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Concordance between maternal recall of birth complications and data from obstetrical records

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ABSTRACT

Background: Prenatal complications are associated with poor outcomes in the offspring. Access to medical records is limited in the United States and investigators often rely on maternal report of prenatal complications.
Study design and aims: We tested concordance between maternal recall and birth records in a community-based sample of mothers participating in a longitudinal study in order to determine the accuracy of maternal recall of perinatal complications.
Subjects: Participants were 151 biological mothers, who were interviewed about gestational age at birth, birthweight, and the most commonly occurring birth complications: nuchal cord and meconium aspiration when the female child was on average 6 years old, and for whom birth records were obtained. Outcome measures: Concordance between reports was assessed using one-way random intra-class coefficients for continuous measures and kappa coefficients for dichotomous outcomes. Associations between maternal demographic and psychological factors and discrepancies also were tested.
Results: Concordance was excellent for continuously measured birthweight (ICC = 0.85, p < 0.001) and good for gestational age (ICC = 0.68, p < 0.001). Agreement was good for low birthweight (<2500 g) (kappa = 0.67, p < 0.001), fair for preterm delivery (<37 weeks gestation) (kappa = 0.44, p < 0.001), and poor for nuchal cord or meconium aspiration. Most discrepancies were characterized by presence according to birth record and absence according to maternal recall. Receipt of public assistance was associated with a decrease in discrepancy in report of nuchal cord.
Conclusions: Concordance between maternal retrospective report and medical birth records varies across different types of perinatal events. There was little evidence that demographic or psychological factors increased the risk of discrepancies. Maternal recall based on continuous measures of perinatal factors may yield more valid data than dichotomous outcomes.

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1. Introduction

Numerous studies have linked obstetric complications such as low birthweight, premature delivery and cord complications with risk for a variety of poor neurodevelopmental outcomes [1]. In fact, birth complications are considered to have significant causal influences for several forms of severe mental disorders including depressive disorder, schizophrenia, and bipolar disorder [2–9]. Large community-based studies in North America that are designed to examine the prevalence and correlates of child and adolescent neurodevelopmental outcomes, frequently assess perinatal complications using maternal retrospective recall. Yet, studies that utilize this methodology have reported inconsistent findings. While some studies have reported no associations between maternal report of birth complications, and low birthweight and offspring neurodevelopmental problems [10,11], others have shown that maternal recall of birth events predicts youth behavior problems [12–14]. For example, in two child epidemiologic studies, maternal recall of birthweight was unrelated to offspring behavior problems [15,16]. In contrast, results from two other large-scale studies revealed significant associations between maternal recall of low birthweight and youth behavioral and emotional problems [17,18]. The variability across studies may be due in part to poor validity of the measures of birth complications.

In fact, research on the concordance between maternal recall and obstetrical record has produced varying levels of agreement. For example, a study of high-risk pregnant women (half of whom delivered twins or triplets) yielded nearly perfect agreement between data from medical record on delivery date, birthweight, cesarean delivery and neonatal intensive care unit admission and maternal reports collected by telephone interview within 2–6 weeks after delivery [19]. In a sample of

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1,011 women strategically selected to over-represent labored and unlabored cesarean deliveries (premature deliveries were excluded), 5-10 year recall for cesarean delivery was perfect and recall for birth weight greater than 4 kg was near perfect (*kappa* = .93) [20]. Buka and colleagues strategically selected subjects in which birth complications and offspring psychosis were over-represented from two larger cohorts [8]. Based on an average period of recall of 30 years, agreement with medical record ranged from good for birthweight < 5 lbs. to poor for preterm delivery. Thus, even within special subpopulations of obstetric patients, substantial variability in concordance between maternal recall and medical record is observed.

Despite the extensive literature linking obstetric issues to offspring neurodevelopment, an assessment of the validity of maternal recall of pregnancy complications has not been rigorously pursued within relevant populations. In the present study, we examine concordance between maternal recall of delivery events on average 6 years following the birth and data collected from medical records in a sample drawn from a community-based study. In addition, we examine whether discordance in the two modes of assessment is associated with maternal sociodemographic and psychological factors.

2. Materials and methods

2.1. Sampling of participants

Participants were 232 girls and their biological mothers recruited for the Pittsburgh Girls Study-Emotions Study (PGS-E), a sub-study of the larger Pittsburgh Girls Study (PGS), for which a stratified, random household sampling, with over-sampling of households in low-income neighborhoods, was used to identify girls who were between the ages of 5 and 8 years. Of the 2992 eligible families 2875 (96%) were successfully re-contacted to determine their willingness to participate in the longitudinal study, and 85% of those families agreed to participate resulting in a PGS sample of 2450 [21].

Girls participating in the PGS-E substudy were recruited from the youngest participants in the PGS, and either screened high on measures of depressive symptoms by their self- and parent-report at age 8, or were included in a random selection from the remaining girls. The measures used to screen for depressive symptoms were the Short Moods and Feelings Questionnaire [22] and the Child Symptom Inventory [23]. Girls whose scores fell at or above the 75th percentile by their own report, their mother's report, or by both informants comprised the screen high group (n = 135). This sampling strategy was used in order to increase the base rate of depression as the girls moved into adolescence.

There were significantly more African American than Caucasian girls in the screen high group. One hundred thirty-six girls were randomly selected from those scoring below the 75th percentile and were matched to the screen high group on race. Eight families were not eligible at the time of recruitment for the PGS-E because the biological mother had died, the family had moved, or the family was no longer participating in the main study and could not be contacted. Of the 263 remaining eligible families, 232 (88.2%) agreed to participate and completed the laboratory assessment, 25 (9.5%) families refused to participate and 6 (2.3%) agreed but could not be scheduled for an assessment.

2.2. Measures

Approval for all study procedures was obtained from the University of Pittsburgh Institutional Review Board. Written informed consent from the mother was obtained prior to any data collection. Using an interview developed by the PGS, mothers were asked to recall birthweight in pounds and ounces, whether the child was born early and if so, how many weeks early, whether the cord was wrapped around the baby's neck (nuchal cord), and whether the baby breathed in any meconium (meconium aspiration), as these perinatal complications are the most commonly occurring in this population [24]. Low birthweight was defined as <2500 g and preterm delivery as delivery prior to 37 weeks gestation. Any complication was defined as one or more of the following birth complications: low birthweight, preterm delivery, nuchal cord complications, and meconium aspiration. Participants with one or more missing complications were excluded from analyses. Concordance between maternal report and birth record was assessed using one-way random intra-class coefficient (ICC) [25] for continuous measures (i.e., birthweight and gestational age) and kappa coefficients for dichotomous outcomes. Level of agreement was characterized according to accepted and comparable guidelines: 0.75–1.0 = excellent; 0.60–0.74 = good; 0.40–0.59 = fair, and 0.0–0.39 poor [26].

The Difficult Life Circumstances Scale (DLC) is a set of 28 yes-no questions about difficult circumstances at home or work. The measure was designed to include items that would be applicable to women living in poverty such as difficulty with finances and housing. The internal consistency of the scale as measured by alpha was 0.64. The Perceived Stress Scale (PSS) is a 14-item scale designed to measure the degree to which situations in one's life are appraised as stressful. The internal consistency of the scale as measured by alpha was high: 0.85. The 21-item Beck Depression Inventory-II (BDI-II) assesses levels of depression in both clinical and non-clinical respondents. Each item requires individuals to select a statement about the degree to which they may or may not have been experiencing a specific symptom of depression in the last two weeks. Cronbach's alpha for the current sample was 0.88.

2.3. Birth record methods

Trained research assistants coded data from the birth records: birthweight, gestational age, nuchal cord, and meconium aspiration. A second research assistant independently coded 25% of the birth records to assess inter-rater reliability. Agreement between trained raters was excellent: Intra-class coefficient (ICC) for birthweight = 0.99; ICC for gestational age = 0.99; kappa coefficient for nuchal cord = 1.0; and kappa coefficient for meconium aspiration = 1.0.

3. Results

Of the 232 participants in the PGS-E study, 151 records were obtained (61.5%) (Fig. 1). Demographic characteristics of the sample and tests of differences between those for whom a medical record was and was not obtained are presented in Table 1. Most of the mothers (67.1%) reported their race as African American, over half (52.0%) acted as single parents, and 47% percent of families received some form of public assistance (e.g., food stamps, Medicaid, or monies from public aid). No significant group differences in demographic characteristics or depression, negative life events, or perceived stress scores were observed between those for whom birth records were and were not obtained. According to the birth records, 33.3% had at least one complication, ranging from 6.9% for low birthweight and 21.2% for nuchal cord complications. Close to 20% of mothers reported at least one complication, ranging from 5.8% for nuchal cord complications and meconium aspiration and 8.6% for low birthweight (Table 2).

Concordance between maternal report and birth record was excellent for birthweight (ICC = 0.85, [95% CI = 0.80–0.89], p < 0.001) (see Fig. 2) and good for gestational age (ICC = 0.68, [95% CI = 0.60–0.77], p < 0.001) (Table 2). Agreement was good for low birthweight (kappa = 0.67, [95% CI = 0.44–0.90], p < 0.001), fair for preterm delivery (kappa = 0.44, [95% CI = 0.10–0.78], p < 0.001), and poor for any complication (kappa = 0.34, [95% CI = 0.18–0.50], p < 0.001); no significant agreement was observed for nuchal cord or meconium aspiration. The average gestational age according to the medical record for the 7 individuals discordant on preterm delivery was 35.9 weeks, ranging from 35 to 37 weeks, and average birthweight for the 7 infants with discordant on low birthweight was 2781.6 g, ranging from 2003 to 3530 g.