	0.48	0.56	0.22

Table 2-Logits from Multinomial Logistic Analyses Predicting Persistent Overweight, Becoming overweight or returning to normal weight Within Pooled Sample, Relative to Keeping Normal Weight: Early Childhood longitudinal Study, 1998-2004

	Persistently Overweight	Becoming Overweight	Becoming Normal Weight
	Child's characteristics		
Hispanic	0.891	0.38	0.378
	(2.09)*	(1.13)	(0.98)
Male	-0.167	0.041	-0.2
	-0.9	-0.28	-1.19
Birth weight	0.137	-0.101	0.198
	(1.53)	(1.44)	(2.28)*
High birth weight(>8.8lb)	0.17	0.247	0.21
	(0.54)	(0.96)	(0.74)
Extra-curriculum activities	-0.133	-0.068	-0.043
	(5.33)**	(3.47)**	-1.96
More physically active	-0.396	-0.2	0.014
	(4.07)**	(2.68)**	-0.17
Born in U.S.	0.041	0.103	-0.603
	(0.06)	(0.20)	(1.09)
	Family's characteristics		
Belief in chubby as healthy	7.429	5.183	4.904
	(44.11)**	(34.86)**	(31.84)**
Family Income (log)	-0.343	-0.357	-0.054
	(1.87)	(2.47)*	(0.33)
Living w/ two parents	-0.501	0.039	-0.419
	(1.79)	(0.17)	(1.62)
Numbers of siblings	0.017	0.069	0.047
	(0.20)	(1.03)	(0.60)
Mom gains bachelor or above	-0.391	-0.402	-0.042
	(1.49)	(1.96)	(0.19)
Mom gains bachelor or above	0.074	-0.198	-0.096
	(0.17)	(0.57)	(0.24)
High SES (>75th percentile)	-0.11	-0.072	0.037
	(0.44)	(0.37)	(0.17)
Constant	-5.851	0.676	-4.835
	(2.83)**	(0.42)	(2.64)**
Observations	6812	6812	6812
Log likelihood	-2547.41		
Pseudo R^2	0.661		

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

Reference category: persistently normal weight

Table 3-Hazard Rates from Cox Proportional Hazard Model Predicting Survival to be Normal Weight Within Pooled Sample: Early Childhood longitudinal Study, 1998-2004

	_t
Hispanic	0.056
	(0.46)
High SES (>75th percentile)	-0.277
	(4.26)**
Family Income (log)	-0.071
	(1.51)
Mom is Hispanic	0.035
	(0.27)
Mom gains bachelor or above	-0.081
	(1.17)
Living w/ two parents	-0.084
	(1.20)
Birth weight	0.063
	(2.68)**
High birth weight(>8.8lb)	0.065
	(0.75)
More physically active	-0.063
	(1.19)
Extra-curriculum activities	-0.067
	(3.20)**
Observations	22920
Log likelihood	-7451
Pseudo R^2	0

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Figure1A –Persistent Racial Differences in Percentage of Overweight, by Race/Ethnicity: Early Childhood longitudinal Study, 1998-2004

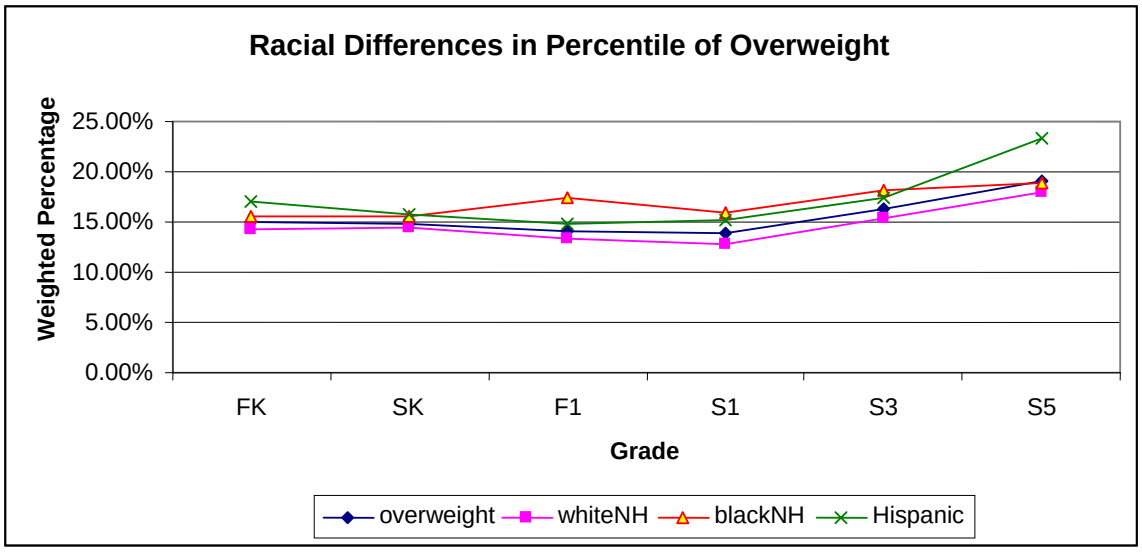

Figure 1B-Persistent Racial Differences in Survival to Being Normal Weight, by Race/Ethnicity: Early Childhood longitudinal Study, 1998-2004