Medical and psychosocial risk profiles for low birthweight and preterm birth. Women’s Health Issues

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RUNNING HEAD: MEDICAL AND PSYCHOSOCIAL RISK PROFILES

Medical and psychosocial risk profiles for low birthweight and preterm birth

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Abstract.

Objectives. Low birthweight (LBW) and preterm birth (PTB) are risks for infant mortality and persistent problems. This study uses representative data to assess whether distinct latent profiles of co-occurring medical and psychosocial factors have implications for PTB and LBW.

Methods. Data are from the Pregnancy Risk Assessment Monitoring System (PRAMS), a cross-sectional survey constituting representative data on pregnancies from 2012-2013. Latent class analysis derived classes of pregnant women potentially at risk for LBW and/or PTB.

Results. Latent class analysis identified five homogenous profiles of interrelated psychosocial and medical factors. Risk was greatest for the profile marked by high rates of medical factors, followed by high risk for a profile marked by a combination of very low-income and psychosocial factors. Two profiles involving low-income and very low-income also indicated greater risk for adverse birth outcomes related to socioeconomic status.

Conclusions and Policy Implications. More attention should be paid to screening for and addressing psychosocial risk in concert with prenatal care. Women who show high-risk profiles can be monitored and supported by an interdisciplinary care team, when warranted.
Pregnancy can pose risks to both maternal and infant health, and while most pregnancies produce healthy newborns, some that result in adverse perinatal outcomes such as low birthweight (LBW) and preterm birth (PTB). LBW and PTB are linked to higher rates of infant mortality or persistent health, cognitive, and social problems (Callaghan, MacDorman, Rasmussen, Qin, & Lackritz, 2006). Prenatal care providers routinely screen for risk factors in the mother’s medical history that predict LBW and PTB (Mehta-Lee, Palma, Bernstein, Lounsbury, & Schlecht, 2016). However, past variable-focused research also supports links between psychosocial factors such as poverty and homelessness and medical factors (McDonal, Kingston, Bayrampour, Dolan, & Tough, 2014; Whitehead 2012). This warrants consideration for health care providers to include psychosocial factors when screening patients in order to develop more comprehensive risk profiles. To this end, the current study used a large sample of representative data on pregnancies for 47 of the United States, to assess whether distinct latent profiles of co-occurring medical and psychosocial factors would have differential implications for PTB and LBW. This is the first study to use such a large and representative sample to explore comprehensive risk profiles in pregnant women.

**Medical risk factors.** Characteristics related to maternal health and disease signify risk for complications, premature birth, and/or LBW. These factors include overall health during pregnancy, weight problems (underweight, overweight, or obese status), gestational diabetes, and other chronic health conditions (Cnattingius et al., 2013; Mehta-Lee et al., 2016; Tucker et al., 2015; Xaverius, Alman, Holtz, & Yarber, 2016). Preterm or premature births are more likely among mothers with a history of preterm delivery, primiparous mothers, and multifetal pregnancies (Mehta-Lee et al., 2016; Tucker et al., 2015; Whitehead, 2012; Xaverius et al., 2016). Environmental exposures that compromise health have been linked to LBW and PTB as
well. Maternal malnutrition, lack of access to adequate food, and exposure to tobacco, alcohol, or other drugs during pregnancy increase the likelihood of complications and prematurity (Tucker et al., 2015; Hendryx et al., 2014; Ma, Liu, Hardin, Zhao, & Liese, 2015). Furthermore, multiple health compromising behaviors during pregnancy have cumulative effects on adverse birth outcomes (Dew Guillory, Okah, Cai, & Hoff, 2007).

**Psychosocial risk factors.** Poverty and associated factors are risks for premature birth or premature labor (Neube, Enquobahrie, Albert, Herrick, & Burke, 2016; Whitehead, 2012). Mothers from high poverty neighborhoods have higher odds of PTB and LBW (Neube et al., 2016). The mechanisms through which low-income status precipitates risky perinatal outcomes remains unclear, though pregnant women experiencing poverty often evidence a variety of co-occurring risks.

Prenatal stress is associated with adverse birth outcomes including PTB and LBW. This includes financial stress (e.g., stress about paying bills) as well as other stressors such as housing instability or intimate partner violence (Mehta-Lee et al., 2016; McDonald et al., 2014). Meanwhile, unplanned pregnancies (McDonald et al., 2014) and inadequate prenatal care (Xaverius et al., 2016) are associated with elevated risk of premature birth and are more likely to co-occur with young maternal age, low education levels, and low income (Finer & Zolna, 2011; Hendryx et al., 2014; Xaverius et al., 2016).

Prenatal care visits can serve to mitigate both medical and psychosocial risks, though historically, women reported that prenatal care visits rarely involved any attention to psychosocial factors like intimate partner violence (31% of the time) compared to medical topics that were frequently discussed such as nutrition (88%), alcohol use (81%), breastfeeding (85%), and preterm labor (87%; Petersen, Connelly, Martin, & Kupper, 2001). In 2006, the American
Congress of Obstetricians and Gynecologists (ACOG, 2006) released a set of recommendations calling for routine psychosocial screening during prenatal care visits. Despite these recommendations, pregnant women characterized by high rates of psychosocial risk are less likely to receive adequate prenatal care (Krans, Davis, & Palladino, 2013). Access to prenatal care can be difficult, particularly for women facing complex and accumulating patterns of psychosocial risk such as homelessness and intimate partner violence (Krans et al., 2013).

**Patterns of complex risk.** Risk factors often co-occur, creating situations of complex risk. For example, homelessness during pregnancy warrants special attention as a context of varied and complex adversity for development that often includes very low income status and one or more potentially traumatic negative life events (Cutuli et al., 2015; Gewirtz, Hart-Shegos, & Medhanie, 2008). As many as 4% of women experience homelessness during pregnancy in the United States (Richards, Merrill, & Baksh, 2011). Homelessness during pregnancy is associated with increased likelihood of other psychosocial risks, including economic hardship, low maternal education, maternal chronic health and mental health conditions, maternal histories of childhood abuse, and intimate partner violence during pregnancy (Murrell et al., 2000; Richards et al., 2011). Women who are homeless during pregnancy typically begin prenatal care later, report fewer prenatal care visits, and are less likely to take prenatal vitamins (Perlman & Fantuzzo, 2010; Richards et al., 2011).

**Person-Centered Approach to Multiple Risks.** Most existing studies of risk for PTB use variable-focused approaches, which are limited because they do not account for the interrelated nature of many risk factors (Jobe-Shields, Andrews, & Parra, 2015). In these variable-focused studies, risk levels are quantified to determine a cumulative effect (Lanza,
However, they do not consider how specific combinations of risk factors may differentially affect birth outcomes.

As an alternative, person-centered analyses account for the co-occurrence of risks within each individual, creating profiles that represent unique subgroups (Jobe-Shields et al., 2015). Given the complexities of predicting birth complications, a person-centered analysis is more appropriate for testing how individuals vary in likelihood of problematic outcomes. A key tenet of person-centered methodology is that relatively homogeneous subgroups of individuals with similar patterns of risk exist, and that more traditional variable-centered approaches cannot detect these differences (Jobe-Shields et al., 2015). Preliminary evidence from West Virginia assessing risk using ten distinct factors in over 28,000 live births appears to support the assumption that patterns of cooccurring risk factors exist for subgroups of pregnant women at increased odds for LBW (Hendryx et al., 2014). The current study looks to expand on this work by applying a person-centered analysis to a large sample of representative data.

The current study has two aims. First, we apply latent class analysis (LCA) to a large sample of data on live births, identifying homogenous subgroups characterized by multiple factors, both psychosocial and in the medical history. We then test whether these subgroups have a differential likelihood of LBW and PTB. We hypothesize that this method will identify unique classes of risk for each birth outcome.

**METHODS**

Data are from the Pregnancy Risk Assessment Monitoring System (PRAMS), a cross-sectional survey developed by the CDC constituting representative data on pregnancies for all of the United States except California, Idaho, and Ohio. The data were anonymous and study procedures were deemed exempt by the University of Delaware institutional review board. The
sample for the present analysis includes 70,757 live births from 2012-2013, the most recent available data from the CDC, weighted to approximate a nationally representative sample large enough to estimate statewide risk within 3.5% at 95% confidence (PRAMS, 2016). The PRAMS data includes birth certificate information and self-reported questionnaire responses. Parents were first mailed a questionnaire, and those who did not respond were contacted by telephone for follow-up.

**Outcome Variables.** The two birth outcomes are LBW and PTB using criteria endorsed by the World Health Organization (WHO, 2013). Weight less than 2500 grams using birth certificate data indicates LBW. Clinically estimated gestational age less than 37 weeks indicates PTB. Though correlated, these two outcomes are not the same. LBW and PTB have different implications for children’s health, and we expected that they might show divergent patterns of association with unique latent subgroups.

**Medical and Psychosocial Factors.** All factors were coded dichotomously (0 = absent; 1 = present). Nine medical factors are considered: history of prior LBW or PTB, multifetal gestation, maternal age (either advanced over 34 years or young under 20 years), mother clinically underweight, mother clinically overweight or obese, alcohol use during the last three months of pregnancy, prenatal smoking, inadequate prenatal care (Kotelchuck, 1994), and gestational diabetes. If responses indicated that the factor was present on the PRAMS questionnaire, it was coded as present for the current analyses.

We considered six psychosocial factors: maternal education (less than high school graduate), maternal race/ethnicity (three dummy-coded variables reflecting Hispanic ethnicity, Black race, and other race, with White, non-Hispanic as the reference group), homelessness (experienced homelessness in the 12 months prior to giving birth), intimate partner violence
(mother experienced intimate partner violence in the 12 months prior to giving birth), and maternal income (low-income or very-low-income as indicated by the Census Bureau poverty guidelines). Finally, we created a dichotomized cumulative stress index as a sum of the number of stressors that each individual reported, including: financial concerns, divorce, incarceration, death of someone close, and moving. A score of three or more on the cumulative index indicated high stress, similar to past work that finds only high numbers of negative life events represent considerable birth risk (Dole, Savitz, Hertz-Picciotto, Siega-Riz, McMahon, & Buekens, 2003).

**Analysis.** We employed latent class analysis using MPlus version 7.4 to derive a categorical latent variable representing classes of pregnant women potentially at risk for LBW and/or PTB (Lanza et al., 2010). We employed a model comparison approach, testing multiple class solutions on unconditional models. We determined the appropriate number of classes based on minimizing the Bayesian information criterion (BIC) value, entropy values to indicate good separation of latent classes, and interpretability guided by theory (Masyn, 2013). Finally, we fitted a model with the accepted number of latent classes and covaried LBW and PTB as outcomes of interest. We examined odds ratios to evaluate whether classes differed significantly in their associations with these problematic birth outcomes.

**RESULTS**

Descriptive statistics for each factor are presented in Table 1. For psychosocial factors, high levels of stress occurred in 18.4% of all pregnancies. Homelessness was reported by 2.6% of women. Additionally, 27.6% of the women had very-low-incomes. For medical factors, overweight or obese status occurred in 39.6% of pregnancies. LBW history occurred in 8.2% of all pregnancies while PTB history occurred in 8.7% of all observations.
Based on the model comparison approach, we selected the model with five latent classes
as the best-fitting and most parsimonious model with good class separation, as indicated by the
entropy value of .80. The 5-class solution had a better fit based on lower BIC value relative to
solutions with two through four latent classes. Although BIC values decreased with the
estimation of each additional class, up until the 9-class solution for which the model did not
converge, we judged these small, incremental improvements in model fit to be negligible due to
our extremely large sample size. Furthermore, we found little added value for theoretical or
practical interpretations upon examination of the solutions with more than five latent classes.
Table 2 shows the model comparison statistics for the two to eight class solutions. Table 3 shows
the results of the final 5-class solution, including the item response probabilities for each factor
within each class. The LCA approach requires that we determine the factors that appear to
differentiate each class from the others. Factors defined any particular class if their within-class
probability was less than 50% or greater than 150% of the sample base rate.

The largest class, which we labeled few factors, contained 37.7% of observations. This
class was characterized by relatively low rates of most factors, including low rates of all
psychosocial factors and low rates of most medical factors. The exception was relatively higher
rates of alcohol use during the last three months of pregnancy. Given the large proportion of
observations and low risk status, this class was used as the referent.

The smallest class, labeled medical factors, accounted for 9.0% of the sample. This class
was characterized by relatively high rates of multifetal gestation, diabetes, history of LBW or
PTB, and older maternal age along with relatively low rates of homelessness, intimate partner
violence, very low income, low education, young maternal age, and smoking. Hispanic
individuals and those of other ethnicities were underrepresented in this group.
Nearly 20% of the sample fell within a third class, labeled *stress/very low SES*, which was characterized by individuals with very low income, and relatively high rates of stress, homelessness, intimate partner violence, low education, young maternal age, underweight, smoking, and inadequate prenatal care. This class had the highest proportion of individuals of Black race with Hispanic and other ethnicity underrepresented. The *stress/very low SES* class also had relatively low rates of older maternal age.

The fourth class, labeled *very low SES*, had relatively high rates of very low income, low education, young maternal age, and inadequate prenatal care along with relatively low rates of low income, older maternal age, and multifetal gestation. There were no individuals of Black race in this class, which had the highest proportions of Hispanic and other ethnicity among the five classes.

Finally, the fifth class was labeled *low SES*, with all individuals in the class having low income. The class was otherwise characterized only by relatively low rates of homelessness and multifetal gestation, and relatively high rates of Hispanic ethnicity.

Table 4 displays the odds ratios for LBW and PTB for each of the latent classes. The odds of LBW were elevated for all four classes compared to the *few factors* class. The highest odds of LBW were for *medical factors* \((OR = 24.2, p < .001)\) and *Stress/Very Low SES* \((OR = 4.1, p < .001)\). The odds for PTB also were elevated for all classes in comparison to *few factors*. The highest odds of PTB also was the *medical factors class* \((OR = 5.4, p < .001)\).

**DISCUSSION**

Women who recently gave birth show distinct profiles of medical and psychosocial risk factors right before and during pregnancy, and these profiles predict differences in risk for LBW and PTB. Latent class analysis identified five distinct profiles of psychosocial and medical
factors among this sample of live births. Risk was greatest for the profile marked by high rates of medical factors, as well the profile characterized by both very low income and high levels of stressful experiences. These findings emphasize the importance of considering both medical and psychosocial factors in decision-making with respect to the health and wellbeing of pregnant women (Denktaş et al., 2012).

Profiles were characterized by the likelihood of various factors relative to their overall prevalence in the sample. The largest class (37.7% of all mothers) had the lowest odds for both LBW and PTB and was characterized by a profile of low incidence of individual medical and psychosocial factors except alcohol use during the last three months of pregnancy. The other four classes were compared to this class to determine relative risk of LBW and of PTB.

Unsurprisingly, women were at increased risk for unfavorable birth outcomes if they belonged to the profiles marked by relatively high rates of medical factors. The highest risk profile associated with LBW (2,320% greater risk) and with PTB (440% greater risk) was marked by the presence of factors traditionally considered medical in nature, namely higher rates of older maternal age, a history of LBW or PTB, diabetes, and multifetal gestation. This profile also was notable for relatively low rates of psychosocial factors, and those from Hispanic and other ethnic backgrounds were underrepresented within this group. This finding is consistent with past variable-focused approaches that emphasize medical factors in determining risk (Mehta-Lee et al., 2016). The current findings indicate a particularly high level of risk for mothers who fit a profile marked by older maternal age, a history of poor birth outcomes, diabetes, and multifetal pregnancies, with a relative absence of other factors.

The remaining three profiles are largely distinguished by different income levels and the presence of psychosocial risks. The largest of these (19.9% of mothers) involves a combination
of very low income and many psychosocial risk experiences. In particular, overrepresented psychosocial risks included high rates of stressful negative life events, homelessness, intimate partner violence, low educational attainment, and young maternal age. This group was also notable for higher rates of underweight status, smoking, and inadequate prenatal care. Black mothers were overrepresented in this group. Together, these factors suggest a profile of severe psychosocial marginalization and high rates of experiencing adversity and trauma. This profile corresponded to a 310% increased risk for LBW and 90% increased risk for PTB. The contribution of psychosocial factors to the increased risk for LBW is consistent with conceptualizations involving a continuum of risk (Gewirtz et al., 2008). Also of note, this profile evidenced a particularly high relative rate of homelessness (7.9% versus a sample base rate of 2.6%) and the association with higher risk for LBW is consistent with past variable-focused results involving homeless mothers (Richards et al., 2011).

A third class involved very low income but was distinguished by average levels of most psychosocial risk experiences and medical factors. The 18.7% of mothers in this group also had higher rates of low educational attainment, young maternal age, and inadequate prenatal care. This group evidenced socioeconomic disadvantage, but without particularly high rates of experiencing the specific psychosocial adversity measured by the PRAMS. This group had increased risk for both LBW (100% greater) and PTB (110% greater) compared to the few factors class. However, risk for LBW was not as high as the class with both very low income and high rates of negative psychosocial factors.

Finally, the fifth class was made up entirely of mothers with low-income but average or below average rates of other factors. This group was also at risk compared to the few factors
class (160% greater risk for LBW; 100% greater risk for PTB), affirming that low-income status is iminical to healthy birth outcomes.

**LIMITATIONS**

While this study is the first to utilize representative data on births to explore profiles of cumulative risk, it is not without limitations. It should be noted that while the PRAMS data are available for almost all states, three states -- California, Idaho, and Ohio -- do not participate..

Despite this fact, the data are the most comprehensive set of data on births. Furthermore, the data are weighted so as to be representative of births in each participating state. As PRAMS reports, the annual sample tends to be large enough to estimate statewide risks within 3.5% at 95% confidence (CDC, 2015). It should also be noted that with such a large sample, the current study likely has more power than necessary. This means that the analyses are quite sensitive to even very small differences.

An important finding is that both classes marked by very low income were also notable for higher rates of inadequate prenatal care. This is an actionable finding in policy and public health arenas, underscoring the importance of reaching highly marginalized groups for prenatal care. However, the lack of prenatal care may have made it more difficult to calculate gestational age for mothers in these classes, thereby biasing the estimates of risk for PTB.

**IMPLICATIONS FOR PRACTICE**

Findings from the current study suggest that screening in prenatal care should include psychosocial factors alongside commonplace medical factors to identify women with profiles of risk for LBW and PTB. Such practice is consistent with current American Congress of Obstetricians and Gynecologists (ACOG) guidelines (2013). Past work suggests that most obstetrician-gynecologists screen for intimate partner violence as one psychosocial risk when
they suspect abuse is occurring, but most do not engage in universal screening with all patients
despite ACOG recommendations (Horan, Chapin, Klein, Schmidt, & Schulkin, 1998) and despite
findings that these factors impact maternal functioning throughout the ante- and post-partum
periods (Lancaster et al., 2010). Special attention should be paid to better understanding how
providers implement the ACOG recommendations. Furthermore, a set of explicit practitioner
guidelines outlining best practice around psychosocial screening would help to support providers
in addressing these risks. The findings from the current study offer support for practices that
other researchers have recommended.

As the findings demonstrate, women with multiple medical factors are at an increased
risk for adverse birth outcomes. Therefore, physicians can play a crucial role in preventing and
addressing potential medical complications during pregnancy. Providers can also engage in an
assessment of risk which addresses psychosocial factors. A risk assessment should consider the
co-morbidity of risks and how their co-occurrence contributes to prenatal development. Though
a rigorous evidence base is still forming (Brown et al., 2017), public health agencies should
stress the importance of preconception health checks for women who plan to become pregnant or
may become pregnant through public service announcements and other health campaigns
(Shannon, Alberg, Nacul, & Pashayan, 2014).

A more comprehensive measure of psychosocial risk factors is necessary to capture the
cumulative exposure to risk and predict the potential adverse outcomes associated with this
exposure. Additionally, practice guidelines for prenatal care providers should encourage more
comprehensive interventions for psychosocial risk. Given the precedent to provide more targeted
and intensive prenatal care supports to women presenting with high levels of medical risk, the
same attention should be provided to women with high levels of psychosocial risk (Krans et al.,
Furthermore, for women who present with high levels of both medical and psychosocial risk, special consideration should be given to monitoring and supporting their pregnancies. Practice guidelines can support these high-risk pregnancies by encouraging referrals to additional care providers like social workers, psychologists, and other mental health workers (Krans et al., 2014). For women identified as having a complex risk profile, the services provided by maternal home visiting programs may be of particular benefit (Reading et al., 2015). Such programs have demonstrated efficacy in decreasing the likelihood of LBW for women from high risk communities. Additionally, for women with a history of PTB, participation in a home visiting program has decreased length of perinatal hospital stay (Lutenbacher et al., 2014). This intervention may be of particular benefit for pregnant women who may have more difficulty accessing prenatal care. Referrals to home visiting may also come from social service agencies who encounter and identify pregnancy women who may benefit.

CONCLUSIONS

Traditional methods of screening for medical risks alone may overlook a substantial number of women at particularly high risk for LBW or PTB. Person-centered analyses suggest that both high frequency of medical factors and high frequency of psychosocial factors influence LBW and PTB. Therefore, it is necessary to assess both medical risks and psychosocial risks during prenatal care visits. Since many women presenting with high psychosocial risk report receive inadequate prenatal care, more concerted efforts should be in place to support these women through other social service agencies by providing information on prenatal care providers, and referrals for home visiting programs. Special attention should be paid to subgroups of women at high risk for psychosocial risk factors, particularly women experiencing
homelessness, intimate partner violence, and other forms of severe psychosocial risk during their pregnancy, as a particularly salient context for adverse birth outcomes.
References


Table 1.

**Descriptive summary of risk factors (N=70,757).**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td>13331</td>
<td>18.8</td>
</tr>
<tr>
<td>Homelessness</td>
<td>1870</td>
<td>2.6</td>
</tr>
<tr>
<td>Intimate partner violence</td>
<td>2811</td>
<td>4.0</td>
</tr>
<tr>
<td>Very low income</td>
<td>19555</td>
<td>27.6</td>
</tr>
<tr>
<td>Low income</td>
<td>12280</td>
<td>17.4</td>
</tr>
<tr>
<td>Low education</td>
<td>28332</td>
<td>40.0</td>
</tr>
<tr>
<td>Older maternal age</td>
<td>10769</td>
<td>15.2</td>
</tr>
<tr>
<td>Young maternal age</td>
<td>5527</td>
<td>7.8</td>
</tr>
<tr>
<td>Overweight</td>
<td>28008</td>
<td>39.6</td>
</tr>
<tr>
<td>Underweight</td>
<td>2216</td>
<td>3.1</td>
</tr>
<tr>
<td>LBW/ preterm history</td>
<td>8141</td>
<td>11.5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>7005</td>
<td>9.9</td>
</tr>
<tr>
<td>Smoking</td>
<td>8136</td>
<td>11.5</td>
</tr>
<tr>
<td>Alcohol use during last three months of pregnancy</td>
<td>4953</td>
<td>7.0</td>
</tr>
<tr>
<td>Inadequate prenatal care</td>
<td>8133</td>
<td>11.5</td>
</tr>
<tr>
<td>Multifetal gestation</td>
<td>2743</td>
<td>3.9</td>
</tr>
<tr>
<td>Hispanic ethnicity</td>
<td>11672</td>
<td>16.5</td>
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<tr>
<td>Black race</td>
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<td>17.0</td>
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<tr>
<td>Other race</td>
<td>10092</td>
<td>14.3</td>
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Table 2.

*Model comparison statistics for the two through eight class solution.*

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of parameters estimated</th>
<th>log-likelihood</th>
<th>BIC</th>
<th>AIC</th>
<th>Entropy</th>
<th>VLMR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 class</td>
<td>39</td>
<td>-471463</td>
<td>943363</td>
<td>943005</td>
<td>.856</td>
<td>39011</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>3 class</td>
<td>59</td>
<td>-463709</td>
<td>928078</td>
<td>927537</td>
<td>.702</td>
<td>15439</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>4 class</td>
<td>79</td>
<td>-458912</td>
<td>918707</td>
<td>917983</td>
<td>.769</td>
<td>9551</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>5 class</td>
<td>99</td>
<td><strong>-456773</strong></td>
<td><strong>914652</strong></td>
<td><strong>913744</strong></td>
<td><strong>.800</strong></td>
<td><strong>4259</strong></td>
<td><strong>&lt;.001</strong></td>
</tr>
<tr>
<td>6 class</td>
<td>119</td>
<td>-455023</td>
<td>911376</td>
<td>910284</td>
<td>.759</td>
<td>3483</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>7 class</td>
<td>139</td>
<td>-453865</td>
<td>909283</td>
<td>908008</td>
<td>.775</td>
<td>2617</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>8 class</td>
<td>159</td>
<td>-452846</td>
<td>907469</td>
<td>906011</td>
<td>.800</td>
<td>2028</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Notes.* VLMR = Vuong-Lo-Mendell Rubin Likelihood Ratio Test, *p*-value indicates whether the current solution is a better fit compared to the solution with one fewer class.
Table 3.

*Factor base rates and probabilities within each class.*

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Stress</td>
<td>.19</td>
<td>.08&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.11</td>
<td>.37&lt;sup&gt;^&lt;/sup&gt;</td>
<td>.23</td>
<td>.23</td>
</tr>
<tr>
<td>Homelessness</td>
<td>.03</td>
<td>.01&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.01&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.08&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.04</td>
<td>.02&lt;sup&gt;˅&lt;/sup&gt;</td>
</tr>
<tr>
<td>Intimate partner violence</td>
<td>.04</td>
<td>.01&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.01&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.10&lt;sup&gt;^&lt;/sup&gt;</td>
<td>.06</td>
<td>.05</td>
</tr>
<tr>
<td>Very low income</td>
<td>.28</td>
<td>.04&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.05&lt;sup&gt;˅&lt;/sup&gt;</td>
<td>.85&lt;sup&gt;^&lt;/sup&gt;</td>
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<td>.15&lt;sup&gt;˅&lt;/sup&gt;</td>
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Notes. PS = Psychosocial, Hx = History; PNC = Prenatal care, SES = Socioeconomic status; bold indicates that the factor characterizes the class; ˅ < 50% of base rate; ^ > 150% of base rate.
Table 4.

<table>
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<tr>
<th>Latent Class</th>
<th>Percent</th>
<th>LBW Odds Ratio</th>
<th>Preterm Odds Ratio</th>
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<td>1. Few factors (referent)</td>
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<td>2. Medical factors</td>
<td>9.0</td>
<td>24.2*</td>
<td>5.4*</td>
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<td>3. Stress and very low SES</td>
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<td>4. Very low SES</td>
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<tr>
<td>5. Low SES</td>
<td>14.7</td>
<td>2.6*</td>
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</table>

Description of latent classes and odds ratios for associations between LBW and PTB and latent risk classes

Notes. LBW = Low Birth Weight; PS = Psychosocial; IPV = Intimate partner violence; PNC = Prenatal care; *p < .001.