

# Exploring the Psychosocial Predictors of Gestational Diabetes and Birth Weight

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## ABSTRACT

**Objective:** To determine the best sociodemographic and behavioral predictors for gestational diabetes mellitus (GDM) and birth weight (BW) and whether stress, depression, or abuse influences GDM and BW after controlling for sociodemographic variables.

**Design:** Retrospective correlational.

**Setting:** Utah Pregnancy Risk Monitoring System and birth certificate data.

**Participants:** We analyzed data from the birth certificates of 4,682 women with live births between 2009 and 2011 in Utah. During that time, a total of 143,373 live births occurred in the state. Data were predominantly from non-Hispanic White, married, or partnered women with average age of 27.5 years and average body mass index (BMI) of 25.1.

**Methods:** Stress, cumulative depression, and abuse were operationalized based on previous analysis, and control and covariate data (e.g., age, BMI, race, ethnicity, education, marital status) were collected. Bivariate analysis was used to identify associations between variables, and a hierarchical stepwise logistical regression was conducted to identify best predictors of GDM and BW.

**Results:** We did not find that cumulative depression, stress, or abuse was a predictor of GDM, and only cumulative stress was a predictor of BW. More incidences of GDM were observed in women who were poor, older, less educated, non-White, obese, or experienced depression during pregnancy.

**Conclusion:** Unlike depression or abuse, stress is often overlooked by providers. This finding represents an unmet opportunity for nurses to screen for and assist women with stressors to positively affect birth weight.

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Researchers suggested that pregnant women with strong social support are less likely to experience emotional distress throughout pregnancy and during the postpartum period, which leads to improved maternal and newborn well-being (Tanner-Stapleton et al., 2012). Symptoms of depression in women during pregnancy have been linked to biological concomitants that include neuroendocrine changes that adversely influence infant temperament (Davis et al., 2007) and long-term behavioral and developmental disorders in children (Van den Bergh, Mulder, Mennes, & Glover, 2005). Social support has also been linked to newborn birth weight (BW). One group of researchers found that mothers with low levels of social support (measured in part by level of neighborhood income inequality) had a twofold increased risk of having newborns who are low birth weight (LBW) compared to mothers with more social support. This association was independent of socioeconomic factors. Mothers

with low levels of social support were also at statistically greater risk of having preterm births (PTBs). Specifically, a low level of social support was an independent risk factor for PTB and LBW (Nkansah-Amankra, Dhawain, Hussey, & Luchok, 2010). Birth weight and PTB are well understood to be major determinants in newborn morbidity and mortality. Newborns who are LBW are at increased likelihood for severe adverse outcomes, including life-long, neurodevelopmental disabilities (Conde-Agudelo & Diaz-Rossello, 2014).

Biopsychosocial factors during pregnancy are also known to influence birth outcomes (including gestational age and BW) and include such variables as health and obstetric history (Kiely et al., 2011), prepregnancy body mass index (BMI), diabetes prior to conception, depression, intimate partner violence, and employment status (St-Laurent et al., 2008). Other determinants such as preeclampsia and hypertension also contribute

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to adverse birth outcomes, and the frequency of these diagnoses has increased during the past decade. Martin et al. (2010) reported that the incidence of women with gestational diabetes mellitus (GDM) increased by an average of 3% per year in the 1990s; this percentage has increased to almost 6% per year since the year 2000.

Gestational diabetes mellitus, defined as carbohydrate intolerance developed during pregnancy, is the most common metabolic complication of pregnancy and is more prevalent in women who are older, have prepregnancy obesity and/or have an increased weight gain during pregnancy, are shorter in height, and have a positive family history related to diabetes (Cianni et al., 2003). The major intrapartum risks of GDM are associated with the fetuses (Singh & Rastogi, 2008). A woman with untreated GDM has a threefold greater chance of having an infant who experiences adverse morbidity outcomes such as admission to the neonatal intensive care unit (NICU), arterial cord pH <7.2, hypoglycemia, hyperbilirubinemia, erythrocytosis, stillbirth, shoulder dystocia, and respiratory complications (Iqbal et al., 2007; Langer, Yogev, Most, & Xenakis, 2005). In addition to greater rates of birth complications, women with GDM have a 30% to 84% risk of recurrence in subsequent pregnancies (Kim, Berger, & Chamany, 2007) and an increased likelihood of developing diabetes mellitus later in life (Singh & Rastogi, 2008).

Crowther et al. (2005) conducted a randomized controlled trial to determine whether a prescribed treatment for women with GDM, including dietary advice, blood glucose monitoring, and insulin therapy as needed versus usual care, would reduce the risk of perinatal complications such as shoulder dystocia, bone fracture, nerve palsy, admission to NICU, jaundice, labor induction, unanticipated cesarean birth, maternal anxiety, and depression. These researchers found that the rates of serious perinatal complications were significantly less among infants in the intervention group ( $n = 490$ ) versus routine care group ( $n = 510$ ); 95% confidence interval [CI] [0.14, 0.75],  $p = .01$ , though infants in the intervention group had significantly lower mean birth weights and were born at earlier gestational ages. Women in the intervention group had lower rates of depression, higher scores on quality-of-life measurements, and reduced incidence of depression after birth. Although these investigators demonstrated the value of targeted interventions once women were diagnosed with GDM, no attempt was made to examine psychosocial or behavioral predictors

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**Cumulative stress was a significant predictor for birth weight. For every increase in cumulative stress, birth weight decreased by 15.6 grams.**

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for the development of GDM, an area that to the best of our knowledge remains unexamined.

In addition to the psychosocial and behavioral predictors for the development of GDM, the sociodemographic and behavioral predictors for LBW also warrant further exploration. Rosen, Seng, Tolman, and Mallinger (2007) examined the prevalence and effect of intimate partner violence (IPV) and mental health conditions known to be the results of abuse, including substance dependence, depression, and posttraumatic stress disorder (PTSD) and the risk of LBW among single mothers on Medicaid. Study measures included LBW, IPV, maternal deprivation (self-reports of experiencing financial hardships such as food insufficiency), and maternal mental health disorders and/or substance abuse. Food insufficiency, IPV, PTSD, and/or depression were all associated with LBW in newborns. Intimate partner violence was most strongly associated with LBW among women who experienced depression or PTSD. Grote et al. (2010) and Wisner et al. (2009) found similar results and observed that a mood disorder was associated with increased adverse outcomes that included LBW in newborns.

However, in a more recent study, Sit et al. (2014) found contrary results. They examined the relationship between abnormal GDM screens, mood disorders, and adverse birth outcomes. In that study, diagnosis of a mood disorder that included depression or bipolar disorder was not associated with increased adverse perinatal outcomes such as PTB, LBW, or adverse perinatal events. Women with or without mood disorders were more likely to have adverse pregnancy outcomes if their glucose challenge test (GCT) results were  $>140$  mg  $\text{dl}^{-1}$ , but the interaction of GCT level with mood disorder was not significantly associated with an increased odds for PTB, LBW infants, or perinatal events. This important area of health is not well understood.

Because conflicting results exist regarding the effect of depression, abuse, and cumulative stress on newborn BWs or the likelihood of the development of GDM, the purpose of this study was to determine the best psychosocial, demographic, and behavioral predictors for GDM and BW using the

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