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## Low job control and racial disparities in breastfeeding

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### Abstract

**Background**—Low job control may predict shorter breastfeeding (BF) among working mothers and may contribute to racial disparities in BF.

**Methods**—We used demographic, employment, health and data for n=631 observations from the Panel Study of Income Dynamics. Job control scores came from a job exposure matrix.

Using path analysis, we assessed whether job control predicted BF and mediated Black-White BF differences. We controlled for education, working hours, marital status, and low birthweight.

**Results**—Lower job control predicted decreased odds of BF for at least 6 months (odds ratio [95% confidence interval]= 0.61 [0.31, 0.90]; reference=no BF). Low job control explained 31% of the Black-White difference for both shorter term and longer-term BF.

**Conclusion**—Low job contributes to shorter BF and to BF disparities by race. Intervening to enhance job control could improve BF.

### Keywords

Breastfeeding; Health Disparities; Racism; Working Conditions; Job Control

## Introduction

### Empirical background

**Breastfeeding:** Breastfeeding (BF) is associated with health benefits including a stronger immune system and reduced risk of infection for infants and young children,<sup>1,2</sup> and reduced risk of certain cancers among mothers.<sup>3,4</sup> Leading health organizations urge mothers to exclusively breastfeed until their child reaches six months of age, and to continue BF along with supplemental foods for at least the first year.<sup>5,6</sup> Most mothers in the United States

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Conflicts of Interest

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(US) intend to breastfeed, and 79% of new mothers initiate BF.<sup>7</sup> However, only 20% of US mothers exclusively breastfeed until six months,<sup>7</sup> and there are notable racial disparities in BF rates. Among White mothers, 82% initiate BF and 23% exclusively breastfeed for six months, while among Black mothers, 64% initiate and 14% breastfeed exclusively at six months.<sup>7</sup> This represents an inequity in vulnerable periods of the life course for both the child and the mother that can contribute to racial inequities in other outcomes later down the line.<sup>1,8</sup>

**Racial inequities in BF and connection to work:** Racial differences in BF are a public health concern.<sup>9</sup> Race is a social construct<sup>10</sup> and it cannot itself cause BF behaviors. Rather, race relates to BF by way of other, causal factors. People's exposures to those causal factors are shaped by racism-related processes, like structural racism in the past and currently.<sup>11–13</sup> BF inequities by race may be related to differences in BF-related beliefs and knowledge,<sup>14–16</sup> stressful life events,<sup>17,18</sup> differing BF-related family norms,<sup>19</sup> access to health insurance<sup>20</sup> and healthcare quality.<sup>19</sup> Structural factors like varying degrees of exposure to infant formula promotion,<sup>18,21,22</sup> and barriers due to work and/or school<sup>23,24</sup> also play a role, although the quantitative literature has often emphasized the role of attitudes, beliefs and culture.<sup>15,25,26</sup> Accurately understanding BF inequities – and effectively addressing them – requires that researchers and practitioners understand the modifiable structural factors leading to racial differences in BF.<sup>9,27</sup>

One example of a causal factor shaped by racism-related processes is work. Work is a key determinant of BF behaviors. Over a quarter of first-time mothers return to work within three months of giving birth,<sup>28</sup> and BF-related problems at work and school are commonly cited reasons for stopping BF.<sup>29</sup> Simply being employed, compared to not being employed, may predict less BF,<sup>30</sup> but the type of job an employed mother holds complicates that relationship.<sup>31</sup> Racial inequities in women's exposure to working conditions may contribute to differences in BF behaviors.<sup>32,33</sup> Numerous historical and present-day structural forces, including inequities in educational opportunities, inconsistent enforcement of civil rights legislation, stereotypical and discriminatory beliefs among employers, and unfair hiring and layoff practices have advantaged White Americans and men, and disadvantaged Black Americans and women, in their opportunities to obtain and maintain jobs that are safe, fulfilling and decently paid.<sup>34–37</sup>

Black women in particular have faced disproportionately more barriers to obtaining well-paid, safe jobs than other groups.<sup>33,38</sup> Black women are more likely to work in service occupations or transportation, in jobs that offer less flexibility<sup>39,40</sup> and jobs without paid maternity leave<sup>41</sup> in comparison to White women, who are more likely to work in management or professional positions.<sup>39</sup> Further, Black workers may face more barriers to BF than their White counterparts even within the same occupation or workplace;<sup>42</sup> such barriers include interpersonal racism and discrimination from colleagues or supervisors.<sup>43–45</sup>

Studies that examined employment status as a potential mediator of Black-White BF disparities present a mixed, sometimes contradictory set of findings. Ryan and colleagues found that Black women were more likely to work full time and less likely to BF until six months compared to White mothers, although the authors did not conduct a formal

mediation analysis.<sup>23</sup> McKinney and colleagues examined whether employment status, among other factors, mediated the relationship between race/ethnicity and BF duration. The proportion of mothers employed at their point of assessment (four months postpartum) was similar across their four racial/ethnic groups, and they did not present results of a formal mediation test.<sup>19</sup> Safon and colleagues measured employment during pregnancy (not postpartum) and found that Black mothers were less likely than White mothers to be employed, less likely to exclusively BF at follow-up, and that being employed was associated with decreased probability of BF at follow-up.<sup>46</sup> In summary, prior research produced mixed evidence for whether and how employment may explain BF inequities among Black and White mothers. Further, studies have only considered employment status, and not working conditions, as potential mediator for racial disparities in BF.

**Occupation and working conditions:** Beyond employment status, many elements of mother's work are predictive of BF, including occupation, access to BF accommodations, and working conditions.<sup>31</sup> It is not simply a question of a mother being physically separated from her infant during the workday that affects BF, but also whether her job accommodates regular expression of breastmilk throughout the work day to maintain a steady supply.<sup>31</sup> Pinpointing which workplace exposures are related to BF can aid in the development of workplace BF interventions. Also, because continued BF requires ability to consistently express milk, any barrier that is not addressed can permanently disrupt BF for that mother-child dyad.

Mothers working in manual, service or administrative occupations,<sup>47–49</sup> or occupations that are hazardous or offer little autonomy<sup>50</sup> have reduced BF duration. In contrast, professional or managerial jobs predict longer BF duration.<sup>47</sup> Further, lactation-specific accommodations, like lactation rooms, lactation breaks, and supervisor support for BF at work, are predictive of more BF,<sup>51–54</sup> as are policies to support work-family integration more broadly, like employer-sponsored childcare and maternity leave.<sup>51,55</sup>

Psychosocial factors at work likely impact the ability of working mothers to BF. The psychosocial work environment refers to the interaction among people at a workplace and its connection to how individuals do their jobs.<sup>56,57</sup> Elements of the psychosocial work environment that may be deleterious to health include low job control (particularly coupled with high demands), lack of social support, job insecurity, and workplace violence or harassment.<sup>58–63</sup> Existing research on BF has studied how flexibility and access to space and time to pump support continued BF,<sup>55,64</sup> but this literature has not integrated commonly-studied psychosocial working conditions. Specifically, the degree of control and decision-making latitude workers have in their occupation could help explain BF behaviors. Qualitative data point to the importance of this. In Spencer and colleagues' exploration of BF experiences among African American women, a mother who worked as a retail cashier described challenges with continuing to BF. "I had to go back to work so we could, um, survive...I couldn't just leave the register to pump when I needed....my milk supply dropped and I had to start formula."<sup>65</sup> (p 979) This contrasts instances where working mothers were able to take breaks when needed and could continue BF.<sup>66</sup> This ability to decide how to structure one's work day and how to complete tasks is related to the construct of low job

control. It is similar conceptually to job inflexibility, which has been connected to shorter BF duration.<sup>55</sup> We are unaware of any studies that tested whether low job control predicts BF.

**Job control:** Low job control is a widely studied psychosocial dimension of working conditions that could explain work-related BF differences. A construct developed in the 1970s as part of Karasek's Job Demand-Control model,<sup>67</sup> low job control describes jobs with low decision-making discretion and few learning opportunities for workers. When combined with high demands, or a heavy workload, low job control contributes to job strain,<sup>67,68</sup> which is predictive of coronary heart disease<sup>62,69</sup> and other health outcomes.<sup>70,71</sup> Social support at work is thought to buffer the negative impact of job strain, and it is sometimes included as a third construct in the model.<sup>72</sup> Low job control among pregnant women is linked to low birth weight in their offspring.<sup>73</sup> It is also linked to unhealthy behaviors including decreased physical activity<sup>74</sup> and poor diet.<sup>75</sup> Various tools have been used to measure job control;<sup>68,76,77</sup> a multinational meta-analysis study determined that 6 items covering learning opportunities, skill levels, opportunities for creativity, repetitiveness of work, ability to decide what one does at work and having decision making power comprised a complete job control measure.<sup>76</sup> While measures of job control are frequently collected through self-report, researchers have also estimated respondents' job control scores based on a workers' detailed occupation code.<sup>78</sup> The latter approach, sometimes called a Job Exposure Matrix, may underestimate variability in individual experiences with job control, but others consider it a more objective measurement,<sup>79</sup> and a more feasible one for secondary analyses of data that only include occupation code.

Job control fits the criteria to be a potential mediator of racial BF disparities.<sup>80</sup> As described above, low job control is likely predictive of shorter BF for working mothers. Moreover, low job control affects a larger share Black working mothers compared to their White counterparts.<sup>73</sup> The present study has examined to what degree low job control may predict BF outcomes, as well as mediate racial disparities in BF between Black and White mothers.

## Research Questions

In this study, we examine whether working conditions, namely low job control, can influence BF and contribute to racial inequities in BF. We consider the following questions. Does low job control predict BF? Then, if so, does low job control mediate the relationship between race (White compared to Black) and BF?

## Methods

### Data set

We used data from the Panel Study of Income Dynamics (PSID), a nationally representative, longitudinal survey of American families.<sup>81,82</sup> The PSID includes data about socioeconomic, family, health and other characteristics. Surveys were conducted using computer-assisted telephone interviews. The PSID employs many approaches to minimize attrition across survey waves and non-response, including incentives of roughly \$1 for each minute of the interview.<sup>83</sup> The study has a 91% overall response rate and 94% wave-to-wave response rate.<sup>84</sup>

We combined the 2007–2015 waves of the main PSID survey. We identified mothers' employment status for the first through fifth months following the child's birth month, in order to capture the first six months postpartum during which exclusive BF is recommended.<sup>6</sup> Mothers who reported not working or being unemployed all five months were classified as not working and excluded from analysis. Notably, the 2007–2015 period covers the economic downturn known as the Great Recession, which caused job loss and other challenges for many families.<sup>85</sup>

We linked mothers' sociodemographic and work data to birth and BF information of their biological children using the 2014 Child Development Supplement, a survey of PSID respondents' children. To keep the sample relatively current, we only included births from the most recent five-year period, meaning that children over age five were excluded. The flow chart for the study sample is shown in Figure 1. After these exclusions, we had an analytic sample of n=631 mothers. There were repeat births (siblings) among the 631 mothers in the sample; there were 382 unique mothers included. We conducted sensitivity analyses to examine potential clustering effects among children of the same mother. We also compared the characteristics of mothers excluded from the sample with those included in the analytic sample. Those results are shown in the supplemental file. The study was determined to not qualify as human subjects research by the University of California Irvine Institutional Review Board.

## Measures

**Breastfeeding initiation and duration:** Study participants were asked whether the child was ever breastfed. For infants who were breastfed, participants were asked at what age in months the child stopped BF. The survey did not assess whether BF was exclusive. In our analyses, we categorized BF as none, less than 6 months, or greater than 6 months, in line with the recommendation that infants BF for at least 6 months.<sup>6</sup>

**Mother's race:** Respondents could select up to three races; we used the first mentioned. In a separate question, respondents were asked about Latino/Hispanic ethnicity. Because of limited sample size, we collapsed Asian, Native Hawaiian or Pacific Islander, and Other into a single category, Other Races. Individuals who identified as Latino/Hispanic were also included in that category. We kept Black (non-Hispanic) and White (non-Hispanic) as additional, separate categories. While it was preferable to maintain all racial and ethnic subgroups in their own categories, this approach allowed us to do the main comparisons between Black and White respondents and maintain an acceptable sample size for stable estimates.

**Low job control:** To obtain information about working conditions, we utilized a job exposure matrix (JEM) built from the General Social Survey - Quality of Worklife Questionnaire. Five waves of the General Social Survey (2002, 2006, 2010, 2014, and 2018)<sup>77</sup> were used to create a JEM for two working conditions: low job control and high physical workload.<sup>78</sup> Physical workload is addressed in our supplemental appendix. JEMs are used to assign values for occupational exposures for which data would not otherwise be available, based on detailed occupation code.<sup>86</sup> To integrate the JEM scores, we converted

the occupation codes within the PSID into the Standard Occupation Classification (SOC) format,<sup>87</sup> then linked JEM scores. The JEM had low job control scores at the level of six-digit SOC occupation codes; it was not gender specific.

The low job control score was based on five items: three about skill development, like whether the respondent had opportunities to develop and use special skills, and two about decision making, like how often the respondent could decide how to do their work.<sup>77</sup> The content in these five items aligns well with the content of the six items used as a complete job control measure for a large multinational study about job demand and control.<sup>62,76</sup> The five items were tested and chosen by a research team through a series of psychometric analyses.<sup>78,88</sup> The Cronbach alpha was 0.67. The possible range for low job control was 5 to 20, with higher values indicating lower job control. The average low job control score in a general population of male and female US workers (the General Social Survey sample from which the JEM was created), was 8.8, with a standard deviation of 2.6.<sup>89</sup>

**Covariates:** We controlled for additional variables that were associated, both in the literature and in our bivariate analyses, with maternal race and BF. We controlled for mother's age at delivery (continuous variable),<sup>90,91</sup> mother's educational attainment,<sup>91–93</sup> categorized as 16 or more years (approximately equivalent to a bachelor's degree) versus less than 16 years; marital status,<sup>94,95</sup> and whether or not the child had low birth weight,<sup>96,97</sup> defined as less than 88 ounces (5.5 lbs). We also controlled for hours worked,<sup>23,98</sup> categorized as less than 20 hours per week, 20 to 40, or over 40 hours per week.

## Analysis

We used Stata 16.1 MP for statistical analyses. To determine statistical significance, we used alpha of 0.05. We accounted for the sampling design using the main child sample weights for the PSID Child Development Supplement (based on child's sex, birth year, race/ethnicity and geographic region), as well as the stratum and cluster weights for the main PSID survey.

## Descriptive statistics

We calculated descriptive statistics for all variables, for the overall sample and stratified by race. For continuous variables we calculated weighted means, and for categorical variables, weighted proportions. To identify statistically significant differences among White mothers, Black mothers, and mothers of other races, we created linear regression models for continuous variable and chi-square tests for categorical variables. We also created 95% confidence intervals (CIs) for each estimate and compared intervals for White and Black mothers, the two groups of focus in this study. The same weighted descriptive statistics were calculated for the subset of n=676 mothers who were excluded from the analytic sample because of missing information or because the mother was not working during the first 6 months postpartum; results are shown in the supplemental appendix.

## Path analysis

We used path analysis, a subtype of structural equation modeling, to assess whether and to what degree low job control mediated the relationship between race and BF, and to better model interrelationships among the other variables. We created two path models; see Figure



1. The purpose of the first model was to establish the extent of racial differences in BF before taking low job control into account. The second model integrated low job control and served to show whether low job control mediated the relationship between race and BF. In both, BF is represented with three categories (no BF as the reference compared to BF less than six months and BF at least six months). The paths ending at BF were modeled using multinomial regression; the coefficients for those paths were exponentiated to become odds ratios. The paths ending in job control were modeled using linear regression; the coefficients were kept in their original form. Both models included the full analytic sample of  $n=631$ .

To determine whether low job control functioned as a mediator, we first examined whether there were statistically significant paths from the race variables to low job control, and from low job control to the two BF outcomes. Then, in alignment with established causal mediation formulas,<sup>99</sup> we calculated direct and indirect effects and their p-values for those same relationships. We did separate calculations for Black race and other race (both compared to White), and also for the two BF outcomes – BF less than six months and BF at least six months (both compared to no BF). The coefficients used in the calculations came from the path model described above. The indirect effects were calculated by multiplying the (non-exponentiated) coefficients for the race to low job control path by the coefficient for the low job control to BF outcome path. The direct effects were estimated based on the race to BF outcome coefficient. For direct and indirect effects, we exponentiated the resulting coefficient because the two BF outcome variables were fit as multinomial logistic. To obtain the proportion of the total effect mediated by low job control, specific to each of the two BF outcomes, we divided the (non-exponentiated) indirect effect by the sum of the indirect and direct effects (the total effect). We conducted all path models in Stata 16.1 using the *gsem* command.

As a supplemental analysis, we conducted a Baron and Kenny-style mediation analysis.<sup>80</sup> The methods are described in the supplemental appendix. Other sensitivity analyses were conducted, including multi-level models that assessed for clustering effects at the level of occupation code, models that excluded siblings, models with robust standard errors, path models with correlated errors, and an additional set of indirect and direct effects calculations that included potential interaction terms.

## Results

### Descriptive statistics

Table 1 displays the characteristics of the  $n=631$  working mothers who comprise this study sample. Based on weighted univariate statistics, 69% of the sample was White, 14% was Black and 18% were of other races. Average age was just under 30 years, 49% of the sample had a bachelor's degree, and 16% of mothers were not married. Overall, 71% of the women initiated BF; for those who breastfed, mean duration was 6.7 months. Low job control scores at the occupational level ranged from 5.5 to 13.6 (higher scores indicate lower job control). The average weighted low job control score was 8.7 for the sample overall.

Overall significance tests and chi-square tests indicated that, in this sample, all of the variables listed in Table 1 varied significantly by mother's race except for infant low birth

weight. Comparing only White and Black mothers, the CIs indicated that White mothers were significantly older, had higher educational attainment, were more likely to be married, were more like to initiate BF and had longer BF duration compared to Black mothers. Hours worked per week differed significantly between the two groups, with more Black mothers working 20–40 hours per week, and more White mothers working over 40 hours per week. White mothers had significantly more job control, indicated by a lower average score, compared to Black mothers.

Comparison between the analytic sample and the excluded observations showed minor differences. Two instances of statistically significant differences, where the 95% CIs did not overlap, emerged. Mothers excluded from the analytic sample were less likely to hold a bachelor's degree (18 percentage point difference), and they were more likely to have an infant with low birth weight (6 percentage point difference). The excluded sample had relatively more Black mothers and fewer White mothers, but the difference was not significant. Average breastfeeding duration and low job control score were similar across the two samples. Results are shown in the supplemental appendix, Table S1.

### Path analysis

Table 2 and Figure 2 show the results of two path analytic models, the first without low job control and the second with. In the first model, Black mothers were less likely than White mothers to BF for at least six months (odds ratio [OR]=0.46 [95% confidence interval [CI]=0.25, 0.85] even after accounting for other covariates except low job control. No other paths were significant.

In the second model, which included low job control, the components of the indirect path between race, low job control, and BF at least six months were significant. Compared to White mothers, Black mothers and mothers of other races had lower job control (e.g., for Black compared to White, beta [95% CI]= 0.61 [0.31, 0.90]). Low job control was associated with lower odds of BF for at least six months (OR [95% CI]=0.61 [0.44, 0.86]). The path between low job control and BF for less than six months tended in the same direction but did not meet the significance threshold (OR [95% CI] =0.79 [0.60, 1.03]). Additionally, the direct path from race to longer-term BF showed that Black mothers were less likely to BF for at least six months, but the relationship was slightly attenuated (OR=0.51, 95%CI=[0.27, 0.97]) compared to the first model.

Table 3 shows the results of the decomposition of effects based on the second path model. It includes the odds ratios and p-values for the relationship between race and BF by way of low job control (indirect effects) and for race on BF independent of low job control (direct effects). The indirect effect of Black compared to White race on both BF outcomes by way of low job control was statistically significant; low job control mediated an estimated 31% of the effect of Black versus White race on BF for less than six months, and 31% for BF of at least six months. The results for mothers of other races compared to White were not interpretable, likely due to the small sample size for the other race category (n=75).



## Sensitivity analyses

We also conducted mediation analysis using the Baron and Kenny-approach with zero-inflated negative binomial models. This approach to mediation analysis is commonly used, and in cases of total mediation, the results may be more straightforward and interpretable than the path analysis approach we employed. Complete results are shown in the supplemental appendix. In those models, low job control partially mediated differences in BF initiation among Black and White mothers. BF duration did not differ significantly between Black and White women in the fully-adjusted model, even before job control was taken into account, so we could not assess mediation. At the same time, stratified models indicated that the relationship between low job control and BF duration was significant for Black mothers but not for White mothers. In order to focus on identifying partial mediation, we prioritized path analysis for the rest of the study.

We conducted other sensitivity analyses to determine how best to model the relationship between maternal race, low job control and BF; these are described in greater detail the supplemental appendix. The results of these analyses indicated that adjusting the models for clustering at the occupation level, adjusting for clustering among siblings, adding correlated errors to the path model, and including interaction terms between the independent variable and mediator did not demonstrably change the results.

## Discussion

### Main findings

Using a nationally representative dataset of working mothers in the US, we found that low job control predicted less BF. We also found evidence that low job control mediated the relationship between race and BF. This is the first study to address either of these questions.

Our hypothesis that low job control would predict reduced BF was supported in the path analysis, primarily for BF more than six months. No prior study has examined low job control in connection with BF, but others have found that a related concept, inflexible work, leads to shorter BF. Specifically, a study of working mothers in California found that inflexibility predicted shorter BF, but it was not statistically significant after adjusting for sociodemographic variables.<sup>55</sup> That we found low job control to be a significant predictor of shorter BF even after adjusting for sociodemographic variables may be because low job control is a broader concept than job inflexibility, encompassing lack of decision-making power and lack of opportunities for skill development.<sup>78</sup> This more comprehensive characteristic may better capture working conditions, especially decision-making power, that enable a working mother to continue BF.

We hypothesized that Black mothers would be exposed to lower job control than White mothers, in line with prior research.<sup>73</sup> Our data supported that hypothesis, although the difference in job control was moderate in size. Our findings add that the racial disparity in low job control impacts breastfeeding, working mothers – a population who especially needs greater control over how they do their work, for childcare in general as well as for BF.<sup>100</sup> Further, we found evidence for our hypothesis that low job control mediated the relationship between race and BF. There were statistically significant indirect effects

due to low job control for the Black-White difference in both BF outcomes. Prior studies considered employment status as a potential mediator of the Black-White BF inequity, with overall inconclusive results.<sup>19,23,46</sup> No prior study explored low job control as a mediator of racial inequities in BF. Our findings indicate that low job control is a barrier to continued BF, and that greater exposure to low job control among Black mothers contributes to their shorter BF relative to White mothers.

One notable finding was that, after adjusting for maternal age, marital status, education, working hours and child's low birth weight, there was no significant difference by race in shorter term BF (less than 6 months compared to none at all). Even prior to adding low job control to the path model, only the path between Black compared to White race and longer-term BF (at least six months compared to none) was significant, meaning that was the only significant path that could be mediated, barring suppression effects.

While we assume low job control affects BF duration among mothers who already initiated, it is possible that part of the relationship captured in the models is low job control contributing to BF non-initiation (the reference category in the models). The impact of low job control on BF duration is more plausible, assuming that low job control is a barrier only after the mother has returned to work. However, low job control may contribute to non-initiation if mothers are aware prior to giving birth that their job will not accommodate BF. They may decide it is not worthwhile to try BF, consistent with prior research about BF and prenatal employment.<sup>101</sup>

### Strengths and limitations

This study applied secondary datasets to overcome a challenge specific to research about occupational drivers of BF: surveys with detailed BF duration information (e.g., the Infant Feeding Practices Study II<sup>102</sup>) often have limited information about mother's working conditions, while studies with ample occupation data (e.g., General Social Survey's Quality of Work Life Survey<sup>77</sup>) typically do not provide information about BF. The longitudinal, cross-generational nature of the PSID<sup>81</sup> and its Child Development Supplement allowed us to gain precise occupation information for the six month postpartum period as well as BF outcomes.

We excluded n=676 observations because of either missing information (n=338) or because the mother was not working during the first six months postpartum (n=339). These exclusions meant that although the PSID is a nationally representative survey,<sup>84</sup> and we applied PSID survey weights, we were examining a selected group of mothers. Mothers excluded from the sample had lower educational attainment and were more likely to have an infant with low birth weight. However, differences in the racial identity, low job control score and breastfeeding initiation and duration were small in magnitude and not statistically significant, suggesting that the excluded group did not differ substantially on the variables most important to our analyses.

Because of limitations in the sample size, we were unable to model outcomes specific to mothers who identified as Asian, Native Hawaiian or Pacific Islander, Latino/Hispanic, or those self-identifying as Other. We grouped those respondents into one category, other races.

We cannot draw meaningful conclusions related to health disparities for that group because of its heterogeneity. Future studies should collect data about BF and working conditions from larger samples of Asian, Native Hawaiian or Pacific Islander, Latino/Hispanic and other subgroups of mothers.

Our BF outcome variable did not capture whether BF was exclusive or not. This means that in our study, we cannot know whether respondents who breastfed for six months were fully in alignment with the recommendation of six months of exclusive BF.<sup>6</sup> Exclusive BF typically requires more frequent milk expression than mixed feeding;<sup>103</sup> for this reason it may be more sensitive to work barriers like low job control than mixed feeding. The impact of low job control on exclusive BF may be stronger than the relationship we describe here. However, BF exclusivity is only a meaningful outcome for duration up to six months, at which point it is recommended that infants begin solid foods.<sup>6</sup> Also, while low job control may be a stronger obstacle to exclusive BF than it is to mixed feeding, it could still pose barriers to breastfeeding mothers who also use formula.

Future research should account for the mother's tenure at her job and examine her working conditions during pregnancy as well as postpartum. Mothers with jobs that had lower job control or other adverse working conditions may have been more likely to stop working during pregnancy, perhaps because they knew their jobs were incompatible with BF.<sup>104</sup> However, if mothers in those jobs have less income overall, they may not have the option to not return to work.<sup>65</sup> In addition, the PSID survey did not directly assess parental leave; future studies should take into account mother's access to leave, in particular duration of leave and whether it is paid.<sup>49,105</sup>

Further, by utilizing a JEM for low job control, we could analyze data on psychosocial working conditions that are rarely studied in surveys of new mothers. A limitation was that the reliability (Cronbach's alpha) for the survey items on which the low job score was based was only moderate. Imprecise measures of job control may have attenuated our results. Also, job exposure matrices specific to female workers may provide more accurate estimates.<sup>78</sup> Future studies could examine whether a gender-specific JEM explains more variation in BF. It would also be valuable to examine whether the subdomains of low job control relate differently to BF; for instance, decision-making discretion may be more relevant than skill development.

Low job control was estimated at the occupation level with a JEM, and we could not account for individual appraisals of working conditions. Many occupational health scholars consider JEMs to be a more objective approach to measuring working conditions.<sup>79</sup> However, this approach could exclude meaningful individual variations in low job control, some of which could relate to race (e.g., if, because of racism, one worker is not permitted the same decision-making latitude as others in the same occupation).<sup>106</sup> Utilizing a JEM to assess job control made it possible for us to address our research questions; future BF studies may assess low job control at the individual level, in addition to experiences with discrimination and other forms of racism.

An additional strength of this study was our application of path analysis, which allowed us to estimate direct paths between race and BF as well as indirect paths via low job control. By calculating the decomposition of effects into direct and indirect, we determined that there was a significant path from Black compared to White race, through low job control, to both short- and longer-term BF. This analytic approach made clear that low job control was only a partial mediator; there are other pathways between race and BF that should be examined. In addition, future research should thoroughly examine whether the relationship between job control and BF is moderated by race.

Our study included births that took place during or shortly after the Great Recession, when many families faced job loss, job insecurity, financial strain and other stressors.<sup>85</sup> This may have further complicated efforts for the mothers in our sample to continue BF. In addition, the Affordable Care Act was being implemented, improving coverage for lactation services and equipment<sup>20</sup> and access to workplace lactation accommodations.<sup>107</sup> Future studies should examine how recent economic and social changes have affected racial inequities in BF among working mothers. The COVID-19 pandemic caused a public health and economic crisis that disproportionately affected Black and Latino Americans and disrupted many families' childcare and work arrangements.<sup>108</sup> There has been growing demand for racial equity and justice, particularly for Black Americans,<sup>109</sup> including at the workplace.<sup>110</sup> These events and movements may influence how different mothers experience BF and work.

## Implications

To address racial health inequities like differing rates of BF, we need to examine the structural factors that continue to make healthy behaviors easier for White families and more difficult for Black families. Overemphasis on individual-level factors obscures the larger structural and policy drivers of BF behaviors,<sup>27</sup> including working conditions. Unequal access and discrimination in educational opportunities, hiring and other job-related processes result in Black workers holding jobs that are more hazardous than White workers.<sup>34,35,37</sup> Work is a structure through which racial discrimination impacts health,<sup>11</sup> but the connection between work and health disparities has been understudied.<sup>111</sup> Naming and measuring specific mediating pathways connecting race and health outcomes advances an understanding of how structural racism operates to influence health.<sup>13</sup> In the present study, we demonstrated how one aspect of work, low job control, partially mediates the differences in BF outcomes among Black and White mothers. This contributes to a growing body of research demonstrating the connection between mothers' work and maternal and child health outcomes.<sup>112,113</sup>

By identifying low job control as a working condition relevant for BF, we provide evidence to encourage the application of interventions, adapted for specific occupations, that give mothers and other workers increased control over how they do their work. Traditionally, workplace interventions to support BF have emphasized lactation rooms, break policies, access to breast pumps, and lactation education/consultation services.<sup>64,114,115</sup> Working mothers observed that while those supports are helpful, they are sometimes insufficient to overcome BF barriers from a demanding, inflexible work environment.<sup>116</sup> This aligns with our findings about job control and BF. Scholars have successfully intervened to

increase job control-related conditions. For instance, Trudel and colleagues implemented a multi-component intervention to increase worker decision latitude, a subcomponent of job control, along with other psychosocial stressors.<sup>117</sup> Moen and colleagues found that a “results only work environment” increased employees’ control over the schedule, and led to less work-family conflict and healthier sleep habits.<sup>118</sup> Those studies did not focus on BF; however, based on our findings that job control is predictive of BF, those approaches may improve BF outcomes as well. Future interventions to improve job control could assess whether there is a positive impact on BF. Also, BF-focused interventions could combine some approaches used by Trudel,<sup>117</sup> Moen<sup>118</sup> and others to improve psychosocial working conditions with traditional workplace lactation support approaches.<sup>115</sup>

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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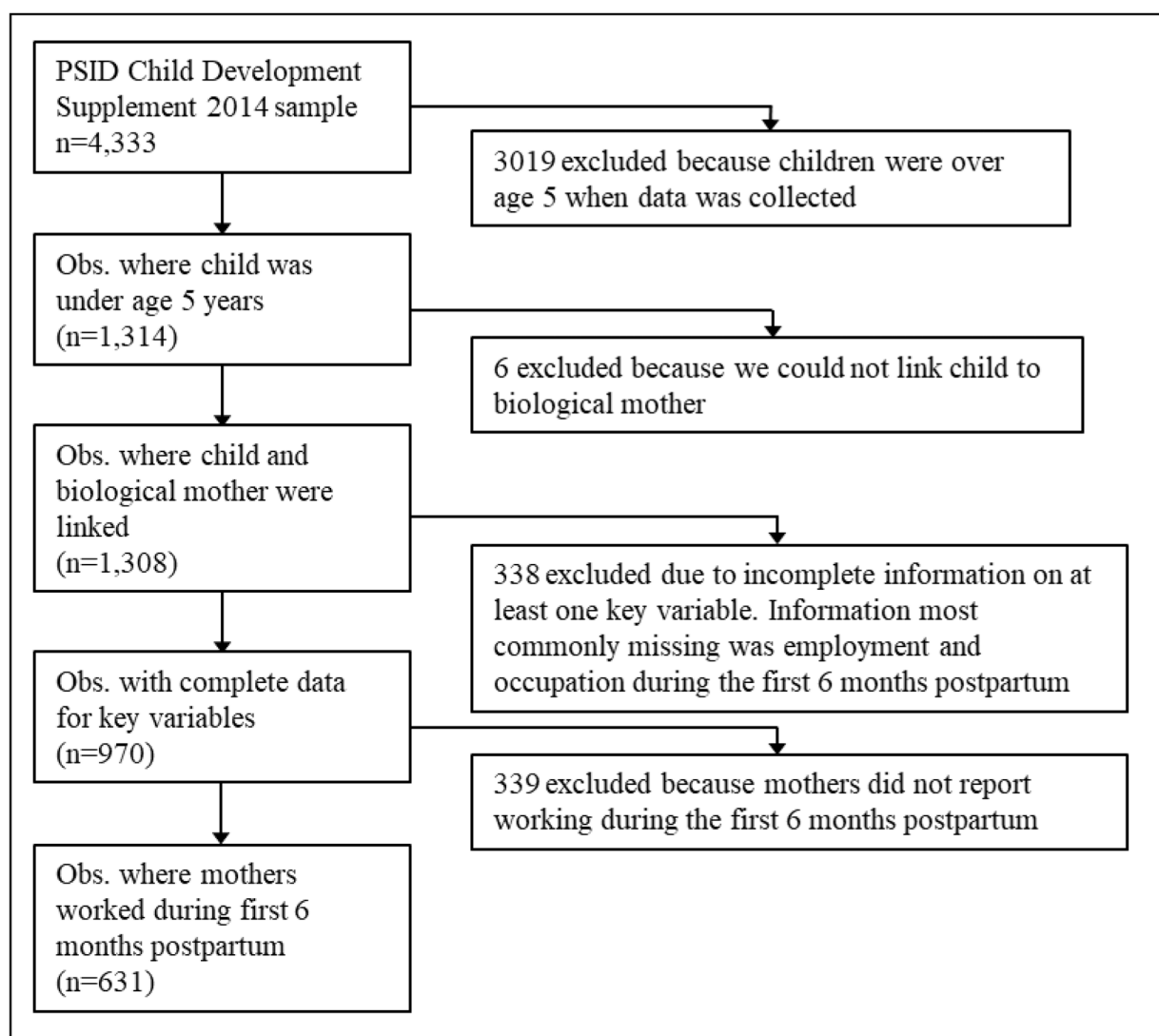
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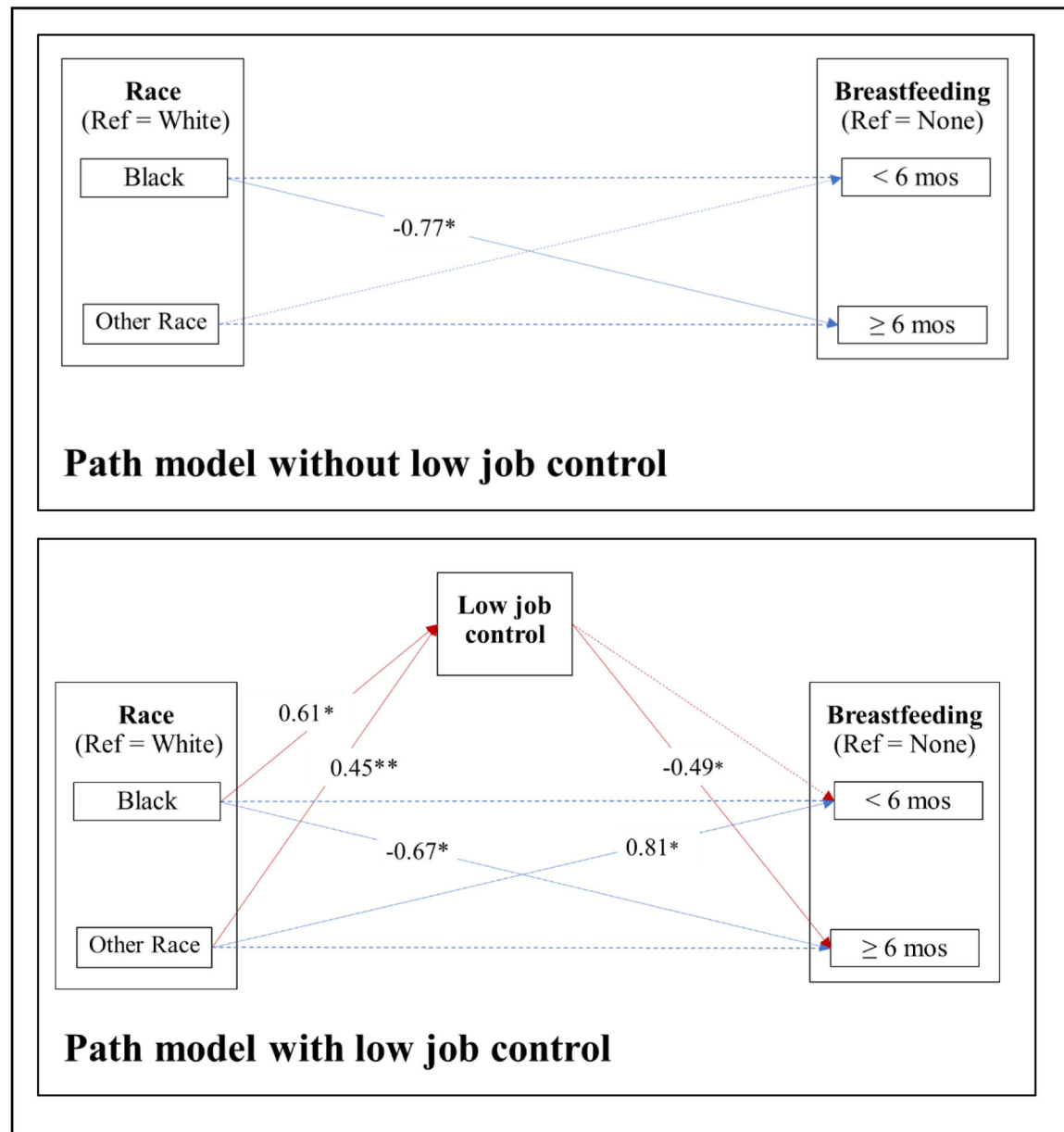
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**Figure 1. Flow chart for study sample.**  
Obs.=Observations.





**Figure 2. Path analytic models for race and breastfeeding, with and without low job control.**

n=631. \*p-value < 0.05, \*\* p-value < 0.001

Dashed line indicates path was not statistically significant. The blue lines represent direct pathways between race and BF, while the red arrows represent the indirect pathway by way of low job control. Estimates are shown only for statistically significant paths. All estimates are beta coefficients (not exponentiated). Control variables: Working hours; Marital status; Education; Maternal age; Infant low birthweight.

Weighted sociodemographic characteristics, health outcomes and working conditions for study sample

**Table 1.**

	Total n= 631	By race		
		White n=333	Black n=223	Other n=75
Mother's socio-demographic characteristics				
Race				
White, %	69.1 (62.2, 75.9)			
Black, %	13.5 (8.2, 18.7)			
Other races, %	17.5 (12.9, 22.1)			
Age in years, mean, (CI) <sup>a</sup>	29.7 (29.0, 30.5)	30.2 (29.3, 31.2)	26.8 (25.8, 27.8)	29.9 (28.5, 31.4)
Education (Bachelors degree or higher), % (CI) <sup>b</sup>	48.8 (43.0, 53.9)	55.9 (48.5, 63.2)	26.6 (9.5, 43.7)	36.0 (24.7, 47.2)
Mother is not married, % (CI) <sup>b</sup>	15.7 (11.0, 20.4)	10.3 (5.7, 14.9)	48.1 (33.6, 62.6)	12.3 (9.2, 15.4)
Health outcomes and BF behaviors				
BF behaviors				
Mother initiated BF, % (CI) <sup>b</sup>	71.3 (66.4, 76.2)	73.1 (67.5, 78.6)	54.0 (45.9, 62.0)	77.8 (67.6, 88.0)
Duration (for n=413 who initiated) <sup>c</sup>				
Duration in months, mean SD (CI) <sup>a</sup>	6.7 (6.1, 7.3)	7.0 (6.2, 7.8)	5.6 (5.0, 6.1)	6.1 (5.4, 6.8)
Duration by category (for n=413 who initiated) <sup>b</sup>				
BF<6 mos, % (CI)	31.4 (26.3, 36.5)	28.3 (21.1, 35.6)	35.1 (28.8, 41.4)	40.5 (35.6, 45.5)
BF 6 mos, % (CI)	40.0 (33.1, 46.8)	44.8 (35.9, 53.6)	18.8 (12.9, 24.8)	37.3 (25.9, 48.7)
Infant born with low birth weight, % (CI)	5.9 (3.5, 8.3)	6.5 (3.4, 9.6)	7.2 (3.5, 10.8)	2.6 (3.5, 10.8)
Mother's job characteristics (among those working)				
Hours working per week <sup>b</sup>				
Less than 20, % (CI)	10.4 (7.4, 13.4)	13.5 (9.8, 17.2)	5.6 (1.3, 10.0)	2.0 (0, 4.3)
20 to 40, % (CI)	72.0 (66.9, 76.6)	66.4 (60.7, 72.1)	88.7 (82.6, 95.0)	80.0 (75.0, 85.0)
Over 40, % (CI)	17.8 (14.0, 21.6)	20.1 (15.3, 24.0)	5.7 (2.3, 8.9)	18.2 (13.0, 23.3)

	Total n= 631	By race		
		White n=333	Black n=223	Other n=75
Low job control score, possible range 5 to 20, Mean, (CI) <sup>a</sup>	8.7 (8.6, 8.8)	8.5 (8.4, 8.6)	9.1 (8.9, 9.4)	9.0 (8.8, 9.1)

CI=95% confidence interval. CIs for proportions are Wald intervals. All estimates except sample size take Panel Study of Income Dynamics survey weights into account.

Higher score for low job control indicates more exposure (lower job control).

<sup>a</sup> p-value < 0.05 for overall significance test in a simple linear regression model comparing differences across three race categories.

<sup>b</sup> p-value <0.05 for chi-square test comparing three race categories.

<sup>c</sup> BF duration was top-coded at 12 months.

**Table 2.**

Path analytic models for race and breastfeeding, with and without low job control

	Model without job control Raw coefficient, OR	Model with job control Raw coefficient; OR
<b>Black (vs White) →</b>	<b>BF&lt;6 mos</b> (vs no BF): -0.39, OR=0.67  <b>BF 6 mos</b> (vs no BF): -0.77, OR=0.46 <sup>*</sup>	<b>BF&lt;6 mos</b> (vs no BF): -0.32, OR=0.72  <b>BF 6 mos</b> (vs no BF): -0.67, OR=0.51 <sup>*</sup>  <b>Low job control:</b> 0.61 <sup>**</sup>
<b>Other race (vs White) →</b>	<b>BF&lt;6 mos</b> (vs no BF): 0.68, OR=1.97  <b>BF 6 mos</b> (vs no BF): 0.33, OR=1.40	<b>BF&lt;6 mos</b> (vs no BF): 0.81, OR=2.25 <sup>*</sup>  <b>BF 6 mos</b> (vs no BF): 0.53, OR=1.69  <b>Low job control:</b> 0.45 <sup>*</sup>
<b>Low job control →</b>		<b>BF&lt;6 mos</b> (vs no BF): -0.24, OR=0.79  <b>BF 6 mos</b> (vs no BF): -0.49, OR=0.61 <sup>*</sup>

BF=Breastfeeding. Mo=months. OR=Odds ratio. vs=versus.

The path model controlled for working hours, marital status, education, maternal age and infant birthweight.

Coefficients for paths that can be interpreted as odds ratios (BF outcomes, which are based on multinomial regression) are also presented as ORs. Coefficients for paths that have a linear outcome (low job control score) are shown only as beta coefficients.

<sup>\*</sup> p-value<0.05<sup>\*\*</sup> p-value<0.001

**Table 3.**

Decomposition of effects for Black compared to White race on breastfeeding with low job control as mediator

	BF<6 mos (vs no BF)			BF ≥ 6 mos (vs no BF)		
BC	OR, indirect effects (by way of low job control), p-value	OR, direct effects, p-value	% of total effect mediated	OR, indirect effects (by way of low job control), p-value	OR, direct effects, p-value	% of total effect mediated
<b>Black (vs White)</b>	0.86, p=0.045	0.72, p=0.260	31.16%	0.74, p=0.018	0.53, p=0.032	30.88%

BF=Breastfeeding. OR=Odds ratio. p=p-value.

Direct effects refer to the pathway from race to BF, not taking job control into account. Indirect effects refer to the pathway through job control.