

Investigating the Association between Maternal Precarious Employment and Childhood Asthma
Exacerbation

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Abstract

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The rise in poor quality employment, also known as precarious employment, over the past few decades has posed many challenges, disproportionately affecting women, impacting both their wellbeing and their families. This cross-sectional study explored the association between maternal precarious employment and childhood asthma exacerbation, a leading cause of child hospitalizations in the United States. The data was drawn from the Panel Study of Income Dynamics (PSID) and a research component of the PSID, the Child Development Supplement (CDS) for the year of 2019. We analyzed employment quality among 543 participants who were mothers with children ages 4 to 17 who were diagnosed with asthma. Precarious employment was defined by combining four of the dimensions of employment quality (employment stability, material rewards, working time arrangements, and collective organization). The overall employment quality was then the unweighted sum of these four scores and was categorized into three groups: low (≤ 1), medium (> 1 to 2), and high (> 2 to 4) employment precarity. Asthma exacerbation was defined as children who have been to a hospital emergency room (ER) in the last 12 months and children who have missed school in the past 12 months due to asthma or wheezing. Logistic regression was used to calculate odds ratios and their accompanying 95%

confidence intervals (95% CI). Our analysis found that children with mothers who had high employment precarity had a higher odds of emergency room (ER) visits due to asthma or wheezing in comparison to mothers who had low employment precarity (OR = 2.15, 95%CI: (1.22, 3.85)). Although the association between mothers who had medium employment precarity and childhood ER visits due to asthma or wheezing was null, the direction of the odds ratio suggested a higher odds of ER visits (OR = 1.70, 95% CI: (0.92, 3.19)). In the stratified analysis for maternal race/ethnicity (White and Non-White), the trends were similar to the previous models, showing an association between high employment precarity and higher odds of ER visits due to asthma or wheezing compared to low employment precarity for both White and Non-White groups. There was no significant association between maternal employment precarity and number of child school absences due to asthma or wheezing. This study can serve as a foundation for future research to inform interventions and policy makers about addressing precarious employment as a social determinant of child health outcomes.

Introduction

Many countries have seen a rise in precarious employment over the past few decades, where individuals have taken on non-traditional and flexible work arrangements due to technological advancements, shifts in the global economy and labor market dynamics (1,2). However, these workers often face barriers such as temporary contracts, lower wages, and hazardous working conditions (1). Employment quality is a multidimensional concept that assesses the contractual and relational aspects of work. Precarious employment reflects the lower end of the employment quality spectrum (3). Previous studies have established precarious employment as a critical social determinant of health, highlighting the relationship between employment and the well-being of workers, families, and communities (4,5). Furthermore, research has found that women are disproportionately represented in precarious employment, and their roles as primary caregivers often have implications for the health of their children (3,6). Additionally, asthma remains one of the primary causes of childhood hospitalizations in the U.S. and presents an economic burden on the U.S. healthcare system (7). The nature of maternal precarious can result in barriers to effective management of childhood asthma, exacerbating the condition and leading to increased hospitalizations among affected children.

Previous research has established that precarious employment is associated with health through mechanisms such as working conditions, job insecurity, and financial burdens (5). Prior studies have also identified an association between maternal precarious employment and low birth weight in the U.S. which in turn increases the risk for childhood asthma (8,9). Furthermore, children of mothers who experience higher precarious employment have a higher incidence of childhood obesity, a condition found to be associated with exacerbated asthma symptoms in childhood (2,10). These findings emphasize the complexity of maternal employment conditions and child health outcomes suggesting intergenerational effects. Potential mechanisms through which maternal precarious employment may impact childhood asthma exacerbation include lack

of healthcare access, high levels of stress, and limited time for caregiving due to job precariousness (11).

Despite these findings, there remains a gap in understanding the direct association between maternal precarious employment and childhood asthma exacerbation, something this research aims to address. As a secondary aim, this study will explore the maternal precarity and childhood asthma exacerbation association stratified by race/ethnicity. Examining this relationship will provide valuable insights to inform labor policy which directly impact maternal employment conditions. We hypothesized that high maternal precarious employment would be associated with greater odds of ER visits and school absences. Ultimately, the findings may inform workplace interventions and healthcare practices aimed at mitigating the adverse effects of precarious employment on childhood health and well-being. Furthermore, this study aims to contribute to the broader understanding of the social determinants of health and their impact on childhood asthma exacerbation.

Methods

Study design:

This cross-sectional study used data from the Panel Study of Income Dynamics (PSID), which collects information on family income, employment, and health. Additionally, the Child Development Supplement (CDS), a research component of PSID, gathers detailed data on the children of PSID participants and their families (12).

Study setting:

The PSID is an ongoing longitudinal household survey with a nationally representative sample of individuals living across the United States. This survey was administered annually from 1969 to 1997 and administered biennially in the following years (12). For this study, we focused on the year 2019 as this is the most recent year before the onset of the COVID-19 pandemic. This

choice aimed to avoid changes in employment status and other hardships faced by many families during the pandemic.

Study subjects/population:

The PSID originated from the Survey Research Center (SRC) and the Survey of Economic Opportunity (SEO) which aimed to study poverty dynamics with a nationally representative sample of the US population in 1968 and an additional sample for areas with higher populations of people of color. Original participants for the PSID 1968 sample consist of about 5,000 households, with an oversampling of low-income and minority households (13,14). The PSID has followed the descendants of the original families and includes more than 9,200 families as of 2021 (15). In the past, PSID has used the 'Head' of household, previously defined as the husband in a heterosexual married couple and to a single adult of any sex, to gather information about the family. In 2017, they changed the term 'Head' to 'Reference Person'. However, the CDS conducts interviews with the child's caregiver and all children aged of 0-17 living in a PSID household (16). To address unequal selection probabilities, researchers adjusted the data using survey weights. Criteria for inclusion in this study are any PSID participant for the year of 2019 who is a working mother figure (regardless of relationship status), and who has a child they care for (whether biological or non-biological) in the CDS between the ages of 4 to 17 with a diagnosis of asthma. Mother figures are defined as those who self-reported as female when given the options of male and female to report their sex in the PSID. Children included in this study are those who have been diagnosed with asthma, as determined through their caregiver's self-reported answer to the CDS interview question, "Has [CHILD NAME]'s doctor or health professional ever said that [CHILD NAME] had asthma?". Those who answered "yes" to this question are considered for inclusion.

Data collection:

From 1972 onwards, nearly all PSID survey data has been collected via telephone interviews. In 2014, the CDS began collecting extensive data on all PSID youth ages 0-17 years and their families by conducting interviews in waves of every 5-6 years (17). This study will only be looking at the year 2019 in which CDS information was gathered for all PSID youth and their families. Several covariates were included in this study to consider factors that influence maternal precarious employment and childhood asthma exacerbation. These include race and ethnicity (self-reported Non-Hispanic White, Non-Hispanic Black, Non-Hispanic AI/AN, Non-Hispanic Asian, Non-Hispanic Native Hawaiian or Pacific Islander, Hispanic or other), maternal education (completed high school or less, greater than high school), marital status (married/cohabiting, unmarried including divorced, separated, single, and widowed individuals), foreign born status (U.S. born, U.S. territory or foreign born), maternal smoking status (current smoker, not a current smoker), child age and child sex (male, female).

Exposure:

The primary exposure of maternal precarious employment was assessed using the previously defined seven dimensions of employment quality which are (1) employment stability, (2) material rewards, (3) workers' rights and social protections, (4) working time arrangements, (5) training and employability opportunities, (6) collective organization and (7) interpersonal power relations (18). Due to missing data on a few of the dimensions, indicators were used from four of these dimensions to define employment precarity. *Employment stability* was measured through the number of months participants were unemployed in the past year. Participants who work 12 months per year were categorized with a score of (0) and participants who work less than 12 months in a year were categorized with a score of (1). The unemployment duration variable had some missing values. If this variable was missing, the average of the other available precarious employment dimension scores was taken and replaced the missing value with this number.

Material rewards were assessed through three indicators: the presence of employer provided health insurance (yes/no), employer provided pension contributions (yes/no), and annual income in the last year (upper 50% and lower 50% percentiles of the sample). These three variables were combined as follows: a score of (1) was given to those who do not have employer provided health insurance or employer provided pension contributions and have lower than 50th percentile annual income. A score of (0.66) was given to those who meet two of the following criteria: lack of employer provided health insurance, lack of employer provided pension contributions, or earning the lower 50th percentile of annual income. Participants would receive a score of (0.33) if one of the three following indicators applied: lack of employer provided health insurance, lack of employer-provided pension contribution, or annual income below the 50th percentile. A score of (0) was given to those who have employer provided insurance, employer provided pension contributions and earn the upper 50th percentile of income.

In the case of missing data, material rewards was scored using the available variables. If only two variables were available (employer provided health insurance and annual income), the following scores would apply: participants earning upper 50% income and employer provided health insurance received a score of (0). Those earning lower 50% income and having employer provided health insurance or earning upper 50% income with no employer provided health insurance received a score of (0.5). Those earning lower 50% income and no employer provided health insurance received a score of (1). *Working time arrangements* was categorized as regular or irregular hours worked per week. Participants who work 30 to 45 hours a week were categorized as having regular working time arrangements (0). Participants who work <30 or >45 were categorized as having irregular working time arrangements (1). Those who worked less than 30 hours were considered irregular because they do not qualify for employer provided healthcare benefits under the Affordable Care Act. Those who worked more than 45 hours were also considered irregular due to overtime work. *Collective organization* was assessed through employee union membership (yes/no). Those who do have an employee union membership are

categorized with a score of (0) and those who do not have an employee union membership are categorized with a score of (1). The union membership variable had some missing values. If this variable was missing, the average of the other available precarious employment dimension scores was taken and replaced the missing value with this number. This approach helped retain as many observations as possible. The overall employment quality was then the unweighted sum of these four scores and were categorized into three groups: low (≤ 1), medium (>1 to 2), and high (>2 to 4) employment precarity (9,19).

Outcome:

Childhood asthma exacerbation was assessed with the following two questions from the CDS: “How many times in the past 12 months has [CHILD NAME] been to a hospital emergency room for asthma or wheezing?” and “How many times in the past 12 months has [CHILD NAME] missed school because of [his / her] asthma or wheezing?”. Each question response, originally recorded on a continuous scale, was recoded to a binary “yes” or “no” so the outcome could be analyzed using logistic regression. These interview questions are only asked to caregivers who reported their child was diagnosed with asthma by healthcare professionals.

Data analysis:

Descriptive statistics were calculated to understand the sociodemographic distribution across different precarious employment categories (low, medium, and high). Table 1 presents the means and standard deviations or the counts and percentages of various demographics for each employment precarity category. Race and ethnicity and marital status are presented with more categories in the descriptive statistics than were used in the models. Table 2 provides the mean (SE) numbers of emergency room (ER) visits and school absences due to asthma or wheezing for each value of the variables used to calculate the precarious employment categories. Logistic regression was used to calculate odds ratios and their accompanying 95% confidence intervals (95% CI). This analysis used two different adjustment models. The minimal

model (Model 1) was adjusted for maternal race/ethnicity (specified as White and non-White), maternal education, maternal foreign-born status, maternal marital status (married and non-married), child age and child sex. Model 2 was a fully adjusted model adjusting for the variables in model 1 and maternal smoking status. The smoking status variable is adjusted for in a separate model because it could potentially lie on the causal pathway from precarious employment to childhood asthma exacerbation. In addition, the analysis was stratified by maternal race and ethnicity into White and Non-White groups, with separate odds ratios for the levels of precarity within each group using the adjustments from the minimal model described above.

Results

Overall, this study included a sample of 543 participants. Among these participants, 198 (36.4%) were categorized as low employment precarity, 157 (28.9%) as medium employment precarity, and 188 (34.6%) as high employment precarity. A majority of the mothers in this study population were Non-Hispanic White (37.7%), and Non-Hispanic Black or African American (47.7%), had greater than a high school education (61.0%), were married/cohabiting (58.5%), were U.S. born (92.5%), and were not current smokers (84.2%). In addition, a majority of the children in this study population were reported as female (85.6%) and the average age was close to 11 years old (**Table 1**).

The descriptive statistics aligned with our a priori hypotheses, showing a consistent pattern of higher mean (SE) values of child ER visits and school days missed due to asthma or wheezing among participants who reported high employment precarity across all variables. However, there were two exceptions to these findings, specifically for employer-provided pension contributions and employee union membership. Individuals with employer provided pension contributions showed a similar mean (SE) (1.01 (0.18)) for number of school absences

compared to the individuals without employer provided pension contributions (0.94 (0.18)). Additionally, participants who reported belonging to a union had a greater mean (SE) for number of child ER visits due to asthma or wheezing (0.62 (0.21)) in comparison to those who did not have a union membership (0.43 (0.06)). (**Table 2**).

Results from the overall model for ER visits showed that there was no association between medium employment precarity and childhood asthma exacerbation, as the CI includes the null (OR = 1.70, 95% CI: (0.92, 3.19)). However, those with high employment precarity are 2.15 times more likely to experience ER visits for childhood asthma or wheezing compared to those with low employment precarity (OR = 2.15, 95%CI: (1.22, 3.85)). Individuals with both medium and high employment precarity showed no association with the number of child school absences due to asthma or wheezing, OR = 1.21, 95% CI: (0.73, 2.02), OR = 1.16, 95% CI: (0.72, 1.90) respectively (**Table 3**). No meaningful differences were observed in the odds ratios and 95% CIs for model 2 (which adjusted for smoking status in addition to the variables in model 1) (**Table 3**). Furthermore, the models stratified by race/ethnicity displayed similar trends to the overall models. An association between high employment precarity and ER visits due to asthma or wheezing in both the White (OR = 4.36, 95% CI: (1.21, 19.02)) and Non-White (OR = 1.93, 95% CI: (1.02, 3.70)) groups was observed. However, no significant association was observed for medium employment precarity for ER visits, and no significant association was observed for medium or high employment precarity and school absences due to asthma or wheezing (**Table 4**).

Discussion

The findings from this study showed that children with mothers who had high employment precarity had a higher odds of ER visits due to asthma or wheezing in comparison to mothers who had low employment precarity. Although the association between mothers who had

medium employment precarity and childhood ER visits due to asthma or wheezing was null, the direction of the odds ratio suggested a higher odds of ER visits, supporting our hypothesis. There was no significant association between maternal employment precarity and number of child school absences due to asthma or wheezing, although this odds ratio was also in the expected direction. In race-stratified analysis, the findings were similar, showing an association between high employment precarity and higher odds of ER visits due to asthma or wheezing compared to low employment precarity for both White and Non-White groups. These results were imprecise (i.e., they had wide confidence intervals) which could be because only 11% (n = 23) of White children had ER visits due to asthma or wheezing. All other race-stratified results were null.

A previous study conducted in Japan explored the relationship between maternal employment and childhood asthma prevalence and found that mothers with full-time employment were associated with having a higher prevalence of children with asthma in comparison to nonworking moms (20). Our study included only working mothers making any direct comparisons difficult, however, contextual differences (such as cultural and social, differences) between the U.S. and Japan are relevant.

Previous literature has also shown that higher maternal precarious employment is associated with other child health outcomes such as low birthweight and childhood overweight/obesity (2,9). These findings suggest that maternal employment precarity can have broader health implications beyond childhood asthma. This aligns with additional research that indicates unstable familial conditions can adversely affect child health outcomes (21).

Our findings were consistent with similar research on maternal depression, financial difficulties faced by parents, significant life stressors, and the availability of parents to their children, where it was found that these factors were significantly associated with exacerbated asthma symptoms

in children (22). For instance, research has shown that last-minute work scheduling practices, including fluctuating hours, shift cancellations, and short notice are associated with higher depressive symptoms among women (23). High depressive symptoms in mothers can contribute to increased stress (or vice versa) and lower their capacity to manage their child's health and asthma symptoms. Along with this, these psychosocial factors could potentially be a result of or lead to precarious employment. While the Longitudinal Study of Australian Children (LSAC) study focuses on parental psychosocial factors and childhood asthma exacerbation, similar to our study it emphasizes the importance of maternal factors on the influence of childhood asthma exacerbation (22). Precarious employment may lead to factors such as maternal hardship, depression, stressful life events, and other psychosocial factors (5,23). By highlighting the role of maternal employment precarity, our study adds to literature that supports the need to address employment instability and precarity for families facing these hardships.

This study has several limitations. The outcome, childhood asthma exacerbation, is assessed through self-reported survey responses regarding unplanned emergency healthcare utilization and school absences. This allows for potential participant recall bias due to individuals who may not accurately report instances of healthcare visits and school absences related to asthma and/or wheezing. These outcome measurements also may not be a complete representation of childhood asthma exacerbation because they do not account for increased asthma symptoms that may not result in ER visits or school absences (24). The children in this sample are also disproportionately female, which could potentially be due to selection bias. Factors such as differences in healthcare-seeking behavior among groups in this sample may have contributed to this difference, given that this study only included children diagnosed with asthma. This study also draws from survey data collected in the years 2019 which is prior to the COVID-19 pandemic. Therefore, pandemic-related factors are not considered in this study limiting the generalizability of the results to the current context. Furthermore, although we believe that

maternal precarious employment may influence childhood asthma exacerbation, there is also a possibility of reverse causality in this study as childhood asthma exacerbation may influence maternal precarious employment due to the demands placed on parents to manage the child's condition.

Another limitation of this study is the limited sample size. The PSID primarily focused on White and Black populations, thus providing us with limited data on other minorities. Given that Latinx populations tend to be disproportionately exposed to precarious employment (25), this is an important population to consider. Participants in high precarity jobs may be less likely to voluntarily participate in surveys and so may be underrepresented in the PSID. This introduces selection bias and may underestimate the effects we see in our study. Furthermore, mothers were identified by using a sex variable identifying males and females. Limiting the study to participants who answered "female" may not fully capture those who identify as mothers and so may not be representative of all mothers. Another limitation would be the use of a logistic regression instead of a zero-inflated Poisson regression for count data with excess zeros in the outcome variables. This limited our ability to access information on the frequency of the outcome and its association with the exposure. Residual confounding may have also been present in the current smoker variable, which only determines whether the maternal figure is a current smoker or not. This fails to capture information on whether or not the mother is smoking in the house, which previous research has shown to be risk factor of asthma exacerbation (26). Our study is also limited by the lack of data on potential environmental triggers that could contribute to asthma exacerbation. This impacts our study because these environmental triggers could potentially be either confounders or mediators, however, there is not enough data to validate this in our study. Lastly, precarious employment is often defined using 7 dimensions (material rewards, working time arrangements, employment stability, workers' rights, collective organization, interpersonal relations, and training opportunities) (25). However, due to lack of

data availability, this study assessed precarious employment using 4 of the 7 dimensions (material rewards, working time arrangements, employment stability, and collective organization) which may not reflect the complete multi-dimensional nature of precarious employment (6).

This study also had several strengths. The PSID provided extensive data on employment of the participants. The abundance of employment variables were used for various dimensions of precarious employment allowing the creation of a comprehensive employment precarity score. Another strength was the availability of intergenerational data. Data on mothers and their children's health was used to analyze intergenerational effects of precarious employment, offering valuable insights into how maternal occupation could potentially impact their child's health outcomes. In addition, this study had effective confounder control. This includes the availability of various demographics for the participants, allowing us to control for confounding factors in the analysis.

This study can serve as a foundation for future research and analyses. This study contributes as the first study to our knowledge to look at the intergenerational effects of multidimensional maternal precarious employment on childhood asthma exacerbation within the United States. Understanding these connections can help inform interventions and policymakers about addressing precarious employment as a social determinant of child health outcomes. To address the issues highlighted in this study, interventions should consider implementing policies that ensure employer provided health insurance and pension contributions. Along with this, advocating for workplace policies that implement increased job security, fair wages and employee benefits could potentially help mitigate the impacts of maternal precarious employment on child health.

Appendix

Table 1. Sociodemographic Characteristics of the Panel Study of Income Dynamics (PSID)/Child Development Supplement (CDS) study participants by employment precarity score				
	Overall sample Mean (SE) or N (%)	Low employment precarity Mean (SE) or N (%)	Medium employment precarity Mean (SE) or N (%)	High employment precarity Mean (SE) or N (%)
	543 (100.0)	198 (36.5)	157 (28.9)	188 (34.6)
Maternal characteristics				
Race/ethnicity N (%)				
Non-Hispanic White	205 (37.7)	65 (32.8)	70 (44.6)	70 (37.2)
Non-Hispanic Black, African-American	259 (47.7)	111 (56.1)	67 (42.7)	81 (43.1)
Non-Hispanic American Indian or Alaska Native (AI/AN)	1 (0.2)	0 (0.0)	1 (0.6)	0 (0.0)
Non-Hispanic Asian	2 (0.4)	1 (0.5)	1 (0.6)	0 (0.0)
Non-Hispanic Other	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Hispanic	76 (14.0)	21 (10.6)	18 (11.5)	37 (19.7)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Education N (%)				
High school or less	208 (38.3)	72 (36.4)	44 (28.0)	92 (48.9)
Greater than high school	331 (61.0)	123 (62.1)	112 (71.3)	96 (51.1)
Missing	4 (0.7)	3 (1.5)	1 (0.6)	0 (0.0)
Marital status N (%)				
Divorced	63 (11.6)	26 (13.1)	12 (7.6)	25 (13.3)
Married/Cohabiting	318 (58.5)	114 (57.6)	111 (70.7)	93 (49.5)
Separated	34 (6.3)	13 (6.6)	6 (3.8)	15 (8.0)
Single	112 (20.6)	41 (20.7)	24 (15.3)	47 (25.0)
Widowed	14 (2.6)	3 (1.5)	3 (1.9)	8 (4.3)
Missing	2 (0.4)	1 (0.5)	1 (0.6)	0 (0.0)
Foreign born N (%)				
U.S. born	502 (92.5)	185 (93.4)	149 (94.9)	168 (89.4)

Table 1. Sociodemographic Characteristics of the Panel Study of Income Dynamics (PSID)/Child Development Supplement (CDS) study participants by employment precarity score

	Overall sample Mean (SE) or N (%)	Low employment precarity Mean (SE) or N (%)	Medium employment precarity Mean (SE) or N (%)	High employment precarity Mean (SE) or N (%)
	543 (100.0)	198 (36.5)	157 (28.9)	188 (34.6)
U.S. territory or foreign born	37 (6.8)	12 (6.1)	8 (5.1)	17 (9.0)
Missing	4 (0.7)	1 (0.5)	0 (0.0)	3 (1.6)
Current smoking N (%)				
Current smoker	86 (15.8)	20 (10.1)	32 (20.4)	34 (18.1)
Not current smoker	457 (84.2)	178 (89.9)	125 (79.6)	154 (81.9)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Child characteristics				
Age (mean, SE)	10.98 (3.72)	10.90 (3.75)	10.58 (3.70)	11.39 (3.68)
Sex N (%)				
Male	78 (14.4)	37 (18.7)	28 (17.8)	13 (6.9)
Female	465 (85.6)	161 (81.3)	129 (82.2)	175 (93.1)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Number of emergency department visits (mean, SE)	0.52 (1.88)	0.33 (1.05)	0.72 (2.45)	0.26 (0.92)
Number of school absences (mean, SE)	1.05 (3.17)	1.08 (3.30)	1.10 (3.24)	0.43 (1.24)
Emergency department visit for asthma/wheezing N (%)				
Yes	101 (18.6)	35 (14.6)	62 (23.0)	4 (11.4)
No	442 (81.4)	204 (85.4)	207 (77.0)	31 (88.6)
School absence due to asthma/wheezing N (%)				
Yes	133 (24.5)	60 (25.1)	68 (25.3)	5 (14.3)
No	410 (75.5)	179 (74.9)	201 (74.7)	30 (85.7)

Table 2. Descriptive statistics for the association between maternal precarious employment and childhood asthma exacerbation

	ER visits due to asthma/wheezing, Mean (SE)	School days missed due to asthma/wheezing, Mean (SE)
Employment stability		
Work 12 months per year	0.38 (0.06)	0.93 (0.17)
Work less than 12 months per year	0.98 (0.58)	1.25 (0.70)
Missing	0.68 (0.17)	1.25 (0.21)
Material rewards		
<i>Employer provided health insurance</i>		
Yes	0.27 (0.06)	0.75 (0.12)
No	0.76 (0.14)	1.33 (0.24)
Missing	NA	NA
<i>Employer provided pension contributions</i>		
Yes	0.24 (0.06)	1.01 (0.18)
No	0.59 (0.11)	0.94 (0.18)
Missing	0.70 (0.17)	1.23 (0.21)
<i>Annual income</i>		
Upper 50%	0.42 (0.11)	0.78 (0.16)
Lower 50%	0.61 (0.11)	1.31 (0.22)
Missing	NA	NA
Working time arrangements		
Regular work times (30 - 45 hrs)	0.42 (0.09)	1.00 (0.16)
Irregular work times (<30 hrs or >45 hrs)	0.59 (0.13)	1.08 (0.17)
Missing	NA	NA
Collective organization		
<i>Employee union membership</i>		
Yes	0.62 (0.21)	1.00 (0.26)
No	0.43 (0.06)	1.03 (0.15)
Missing	0.60 (0.14)	1.08 (0.17)

Table 3. ORs and 95% CIs for the association between employment precarity and childhood asthma exacerbation for minimal model and model adjusted for maternal smoking status		
Employment precarity	ER visits due to asthma/wheezing, OR (95% CI)	School days missed due to asthma/wheezing, OR (95% CI)
Overall: Minimal model ^a		
Low precarity	Reference group	Reference group
Medium precarity	1.70 (0.92, 3.19)	1.21 (0.73, 2.02)
High precarity	2.15 (1.22, 3.85)	1.16 (0.71, 1.89)
Overall: Model includes smoking ^b		
Low precarity	Reference group	Reference group
Medium precarity	1.72 (0.92, 3.24)	1.22 (0.73, 2.05)
High precarity	2.15 (1.22, 3.87)	1.16 (0.72, 1.90)

A. Adjusted for maternal race/ethnicity, maternal education, maternal foreign-born status, maternal marital status, child age and child sex

B. Additional adjusted for maternal smoking

Table 4. ORs and 95% CIs for the association between employment precarity and childhood asthma exacerbation stratified by race/ethnicity		
Employment precarity	ER visits due to asthma/wheezing, OR (95% CI)	School days missed due to asthma/wheezing, OR (95% CI)
White		
Low precarity	Reference group	Reference group
Medium precarity	2.48 (0.65, 11.11)	0.64 (0.26, 1.53)
High precarity	4.34 (1.20, 18.96)	0.81 (0.35, 1.88)
Non-White		
Low precarity	Reference group	Reference group
Medium precarity	1.74 (0.84, 3.59)	1.56 (0.81, 3.03)
High precarity	1.93 (1.02, 3.70)	1.26 (0.69, 2.33)

Adjusted for maternal race/ethnicity, maternal education, maternal foreign-born status, maternal marital status, child age and child sex

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