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## Direct and proxy recall of childhood socioeconomic position and health

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### Abstract

**Background**—The utility of proxy reporting within the life course framework has not been adequately assessed; therefore we sought to assess the magnitude and type of agreement that exists between index and proxy reports for body weight, health and socioeconomic position (SEP) in childhood.

**Methods**—Participants were enrolled as part of an ongoing study of preterm birth in African American women in metro Detroit. Postpartum women and their mothers (N=333 pairs) provided retrospective reports about the woman's childhood body weight, health, and SEP. Agreement was assessed using kappa, weighted kappa [ $\kappa$ ], and intraclass correlation coefficients [ICC]. Log-linear models were used to describe the pattern of agreement for ordinal data.

**Results**—Birthweight and weight at age 18 was reported with a high level of agreement (ICC=0.86 and 0.71, respectively). Kappa indicated moderate agreement for early and late childhood/adolescent weight. Log-linear models suggested that there was diagonal agreement plus linear by linear association for early childhood weight and linear by linear association in late childhood/adolescence. Reports of childhood medical problems and hospitalizations had only moderate agreement. Agreement for SEP in both early ( $\kappa=0.14$ ) and late childhood/adolescence ( $\kappa=0.20$ ) was poor. Log-linear models suggest a linear by linear association, indicating a positive association between the responses.

**Conclusions**—Results suggest that proxy reports may be utilized in conjunction with an index report to provide an estimate of the accuracy of report or to more fully capture experiences over the life course. This may be particularly useful when multiple developmental periods are examined.

### Keywords

life course; kappa; proxy; linear models; epidemiology

## Introduction

A growing body of literature suggests that experiences and exposures that occur outside of the prenatal period have implications for pregnancy health and outcomes.<sup>1</sup> Nonetheless, few studies have examined more distal preconceptional exposures as time and resources are frequently cost prohibitive in the absence of historical records measuring these exposures. Lengthy longitudinal studies such as the Black Women's Health Study [BWHS] have highlighted some of the difficulties associated with conducting follow-up studies and maintaining a high retention rate.<sup>2</sup> Many of the BWHS participants were highly mobile and tracking such participants is associated with substantial costs.<sup>2</sup> As a result of these challenges, most studies have focused on self-reported retrospective experiences and exposures. Yet even in the absence of historical records, self-report may not be the best method to reliably capture valid data across the life course.

Proxy reporting is a possible alternative approach to capturing a range of childhood exposures retrospectively. Although parent proxies are often used in other fields, including developmental psychology, gerontology, and mental health, they have typically not been used in life course perinatal epidemiology research. Nonetheless, the studies that have been done have identified mothers as an accurate proxy for a number of exposures and outcomes, including diseases such as asthma and birthweight.<sup>3-5</sup> Maternal proxies may be useful in life course research as we might expect that mothers are able to provide accurate responses to questions pertaining to their offspring's childhood. However, it is unclear whether adult women and their mothers can recall and report similar details about the women's childhood that is pertinent to life course research. Such information will aid in determining whether the added costs associated with including proxy reporters are justified in perinatal life course research. The importance of accurate, timely, and cost-effective data collection methods for life course research in perinatal epidemiology highlights the need to assess the utility of proxy reporting within a life course framework model. Our ongoing study of preterm birth provides an opportunity in which to address some of the aforementioned barriers and challenges to assessing exposures over the life course distally from the pregnancy outcome events. We therefore sought to assess the magnitude and type of agreement that exists between index (woman) and proxy (mother) retrospective reports for body weight, health, and socioeconomic status in childhood.

## Methods

### Data collection

Study participants were enrolled as part of an ongoing study of preterm birth. Women were eligible if they self-identified as African American or Black and delivered a singleton infant at Providence Hospital in the Metro Detroit area. At the time of this analysis, 762 women (70% response rate) had consented to the study and been interviewed. Women were interviewed in person at the hospital after delivery and data were collected on race/ethnicity, current age, education, income, weight and body image in childhood/adolescence, hospitalizations and serious medical conditions in childhood/adolescence, and childhood and adulthood indicators of socioeconomic position. Additional information was obtained about the woman and her infant through medical record abstraction.

Study participants were asked to provide contact information for their mother (grandmother of index child). Approximately 10% of mothers were ineligible (deceased; inability to communicate; poor health; institutionalized) and 24% of study participants did not provide contact information for their mothers. We obtained consent from and interviewed 71% of the mothers for whom contact information was provided. Only 12 mothers (2.4%) refused to participate while the others could not be reached. There was no significant difference by

income or education among participants whose mother was not interviewed compared to those whose mother was interviewed. However, mothers of younger women were more likely to be interviewed. Mothers were interviewed over the telephone (78.4%) or in person at the hospital prior to the woman being discharged (21.6%). Both the women and their mothers provided retrospective reports about the woman's childhood. At the time of this analysis, data were available for 333 pairs of women and their mothers.

### Measurement of key variables

The main variables of interest included childhood/adolescent body weight and size, medical problems and hospitalizations, and socioeconomic position. Both the woman and her mother were asked a series of questions relating to these topics for specific time periods during the woman's childhood. The woman's childhood body size was queried by asking her to report her weight at birth and at age 18. Both variables were evaluated as continuous variables. In addition, birthweight was evaluated as a dichotomous variable [low birthweight (<2500 grams), vs. not]. Mothers were asked to report on the woman's weight at birth and at age 18 using questions that were phrased identically to those asked of the women. Perception of weight at age 10 and at age 18 was assessed by asking both respondents to describe the woman's weight at each time point as being: very underweight, skinny, just right, a little heavy but not overweight, overweight, or extremely overweight.

Respondents were asked to reply yes or no and to describe serious medical problems and hospitalizations that occurred during early (birth up to age 10) and late childhood/adolescence (aged 10 to 18). Women and their mothers were asked identical questions about the developmental stage of interest.

The woman's subjective childhood socioeconomic position was assessed with an ordinal 5 point response scale using questions from the National Survey of American Life.<sup>6</sup> Women were asked "How would you describe your family's financial situation between the time you were born (birth) and your 10th birthday?" whereas their mothers were asked "How was your family's financial situation at the time of your daughter's birth?".<sup>6</sup> Response choices for both questions included: very poor, not enough to get by; barely enough to get by; had enough to get by but no extras; had more than enough to get by; or well to do. Similar questions were asked of the woman and her mother for the time period between the woman's 10<sup>th</sup> and 18<sup>th</sup> birthday. For simplicity, the two time periods queried are referred to as early childhood and late childhood/adolescence.

In addition to these measures, we collected data on the woman's age (<30 or ≥30), education (less than a college education or at least some college education or more), household income (<50,000/year or ≥50,000/year), and mother's education when the woman was 18 years of age (less than a college education or at least some college education or more) as these factors may impact agreement between the respondents.

### Statistical analysis

All analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC). Univariate analyses were used to describe the demographic characteristics of the study population.

Agreement between the responses from the women and their mothers was assessed using weighted kappa [κ] for ordinal data and unweighted kappa for categorical data. The effect of additional covariates of interest, such as the woman's current educational attainment or income on the level of agreement was assessed by comparing stratum-specific kappa estimates using a chi-square test. Intraclass correlation coefficients [ICC] were generated to compare reports of continuous variables such as birthweight and weight at age 18. Higher values indicate better agreement.

The use of kappa is limited as it is sensitive to the distributions of the marginal values and it does not provide any additional information about the pattern of agreement<sup>7, 8</sup>. Therefore, in an effort to further describe the nature of agreement, a series of increasingly complex log-linear regression models were fit to ordinal data with the goal of identifying the best fitting model. Each model describes a different pattern of agreement (independence, diagonal, linear by linear, diagonal plus linear by linear, triangular, and quasi-independence).<sup>7, 9</sup> A summary of the parameters fit in each log-linear model is provided in Table 1. Details about using log-linear models for agreement analyses have been reviewed elsewhere.<sup>9</sup> Briefly, the model of independence is the simplest model. A good fit of this model to the data suggests that the response of the woman was not related to the response of her mother. Diagonal agreement indicates exact agreement or agreement along the main diagonal. Linear by linear association indicates a positive association between the response of the woman and that of her mother; that is high (or low) responses by the woman were associated with similarly high (or low) responses by her mother. Diagonal plus linear by linear association indicates the presence of both exact agreement and a tendency for discordant respondent pairs to be positively associated. Triangular agreement indicates that there was a tendency of one respondent to consistently rate higher than the other. Quasi-independence indicates that among the off-diagonal cells, the responses of the woman and her mother were not related.

The model that best describes the type and amount of agreement present was selected by determining the best fitting and most parsimonious model.<sup>9</sup> The deviance ( $G^2$ ) of each increasingly complex model was compared using the likelihood ratio test. If the likelihood ratio test was nonsignificant, thereby indicating that a more complex model did not significantly improve model fit, then the more parsimonious model was selected as the model that best described the pattern of agreement. All tests of significance were two-tailed with a type one error rate fixed at 5%.

## Results

### Population sociodemographics

A total of 333 pairs of women and their mothers were included in the analyses. Mean age of the women was 26.0 years (range 18-43) with considerable heterogeneity across income categories. Few women had less than a high school education or a GED (3.6%). About 73% of the women and 63% of their mothers had at least some college education. About 24% of the women were married and another 26.5% lived with their partner. Household income was less than \$25 000 for 33.1% of women, but exceeded \$50 000 for almost 34% of them. However, 40.2% of women reported receiving benefits from the Women, Infants, and Children [WIC] food supplement program and 26.4% received food stamps.

### Infant and childhood body size

Birthweight was reported by the women and their mothers with a high level of agreement, regardless of whether it was assessed categorically (low birthweight or not) or continuously ( $\kappa=0.78$  and  $ICC=0.86$ , respectively). However, more women ( $N=89$ ) than mothers ( $N=16$ ) were unable to report birthweight. Weight of the woman at age 18 also had a high level of agreement ( $ICC=0.71$ ). Not surprisingly, few women were unable to report their weight at age 18 ( $N=28$ ). A greater number of mothers were unable to report the woman's weight at age 18 ( $N=99$ ).

Perception of weight (using the categories described earlier) during early and late childhood/adolescence had moderate agreement ( $\kappa=0.39$  and  $\kappa=0.42$ , respectively). Data are presented in Tables 2 and 3. Log-linear models suggested that there was diagonal agreement plus a linear by linear association for weight at age 10, indicating that the responses from the

women and their mothers were generally concordant, but when they were discordant, the responses were positively associated. However, there was linear by linear association between the women and their mothers for perception of weight in late childhood/adolescence. This pattern indicates that the responses of the women and her mother were positively associated. In other words, the responses for the dyads tend to both be high or both low, but not necessarily equal. Agreement for perception of weight in early childhood or late childhood/adolescence was not influenced by any of the covariates assessed.

### Childhood medical problems and hospitalizations

The women were less likely than their mothers to recall and report serious medical problems that occurred before the women were 10 years of age (18% and 25% respectively; Table 4). The opposite occurred for late childhood/adolescence. When compared to their mothers, the women were more likely to report hospitalizations that occurred in both early and late childhood/adolescence. Reports of the woman's early and late childhood/adolescence medical problems and hospitalizations had only moderate agreement (Table 4). The covariates assessed did not influence agreement for any of the questions pertaining to medical problems and hospitalizations.

### Childhood socioeconomic position

Table 5 presents the distribution of responses to the questions about the women's financial situation in early childhood and late childhood/adolescence. Similar response distributions were observed for both time periods. In early childhood, a greater percentage of women as compared to their mothers reported that they were well to do. Regardless of time period queried, the majority of women and their mothers reported that they had either "enough to get by, but no extras" or "more than enough to get by."

Kappa values for agreement about the family's financial situation during the woman's early childhood and late childhood/adolescence indicated that agreement was poor (Table 6). Log-linear models, however, show a linear by linear pattern of agreement for both time periods. This indicates that the responses from women and their mothers were positively associated. Agreement for early childhood financial situation was influenced by the woman's current income so that agreement was better for women with a higher income. None of the other covariates examined influenced the agreement statistics.

## Discussion

This study is among the first to examine how life course factors might be captured by interviewing adult women and their mothers using retrospective questions about specific developmental stages. In agreement with previous studies, when birthweight could be reported, it was reported with a high level of agreement.<sup>3, 4</sup> We expanded on earlier findings by also attempting to capture information on body weight and perceived body size in early childhood and late childhood/adolescence. Results suggest that while overall agreement in early and late childhood/adolescence is moderate, there are age-dependant differences in the nature of the pattern of agreement. When there is agreement about body size in early childhood, reports tended to agree exactly and when they did not, the reports still tended to positively associated (i.e., both high or both low). In late childhood/adolescence the pattern changes somewhat, but the responses tended to be positively associated.

Few previous studies have examined reporting of body weight over the life course and to our knowledge none have directly compared retrospective reports of body weight in childhood from adult index and adult surrogate respondents. We used subjective measures of body size in early and late childhood/adolescence and the moderate agreement observed in this

population may be attributable to intergenerational differences in perception of body size. Goodman et al. asked adolescents and their parents to report subjective (overweight, obese, etc) and objective (height and weight) body size indicators.<sup>10</sup> Consistent with our study, Goodman et al. found discrepancies in the adolescent and parent report of the adolescent's subjective obesity indicators even though the recall was not retrospective but contemporaneous.<sup>10</sup> However, some studies suggest that body weight in late adolescence (age 18) can be recalled fairly accurately, but less is known about the accuracy of recalled body weight in childhood.<sup>11</sup> These and our results suggest that future studies should rely on objective indicators of body weight rather than subjective measures. In addition, effort should be made to directly assess which reporter provides the most accurate responses, a factor that is likely tied to the time period in question.

Reports of early and late childhood medical problems and hospitalizations by the women and their mothers had only moderate agreement. Some previous reports found that retrospective self reports of childhood disease were generally reliable, but varied by disease type.<sup>12-14</sup> One study found that accuracy of recalling childhood illness was approximately 40%, but that study only asked about number of illnesses, which captures a broad range of conditions.<sup>15</sup> Querying only about serious illness or hospitalizations may improve accuracy. Nonetheless, agreement may have been affected by the nature of the hospitalization or illness. For example, both groups may have reported asthma, but stigmatized hospitalizations such as abuse may have not been reported by both women and their mothers with equal frequency. Our follow up questions on the nature of the illness or hospitalization suggest that data for both respondents did not overestimate but we cannot assess underestimation. Additional discrepancies in reporting may have occurred due to inaccuracies in recall of age at the time of disease or hospitalization. One longitudinal study that sought to compare retrospective reports of specific childhood illness and hospitalizations with historical documents noted that retrospective recall of age at time of disease occurrence was usually reported within 2 years of the actual occurrence.<sup>12</sup> We dichotomized age as either early childhood or late childhood/adolescence. If age at occurrence fell near the cut-off for this dichotomization, small differences in recall of age at occurrence of medical problems or hospitalizations between women and their mothers may have led to discrepant reports of medical problems and hospitalizations. We did not query about the exact age of the illness/hospitalization to rule this out as a source of error. Agreement in reporting retrospective events might be enhanced if additional probes were used to focus the respondents on the time period in question. For example, instead of just asking about age 10, we might also remind the respondents what grade of school they would have been at that age. Alternatively, the lifegrid interview method has been successfully used in some populations. However, this method requires the creation of four timelines (family events, major political events, residential history events, and occupational history) prior to asking the participant for details about each phase of their life; therefore it is very time consuming and not feasible for telephone interviews or within the context of studies with a larger study focus.<sup>15</sup>

In this analysis of health problems, agreement was not impacted by demographic characteristics of the respondents. Previous studies have not evaluated agreement in a manner comparable to that used here. However, previous reports comparing parental reports with historical documents such as medical records also found that agreement was not influenced by demographic characteristics of the respondents.<sup>12, 13</sup>

Although kappa tests suggested that agreement between the woman and her mother was weak, there was linear by linear agreement for reports of the woman's childhood socioeconomic position. Few previous studies have compared retrospective reports of childhood socioeconomic position with reports obtained during childhood. Those that did

largely used father's occupation or head of household occupation to create socioeconomic classifications.<sup>16, 17</sup> However, by using longitudinal data from the Aberdeen children of the 1950s study, David Batty et al. found moderate agreement between paternal occupation at birth or age 12 and retrospective reports in adulthood.<sup>16</sup> Similar results were found using data from a study assessing agreement between female twin reports of household socioeconomic environment (based on paternal or household socioeconomic environment).<sup>17</sup> These findings are not entirely consistent with the pattern of agreement found in this analysis.

There are a number of reasons why our findings may differ. First, our cohort was comprised entirely of African American women, many of whom were low income although not necessarily of low educational attainment. In the United States, African American families are more likely to be headed by single mothers so paternal occupation may not be salient in conferring a childhood socioeconomic position. This is supported in our population as only about half of the population reported being married or living with a partner. The differences in agreement may also be attributed, at least in part, to the fact that we asked about perception of financial situation, a subjective measure, as opposed to using administrative records to measure income objectively. Younger children may perceive their family's financial situation differently or they may be shielded from it, thus, women may have not been able to accurately report their family's financial situation in early childhood. Data from additional studies are needed to further evaluate this concept, but our data suggest that the mother may have been better at reporting the financial situation for the woman's early childhood. While it is often difficult and expensive to obtain objective measures of financial well being retrospectively in the U.S., it is possible to link to earnings records. However, the rise in privacy laws may restrict such linking. Finally, the weak agreement may also be attributed to differences in the wording of our questions about SEP. The mothers were asked to report SEP at the time of the woman's birth whereas women were asked to report SEP over a 10 year period (birth to age 10). The lack of agreement may reflect changes in SEP between birth and age 10. Unfortunately the mothers were not explicitly asked about SEP when the women were 10 years of age, so we are unable to further examine this discrepancy.

This analysis presents important and novel findings regarding the use of proxy reporting as a tool to capture exposure that have occurred throughout the life course. However our analyses are limited in that we do not address bias in self-reported measures. Rather, we are focusing on alternative strategies to obtaining measures of body weight and size, socioeconomic position, and health over the life course. Additional studies are needed to determine the accuracy of self-reported measures. However, for many measures, objective records may be difficult to obtain, thus, it will be challenging to determine which respondent is more accurate.

There are a number of benefits to using multiple respondents in life course research. First, maternal reports are useful in that they provide supplemental information on questions that may have been skipped by the woman because she did not know the answer. This data alone or combined with imputation may provide a better estimate of what the response would have been. In addition, although we did not directly assess accuracy, the results suggest that the best reporter seems to differ depending on the nature of the question and developmental stage. For example, the mothers are likely better reporters for the women's early childhood exposures and experiences while the women may be better able to report on their own late childhood/adolescent exposures and experiences. Having data from multiple respondents provides an opportunity to adjust for and assess recall bias. We are currently exploring methods that may enable us to utilize data that we have captured from the woman-mother pairs to adjust our analyses for potential bias. We are also evaluating whether we can use the information we collected from the mother to impute information that is missing for women

whose mothers were not interviewed. Knowing the pattern of agreement between the woman's and mother's reports may provide important data for this effort. We estimate that each mother cost approximately \$50 to interview. This cost is modest considering the potential gains in accuracy and validity if researchers are interested in examining perinatal life course factors retrospectively.

The generalizability of our findings may be limited given how many women did not provide contact information for their mothers. Except for areas in which data can be linked to objective extant measures, this may be the most feasible approach to measure childhood context after the fact. This response rate is quite comparable to other studies that rely on the index respondent to gain access to the proxy. For example, Hatch et al. had a 48.6% response rate for fathers when recruited through the mother.<sup>18</sup> In the LIFE study, women acted as gatekeepers for their mother's contact information. As such, younger women were more likely to provide contact information for their mother, so mothers of younger women were more likely to participate in the study. This is not surprising as the women's age is correlated with her mother's age, and the older a mother is, the more likely she will have died or be unable to participate. Further, women with elderly or frail mothers may be more likely to "protect" their mothers and not provide their contact information. Whether it is an age-related decline or some other factor, proxies are not always available. Nevertheless, there are ways to effectively utilize proxy information when it is available.

In conclusion, our analyses suggest that multiple respondents may be beneficial for examining life course factors. This may be particularly important when multiple time periods are examined as the ability to provide an accurate response may be dependent on the respondent's age during the time frame in question. Although additional studies are needed, it is possible that multiple proxy reports may be utilized in conjunction to provide an estimate of the accuracy of report or to more fully capture experiences over the life course. Future studies may benefit from the efficiency and cost-effectiveness of using multiple informants to collect data on life course factors.

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## References

1. Misra DP, Guyer B, Allston A. Integrated perinatal health framework. A multiple determinants model with a life span approach. *American Journal of Preventive Medicine*. 2003; 25:65–75. [PubMed: 12818312]
2. Russell C, Palmer JR, Adams-Campbell LL, Rosenberg L. Follow-up of a large cohort of Black women. *American Journal of Epidemiology*. 2001; 154:845–853. [PubMed: 11682367]
3. Walton KA, Murray LJ, Gallagher AM, Cran GW, Savage MJ, Boreham C. Parental recall of birthweight: a good proxy for recorded birthweight? *European Journal of Epidemiology*. 2000; 16:793–796. [PubMed: 11297220]
4. Wodskou PM, Hundrup YA, Obel EB, Jorgensen T. Validity of self-reported birthweight among middle-aged and elderly women in the Danish Nurse Cohort Study. *Acta Obstetrica et Gynecologica Scandinavica*. 2010; 89:1134–1139. [PubMed: 20804338]
5. Furu K, Karlstad O, Skurtveit S, Haberg SE, Nafstad P, London SJ, et al. High validity of mother-reported use of antiasthmatics among children: a comparison with a population-based prescription database. *J Clin Epidemiol*. 2011; 64:878–884. [PubMed: 21232920]



6. Jackson JS, Torres M, Caldwell CH, Neighbors HW, Nesse RM, Taylor RJ, et al. The National Survey of American Life: a study of racial, ethnic and cultural influences on mental disorders and mental health. *International Journal of Methods in Psychiatric Research*. 2004; 13:196–207. [PubMed: 15719528]
7. Agresti A. A Model for agreement Between Ratings on an Ordinal Scale. *Biometrics*. 1988; 44:539–548.
8. Tanner MA, Young MA. Modeling agreement among raters. *Journal of the American Statistical Association*. 1985; 80:175–180.
9. May SM. Modelling observer agreement--an alternative to kappa. *Journal of Clinical Epidemiology*. 1994; 47:1315–1324. [PubMed: 7722568]
10. Goodman E, Hinden BR, Khandelwal S. Accuracy of teen and parental reports of obesity and body mass index. *Pediatrics*. 2000; 106:52–58. [PubMed: 10878149]
11. Must A, Willett WC, Dietz WH. Remote recall of childhood height, weight, and body build by elderly subjects. *Am J Epidemiol*. 1993; 138:56–64. [PubMed: 8333427]
12. Krall EA, Valadian I, Dwyer JT, Gardner J. Recall of childhood illnesses. *Journal of Clinical Epidemiology*. 1988; 41:1059–1064. [PubMed: 3204416]
13. Pless CE, Pless IB. How well they remember. The accuracy of parent reports *Archives of Pediatrics & Adolescent Medicine*. 1995; 149:553–558.
14. Haas SA. The long-term effects of poor childhood health: an assessment and application of retrospective reports. *Demography*. 2007; 44:113–135. [PubMed: 17461339]
15. Berney LR, Blane DB. Collecting retrospective data: accuracy of recall after 50 years judged against historical records. *Soc Sci Med*. 1997; 45:1519–1525. [PubMed: 9351141]
16. David Batty G, Lawlor DA, Macintyre S, Clark H, Leon DA. Accuracy of adults' recall of childhood social class: findings from the Aberdeen children of the 1950s study. *Journal of Epidemiology and Community Health*. 2005; 59:898–903. [PubMed: 16166367]
17. Krieger N, Okamoto A, Selby JV. Adult female twins' recall of childhood social class and father's education: a validation study for public health research. *American Journal of Epidemiology*. 1998; 147:704–708. [PubMed: 9554610]
18. Hatch MC, Misra D, Kabat GC, Kartzmer S. Proxy respondents in reproductive research: a comparison of self- and partner-reported data. *Am J Epidemiol*. 1991; 133:826–831. [PubMed: 2021150]

**Table 1**  
**Log-linear models of agreement**

Model name	Model specification
Independence	$\log m_{ij} = \mu + \lambda_i^A + \lambda_j^B$
Diagonal agreement	$\log m_{ij} = \mu + \lambda_i^A + \lambda_j^B + \delta_{ij}$ $\text{where } \delta_{ij} = \begin{cases} \delta & \text{if } i=j \\ 0 & \text{otherwise} \end{cases}$
Linear by linear association	$\log m_{ij} = \mu + \lambda_i^A + \lambda_j^B + \beta \mu_i \mu_j$
Diagonal agreement plus linear by linear association	$\log m_{ij} = \mu + \lambda_i^A + \lambda_j^B + \delta_{ij} + \beta \mu_i \mu_j$ $\text{where } \delta_{ij} = \begin{cases} \delta' & \text{if } i=j \\ 0 & \text{otherwise} \end{cases}$
Triangle parameters	$\log m_{ij} = \mu + \lambda_i^A + \lambda_j^B + \delta_{ij}$ $\text{where } \delta_{ij} = \begin{cases} \delta'' & \text{if } i > j \\ 0 & \text{otherwise} \end{cases}$
Quasi-independence	$\log m_{ij} = \mu + \lambda_i^A + \lambda_j^B + \delta_{ij}$ $\text{where } \delta_{ij} = \begin{cases} \delta_i & \text{if } i=j \\ 0 & \text{otherwise} \end{cases}$

$\mu_{ij}$  is the expected number of observations in the  $ij^{\text{th}}$  cell;  $\lambda$  is the overall effect;  $\lambda_i^X$  is the main effect of the women;  $\lambda_j^Y$  is the main effect of the mother

The indicator  $I(i=j)$  equals 1 when  $i=j$  and equals 0 when  $i \neq j$ .

**Table 2**  
**Distribution of the responses to the questions about a woman's childhood/adolescent body size for 333 women and their mothers, The LIFE Study, Metro Detroit, Michigan, June 2009-December 2010**

	Woman's report	Mother's report
	%	%
<b>Perception of weight in early childhood</b>	N <sup>a</sup> =332	N=332
very underweight	0.6	1.2
skinny	37.6	19.0
just right	40.4	60.5
a little heavy but not overweight	16.6	16.0
overweight	4.5	3.0
extremely overweight	0.3	0.3
<b>Perception of weight in late childhood/adolescence</b>	N=329	N=331
very underweight	0.6	0.6
skinny	20.4	9.1
just right	50.4	63.4
a little heavy but not overweight	20.1	18.7
overweight	7.6	6.7
extremely overweight	0.9	1.5

<sup>a</sup> woman-mother pairs

Agreement statistics for perception of weight in childhood/adolescence for 333 women and their mothers, The LIFE Study, Metro Detroit, Michigan, June 2009-December 2010.

**Table 3**

	Kappa		Log-linear model and fit statistics		
	$\kappa$	95% CI	model	G <sup>2</sup>	DF
Early childhood N=331	0.39	[0.32, 0.46]	Independence	157.33	25
			Diagonal agreement	89.36	24
			Linear by linear association	60.08	24
			Diagonal agreement plus linear by linear association <sup>b</sup>	50.76	23
			Triangular agreement	84.18	23
			Quasi-independence	80.08	19
Late childhood/adolescence N=327	0.42	[0.35, 0.49]	Independence	167.22	25
			Diagonal agreement	108.44	24
			Linear by linear association <sup>b</sup>	34.04	24
			Diagonal agreement plus linear by linear association	32.90	23
			Triangular agreement	100.95	23
			Quasi-independence	120.01	19

<sup>a</sup> woman-mother pairs

<sup>b</sup> best fitting model

CI=confidence interval; DF=degrees of freedom;  $\kappa$ =Kappa; G<sup>2</sup>=deviance

**Table 4**

Distribution of responses and agreement statistics for childhood/adolescent medical problems and hospitalizations from 333 Women and their mothers, The LIFE Study, Metro Detroit, Michigan, June 2009-December 2010.

	Woman's Report		Mother's report		Kappa	
	%	N <sup>a</sup>	%	N <sup>a</sup>	$\kappa$	95% CI
Serious medical problems in early childhood	18.1	326	24.9	326	0.40	[0.29, 0.52]
Hospitalizations in early childhood	23.8	324	21.3	324	0.42	[0.30, 0.53]
Serious medical problems in late childhood/adolescence	24.7	332	21.4	332	0.48	[0.37, 0.59]
Hospitalizations in late childhood/adolescence	22.5	324	16.1	324	0.40	[0.28, 0.52]

<sup>a</sup> woman-mother pairs

CI=confidence interval;  $\kappa$ =Kappa

**Table 5**

Distribution of the responses about childhood/adolescent socioeconomic position for 333 women and their mothers, The LIFE Study, Metro Detroit, Michigan, June 2009-December 2010.

	Woman's report	Mother's report
	%	%
Financial situation in early childhood	N <sup>a</sup> =328	N=310
Very poor, not enough to get by	1.5	1.0
Barely enough to get by	7.9	7.7
Enough to get by, but no extras	26.2	40.3
Had more than enough to get by	46.7	41.6
Well to do	17.7	9.4
<b>Financial situation in late childhood/adolescence</b>	N=331	N=321
Very poor, not enough to get by	1.2	0.6
Barely enough to get by	5.7	5.3
Enough to get by, but no extras	33.8	32.1
Had more than enough to get by	43.8	45.2
Well to do	15.4	16.8

<sup>a</sup>Woman-mother pairs

Agreement statistics on childhood/adolescent socioeconomic position for 333 women and their mothers, The LIFE Study, Metro Detroit, Michigan, June 2009-December 2010.

**Table 6**

	Weighted kappa $\kappa$	95% CI	Log-linear model and fit statistics model	G <sup>2</sup>	DF
Early childhood N=305	0.14	[0.06, 0.21]	Independence	25.12	16
			Diagonal agreement	18.11	15
			Linear by linear association <sup>b</sup>	13.73	15
			Diagonal agreement plus linear by linear association	11.95	14
Late childhood/adolescence N=319	0.20	[0.12, 0.27]	Triangular agreement	18.00	14
			Quasi-independence	14.16	11
			Independence	41.39	16
			Diagonal agreement	30.22	15
			Linear by linear association <sup>b</sup>	14.29	15
			Diagonal agreement plus linear by linear association	13.49	14
			Triangular agreement	27.36	14
			Quasi-independence	25.49	11

<sup>a</sup> woman-mother pairs

<sup>b</sup> indicates best fitting model

CI=confidence interval; DF=degrees of freedom;  $\kappa$ =Kappa; G<sup>2</sup>=deviance