NBER WORKING PAPER SERIES

OCCUPATIONAL HAZARD? AN ANALYSIS OF BIRTH OUTCOMES AMONG PHYSICIAN MOTHERS

Anupam Jena
David Slusky
Lilly Springer

Working Paper 31955
http://www.nber.org/papers/w31955

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 2023, revised June 2024

We thank Dr. Samuel Dickman and Dr. Chavi Eve Karkowsky for providing guidance on changes to ventilation procedure for newborns. Springer gratefully acknowledges the Madison and Lila Self Graduate Fellowship for financial support. We also thank conference participants at the Missouri Valley Economic Association and NBER Children Program Meeting, and seminar participants at the University of Kansas, University of Missouri, Middle Tennessee State University, and University of Massachusetts Amherst for their helpful comments and suggestions. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Occupational Hazard? An Analysis of Birth Outcomes Among Physician Mothers
Anupam Jena, David Slusky, and Lilly Springer
NBER Working Paper No. 31955
December 2023, revised June 2024
JEL No. I12,J13,J44,K32

ABSTRACT

Are birth outcomes of physician mothers affected by their long work hours and physically demanding job? Using Texas birth data from 2007-2014, we compared birth outcomes between physicians and another highly educated group, lawyers, and between surgeons and non-surgeon physicians. Further, using a difference-in-differences framework, we examine whether a 2011 duty hour reform impacted the physician birth outcomes. We find that physicians have an increased incidence of low birthweight and small for gestational age infants, with the results driven by surgeons. We find evidence that duty hour reforms were associated with improved birth outcomes for younger physicians.

Anupam Jena
Department of Health Care Policy
Harvard Medical School
180 Longwood Avenue, Door A
Boston, MA 02115
and NBER
jena@hcp.med.harvard.edu

Lilly Springer
Department of Economics
University of Kansas
1460 Jayhawk Boulevard
Lawrence, KS 66045
lilly.springer@ku.edu

David Slusky
Department of Economics
University of Kansas
1460 Jayhawk Boulevard
Lawrence, KS 66045
and NBER
david.slusky@ku.edu

1 Introduction

Working in a high stress occupation may have a significant impact on one's health. For pregnant women in strenuous occupations, those negative impacts could extend to their children. For example, maternal stress has been linked to increased production of cortisol (Coussons-Read 2013, Kramer et al. 2009), a hormone that regulates the body's stress response, and epinephrine and norepinephrine (Katz et al. 1988), hormones associated with the body's fight-or-flight response. Both sets of hormones can hinder fetal growth if present in too high quantities. Further, maternal stress can impact fetal health through behavioral responses to stress including worse sleep, changes in diet, and a reduction in physical activity (Coussons-Read 2013).

One occupation that is particularly stressful, physically demanding, and involves long work hours during child-bearing years is medicine, particularly surgery. For example, physicians in specialties such as internal medicine, family medicine, and surgical subspecialties routinely work up to 80 hours per week during inpatient portions of training. In a 2023 study on surgical residents, Gates et al. (2023) found that surgical residents reported a median 78 total patient care hours per week. Despite the long hours, anywhere between 30% and 45% of residents report either having a child or planning on having a child during their training program (Blair et al. 2016, Holliday et al. 2015). As the share of physicians that are women has steadily increased (**Appendix Figure A1**) it is unknown if birth outcomes of physician mothers, in particular surgeon mothers, are affected as a result of their physically demanding occupation. If female physicians' birth outcomes are negatively impacted by their occupation, then it is possible that some women who wish to have children may leave the profession early or forego ever becoming a physician in the first place, further exacerbating a growing global healthcare worker crisis.

To study the potential impact of stressful occupations on birth outcomes, we employed a similar method as in Gottlieb et al. (2023) and compared birth outcomes between physicians and another highly educated group, lawyers. While comparably educated people tend to initially sort into these occupations, the work of physicians, particularly those in training, tends to be more physically demanding, involving long hours, with many of those hours on one's feet. Comparing physicians to lawyers allows us to study the association of a physically strenuous occupation on the birth outcomes of comparably educated mothers in those occupations, a descriptive analysis. We also compared birth outcomes between surgeon and non-surgeon physicians to study if a physician's specialty may have a heterogenous relationship with birth outcomes.

In part recognizing the strenuous physical requirements of becoming a physician, the Accreditation Council for Graduate Medical Education (ACGME), the organization responsible for accrediting all graduate medical programs in the U.S., instituted several duty hour reforms that lowered work hours during the period of graduate medical education known as residency. Residency is the period of training after medical school in which physicians work intensively in their chosen specialty. Following a successful 2003 reform, which lowered the number of hours that residents could work weekly to 80 hours, the ACGME instituted a 2011 duty hour reform which limited the number of consecutive hours a first-year resident could work to 16 hours (Riebschleger & Nasca 2011). This was reversed in 2014 with duty hour reforms allowing first-year residents to work 24 hours continuously with 4 additional hours permissible for transitioning care and formal teaching, for a total of 28 hours (Burchiel et al. 2017). We add to the body of research that has studied the impact on medical practice of these various reforms (Volpp et al. 2007, Jena, Prasad, & Romely 2014, Wasserman 2023, Awan et al. 2021, Patel et al.

2014) by examining whether the 2011 ACGME reform may have impacted the birth outcomes of physician mothers by reducing work hours for those in training.

Using Texas birth records from 2007 to 2014 we compare the birth outcomes of physicians (birth weight, pregnancy length, and rates of pre-term birth, Caesarean delivery, and newborn abnormal conditions) to birth outcomes of lawyers, accounting for maternal characteristics such as age, prenatal visits, race, ethnicity, and other risk factors. Among physicians, we then estimate a similar model that compares birth outcomes of surgeons and non-surgeons, hypothesizing worse birth outcomes among surgeon mothers due to the particularly demanding nature of surgical training, which involves longer work hours, more time on one's feet, and repeated instances of sexism from both colleagues and patients (Hutchinson 2020, Sudol et al. 2021, Lombarts & Verghese 2022). Finally, to better understand the potential causal effect of reduced work hours on infant outcomes of physician mothers in training, we estimate a difference-in-differences model to examine the impact the 2011 ACGME duty hour reform had on the difference in birth outcomes between physicians and lawyers, under the assumption that work hours of lawyers would not be affected by the medical reform. Our analysis focuses on physician trainees, whose work hours were predominantly affected by the work hour reforms.

We find that physicians have worse birth outcomes than lawyers. Specifically, after adjusting for several maternal characteristics, we find that physicians have a 15.8% (1.5 percentage points) increase in having low birthweight infants and a 17.9% (1.9 percentage points) increase in the incidence of small for gestational age infants, both statistically significant at the 1% level. We also find that physicians are 10.2% more likely to give birth pre-term than lawyers. These findings, which are descriptive, are similar in magnitude to the estimated effects of air pollution on infant health identified in other studies (Currie & Walker 2011, Alexander &

Schwandt 2022). We also find that physicians have 2.5% (80.36 grams) lower birth weights, 0.3% (0.13 weeks) shorter pregnancies, and are 10.1% less likely to deliver via Caesarean delivery. The estimated differences are driven primarily by physicians in surgical specialties. For example, when compared to non-surgeon physicians, we find that surgeons have a 32.4% (3.5 percentage points) increased incidence of having a low birthweight infant, are 30.2% more likely to deliver preterm (4.2 percentage points), and have 2.1% lower birth weights (67.43 grams) and 0.9% shorter pregnancies (0.34 weeks).

We then analyzed the potential causal effect of reduced work hours on infant outcomes of physician mothers by studying changes in infant outcomes among physician trainees (compared with lawyers), a group whose work hours were impacted by the 2011 duty hour reforms. We found highly significant evidence that the reform led to a 56.3% (6.2 percentage points) reduction in the incidence of small for gestational age infants and suggestive evidence that the reform improved the likelihood of having a low birthweight infant and birth weights, in general, among young physicians (those aged 26-30 years old) as compared with young lawyers. Consistent with work hour reforms not applying to older physician mothers, we found no effect of the reforms on older physicians (those aged 34-45) compared with older lawyers. Among young physicians, the impact of the work hour reforms on infant outcomes was slightly larger for surgeons than non-surgeon physicians. While both surgeons and non-surgeon physicians saw a decrease in small for gestational age infants, surgeons also saw a reduction in low birthweight infants and Caesarean deliveries. Due to surgeons' particularly strenuous job requirements, they are the group that could benefit the most from the 2011 work reform, although prior evidence has shown that surgical training programs had greater difficulty complying with work hour regulations (Drolet et al. 2013b, Byrne et al. 2015). Thus, stronger work reforms or additional

work environment changes may be needed to ensure the retention of female physicians who are interested in growing their families.

Several studies suggest that physicians tend to have better health behaviors than the general population (Frank & Segura 2009, Glanz et al. 1982). A majority of physicians report that they are in excellent health or are satisfied with how they take care of themselves (Leuven et al. 2013, Ahmed et al. 2023). Given that physicians appear to be in better health in general, we would expect that physicians' birth outcomes would be better than those of comparably educated mothers. If so, our estimated difference in birth outcomes between physicians and lawyer mothers may understate any potential adverse impact of physician's work on birth outcomes.

Our study contributes to several strands of literature. First, our study adds to growing work on the impact of mothers' behaviors and environment during pregnancy on birth outcomes. Much of the economic literature around this issue seeks to provide support for the Fetal Origins Hypothesis, which argues that stress and other environmental factors that the mother experiences while pregnant can impact the health and long-term well-being of the child (Barker 1990, Almond & Currie 2011).

Our study also relates to literature that explores health care and behavior outcomes of physicians when they are patients. Because physicians are arguably highly informed about the benefits and costs of health care treatments, in theory their behavior and outcomes could differ greatly from that of the rest of the public. For example, physicians are less likely to undergo a Caesarean when giving birth (Johnson & Rehavi 2016, Frakes et al. 2021) and are more likely to receive novel, targeted cancer drug therapy instead of surgery or radiation (Chen et al. forthcoming). This literature suggests that *ceteris paribus* physician mothers would be expected to have better birth outcomes than a comparably educated group of non-physician mothers. If so,

our estimated difference in birth outcomes between physician and lawyer mothers may be biased downwards.

However, several studies find that despite their access to medical knowledge, physicians act similarly to the public. There is mixed evidence on physicians' adherence to care guidelines with one study (Frakes et al. 2021) finding that physicians adhere to care guidelines at the same rate or only slightly more than non-physicians and another (Finkelstein et al. 2022) finding that physicians are far less likely to adhere to care guidelines. Despite agreeing professionally what the best care guidance is, the investments that physicians make in their own health may not be that different from otherwise comparable people.

Most directly related to our study Katz et al. (1988) identified that physicians were at an increased risk of adverse pregnancy outcomes including pre-term labor and intrauterine growth restriction. The effect appeared to be the strongest among residents. These results, however, were obtained through aggregating the results from studies that were conducted on small samples. Our paper builds on this finding by comparing birth outcomes of physicians to those of a similarly educated group, lawyers and among physicians, between surgeons and non-surgeons.

The paper is organized as follows. Section 2 provides background information on the Fetal Origins Hypothesis and the ACGME's prior duty hour reforms. Section 3 describes our data and Section 4 outlines our empirical methodology. Section 5 reports our results, which are discussed in Section 6. Section 7 concludes.

2 Background

2.1 Fetal Origins Hypothesis

The overall impact of in utero stressors on birth outcomes is well documented. Lauderdale (2006) finds that Arab women in California experienced a 34% increased risk of

having a low birthweight infant in the six months after September 2001. The authors argue that the surge of anti-Arab sentiment after 9/11 led to an increase in maternal stress during pregnancy. In a similar study on maternal stress, Currie et. al (2023) estimate that mothers that were exposed to the Virginia beltway sniper, who perpetuated a series of random shootings around the Washington D.C. metro area in October 2002, experienced a 25% increased likelihood of infant low birthweight and a 32% increase in the likelihood of a very premature birth. Almond and Mazumder (2011) find that Arab mothers exposed to Ramadan during pregnancy have lower birth weights likely due to fasting associated with Ramadan. Duncan et al. (2017) find that even short periods of maternal stress may impact birth outcomes with pregnant mothers who were exposed to a Super Bowl win of their home team experiencing a 4% increase in the likelihood of having a low birthweight child.

Several studies directly explore the role of a mother's work environment in pregnancy and birth outcomes. Using a measure of the strenuousness of work activities from the Census Occupational Classification System, Dave and Yang (2022) find that working in a relatively more strenuous job increases the likelihood of fetal macrosomia, a birth weight exceeding 4,000 grams, which is associated with maternal complications, but the likelihood of low birthweight, shorter gestational length, or pre-term birth are not affected. Similarly, Baum (2005) finds no adverse effect of working while pregnant on mother's birth outcomes and argues that any potential adverse impacts on birth outcomes that occur due to employment are offset by the increase in family income.

2.2 2003 Duty Hour Reform to Physician Training

In July 2003, the ACGME instituted the 2003 common duty hour reform, which limited the number of hours that residents could work to 80 hours per week (Philibert et al. 2002). Prior

to this, residents would work on average 83 hours per week with residents in surgical specialties working anywhere from 102 to 110 hours per week, with many of these work hours accumulating in single stretches (Baldwin et al. 2003). After seeing the impact of several smaller work reforms and amid growing concern about the effects of sleep deprivation on patient outcomes and physician well-being, the ACGME created a comprehensive set of rules governing the duty-hour standards for residents.

In the years since this first reform, there have been several studies that have sought to identify the impact of limiting duty hours on both patients and physicians. When looking at the short-term impact on patient outcomes, the reform was associated with overall reductions in patient mortality in teaching-intensive hospitals (Volpp et al. 2007, Shetty & Bhattacharya 2007). However, there were heterogenous impacts on patient mortality rates with mortality rates remaining unchanged for surgical patients (Shetty & Bhattacharya 2007). Duty hour restrictions have also been associated with longer term reductions in inpatient mortality for high-risk patients with pneumonia, congestive heart failure, and strokes in teaching hospitals (Jena, Prasad, & Romley 2014).

Turning towards the reform's impact on physicians, prior to the reform there were concerns about how reduced work during residency would impact physician training and long-term quality. For example, some physicians feared that residents would be less well-trained and unprepared for independent practice after the completion of their residency. Subsequent studies suggest, however, that the reform reduced reported levels of resident burnout, especially among first year residents, but appeared to have had no major impact on the quality of residents' training and education (Martini et al. 2014, Hutter et al. 2006, Jena et al. 2014). However, the work that residents would have done prior to the work hour constraints seems to have shifted to

supervising physicians (known as attending physicians), as post reform attending surgeons reported that their quality of life in and out of the hospital was slightly worse (Hutter et al. 2006). The 2003 reform also had the unintended impact of encouraging more women to enter certain specialties that previously involved greater hours of training. Wasserman (2023) details how the reform shifted women's labor supply from less time-intensive specialties to more time intensive specialties as those specialties reduced their weekly hours to comply with the 2003 reform.

2.3 2011 Duty Hour Reform

To further increase patient and resident safety, in 2011 the ACGME implemented an additional work reform which prohibited first year residents from working more than 16 consecutive hours (Riebschleger & Nasca 2011). Prior to this change, first year residents worked the longest hours of any resident cohort, sometime nearing 30 hours in a single stretch, and were found to make more errors when working those longer hours (Riebschleger & Nasca 2011). Overall, the restrictions on first year hours were designed to create a more structured learning environment that would enable first year residents to develop the skills to properly care for patients.

The 2011 work reform had an impact on the workload of first year residents with the mean number of duty hours reported per week decreasing from 67.0 hours prior to the reform to 64.3 hours after the reform was implemented (Sen et al. 2013). In addition to a decrease in work hours, first year residents also saw a decrease in caseload (Vucicevic et al. 2015, Kamine et al. 2014, Schwartz et al. 2013). First year surgical residents also experienced a 46.3% decrease in first-assistant cases (Schwartz et al. 2013). The decrease in work hours and caseload from first year residents was compensated for by an increase in cases handled by third year residents and an increase in teaching assistant cases by fourth year residents (Kamine et al. 2014). Further, in a

survey of residents, Drolet et al.(2013a) found that 68.7% of residents reported that after the 2011 duty hour reform, senior residents took on more of the responsibilities previously handled by junior-level residents. Surgical residents were slightly more likely to report this shift of responsibility than non-surgical residents. Overall, the 2011 duty hour reform seems to have decreased first year residents' work responsibilities, with potentially offsetting work to older residents and physicians.

However, the 2011 duty hour reform appears to have had little impact on either patient outcomes or physician well-being. While the reform was effective in reducing first year resident hours, there were no significant changes in first year residents' reported hours slept, well-being scores, or presence of depressive symptoms (Sen et al. 2013). Furthermore, post reform, junior surgical residents had less experience and clinical responsibilities were shifted to more senior residents (Awan et al. 2021). However, Rajaram et al. (2014) report that there was no change in resident performance on board examinations post reform, indicating that even if first year residents did receive less experience, their knowledge base, as measured by a standardized written exam, was not harmed in the long run.

Several studies have also found that patient outcomes were unchanged after the reform, with no measurable impact found on general surgery patient outcomes (Rajaram et al. 2014), 30-day morality rates or 30-day all cause readmission rates for Medicare beneficiaries (Patel et al. 2014), or serious patient complications (Awan et al. 2021).

While these results suggest that the 2011 duty hour reform has had little impact on physician behavior or patient outcomes, little is known about how these work reforms have affected the physical health of physicians. Our study seeks to examine one dimension of this issue by examining if the 2011 duty hour reform improved physicians' birth outcomes.

3 Data

To measure the potential impact of being a physician on a mother's birth outcomes we use Texas birth records from 2007 to 2014. Texas birth records include demographic information about the mother and father (including their names), information about the labor and delivery process, and a variety of birth outcomes. The subset of birth records we obtained from the Texas Department of State Health Services included births where at least one parent had a doctorate (PhD, EdD) or a terminal, doctoral level professional degree (MD, DDS, DVM, LLB, or JD).

For the purposes of our study, we constructed a sample of mothers between 26 and 45 years old which spans from the age most people begin their residency to the age commonly regarded by obstetricians as the end of a woman's fertility period. We further narrowed our sample by only including mothers that listed their occupation as an equivalent of "physician" or "lawyer".[1] [2]

After narrowing the sample to mothers who identified either as a physician or lawyer, we attempted to identify the specialties of physician mothers. To find specialties of physician mothers, we first identified if the mother included a specialty in her self-reported occupation

[1] Since the occupations were self-reported in the birth records, there were many misspellings in mother's occupation field. Spellings that either missed a few letters or included a phonetically similar letter (ex. s instead of c) were assumed to be misspellings and were assigned the correct occupation. For example, "physisian" was considered to be "physician" and "anestheoligst" was considered "anesthesiologist". If a misspelled occupation was potentially close to an equivalent of physician or lawyer, the spelling was entered into Google to see if it was a common misspelling of the occupation (ex. "optimologist" was considered to be "ophthalmologist"). All misspellings were evaluated by hand by the researchers.

[2] Using state-level statistics, we find that the annual fertility rate for physicians ranges from 43.8 to 51.5 births per 1,000 physicians and the annual fertility rate for lawyers ranges from 27.8 to 31.3 births per 1,000 lawyers. The annual general fertility rate during this period ranges between 69.5 to 62.9 births per 1,000 women aged 15-44. The annual number of physicians were obtained from the September 2007-2014 estimates from the Texas Medical Board and the annual number of lawyers were obtained from the State Bar of Texas for 2007-2013. A 2014 estimate from the State Bar of Texas was not available. Fertility rates for the public were obtained from the 2007-2014 CDC National Vital Statistic Reports. To calculate the annual fertility rates for physicians, we divided the number of births from a specific year for physicians divided by the number of physicians between the "under 30" to 45 years old group. The same was done for lawyers. Unfortunately, full data was not available to disaggregate between female and male doctors and lawyers.

(e.g. a mother could self-report her occupation as "surgeon"). If the self-reported occupation was simply an equivalent of "physician," we then matched the mother's first and last name and state (Texas) to the CMS National Plan and Provider Enumeration System National Provider Identifier (NPI) registry, which lists the taxonomy numbers associated with the physician's specialty.[3] Through either self-reported specialties on the birth records or through matching the NPI registry, we identified specialties for approximately 70% of the physician mothers.

We then used the specialties to create a sub sample of surgeons and non-surgeons. The surgeon sample included physicians in the specialties of general surgery, obstetrics and gynecology (OBGYN), orthopedics, otolaryngology, plastic surgery, and urology. The non-surgeon sample were those physicians whose identified specialties were in the complement of this group.

4 Methodology

We compare birth outcomes of physician mothers to those of lawyer mothers since lawyers are a comparable group to physicians in terms of educational background. We follow Gottlieb et al. (2023) who compared physicians and lawyers to evaluate the earnings and labor supply of physicians. Despite similar education requirements, physicians and lawyers are subject to very different work environments. Physicians' work is more physically demanding due to its long hours, prolonged periods of standing, and moments of great stress. As shown in **Appendix Figure A5** on average, from 2007 to 2014, Texas physicians reported in the ACS that they worked 53.9 hours per week while Texas lawyers worked 45.9 hours per week. While both occupations work longer hours than the standard work week, physicians tend to have longer

[3] We did not include matches where multiple NPIs matched to one mother unless one of the matches was a physician practicing in Texas. If there were multiple matched physicians practicing in Texas, the match was not included.

hours than their lawyer counterparts. Goldman and Barnett (2023) also show that irrespective of parental status or gender, physicians on average work longer than their nonphysician doctoral degree counterparts. This difference is magnified for surgeons, the subgroup of physicians that work the longest hours and are on their feet for the majority of those hours. By comparing mothers in these educationally similar occupations, we attempt to estimate the impact of the strenuous work environment on physician mothers' and surgeon mothers' birth outcomes. Importantly, however, since individuals are not randomized or quasi-randomized to occupation, our results should be interpreted descriptively.

We compare seven different birth outcomes between physicians and lawyers and among physicians, between surgeons and non-surgeons: newborn's birth weight (in grams), length of the pregnancy (in weeks), and binary indicators for low birthweight (< 2,500 grams), small for gestational age (birth weight is less than 10th percentile for the baby's sex and gestational age[4]), pre-term delivery (a delivery that occurred before 37 weeks of pregnancy), Caesarean delivery, and the presence of an abnormal birth condition. Included in newborn abnormal birth conditions are indicators for admission to the neo-natal intensive care unit (NICU), receiving surfactant replacement therapy to manage respiratory distress syndrome, requiring antibiotics for suspected neonatal sepsis, having seizure or serious neurologic dysfunction, and significant brain injury.[5]

[4] We used Aris et al. (2019)'s estimated gestational age birth weight percentiles. The percentiles were estimated using over 3 million births between 22 and 42 weeks gestation from the 2017 US natality files. As such, we only have data on being small for gestational age if the baby's gestational age was between 22-42 weeks. We are able to estimate this outcome for 96% of our sample.

[5] The original Texas birth data includes two measures of newborn ventilator usage in the newborn abnormal conditions ("assisted ventilation required immediately following delivery" and "assisted ventilation required for more than 6 hours"). However, in 2011, neonatologists began using non-invasive positive pressure ventilators (NIPPV) for newborns (De Jesus Rojas et al. 2017). The introduction of this new technology, which could be a substitute for traditional ventilation in some situations (Garg & Sinha 2013), coincides directly with the 2011 ACGME duty hour reform that we are studying. Further, we are concerned that physicians would adopt this new less invasive procedure at different rates than non-physicians. Given these concerns, we do not study newborn ventilation rates.

Summary statistics of our sample are included in **Table 1**. Demographically, physicians and lawyers are quite similar.[6] For example, the age of mothers in both groups is, on average, approximately 33 years old.[7] Physicians are slightly more likely to have had a prior poor pregnancy outcome while lawyers are more likely to smoke during pregnancy. Lawyers are also more likely to be non-Hispanic white than physicians, and physicians are slightly more likely to be non-Hispanic Asian than lawyers.

4.1 Descriptive Models

We begin by estimating two descriptive models to identify if being a physician is associated with worse birth outcomes compared with being a lawyer. As stated above, we are unable to establish if being a physician causes adverse birth outcomes since we cannot address the fact that people do not randomly sort into their occupation. We instead attempt to understand how the birth outcomes are descriptively different between the two occupations.

We estimate the following descriptive model on our full sample of physician and lawyer mothers:

$$Y_{ict} = \beta physician_i + \delta \boldsymbol{X}_i + \alpha_t + \alpha_c + \epsilon_{ict} \quad (1)$$

where Y_{ict} is one of the birth outcomes outlined above measured for mother i in county c in year t. $physician_i$ is an occupation binary variable that indicates if the mother is a physician. $\boldsymbol{X}_i$ is the set of demographic and behavior controls, including mother's age and race, number of

[6] We also find that there is no major difference for physicians and lawyers in terms of birth month shown in **Appendix Figure A3**. However, when we look at births throughout the years, we find that physicians exhibit an increasing trend as shown in **Appendix Figure A4**. We further find that the year is significantly associated with the number of births in each month-year as shown in **Appendix Table 1**.

7 The average age of mothers does not vary depending on their occupation. Surgeon physician mothers' average age is 33.96 years, non-surgeon physician mothers' average age is 33.83 years, and lawyer mothers' average age is 33.63 years.

Table 1: Summary Statistics

	Full Sample		Physicians		Lawyers	
VARIABLES	N	Mean	N	Mean	N	Mean
Dependent Variables						
Low birthweight (<2500 grams)	19,203	0.095	9,839	0.104	9,364	0.085
Small for gestational age	18,474	0.106	9,472	0.125	9,002	0.087
Pre-term delivery	18,704	0.128	9,603	0.134	9,101	0.121
Birth weight (grams)	19,203	3,232	9,839	3,172	9,364	3,295
Length of pregnancy	18,704	38.34	9,603	38.25	9,101	38.43
Caesarean delivery	19,203	0.434	9,839	0.415	9,364	0.453
Newborn abnormal conditions	19,203	0.091	9,839	0.093	9,364	0.089
Occupation Variables						
Physician	9,839					
Lawyer	9,364					
Surgeon	7,060	0.183				
Demographic and Health Controls						
Mother's age	19,203	33.49	9,839	33.63	9,364	33.35
Prenatal visits (n)	19,203	11.16	9,839	10.83	9,364	11.51
Cigarettes smoked during pregnancy (n)	19,203	0.026	9,839	0.010	9,364	0.044
Diabetic	19,203	0.046	9,839	0.048	9,364	0.044
White	19,203	0.611	9,839	0.492	9,364	0.735
Black	19,203	0.077	9,839	0.082	9,364	0.071
Asian	19,203	0.167	9,839	0.270	9,364	0.059
Hispanic	19,203	0.130	9,839	0.138	9,364	0.122
Mother born in US	19,203	0.770	9,839	0.650	9,364	0.897
Prior live births (n)	19,203	0.742	9,839	0.787	9,364	0.696
Prior poor pregnancy outcome	19,203	0.007	9,839	0.010	9,364	0.005

Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age and gender. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Surgeon category includes physicians in the specialties: General Surgery, OBGYN, Orthopedics, Otolaryngology, Plastic Surgery, and Urology.

prenatal visits during this pregnancy, number of cigarettes smoked during pregnancy, a binary indicator for having diabetes prior to pregnancy or developing gestational diabetes, a binary indicator for the mother being born in a US state or territory, the number of prior live births, and a binary indicator for if the mother experienced a prior poor pregnancy outcome (defined as perinatal death, a newborn small for gestational age, and intrauterine growth restriction). Finally, α_t and α_c are year and county fixed effects respectively. The coefficient of interest is β which identifies the difference in birth outcomes between physicians and lawyers.

We then estimated an analogous model restricted to physicians and compared birth outcomes between surgeons and non-surgeons, adjusting for the same factors described above. This specification included the variable $surgeon_i$, which indicates if the physician is in a surgical specialty. All other variables in the model are unchanged and as previously described. Here the coefficient of interest β identifies if surgeon physicians have better or worse birth outcomes than non-surgeon physicians.

4.2 Difference-in-Differences Models

Following a descriptive analysis of birth outcomes between physicians and lawyers and between surgeons and non-surgeon physicians, we then turn toward evaluating if the 2011 ACGME duty hour reform impacted birth outcomes of young physicians, those impacted by the work hour reforms. We hypothesized that the reforms, which reduced work hours for young physicians (trainees) but not older physicians (attending physicians), may have been associated with improved birth outcomes among young physicians compared with young lawyers. We compared physician and lawyer mothers who gave birth prior to the 2011 ACGME duty hour reform to physician and lawyer mothers who gave birth after the reform, separately for two age

groups (mothers aged 26-33 and 34-45).[8] While the 2011 duty hour reform pertained just to first-year residents, the effects of the reform may have spilled over to older residents (Awan et al. 2021). As such, we estimate the effect for physicians of residency age instead of just first year residents. To do so we estimate the following difference-in-differences model:

$$Y_{ict} = \beta_1 physician_i + \beta_2 postrule_i + \beta_3 (physician_i * postrule_i) + \boldsymbol{X}_i + \alpha_t + \alpha_c + \epsilon_{ict} \quad (2)$$

where $postrule_i$ indicates if the birth took place 9 months after the rule change went into effect, thereby focusing on mothers who may have been exposed to reduced work hours during the entirety of their pregnancy. Since the duty hour reform went into effect on July 1, 2011, $postrule_i$ equals one for births that occurred on or after April 1, 2012. All other variables have the same meaning as in the descriptive models. Thus β_3 identifies if the 2011 duty hour reform improved the birth outcomes of physicians within the age cohort compared to lawyers of the same age. Given that the 2011 work reform was targeted towards residents, we are treating older physicians (ages 34-45) as an additional control group as we expect that the work reform would not have impacted their birth outcomes.

As mentioned above, surgical residents had more difficulty complying with the 2011 work hour reform with surgical residents being 2.18 times more likely than any other specialty to falsely report their hours and 67.6% of surgical residency anonymously reporting that they are noncompliant with the 2011 reform (Drolet et al. 2013b). Thus, we estimate a second set of DID

[8] While ideally, we would estimate the model only including resident mothers, we were only able to identify less than 600 mothers who reported being residents. The majority of physicians mothers reported their occupation as physician or their specific specialty no matter their residency status. As such, we proxy residency status by estimating our difference-in-differences model from equation (2) for physician mothers most likely to be in residency due to their ages. Specifically, we estimate four separate models each starting with age 26 and ending with either age 30, 31, 32, or 33. The average age of entry to medical school is 22 years old and medical school typically takes 4 years, implying most physicians would start residency around age 26. Residency programs typically last between 3 to 7 years.

models to assess whether the 2011 ACGME duty hour reform had heterogenous effects on surgeons and non-surgeons.[9] Specifically, we stratify our age-segmented DID model based on whether or not the physician is a surgeon, replacing the physician occupation variable from equation (2) with an indicator variable for being a surgeon. We estimate these DID models for age groups 26 to 32 and 33 to 45. In one model, we are comparing the birth outcomes of young (older) lawyers to those of young (older) surgeons, and in the second model, we are comparing the birth outcomes of young (older) lawyers to those of young (older) non-surgeons. Depending on the which subgroup is included in the stratification, β_3 identifies if the 2011 duty hour reform improved the birth outcomes of young (older) surgeons (non-surgeons) as compared to young (older) lawyers.

5 Results

5.1 Descriptive Results

Table 2 Panel A reports our main descriptive results where we compare 26-45 year-old physician mothers to lawyer mothers as outlined in equation (1). Our preferred models (the even numbered models) include control variables. We find that physicians are 15.8% more likely to have a low birthweight infant (birth weight < 2,500 grams) and 17.9% more likely to have an infant that is small for gestational and sex. We also find that physicians are 10.2% more likely to give birth pre-term than lawyers. As we would expect to see with an increase in infants that are small for gestational age, we find that physicians have 2.5% lower birth weights and 0.3%

[9] A few years into some select surgical residency programs, surgical residents will begin a research portion of their residency where they are more focused on academic and professional development than patient care. It is possible that some surgical residents could delay their fertility until this period. However, a research period is not available in every surgical residency program. Further, if the delay in fertility were to occur, this would bias our results on the difference between surgeon physicians and non-surgeon physicians to the null which would indicate that our results are a lower bound.

shorter pregnancies than lawyers. Similar to Johnson & Rehavi (2016) and Frakes et al. (2021) we observe that physicians are 10.1% less likely to have a Caesarean delivery than lawyers.[10] We find no significant results when comparing the incidence of newborn abnormal conditions of physician mothers to lawyer mothers.[11]

The work hours and job requirements of both occupations are likely to change as an individual becomes more experienced. For instance, as shown in **Appendix Figure A5**, the gap between the hours that Texas lawyers work and the hours that Texas physicians work shrinks as both groups become more experienced. Because of this potential difference we segmented the sample into two groups: ages 26-35 and ages 36-45. The results are shown in **Table 3.** We find that younger physicians are 20% more likely to have a low birthweight infant than young lawyers while we find no evidence of a difference between older physicians and lawyers. Further, we estimate that young physicians are 20.8% more likely to have an infant that is small for gestational age than young lawyers, but there is again no difference for older physicians and lawyers. There is also suggestive evidence that older physicians are 13.3% more likely deliver preterm than older lawyers while young physicians are only 9.5% more likely to deliver preterm, though these estimates are only significant at the 10% level. Again, consistent with the increased likelihood of having a small for gestational age infant, younger physicians have 2.5% lower birth weights and 0.3% shorter pregnancies than young lawyers. Older physicians have 2.4% lower birth weights and 0.3% shorter pregnancies (significant at the 10% level). Physicians in both age

[10] As shown in **Appendix Table A3**, physicians are also 9% more likely to induce labor than lawyers. Since induction of labor can be a product of either maternal characteristics or pregnancy complications, this result aligns with our finding that physicians tend to have worse birth outcomes than lawyers.

[11] We also estimated the association of being a physician with two very extreme birth outcomes: very pre-term (< 32 weeks of gestational) and very low birthweight (< 1,500 grams). These results are in **Appendix Table A4**. There is no significant association between being a physician and having a very low birthweight or very pre-term infant. However, these estimates may be under-powered since less than 2% of the sample experiences either of these extreme outcomes.

groups are less likely to deliver via Caesarean than their lawyer counterparts, but younger physicians are 12.9% less likely while older physicians are only 4.9% less likely (and only at the 10% significance level). These results suggest that at younger ages, when physicians are in training, there is a larger difference in their birth outcomes as compared to similarly aged lawyers than when both groups are older. Further, the diminishing differences in birth outcomes when lawyers and physicians are older provides additional evidence that lawyers and physicians are similar groups with some of their major differences coming from their occupation's early career physical requirements.

We then attempt to identify which group of physicians, if any, is driving these differences between physicians and lawyers. We first stratify our results by race.[12] The majority of our sample (around 61%) are non-Hispanic white mothers, with 7.7%, 16.7% and 13% of the sample being non-Hispanic Black, non-Hispanic Asian, and Hispanic mothers, respectively.[13] As shown in **Appendix Figure A2**, non-Hispanic Asian and Black mothers have the lowest birthweights on average. The results for our descriptive model for all birth outcome variables are shown in **Figure 1** and **Appendix Table A2**. Non-Hispanic white and Asian mothers are driving the increase in low birthweight and small for gestational age infants. We, however, see no identifiable difference in rates of pre-term delivery for different races. Non-Hispanic white, non-Hispanic Asian and Hispanic mothers are driving the decrease in birth weights observed among physicians, with non-Hispanic Asian mothers experiencing the largest reduction in birth weight. The decrease in pregnancy length is driven by non-Hispanic white and non-Hispanic Asian mothers, and the decline in Caesarean deliveries appears to be due primarily to the decrease

[12] We also stratified the results by ages of the mothers, 26-35 and 36-45, but there were no significant differences in birth outcomes between the age groups.

[13] The rest of the sample, 1.5%, identify as multi-racial.

experienced by non-Hispanic white and Hispanic mothers. As in the main descriptive model, there is no statistically significant difference in the incidence of newborn abnormal conditions between physicians and lawyers.[14]

We then examine whether heterogeneous effects may exist for different types of physicians: surgeons versus non-surgeons. We estimate the previously described analogous model on the sub-sample of physicians that have identified specialties. In this model, we compare 26-45 year-old surgeons to non-surgeons. Our results are outlined in **Table 2 Panel B**. Overall, surgeons experience worse birth outcomes than non-surgeons. Surgeons are 32.4% more likely to have a low birthweight infant than non-surgeon physicians. We, however, do not find any significant differences in the incidence of having a for small for gestational age infant. Surgeons are 30.2% more likely to deliver pre-term as compared to non-surgeon physicians. Surgeons have birth weights that are 2.1% lower and pregnancies that are 0.9% shorter than non-surgeon physicians. Finally, we do not find any significant differences in rates of Caesarean deliveries or the incidence of newborn abnormal conditions between surgeons and non-surgeons. Importantly, in **Appendix Table A6**, we find that younger surgeons (those between 26 and 32 years old), who are likely in their residency, appear to be driving this heterogeneous effect.*5.2 Robustness Checks*

To identify if the stress of a specific specialty drives our results for physicians, we estimated our descriptive regression with a variable indicating whether the mother was in a specialty with a high burnout rate. We obtained burnout rates of physicians from Medscape's

[14] We also estimated our primary descriptive model for just US-born mothers who report being of Chinese or Indian race. As **Appendix Table A5** illustrates, infants born to Chinese American physicians have significantly worse birth outcomes compared to infant born to Chinese American lawyers. For both Indian American and Chinese American mothers, the difference in birth outcomes between physicians and lawyers is significantly larger than in our general descriptive model.

2022 Physician Burnout and Depression Report which asks physicians in every specialty to report whether or not they feel burned out. Specialties with a reported share of burnout of 47 (the median value) or higher were labeled as high burnout specialties.[15] As shown in **Appendix Table A7** having a high share of reported burnout is not associated with a difference in birth outcomes.

Each physician specialty has different requirements for how often a physician is required to be on call or how long their shift tends to be. To evaluate if this heterogeneity may explain the difference in birth outcomes between physicians and lawyers, we estimate our descriptive regression with an indicator for specialties that have high on call requirements or long shifts. Those specialties include Family Medicine, Pediatrics, Internal Medicine, General Surgery, OBGYN, Orthopedics, Otolaryngology, Plastic Surgery, and Urology. As shown in **Appendix Table A8** there is some evidence that physicians in these specialties have worse birth outcomes, including higher incidence of low birthweight infants and lower birth weight. By construction, this subset of specialties includes the surgical specialties. Thus, the results in **Table 2 Panel B** are likely more relevant when determining which group of physicians are driving our results.

We also estimated our primary descriptive model, comparing physician mothers to lawyer mothers, for mothers for whom this was their first live birth. As shown in **Appendix Table A9**, the difference in birth outcomes, specifically lower birth weights, shorter pregnancies, and increased incidence of low birthweight and small for gestational age infants, between physicians and lawyers persists. Thus, our results are not due to the increased burden that a prior live birth can have on subsequent births.

[15] Specialties with the highest reported burnout shares (in descending order) include Emergency Physicians, Urgent Care, OBGYN, Infectious Disease, Family Physician, Physical Medicine, Endocrinology, Radiology, Pediatrics, Pulmonary Medicine, Gastroenterology, Internal Medicine, Hospitalist, Urology, and Anesthesiology.

When identifying lawyer mothers, we also included mothers who listed their occupation as an equivalent of "judge". It is possible that the work requirements of judges are vastly different than those of lawyers. Thus, we estimated our primary descriptive model without judge mothers of which there are only 36 in the sample. The results are shown in **Appendix Table A10** and show that the exclusion of judge mothers did not change our results. [16]

[16] As a placebo test, we estimated the impact that having a physician father as compared to a lawyer father has on birth outcomes. **Appendix Table A11** shows the results for a sample where the father is either a physician or a lawyer and does not include any couples where the mother is a physician. We find that infants born to physician fathers are 12.5% (1.2 percentage points) more likely to be small for their gestational age and have 0.9% (30.069 grams) lower birth weights. Comparing these estimates to results in **Table 2** (infants born to physician mothers are 17.9% more likely to have a small for gestational and have 2.5% lower birth weights), it is possible that some of the variation between physicians and lawyers comes from having any physician parent – either mother or father. However, it is also possible that male physicians may tend to marry women who have similarly demanding jobs in which case, this result could still be a maternal occupation effect. Infants born to physician fathers are also 10.9% (4.3 percentage points) less likely to be delivered via a Caesarean delivery which is a similar result to infants born to physician mothers (a 10.1% reduction). However, unlike our estimates for physician mothers, we do not find a significant difference between physician and lawyer fathers in incidence of low birthweight, pre-term delivery, or pregnancy length.

Table 2: Birth Outcomes among Physicians vs. Lawyers

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Physicians vs. Lawyers														
Physician	0.020***	0.015***	0.037***	0.019***	0.012**	0.013**	-120.049***	-80.356***	-0.172***	-0.128***	-0.036***	-0.044***	0.002	0.001
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(8.717)	(9.188)	(0.034)	(0.036)	(0.007)	(0.008)	(0.004)	(0.005)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.006	0.015	0.010	0.024	0.006	0.018	0.020	0.042	0.009	0.033	0.013	0.044	0.008	0.018
Observations	19,203		18,474		18,704		19,203		18,704		19,203		19,203	
Dependent variable mean	0.095		0.106		0.128		3232		38.34		0.434		0.091	
Panel B: Surgeons vs. Non-Surgeon Physicians														
Surgeon	0.028***	0.035***	-0.021**	-0.005	0.045***	0.042***	-36.436*	-67.427***	-0.344***	-0.343***	0.019	0.024	0.011	0.012
	(0.010)	(0.011)	(0.010)	(0.010)	(0.012)	(0.012)	(18.865)	(19.047)	(0.076)	(0.076)	(0.015)	(0.015)	(0.009)	(0.010)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.012	0.025	0.011	0.035	0.015	0.027	0.019	0.056	0.018	0.041	0.018	0.050	0.011	0.020
Observations	7,060		6,792		6,886		7,060		6,886		7,060		7,060	
Dependent variable mean	0.108		0.123		0.139		3174		38.22		0.416		0.095	

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Surgeon category includes physicians in the specialties: General Surgery, OBGYN, Orthopedics, Otolaryngology, Plastic Surgery, and Urology. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Birth Outcomes among Physicians vs. Lawyers by Race

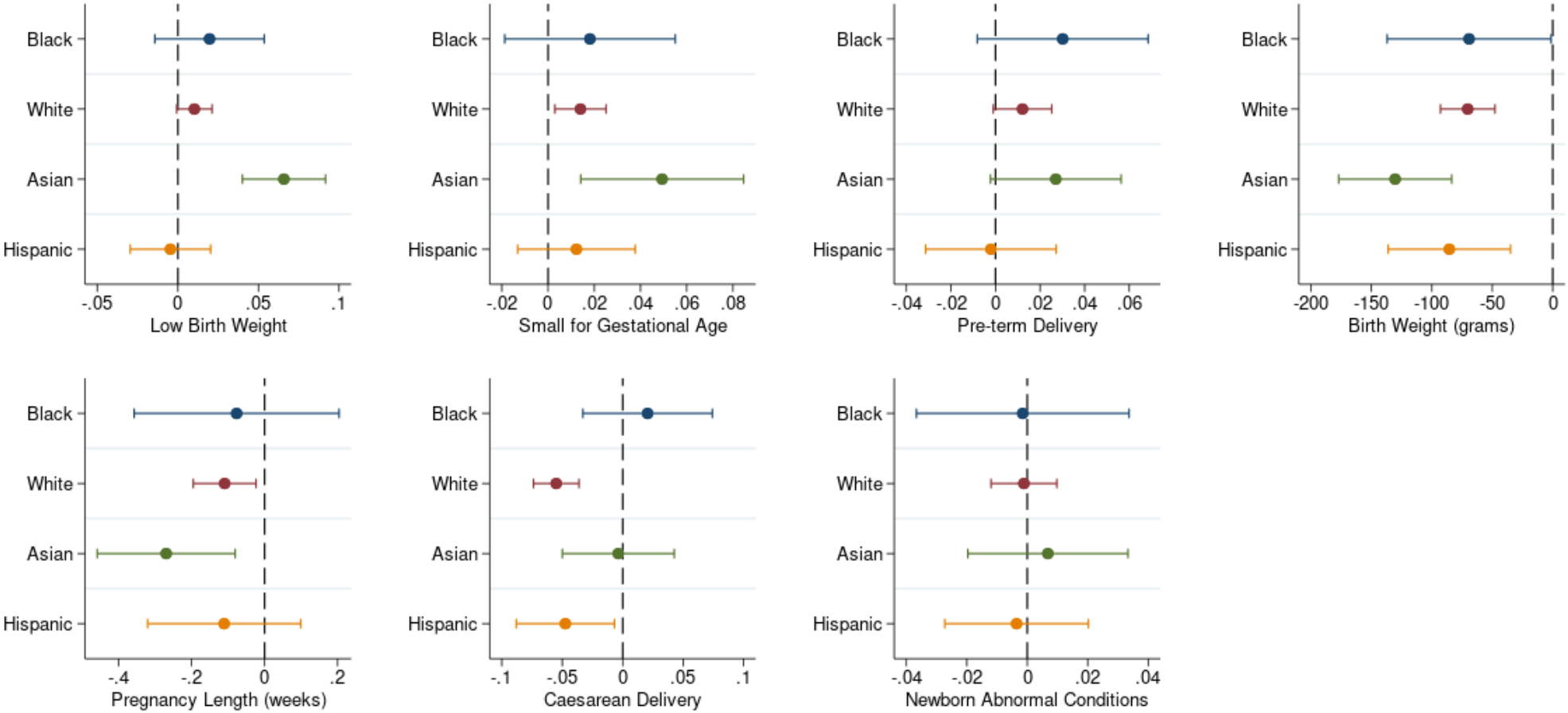


Table 3: Birth Outcomes among Physicians vs. Lawyers by Age

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Ages 26-35														
Physician	0.023***	0.017***	0.042***	0.022***	0.009	0.011*	-124.174***	-82.001***	-0.168***	-0.133***	-0.039***	-0.051***	0.006	0.003
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(10.001)	(10.662)	(0.039)	(0.042)	(0.009)	(0.009)	(0.005)	(0.005)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.009	0.014	0.011	0.028	0.008	0.015	0.023	0.043	0.012	0.027	0.014	0.026	0.008	0.014
Observations	13,757		13,269		13,440		13,757		13,440		13,757		13,757	
Dependent variable mean	0.085		0.106		0.116		3247		38.47		0.395		0.083	
Panel B: Ages 36-45														
Physician	0.014	0.014	0.026***	0.012	0.013	0.021*	-104.318***	-77.638***	-0.117*	-0.125*	-0.041***	-0.026*	-0.008	-0.005
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.011)	(17.650)	(18.149)	(0.069)	(0.071)	(0.014)	(0.015)	(0.009)	(0.009)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.012	0.024	0.015	0.026	0.012	0.028	0.022	0.047	0.017	0.038	0.020	0.054	0.017	0.034
Observations	5,446		5,205		5,264		5,446		5,264		5,446		5,446	
Dependent variable mean	0.118		0.108		0.158		3192		38.01		0.531		0.110	

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.3 Impact of the 2011 ACGME work hour reductions

To better understand the potential causal effect of work hours on birth outcomes of physician mothers, we examined the impact of the 2011 ACGME duty hour reform, which improved working conditions for physicians in training, but was not applicable to older physicians who had already completed their residency training. **Table 4** reports the results of a difference-in-differences analysis that compared birth outcomes of younger physicians with younger lawyers, before versus after the 2011 duty hour reforms (from equation (2)). As show in **Table 4 Panel A**, our key variable of interest, the difference-in-differences estimate of changes in birth outcomes among physicians compared with lawyers before versus after duty hour reform (variable, *Physician post rule)*, shows that younger physicians who gave birth after the reform was implemented saw a 56.4% (6.2 percentage point) decrease in the incidence of infants being small for their gestational age.[17] There is also suggestive evidence that the work reform lowered the likelihood (a 38.4% reduction) of physicians having a low birthweight infant and increased birth weights (64.92 grams) of infants born to young trainee physicians after the reform.[18] The positive impact of the duty hour reform diminishes as we increase the upper bound on the age range until it completely disappears in the 26-33 age cohort, which provides evidence that the reform primarily impacted younger trainee physicians.[19]

[17] As shown in **Appendix Table A13**, when we estimate the difference-in-differences model for smaller young age segments (26-27, 26-28, and 26-29), the positive impact of the duty hour reform becomes stronger.

[18] We find that the duty hour reform did not have an impact on the labor induction for physician mothers as shown in **Appendix Table A3**.

[19] We also estimated the difference-in-differences model without judge mothers. As shown in **Appendix Table A12** there is no change to our results.

We also estimated an analogous difference-in-difference model for older physicians and lawyers.[20] We expect that since the 2011 work hour reform was targeted at residents, we will not see an impact of the reform on older physicians. Thus, older physicians can be seen as an additional control group. **Table 5** confirms our hypothesis as it shows that the work reform had no consistent impact on the birth outcomes of infants born to older physicians post reform (as compared to the birth outcomes of older lawyers).[21]

We then estimate event studies for each of our birth outcomes to evaluate the parallel trends assumption required for the results from our difference-in-differences estimation to be valid. Since our treatment window begins on April 1, 2012 (9 months after the implementation of the work hour reform on July 1, 2011), each year in the event study spans from April 1st to March 31st the next year with April 1, 2012 to March 31, 2013 classified as year 0. We estimated the event study for two separate age groups (26-30 and 34-45) which correspond to the ages in our difference-in-difference models. Both event studies include the same demographic and behavior controls as our difference-in-differences estimation. As **Figure 2** illustrates, there is no evidence of pre-trends in any of the outcomes for the 26-30 age group and no pre-trends for low birthweight, small for gestational age, pre-term delivery, birth weight, Caesarean delivery, or newborn abnormal conditions for the 34-45 age group. There is suggestive evidence that there may be an increasing trend in pregnancy length. Given our null result, the increasing trend would only be of concern if the work reform

[20] Similar to the younger physicians, we estimated our difference-in-differences model for four separate age cohorts, 34-45, 36-45, 38-45, 40-45.

[21] **Appendix Table A4** presents the results for the age-segmented difference-in-differences models for our two extreme birth outcomes: very low birthweight and very pre-term. We find that after the reform physicians between 34 and 45 years old are 1.4 percentage points more likely to have a very pre-term infant. Given Drolet et al. (2013a)'s finding, it's possible that the increased work load the reform caused for older physicians contributes to the increase in very pre-term infants. The reform did not impact the likelihood that younger physicians experience extreme birth outcomes.

decreased pregnancy length, thereby biasing our results to zero. However, a decrease in pregnancy length (i.e., worsening outcome) due to a work reform would be inconsistent with reductions in work hours brought about by work reforms.

The event studies for the 26-30 age group reemphasize the results we find in our difference-in-differences model. There is a decrease in low birthweight, small for gestational age, and pre-term delivery in the year after the implementation of the reform. There is also evidence of an increasing trend in pregnancy length and birth weight post reform. The event studies for ages 34-45 continue to show no major improvement in any of our studied birth outcomes.

Since the 2011 duty hour rule may have affected working conditions of different specialties differently and since there is evidence that surgical residents were less likely to comply with the hour requirements, we also stratified our model comparing surgeons to lawyers and non-surgeon physicians to lawyers. **Table 6** shows the results of that model for two age segments 26-30 and 34-45. Similar to the general difference-in-differences model, our variable of interest is not associated with any robust significant changes in birth outcomes for our older physicians (as compared to older lawyers) no matter their surgeon status. For younger physicians, we see that the work reform appears to have benefited both surgeons and non-surgeons as relative to their means both groups experience a 93.7% (8.9 percentage points) and a 78.4% (8.0 percentage points) post reform reduction in small for gestational age infants, respectively. Surgeons also experience a significant reduction in the incidence of low birthweight and rate of caesarean delivery.

There is also a concern that the work reform could have changed the gender composition of physicians (e.g. encouraging more women to become physicians) which

could impact our difference-in-differences estimates. As we show in **Appendix Figure A6** the share of female physicians in Texas remains relatively stable during our sample period with anywhere between 40% and 48% of active physicians identifying as female. Further, women who decided to become physicians after the 2011 work reform was implemented would at the earliest enter their residency in 2015 or 2016. Since our sample period only spans 3 years after the implementation of the 2011 work reform, we would not capture this increase in our estimates. As such, we do not believe that the work reform changed the gender composition of physicians during our sample period.[22]

An analogous argument can be made for a change in the supply of physicians caused by the 2011 work reform. For example, if the work hour reform led to an increase in the supply of physicians, this could lead to an increase in the number of births for physicians. If this occurred, then any effect we identify in our difference-in-difference estimates could reflect the change in the number of births instead of the direct effect of the reform. Therefore, we estimated an analogous model where the outcome variable is total births. We collapsed our data to the county of birth, year, and physician status level and then constructed a balanced panel. Since there are many zeros in our outcome variable, we estimated both a standard difference-in-differences model as well as a Poisson difference-in-differences model. **Appendix Table A15** illustrates that the 2011 work reform had no impact on the number of births to physicians for either the full sample or the 26-31 age subsample.[23]

[22] We also estimated a demographic balance (**Appendix Table A14**) test for physicians before and after the 2011 work hour reform.

[23] There is a possibility that the duty hour reform may have encouraged physicians to have children at younger ages since the duty hour reform lowered the work requirements of first-year residents. However, in **Appendix Table A16** we also show that the duty hour reform did not impact physician mothers' ages at birth.

Table 4: Impact of Duty Hour Reform on Birth Outcomes of Physicians – By Younger Ages

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Ages 26-30														
Physician post reform	-0.034**	-0.030*	-0.062***	-0.062***	-0.028	-0.024	73.202**	64.918*	0.127	0.067	-0.040	-0.035	-0.000	-0.002
	(0.017)	(0.017)	(0.020)	(0.020)	(0.019)	(0.019)	(35.092)	(34.703)	(0.142)	(0.143)	(0.030)	(0.030)	(0.017)	(0.017)
Physician	0.039***	0.029***	0.063***	0.038***	0.033***	0.034***	-153.287***	-108.514***	-0.211**	-0.140	-0.029	-0.045**	0.013	0.012
	(0.011)	(0.011)	(0.013)	(0.013)	(0.012)	(0.012)	(22.092)	(22.838)	(0.087)	(0.089)	(0.019)	(0.020)	(0.010)	(0.011)
Post reform	-0.002	-0.003	0.024*	0.023*	0.005	0.005	4.834	9.326	0.180*	0.199**	-0.033	-0.038*	0.003	0.004
	(0.011)	(0.011)	(0.013)	(0.014)	(0.013)	(0.013)	(24.524)	(24.620)	(0.093)	(0.094)	(0.021)	(0.021)	(0.011)	(0.011)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.021	0.030	0.020	0.040	0.019	0.028	0.037	0.056	0.017	0.032	0.027	0.033	0.014	0.018
Observations	4,350		4,194		4,248		4,350		4,248		4,350		4,350	
Dependent variable mean	0.078		0.110		0.098		3262		38.63		0.346		0.076	
Panel B: Ages 26-31														
Physician post reform	-0.024*	-0.022	-0.043**	-0.040**	-0.008	-0.008	27.943	21.539	0.010	-0.014	-0.022	-0.018	0.010	0.008
	(0.014)	(0.014)	(0.017)	(0.017)	(0.016)	(0.016)	(29.093)	(28.749)	(0.115)	(0.115)	(0.025)	(0.025)	(0.014)	(0.014)
Physician	0.042***	0.031***	0.059***	0.032***	0.026***	0.028***	-144.031***	-93.173***	-0.204***	-0.152**	-0.038**	-0.055***	0.010	0.008
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(18.163)	(18.786)	(0.070)	(0.073)	(0.016)	(0.016)	(0.009)	(0.009)
Post reform	-0.004	-0.004	0.021*	0.019*	-0.006	-0.005	22.584	26.942	0.217***	0.223***	-0.022	-0.028	-0.003	-0.003
	(0.009)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)	(20.182)	(20.138)	(0.077)	(0.077)	(0.018)	(0.018)	(0.009)	(0.009)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.016	0.025	0.016	0.038	0.012	0.022	0.032	0.057	0.014	0.028	0.019	0.026	0.009	0.015
Observations	6,263		6,045		6,120		6,263		6,120		6,263		6,263	
Dependent variable mean	0.079		0.110		0.100		3263		38.60		0.356		0.076	

Table 4 cont.: Impact of Duty Hour Reform on Birth Outcomes of Physicians – By Younger Ages Cont.

VARIABLES	Low Birthweight (1)	(2)	Small for Gestational Age (3)	(4)	Pre-term Delivery (5)	(6)	Birth Weight (grams) (7)	(8)	Pregnancy Length (weeks) (9)	(10)	Caesarean Delivery (11)	(12)	Newborn Abnormal Conditions (13)	(14)
Panel C: Ages 26-32														
Physician post reform	-0.015	-0.014	-0.033**	-0.032**	-0.009	-0.008	25.732	20.813	0.034	0.008	0.012	0.014	0.008	0.007
	(0.013)	(0.013)	(0.015)	(0.015)	(0.014)	(0.014)	(25.602)	(25.298)	(0.099)	(0.099)	(0.022)	(0.022)	(0.013)	(0.013)
Physician	0.034***	0.025***	0.052***	0.030***	0.021**	0.021**	-137.690***	-89.597***	-0.212***	-0.162**	-0.048***	-0.059***	0.006	0.003
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(16.162)	(16.746)	(0.062)	(0.064)	(0.014)	(0.014)	(0.008)	(0.008)
Post reform	-0.005	-0.006	0.015	0.015	-0.004	-0.004	23.495	25.338	0.229***	0.238***	-0.032**	-0.036**	-0.002	-0.002
	(0.008)	(0.008)	(0.010)	(0.010)	(0.010)	(0.010)	(17.887)	(17.778)	(0.067)	(0.066)	(0.016)	(0.016)	(0.009)	(0.008)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.011	0.020	0.012	0.030	0.009	0.020	0.027	0.054	0.014	0.031	0.018	0.025	0.006	0.013
Observations	8,135		7,857		7,949		8,135		7,949		8,135		8,135	
Dependent variable mean	0.083		0.110		0.106		3255		38.57		0.366		0.079	
Panel D: Ages 26-33														
Physician post reform	-0.014	-0.013	-0.013	-0.012	-0.008	-0.007	28.699	25.172	0.051	0.031	0.017	0.020	0.001	0.000
	(0.011)	(0.011)	(0.013)	(0.013)	(0.013)	(0.013)	(23.416)	(23.150)	(0.092)	(0.092)	(0.020)	(0.020)	(0.011)	(0.011)
Physician	0.031***	0.023***	0.046***	0.025***	0.017**	0.016*	-135.090***	-87.889***	-0.190***	-0.123**	-0.039***	-0.051***	0.009	0.005
	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(14.600)	(15.238)	(0.056)	(0.059)	(0.012)	(0.013)	(0.007)	(0.007)
Post reform	-0.001	-0.002	0.006	0.006	-0.002	-0.003	12.530	16.342	0.157**	0.179***	-0.032**	-0.037***	-0.001	-0.002
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(16.714)	(16.600)	(0.064)	(0.063)	(0.014)	(0.014)	(0.008)	(0.008)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.010	0.016	0.013	0.030	0.007	0.016	0.024	0.047	0.011	0.030	0.017	0.024	0.007	0.013
Observations	10,181		9,831		9,948		10,181		9,948		10,181		10,181	
Dependent variable mean	0.086		0.108		0.112		3251		38.52		0.374		0.082	

Note: Each model includes county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, indicator for if the mother was born in the United States, the number of prior live births, and number of cigarettes smoked during pregnancy. The DID model compares physician and lawyer mothers who gave birth prior to the 2011 duty hour change to physician and lawyer mothers who gave birth after the rule change. 'Physician post reform' estimates the impact of the effect of the 2011 duty hour rule change on physician mothers' birth outcomes. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5: Impact of Duty Hour Reform on Birth Outcomes of Physicians – By Older Ages

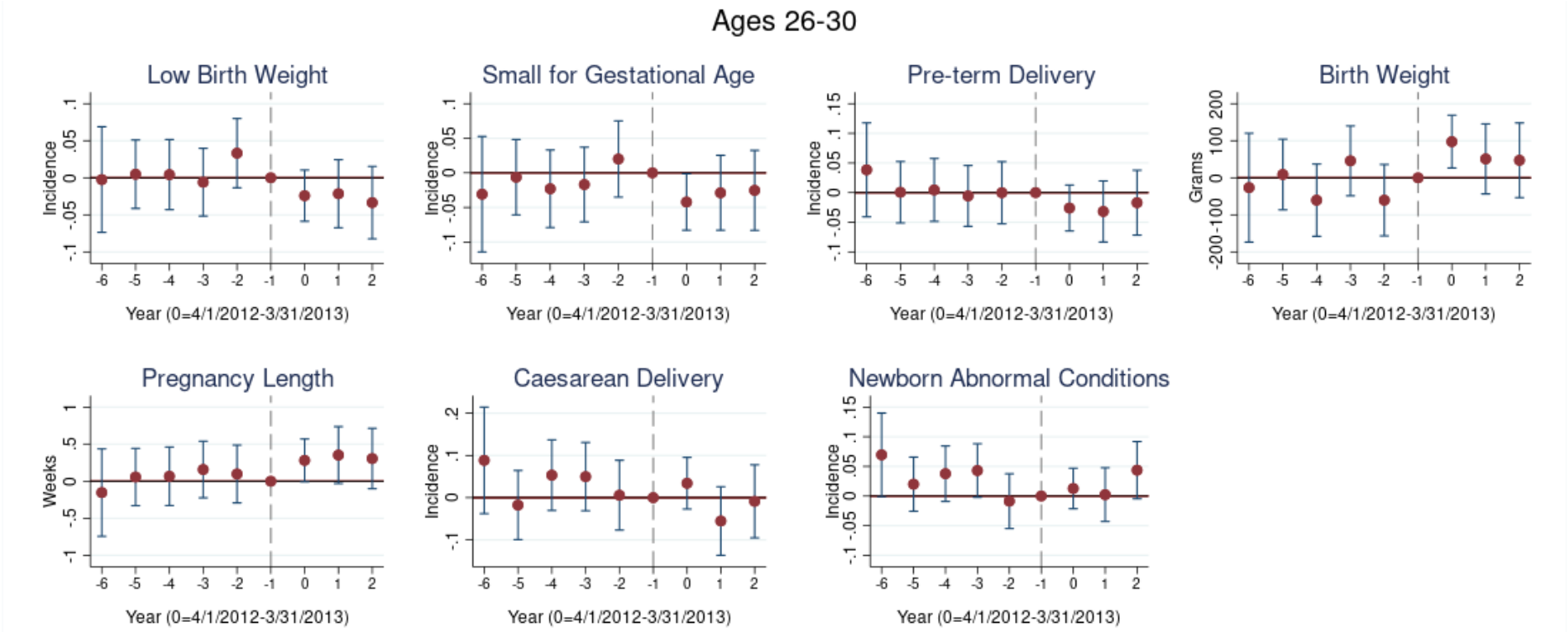
	Low Birthw eight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	37)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Ages 34-45														
Physician post reform	0.002	0.001	-0.017	-0.019	0.018	0.017	-6.715	0.198	-0.101	-0.098	0.035	0.032	0.019	0.018
	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)	(26.621)	(26.333)	(0.105)	(0.104)	(0.022)	(0.022)	(0.013)	(0.013)
Physician	0.013	0.014*	0.040***	0.025***	-0.002	0.008	-107.759***	-83.545***	-0.086	-0.115*	-0.065***	-0.054***	-0.015*	-0.011
	(0.008)	(0.009)	(0.008)	(0.009)	(0.010)	(0.010)	(16.338)	(16.779)	(0.064)	(0.066)	(0.014)	(0.014)	(0.008)	(0.008)
Post reform	0.002	0.003	0.018*	0.016*	-0.013	-0.011	-13.494	-13.133	0.121	0.107	-0.022	-0.019	-0.009	-0.008
	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)	(19.842)	(19.754)	(0.078)	(0.077)	(0.016)	(0.016)	(0.010)	(0.010)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.009	0.021	0.011	0.024	0.010	0.025	0.021	0.044	0.015	0.035	0.017	0.045	0.013	0.026
Observations	9,022		8,643		8,756		9,022		8,756		9,022		9,022	
Dependent variable mean	0.105		0.105		0.146		3210		38.14		0.501		0.101	
Panel B: Ages 36-45														
Physician post reform	-0.017	-0.014	-0.038**	-0.038**	0.004	0.007	32.101	32.183	-0.199	-0.214	0.005	0.012	0.023	0.026
	(0.018)	(0.018)	(0.018)	(0.018)	(0.021)	(0.021)	(36.095)	(35.646)	(0.144)	(0.143)	(0.028)	(0.028)	(0.018)	(0.018)
Physician	0.020*	0.019	0.041***	0.027**	0.011	0.018	-116.656***	-89.774***	-0.038	-0.042	-0.042**	-0.030*	-0.017	-0.014
	(0.011)	(0.012)	(0.011)	(0.011)	(0.013)	(0.013)	(22.017)	(22.495)	(0.084)	(0.087)	(0.018)	(0.018)	(0.011)	(0.011)
Post reform	0.009	0.008	0.023*	0.019	0.009	0.009	-31.153	-24.614	0.063	0.068	-0.009	-0.011	-0.012	-0.013
	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)	(0.015)	(27.242)	(27.205)	(0.109)	(0.108)	(0.021)	(0.020)	(0.013)	(0.013)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.011	0.023	0.014	0.025	0.012	0.028	0.021	0.046	0.016	0.037	0.019	0.053	0.015	0.031
Observations	5,446		5,205		5,264		5,446		5,264		5,446		5,446	
Dependent variable mean	0.118		0.108		0.158		3192		38.01		0.531		0.110	

Table 5 cont.: Impact of Duty Hour Reform on Birth Outcomes of Physicians – By Older Ages cont.

VARIABLES	Low Birthweight (1)		Small for Gestational Age (3)		Pre-term Delivery (5)		Birth Weight (grams) (7)		Pregnancy Length (weeks) (9)		Caesarean Delivery (11)		Newborn Abnormal Conditions (13)	
	(2)		(4)		(6)		(8)		(10)		(12)		(14)	
Panel C: Ages 38-45														
Physician post reform	0.008	0.009	-0.018	-0.022	0.025	0.030	-32.786	-29.218	-0.336	-0.365*	0.033	0.037	0.022	0.023
	(0.026)	(0.026)	(0.025)	(0.025)	(0.031)	(0.030)	(51.580)	(50.669)	(0.210)	(0.206)	(0.039)	(0.038)	(0.025)	(0.025)
Physician	0.020	0.018	0.030*	0.017	0.017	0.017	-81.807***	-54.129*	-0.081	-0.055	-0.065***	-0.051**	-0.016	-0.016
	(0.016)	(0.016)	(0.016)	(0.016)	(0.018)	(0.019)	(30.361)	(31.236)	(0.122)	(0.127)	(0.024)	(0.025)	(0.015)	(0.016)
Post reform	0.007	0.008	0.010	0.006	0.013	0.014	-3.439	-0.393	0.079	0.076	-0.035	-0.035	-0.003	-0.002
	(0.018)	(0.018)	(0.017)	(0.017)	(0.021)	(0.021)	(37.957)	(37.746)	(0.154)	(0.152)	(0.028)	(0.028)	(0.018)	(0.018)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.025	0.040	0.022	0.033	0.025	0.049	0.028	0.058	0.028	0.053	0.026	0.071	0.020	0.044
Observations	2,838		2,688		2,723		2,838		2,723		2,838		2,838	
Dependent variable mean	0.124		0.107		0.172		3195		37.90		0.561		0.117	
Panel D: Ages 40-45														
Physician post reform	-0.019	-0.023	-0.007	-0.009	-0.036	-0.032	16.226	21.329	-0.186	-0.226	0.054	0.052	-0.041	-0.039
	(0.043)	(0.043)	(0.040)	(0.040)	(0.050)	(0.050)	(80.708)	(80.395)	(0.315)	(0.319)	(0.057)	(0.056)	(0.040)	(0.040)
Physician	0.037	0.032	0.017	0.009	0.037	0.040	-76.563	-51.946	-0.049	-0.012	-0.081**	-0.064*	0.001	-0.008
	(0.026)	(0.027)	(0.024)	(0.025)	(0.030)	(0.031)	(48.188)	(49.540)	(0.196)	(0.205)	(0.036)	(0.037)	(0.025)	(0.025)
Post reform	0.027	0.029	0.025	0.016	0.054	0.050	-16.759	-5.345	-0.031	-0.011	-0.029	-0.041	0.032	0.029
	(0.030)	(0.030)	(0.028)	(0.028)	(0.035)	(0.035)	(59.749)	(59.819)	(0.241)	(0.239)	(0.041)	(0.040)	(0.030)	(0.030)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.044	0.066	0.044	0.058	0.046	0.076	0.041	0.078	0.044	0.074	0.036	0.091	0.029	0.051
Observations	1,277		1,209		1,222		1,277		1,222		1,277		1,277	
Dependent variable mean	0.156		0.122		0.214		3140		37.64		0.611		0.131	

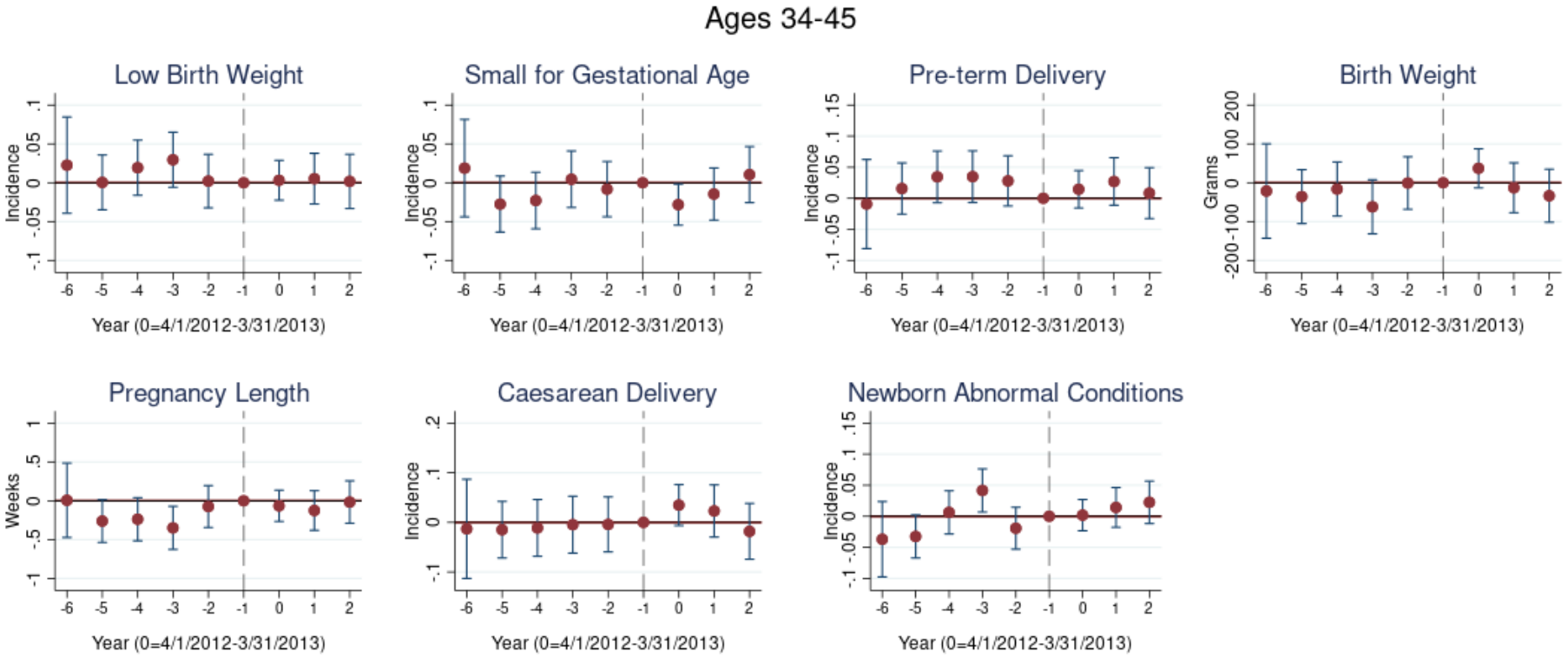
Note: Each model includes county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, indicator for if the mother was born in the United States, the number of prior live births, and number of cigarettes smoked during pregnancy. The DID model compares physician and lawyer mothers who gave birth prior to the 2011 duty hour change to physician and lawyer mothers who gave birth after the rule change. 'Physician post reform' estimates the impact of the effect of the 2011 duty hour rule change on physician mothers' birth outcomes. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure 2: Event Studies for Birth Outcomes by Age Groups



Each event study includes controls for mother's age, race, number of prenatal vists, number of cigarettes smoked, number of prior live births, and indicators for mother being born in the US, diabetes, and for prior poor pregnancy outcomes and county of birth fixed effects

Figure 2 cont.: Event Studies for Birth Outcomes by Age Groups



Each event study includes controls for mother's age, race, number of prenatal vists, number of cigarettes smoked, number of prior live births, and indicators for mother being born in the US, diabetes, and for prior poor pregnancy outcomes and county of birth fixed effects

Table 6: Impact of Duty Hour Reform on Birth Outcomes - Surgeons vs. Non-Surgeons

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
	Surgeon	Non-Surgeon	Surgeon	Non-Surgeon	Surgeon	Non-Surgeon	Surgeon	Non-Surgeon	Surgeon	Non-Surgeon	Surgeon	Non-Surgeon	Surgeon	Non-Surgeon
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Ages 26-30														
Physician post reform	-0.098**	-0.024	-0.089**	-0.080***	-0.074	-0.009	96.676	60.321	0.130	0.080	-0.146**	-0.032	-0.009	-0.001
	(0.040)	(0.021)	(0.042)	(0.025)	(0.047)	(0.024)	(77.499)	(42.641)	(0.329)	(0.181)	(0.061)	(0.037)	(0.040)	(0.021)
Physician	0.095***	0.022	0.078**	0.041**	0.087***	0.018	-178.400***	-93.573***	-0.478**	-0.035	0.013	-0.049**	0.041	0.003
	(0.029)	(0.014)	(0.031)	(0.016)	(0.030)	(0.014)	(54.496)	(27.528)	(0.190)	(0.108)	(0.042)	(0.024)	(0.025)	(0.013)
Post reform	-0.005	-0.005	0.024*	0.022	0.006	0.004	9.525	11.774	0.198**	0.207**	-0.036*	-0.034	0.003	0.002
	(0.011)	(0.011)	(0.014)	(0.014)	(0.013)	(0.013)	(24.890)	(24.753)	(0.095)	(0.094)	(0.022)	(0.022)	(0.012)	(0.012)
R-squared	0.047	0.034	0.036	0.042	0.040	0.030	0.052	0.058	0.046	0.035	0.038	0.033	0.024	0.021
Observations	2,537	3,310	2,444	3,188	2,469	3,229	2,537	3,310	2,469	3,229	2,537	3,310	2,537	3,310
Dependent variable mean	0.074	0.075	0.095	0.102	0.094	0.0923	3310	3288	38.67	38.69	0.367	0.353	0.071	0.071
Panel B: Ages 34-45														
Physician post reform	0.031	-0.005	0.008	-0.026*	0.050	0.013	-74.360	26.905	-0.290	-0.049	0.070*	0.031	0.043*	0.013
	(0.028)	(0.015)	(0.026)	(0.016)	(0.033)	(0.017)	(50.761)	(29.736)	(0.211)	(0.118)	(0.041)	(0.025)	(0.026)	(0.015)
Physician	0.034*	0.017*	0.008	0.032***	0.034	0.008	-114.443***	-84.820***	-0.384***	-0.113	-0.057**	-0.060***	-0.016	-0.005
	(0.019)	(0.010)	(0.018)	(0.010)	(0.022)	(0.012)	(33.184)	(19.337)	(0.131)	(0.076)	(0.028)	(0.016)	(0.017)	(0.010)
Post reform	0.005	0.002	0.020**	0.016*	-0.011	-0.011	-15.814	-12.602	0.108	0.103	-0.018	-0.021	-0.006	-0.008
	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)	(19.827)	(19.786)	(0.077)	(0.077)	(0.016)	(0.016)	(0.010)	(0.010)
R-squared	0.031	0.019	0.027	0.028	0.030	0.021	0.049	0.041	0.053	0.034	0.048	0.043	0.030	0.027
Observations	4,887	7,129	4,685	6,840	4,741	6,924	4,887	7,129	4,741	6,924	4,887	7,129	4,887	7,129
Dependent variable mean	0.104	0.102	0.090	0.103	0.149	0.142	3247	3230	38.15	38.18	0.523	0.503	0.104	0.101

Note: Sample includes mothers ages 26 to 30. Each model includes county of birth fixed effects and additional controls for mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for if the mother was born in the United States, the number of prior live births, indicator for a prior poor pregnancy outcome, and number of cigarettes smoked during pregnancy. The DID model compares surgeon (non-surgeon) and lawyer mothers who gave birth prior to the 2011 duty hour change to surgeon (non-surgeon) and lawyer mothers who gave birth after the rule change. 'Physician post reform' estimates the impact of the effect of the 2011 duty hour rule change on surgeon (non-surgeon) mothers' birth outcomes. Surgeon category includes physicians in the specialties: General Surgery, OBGYN, Orthopedics, Otolaryngology, Plastic Surgery, and Urology. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

6 Discussion

Our descriptive results, while not causal, suggest that physicians tend to have worse birth outcomes than lawyers, even after adjustment for several maternal characteristics that are correlated with birth outcomes (see **Appendix Figure A7** for a visual representation of the difference in birth weights). Additionally, we find that the difference in birth outcomes between physicians and lawyers diminishes once physicians pass the years of residency training, when work hours for physicians are the longest in both absolute and relative terms.

Several studies of the relationship between pollution and birth outcomes help put the magnitude of physician-lawyer birth outcome differences identified in this study into context. For example, in an analysis of the impact of the hidden diesel fuel pollution from Volkswagen's 2008 "clean diesel" cars on birth outcomes, Alexander and Schwandt (2022) found a 1.9% increase in low birthweight infants (< 2,500 grams) and a 0.7% increase in pre-term births for each additional "clean diesel" car per 1,000 cars. Because the public was unaware that the "clean diesel" cars actually emitted much more pollution than comparable gas-fueled cars, the rollout of the "cheating" cars, as they became known, serves as a natural experiment to study the impact of pollution on birth outcomes. Due to the nature of who purchased the "cheating" diesel cars, higher educated and primarily white people, the sample of the study is very similar to the population that we study. As such, while not necessarily causal, our findings of physicians having a 15.8% increase in the incidence of low birthweight infants and a 10.2% increase in pre-term delivery compared with lawyers are similar (if not slightly larger) in magnitude with the effects observed for diesel fuel pollution. In another study of air pollution's impact on birth outcomes, Currie and Walker (2011) find that incidence of premature birth is reduced by 10.8% and the likelihood having of low birthweight infants reduced by 11.8% for mothers within 2

kilometers of a toll plaza when E-ZPass is introduced, due to a reduction in local pollution from cars moving more quickly through tolls. The increase in pre-term delivery (10.2%) and rate of low birthweight infants (15.8%) are consistent in magnitude with the impacts observed by Currie and Walker (2011). If causal, our findings suggest that the strenuous work environment of physicians, particularly surgeons, may be associated with modest but meaningful reductions in infant gestational age and birth weight.

Comparing our results to national descriptive birth outcomes, we find that the difference in birth weights between physicians and lawyers is about 32% of the 2007-2014 non-Hispanic Black to non-Hispanic white gap in average birth weights, which was 250.53 grams.[24] Further, the difference in birth weights between physicians and lawyers is larger than the gap in average birth weight between mothers with a high school diploma and those with a doctoral or professional degree (60.60 grams) and the gap between rural-based and metro-based mothers (3.67 grams). In terms of pregnancy length, the difference between physicians and lawyers is similar to or larger than the gap between rural-based and metro-based mothers (0.04 weeks) and the gap between mothers with a high school diploma and mothers with a doctoral or professional degree (0.16 weeks), and the difference is about 28% of the difference in average pregnancy length between non-Hispanic white and non-Hispanic Black mothers (0.46 weeks). Overall, the physician-lawyers difference in birth weight and pregnancy length are clinically meaningful. The differences that we estimate are comparable to or larger than birth outcome gaps due to residential location or education and have magnitudes that are approximately 30% of the sizeable gap in birth outcomes between non-Hispanic Black and non-Hispanic white mothers.

[24] Reported gaps in average birth weights and pregnancy lengths are national averages from 2007 to 2014 and were obtained from the CDC National Vital Statistics System's WONDER database. The reported national averages are from the Natality Records 2007-2022.

While, in general, it is difficult to translate an economic value to the difference in birth outcomes that we find, we can use prior literature to estimate rough back of the envelope monetary values for physicians' worse birth outcomes. Using Hoynes et al. (2015)'s finding that the expansion of the EITC by $1,000 led to a 2.9% decline in low birthweight infants in the state, we can say that physicians would require around $5,500 to close their estimated 15.8% increased incidence of low birthweight compared to lawyers. Hoynes et al. (2015) also find that the $1,000 EITC expansion decreases small for gestational age infants by 2.5%, decreases pre-term delivery by 1.33%, and increases birth weights by 0.31% in the state. As such, the 17.9% increase in small for gestational age, 10.2% increase in pre-term delivery, and 2.5% decrease in birth weight experienced by physicians (as compared to lawyers) translates into approximately $7,160, $7,850, and $8,065 respectively required to close the gap between physicians and lawyers. The EITC estimates from Hoynes et al. (2015) focus on single women with a high school education or less, so it is likely that an extra $1,000 would improve outcomes less for the more educated and wealthier population studied here. Using Norwegian data, Black et al. (2007) found that a 10% increase in birth weight led to improvements in long run outcomes including a 1% increase in full time earning and a 0.9% increase in the probability of completely high school. Using our birth weight result, infants born to physicians may be expected to experience 0.25% lower full time earnings and be 0.225% less likely to complete high school than infants born to lawyers.

Our results contrast those from Dave and Yang (2022) and Baum (2005), which found that working in a strenuous job had no effect on birth weight, pregnancy length, and pre-term delivery. However, Katz et al. (1988) identified that physicians are more likely to experience pre-term labor. Further, the characteristics of physicians' work (long hours, night and shift work, and long periods of standing) have been medically associated with adverse birth outcomes such as

pre-term birth and lower birth weights (Mozurkewich et al. 2000, Bonzini, Coggon, and Palmer 2007, Palmer et al. 2013). Therefore, our descriptive results have precedence in the literature though we remain unable to speak to the causal nature of being a physician on birth outcomes.

In our descriptive model physicians were also less likely to give birth via a caesarean delivery. This result, which has been found by others (Johnson & Rehavi 2016, Frakes et al. 2021), is likely related to the increasingly common medical advice that, if possible, mothers should avoid giving birth via caesarean delivery. Physicians are more likely to understand the current and future risks associated with a caesarean delivery than lawyers and thus more likely to avoid this form of delivery if possible. Similar to the findings of Johnson and Rehavi (2016) and Chen et al. (forthcoming), physicians may use their medical expertise to improve their own care.

Our study suggests that the difference in birth outcomes between physicians and lawyers may largely be driven by surgeons. While all medical specialties require some level of physical exertion, particularly during the years of residency training where hours are long and overnight and lengthy shift work are common, surgeons tend to have more physically demanding tasks. Surgeons work longer weekly hours, are often required to stand for long periods of time, and often experience periods of intense stress. Moreover, some studies suggest that the workplace environment towards women is particularly difficult for female surgeons (Lombarts & Verghese 2022, Hutchison 2020) with Sudol et al. (2021) reporting that 94% of surveyed female surgeons report experiencing sexist microaggressions including overhearing or seeing degrading female terms and images. The female surgeons who reported experiencing sexist microaggressions were then more likely to experience burnout (Sudol et al. 2021). Medical studies suggest that these physical aspects of the job are associated with adverse birth outcomes (Palmer et al. 2013, Bussières et al. 2015). Surgeons experiencing worse birth outcomes than non-surgeon physicians

provides evidence for our theory that the physically strenuous job of being a physician may lead to adverse birth outcomes compared with being a lawyer.

To better understand the causal effect of work hour reductions on infant outcomes of physician mothers, we studied the impact of the 2011 ACGME duty hour reform, which reduced work hours for physicians in training, but did not affect the work hours for older physicians who had already completed residency or the work hours of lawyers. Given that the 2011 ACGME duty hour reform was partly intended to improve working conditions of physicians in training, we would expect the reform to improve young physician's birth outcomes. We find evidence that the 2011 work reform improved several birth outcomes for younger physician mothers, including the probability of having an infant of low birthweight or small for gestational age, and birth weight. We found no evidence that the 2011 work hour reform impacted birth outcomes of older physician mothers, whose work hours would be expected to be largely unaffected by the work hour reforms. Notably, the improvement in birth outcomes observed among young physician mothers following the 2011 duty hour reform may understate the impact of work hour reductions on birth outcomes to the extent that some hospitals may already have exempted their pregnant residents from long consecutive hour shifts.

7 Conclusion

Given growing evidence that a mother's environment and experiences during pregnancy may impact the health of her infant, we examined the potential impact on infant health of working in a particularly physically demanding and stressful high-attainment occupation, medicine. We compared birth outcomes of physician mothers to those of a comparable, highly educated group, lawyer mothers. Though our findings are not causal, we found that infants born to physicians have a 15.8% and 17.9% increased likelihood of having an infant that is low

birthweight and small for their gestational age, respectively, as compared to lawyers. We also find that physicians (compared to lawyers) are 10.2% more likely to deliver pre-term. The decline in birth outcomes appears to be driven primarily by surgeons, who among physicians often perform the most physically demanding work.

We then explored the impact of the 2011 ACGME duty hour reform, which improved the work environment of physicians in training on physician's birth outcomes, with the goal of understanding how it impacted the difference in birth outcomes we found between physicians and lawyers. Our finding suggests that the 2011 work hour reform may have improved birth outcomes for younger physicians, the group most likely to be affected by the reform.

While our findings are primarily descriptive, they raise the possibility that the long and stressful hours that physicians undertake early in their careers may be associated with slightly worse birth outcomes, particularly among surgeons. Future research could assess this issue by leveraging natural experiments in which otherwise similar individuals are plausibly randomly exposed to careers in medicine, as Ketel et al. (2016) and Chen et al. (2022) have evaluated in the context of medical school lotteries in the Netherlands and Sweden, respectively. Additionally, to the extent that work hour reforms may have modestly improved birth outcomes of younger physician mothers, stronger work reforms or further changes in the work environment may be needed.

References

Ahmed, F., Craig, R., Omar, A., & El-Masri, M. (2023). Self-reported study analyzing physicians' personal compliance with health prevention guidelines in medium-sized Canadian community. *Journal of Primary Care & Community Health, 14*, 21501319231162480.

Alexander, D. & Schwandt, H. (2022). The impact of car pollution on infant and child health: Evidence from emissions cheating. *Review of Economic Studies*, *89*, 2872-2910.

Almond, D. & Currie, J. (2011). Killing me softly: The feta origins hypothesis. *Journal of Economic Perspectives, 25*(3), 153-172.

Almond, D. & Mazumder, B. (2011). Health capital and the prenatal environment: The effect of Ramadan observance during pregnancy. *American Economics Journal: Applied Economics, 3*, 56-85.

Aris, I.M., Kleinman, K.P., Belfort, M.B., Kaimal, A., & Oken, E. (2019). A 2017 US reference for singleton birth weight percentile using obstetric estimates of gestation. *Pediatrics*, *144*(1), e20190076.

Awan, M., Zagles, I., McKenney, M., Kinslow, K., & Elkbuli, A. (2021). ACGME 2011 duty hour restrictions and their effects on surgical residency training and patients outcomes: A systemic review. *Journal of Surgical Education, 78*(6), e35-e46.

Baldwin, D.C., Daugherty, S.R., Tsai, R., Scotti, M.J. (2003). A national survey of residents' self-reported work hours: Thinking beyond specialty. *Academic Medicine, 78*(11), 1154-1163.

Barker, D.J.P. (1990). The fetal and infant origins of adult disease. *BMJ, 301*(6761), 1111.

Baum, C.L. (2005). The effects of employment while pregnant on health at birth. *Economic Inquiry, 43*(2), 283-302.

Blair, J.E., Mayer, A.P., Caubet, S.L., Norby, S.M., O'Connor, M.I., Hayes, S.N. (2016). Pregnancy and parental leave during graduate medical education. *Academic Medicine*, *91*(7), 972-978.

Bonzini, M., Coggon, D., & Palmer, K.T. (2007). Risk of prematurity, low birthweight, and pre-eclampsia in relation to working hours and physical activities: A systemic review. *Occupational & Environmental Medicine, 64*(4), 228-243.

Burchie, K. J., Zetternan R.K., Ludmerer, K.M. et al. (2017). The 2017 ACGME common work hour standards: Promoting physician learning and professional development in a safe, humane environment. *Journal of Graduate Medical Education*, *9*(6), 692-696.

Bussières, E., Tarabulsy, G.M., Pearson, J., Tessier, R., Forest, J., Giguèr, Y. (2015). Maternal prenatal stress and infant birth weight and gestational age: A meta-analysis of prospective studies. *Developmental Review, 36*, 179-199.

Byrne, J.M., Loo, L.K., & Giang, D.W. (2015). Duty hour reporting: Conflicting values in professionalism. *Journal of Graduate Medical Education*, *7*(3), 395-400.

Chen, S.H., Chen, J., Chuang, H., & Lin, T. (forthcoming). Physicians treating physicians: Relational and informational advantages in treatment and survival. *Journal of Labor Economics*.

Chen, Y., Persson, P., & Polyakova, M. (2022). The roots of health inequality and the value of intrafamily expertise. *American Economics Journal: Applied Economics, 14*(3), 185-223.

Coussons-Read, M.E. (2013). Effects of prenatal stress on pregnancy and human development: Mechanisms and pathways. *Obstetric Medicine, 6*(2), 52-57.

Currie, J., Dursun, B., Hatch, M., & Tekin, E. (2023). *The hidden cost of firearm violence on pregnant women in their infants.* (NBER Working Paper No. 31774) National Bureau of Economic Research.

Currie, J. & Walker, R. (2011). Traffic congestion and infant health: Evidence from E-ZPass. *American Economic Journal: Applied Economics*, *3*, 65-90.

Black, S.E., Devereux, P.J., & Salvanes, K. G., (2007). From the cradle to the labor market? The effect of birth weight on adult outcomes. *The Quarterly Journal of Economics*, *122*(1), 409-439.

Byrne, J.M., Loo, L.K., & Giang, D.W. (2015). Duty hour reporting: Conflicting values in professionalism. *Journal of Graduate Medical Education*, *7*(3), 395-400.

Dave, D.M. & Yang, M. (2022). Maternal and fetal health effects of working during pregnancy. *Review of Economics of the Household, 20*, 57-102.

De Jesus Rojas, W., Jon, C., Stark, J., McBeth, K., Yadav, A., & Mosquera, R. (2017, October 10). *Implementation of nasal non-invasive ventilation with a RAM Cannula in the inpatient/outpatient setting*. NCT03473171. UT Health Science Center.

Duncan, B., Mansour. H., & Rees, D.I. (2017). It's just a game: The super bowl and low birth weight. *The Journal of Human Resources, 52*(4), 946-978.

Drolet, B.C., Sangisetty, S., Tracy, T.F., Cioffi, W.G. (2013a). Surgical residents' perceptions of 2011 Accreditation Council for Graduate Medical Education duty hour regulations. *JAMA Surgery*, *148*(5), 427-433.

Drolet, B.C., Schwede, M., Bishop, K.D., & Fischer, S.A. (2013b). Compliance and falsification of duty hours: Reports from residents and program directors. *Journal of Graduate Medical Education*, *5*(3), 368-373.

Finkelstein, A., Persson, P., Polyakova, M., & Shaprio, J.M. (2022). A Taste of their own medicine: Guideline adherence and access to expertise. *AER: Insights, 4*(4), 507-526.

Frakes, M., Gruber, J., & Jena, A. (2021). Is great information good enough? Evidence from physicians as patients. *Journal of Health Economics, 75*, 102406.

Frank, E. & Segura, C. (2009). Health practices of Canadian physicians. *Canadian Family Physician, 55*(8), 810-811.

Garg, S. & Sinha, S. (2013). Non-invasive ventilation in premature infants: Based on evidence or habit. *Journal of Clinical Neonatology*, *2*(4), 155-159.

Gates, R.S., Kemp, M.T., Evans, J., Liesman, D., Pumiglia, L., Matusko, N., George, B.C., & Sandhu, G. (2023). The demands of surgery residency: More than just duty hours? *Journal of Surgical Research*, *290*, 293-303.

Glanz, K., Fiel, S.B., Walker, L.R., & Levy, M.R. (1982). Preventive health behavior of physicians. *Journal of Medical Education, 57*(8), 637-639.

Gottlieb, J. D., Polyakova, M., Rinz, K., Shiplett, H., & Udalova, V. (2023). *Who values human capitalists' human capital? The earnings and labor supply of U.S. physicians.* (NBER Working Paper No. 31469). National Bureau of Economic Research.

Holliday E.B., Ahmed, A.A., Jagsi, R., Stentz, N.C., Woodward, Fuller, C.D., Thomas, C.R. (2015). Pregnancy and parenthood in radiation oncology, views and experiences survey (PROVES): Results of a blinded prospectives trainee parenting and career development assessment. *International Journal of Radiation Oncology*Biology*Physics*, *92*(1), 516-524.

Hoynes, H., Miller, D., & Simon, D. (2015). Income, the Earned Income Tax Credit, and infant health. *American Economic Journal: Economic Policy*, *7*(1), 172-211.

Hutchison, K. (2020). Four types of gender bias affecting women surgeon and their cumulative impact. *Journal of Medical Ethics, 46*, 236-241.

Hutter, M.M., Kellogg, K.C., Ferguson, C.M., Abbott, W.M., & Warshaw, A.L. (2006). The impact of the 80-hour resident workweek on surgical residents and attending surgeons. *Annals of Surgery*, *243*(6), 864-875.

Jena, A.B., Prasad, V., Romley, J.A. (2014). Long-term effects of the 2003 ACGME resident duty hour reform on hospital mortality. *Mayo Clinic Proceedings, 89*(7), 1023-1025.

Jena, A.B., Schoemaker, L., & Bhattacharya, J. (2014). Exposing physicians to reduced residency work hours did not adversely affect patient outcomes after residency. *Health Affairs, 33*(10), 1832-1840.

Johnson, E.M. & Rehavi, M.M. (2016). Physicians treating physicians: Information and incentives in childbirth. *American Economic Journal: Economic Policy, 8*(1), 115-141.

Kamine, T. H., Gondek, S., & Kent, T.S. (2014). Decease in junior resident case volume after 2011 ACGME work hours. *Journal of Surgical Education*, *71*(6), e59-e63.

Katz, V.L., Miller, N.H., & Bowes, W.A. (1988). Pregnancy complications of physicians. *The Western Journal of Medicine, 149*(6), 704-707.

Ketel, N., Leuven, E., Oosterbeek, H., & Van der Klaauw, B. (2016). The returns to medical school: Evidence from admission lotteries. *American Economics Journal Applied Economics, 8*(2), 225-254.

Kramer, M.S., Lydon, J., Seguin, L., et al. (2009). Stress pathways to spontaneous preterm birth: The role of stressors, psychological distress, and stress hormones. *American Journal of Epidemiology, 169*(11), 1319-1326.

Lauderdale, D.S. (2006). Birth outcomes for Arabic-named women in California before and after September 11, *Demography, 43*(1), 185-201.

Leuven, E., Oosterbeek, H., & de Wolf, I. (2013). The effects of medical school on health outcomes: Evidence from admission lotteries. *Journal of Health Economics, 32*, 698-707.

Lombarts, K.M.J. & Verghese, A. (2022). Medicine is not gender-neutral – She is male. *The New England Journal of Medicine, 386*, 1284-1287.

Martini, S., Arfken, C.L., Balon, R. (2014). Comparison of burnout among medical residents before and after the implementation of work hours limits. *Academic Psychiatry, 30*, 352-355.

Mozurkewch, E., Luke, B., Avni, M., & Wolf, F.M. (2000). Working conditions and adverse pregnancy outcome: A meta-analysis. *Obstetrics & Gyencology, 95*(4), 623-635.

National Vital Statistics System. (2023). *CDC WONDER natality online database.* [Data set]. Center for Disease Control and Prevention, National Center for Health Statistics. http://wonder.cdc.gov/natality-current.html

Palmer, K.T., Bonzini, M., Harris, E.C., Linaker, C., & Bonde, J.P. (2013). Work activities and risk of prematurity, low birth weight, and pre-eclampsia: an updated review with meta-analysis. *Occupational & Environmental Medicine, 70*(4), 213-222.

Patel, M.S., Volpp, K.G., Small, D.S., et al. (2014). Association of the 2011 ACGME resident duty-hour reforms with mortality and readmissions among hospitalized Medicare patients. *JAMA, 312*(22), 2364-2373.

Philibert, I., Friedmann, P., & Williams, W.T. (2002). New requirements for resident duty hours. *JAMA, 288*(9), 1112-1114.

Rajaram, R., Chung, J.W., Jones, A.T., et al. (2014). Association of the 2011 ACGME resident duty hour reform with general surgery patient outcomes and with resident examination performance. *JAMA, 312*(22), 2374-2384.

Riebschleger, M. & Nasca, T.J. (2011). New duty hour limits: Discussion and justification. In I. Philibert & S. Amis (Eds.) *The ACGME 2011 duty hour standard* (pp. 29- 37).

Schwartz, S.I., Galante, J., G., Kaji, A, et al. (2013). Effect of the 16-hour work limit on general surgery intern operative case volume: A multi-institutional study. *JAMA Surgery*, *148*(9), 829-833.

Sen, S., Kranzler, H.R., Didwania, A.K. et al. (2013). Effects of the 2011 duty hour reforms on interns and their patients. *JAMA Internal Medicine, 173*(8), 657-662.

Shetty, K.D. & Bhattacharya, J. (2007). Changes in hospital mortality associated with resident work-hour regulations. *Annals of Internal Medicine, 147*(2), 73-80

Sudol, N.T., Guaderrama, N.M., Honsberger, P., Weiss, J., Li, Q., & Whitcomb, E. L. (2021). Prevalence and nature of sexism and racial/ethnic microaggressions against surgeons and anesthesiologists. *JAMA Surgery*, *156*(5), e210265.

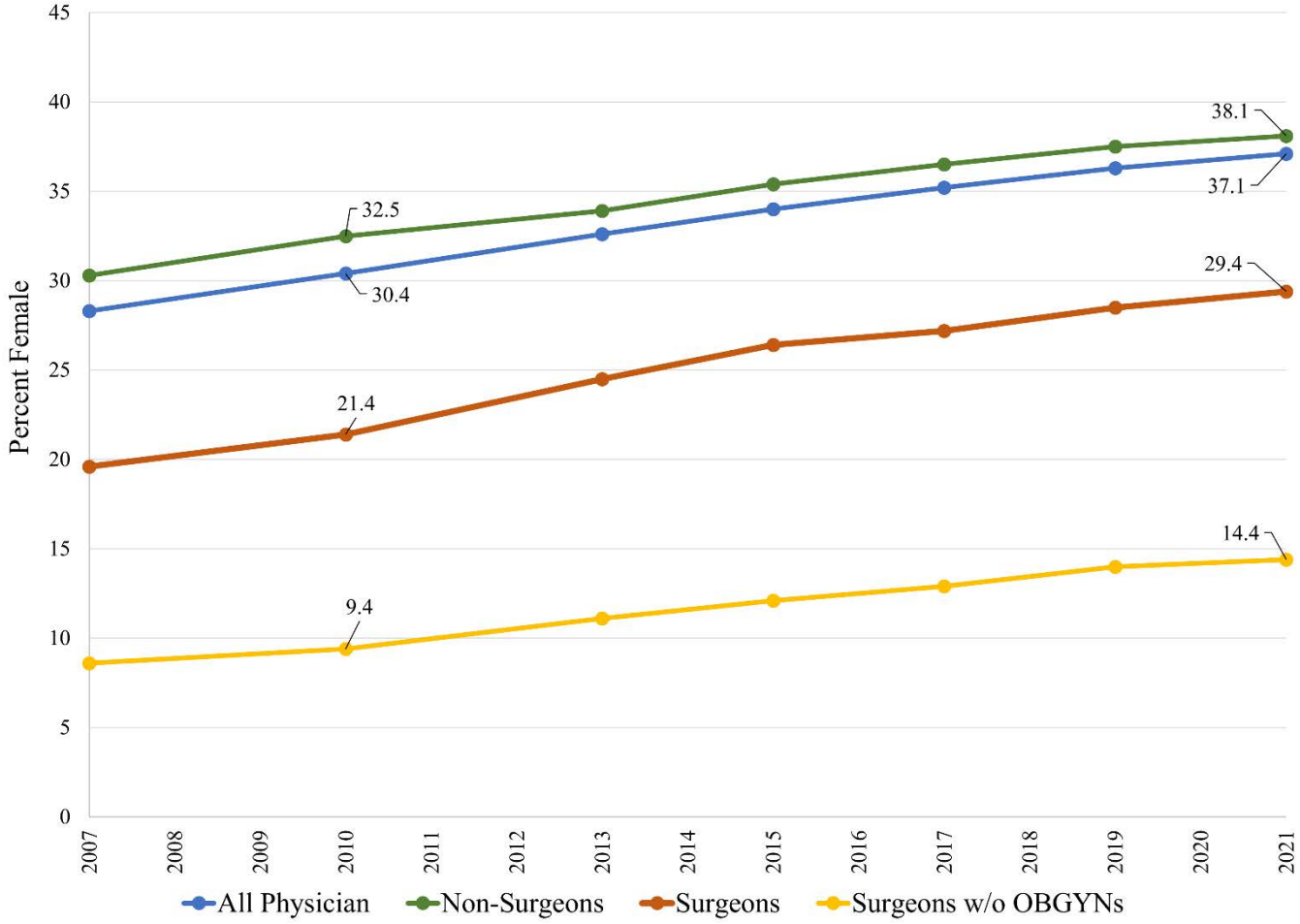
Volpp, K.G., Rosen, A.K., & Rosenbaum, P.R. et al. (2007). Mortality among patients in VA hospital the first 2 year following ACGME resident duty hour reform. *JAMA, 298*(9), 984-992.

Vucicevic, D., Mookadam, F., Webb, B.J., Labonte, H.R., Cha, S.S., & Blair, J. E. (2015). The impact of 2011 ACGME duty hour restrictions on internal medicine resident workload and education. *Advances in Health Sciences Education*, *20*, 193-203.

Wasserman, M. (2023). Hours constraints, occupational choice, and gender: Evidence from medical residents. *Review of Economic Studies, 90*, 1535-1568.

Figure and Table Appendix

Figure A1: Share of Active Physicians that Identify as Female



Source: AAMC Physician Specialty Data Report 2008-2022

Figure A2: Average Birth Weights over Race and Occupation

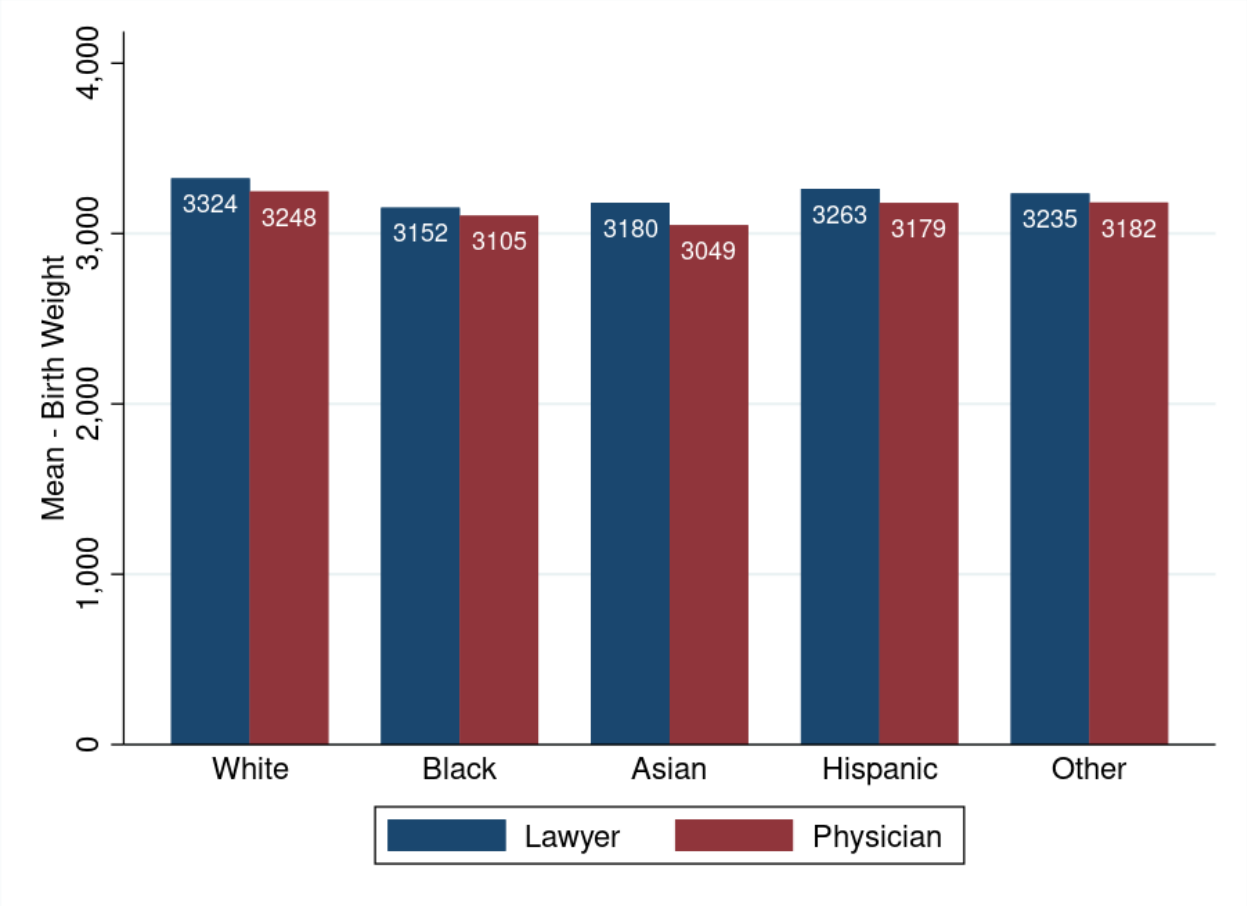


Figure A3: Birth Seasonality for Physicians and Lawyers

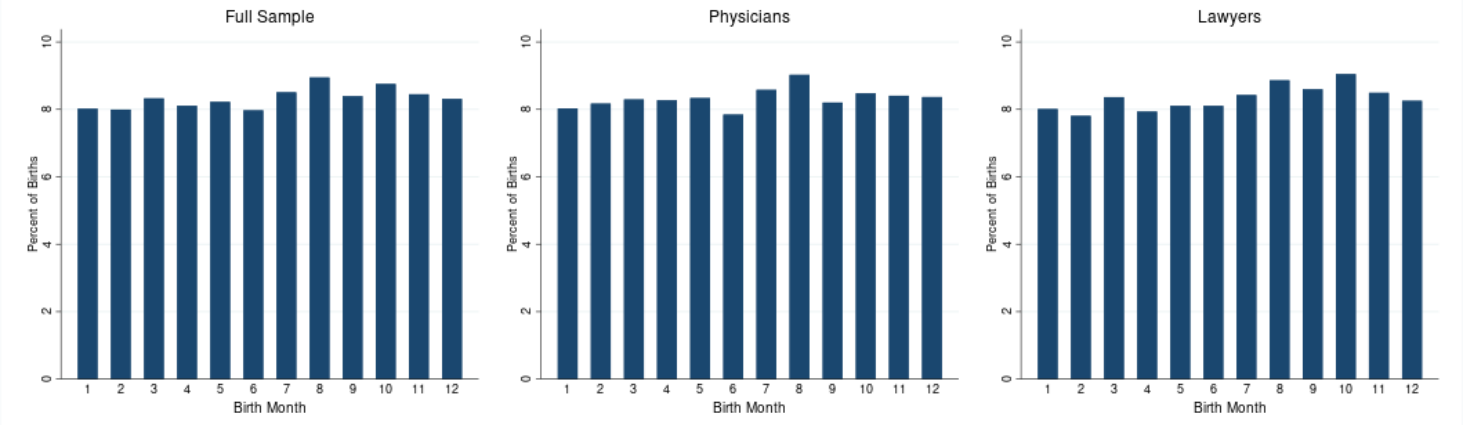


Figure A4: Births by Year for Physicians and Lawyers

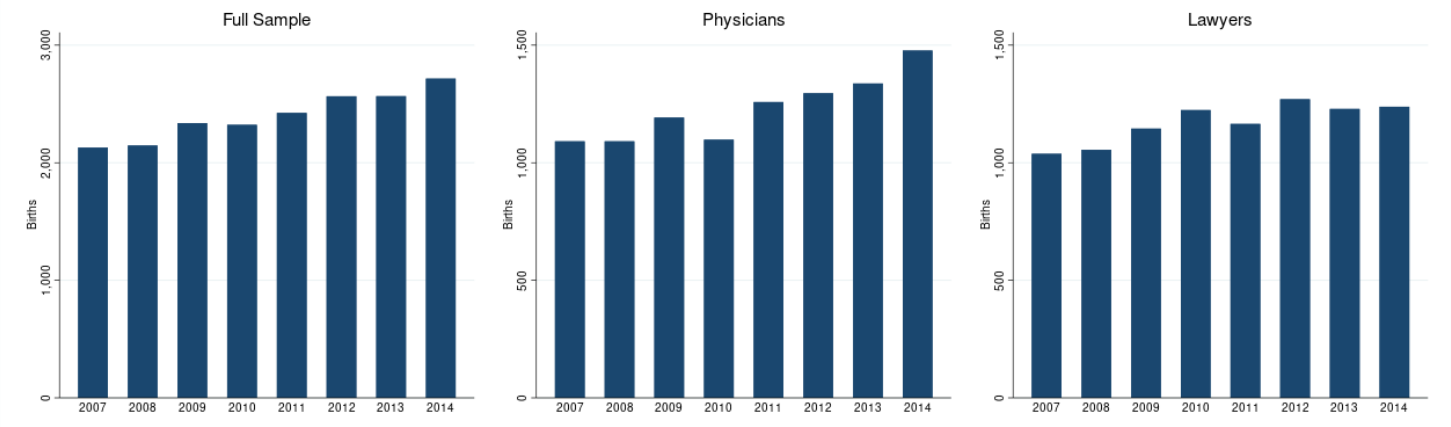
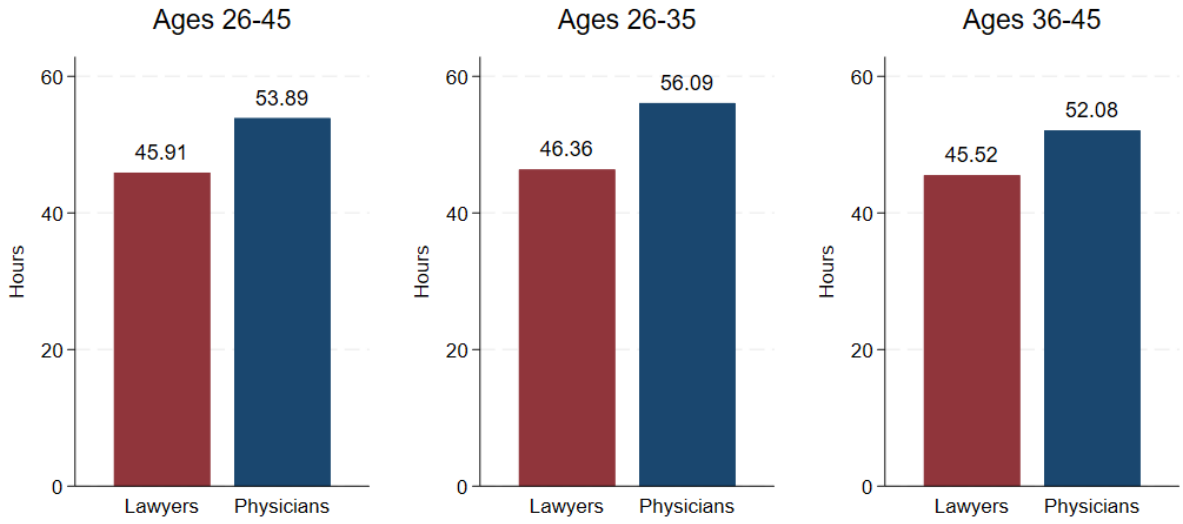
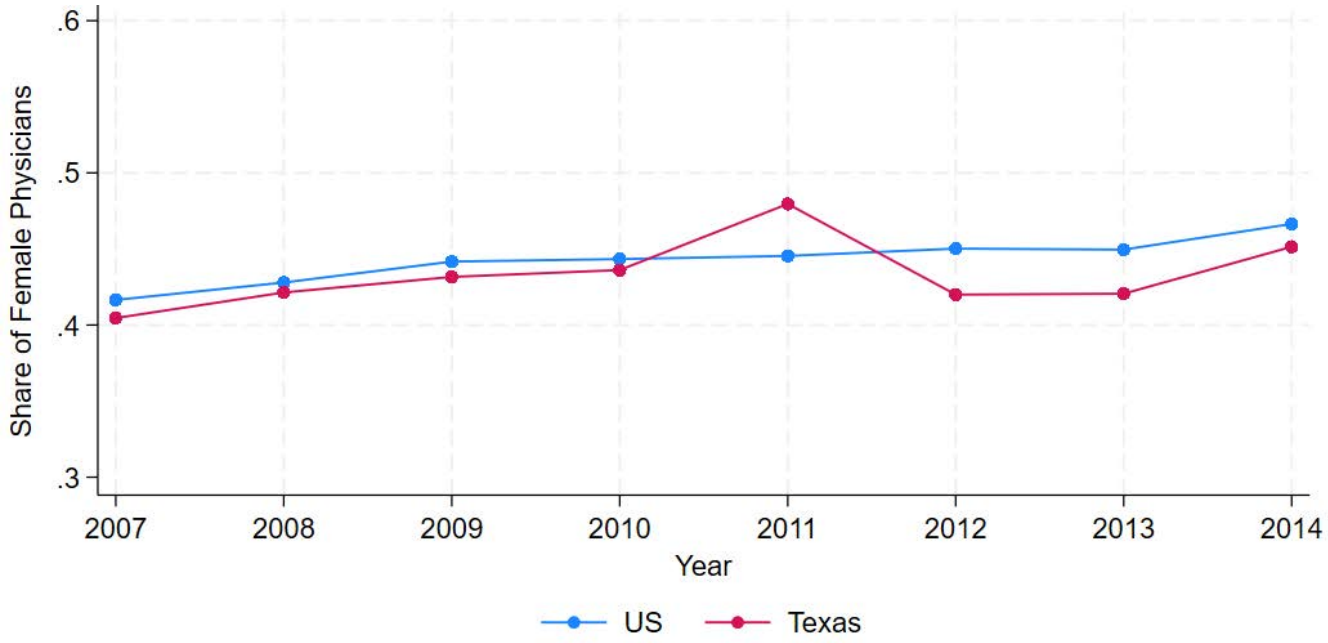


Figure A5: Average Usual Hours Worked Per Week for Texas



Source: ACS 2007-2014. Usual hours worked per week reports the number of hours that respondents usually worked per week in the previous 12 month period. Physicians are respondents that reported their occupation as 'Physicians or Surgeons'. Lawyers are respondents who reported their occupation as 'Lawyers, and judges, magistrates, and other judicial workers'.

Figure A6: Share of Female Physicians in USA and Texas



Source: ACS 2007-2014. Sample includes respondents 26-45 years old who list their occupation as 'Physicians and Surgeons' in the ACS.

Figure A7: Difference in Birth Weight (in grams) Between Physicians vs. Lawyers

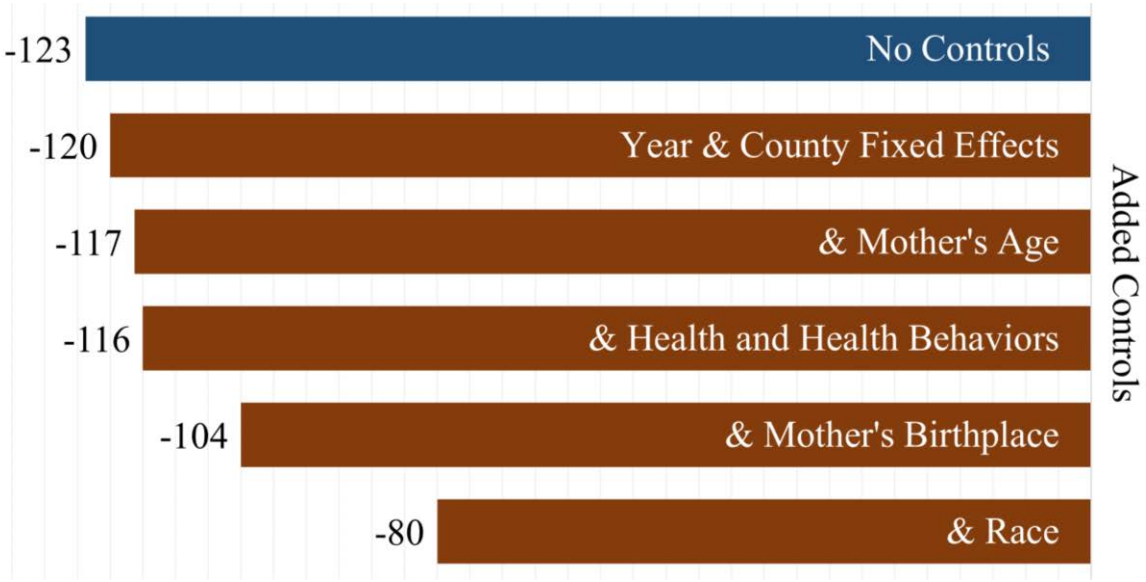


Table A1: Total Births

VARIABLES	Full Sample (1)	Physicians (2)	Lawyers (3)
Month	290.516	186.279	104.237
	(446.889)	(318.158)	(279.395)
Year	7.867***	4.967***	2.900***
	(1.636)	(1.165)	(1.023)
Month#Year	-0.144	-0.092	-0.051
	(0.222)	(0.158)	(0.139)
Observations	96	96	96
R-squared	0.488	0.416	0.276

Note: Outcome variable is the number of births in each month-year for our sample. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A2: Birth Outcomes among Physicians vs. Lawyers by Race

	Low Birthweight				Small for Gestational Age			
	Black	White	Asian	Hispanic	Black	White	Asian	Hispanic
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Physician	0.020	0.010*	0.066***	-0.005	0.018	0.014**	0.049***	0.012
	(0.017)	(0.006)	(0.013)	(0.013)	(0.019)	(0.006)	(0.018)	(0.013)
R-squared	0.038	0.018	0.018	0.038	0.027	0.013	0.021	0.035
Observations	1,476	11,729	3,208	2,499	1,415	11,269	3,089	2,417
Dependent variable mean	0.114	0.0855	0.118	0.0940	0.119	0.0829	0.183	0.109

Table A2 cont.: Birth Outcomes among Physicians vs. Lawyers by Race

	Pre-term Delivery				Birth Weight (grams)				Pregnancy Length (weeks)			
	Black	White	Asian	Hispanic	Black	White	Asian	Hispanic	Black	White	Asian	Hispanic
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Physician	0.030	0.012*	0.027*	-0.002	-69.205**	-70.322***	-130.332***	-85.532***	-0.077	-0.109**	-0.269***	-0.111
	(0.020)	(0.007)	(0.015)	(0.015)	(34.556)	(11.497)	(23.836)	(25.807)	(0.143)	(0.044)	(0.096)	(0.107)
R-squared	0.082	0.019	0.029	0.033	0.046	0.025	0.030	0.050	0.054	0.036	0.029	0.054
Observations	1,427	11,427	3,124	2,442	1,476	11,729	3,208	2,499	1,427	11,427	3,124	2,442
Dependent variable mean	0.148	0.126	0.122	0.133	3126	3293	3071	3217	38.08	38.41	38.30	38.22

Table A2 cont.: Birth Outcomes among Physicians vs. Lawyers by Race

	Caesarean Delivery				Newborn Abnormal Conditions			
	Black	White	Asian	Hispanic	Black	White	Asian	Hispanic
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Physician	0.021	-0.055***	-0.004	-0.047**	-0.002	-0.001	0.007	-0.004
	(0.027)	(0.010)	(0.024)	(0.021)	(0.018)	(0.006)	(0.014)	(0.012)
R-squared	0.073	0.043	0.047	0.101	0.049	0.019	0.029	0.033
Observations	1,476	11,729	3,208	2,499	1,476	11,729	3,208	2,499
Dependent variable mean	0.453	0.423	0.424	0.489	0.118	0.0873	0.0945	0.0844

Note: Each model includes year and county of birth fixed effects and controls for mother's age, number of prenatal visits, diabetes, number of cigarettes smoked, an indicator for if the mother was born in the United States, the number of prior live births, and an indicator for a prior poor pregnancy outcome. White, Black, and Asian mothers are non-Hispanic white, non-Hispanic Black, and non-Hispanic Asian respectively. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A3: Birth Outcomes among Physicians vs. Lawyers: Induced Labor

	Full Sample		Ages 26-31		Ages 34-45	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Physician post reform			-0.001	-0.012	-0.015	-0.015
			(0.024)	(0.024)	(0.018)	(0.018)
Physician	0.002	0.022***	0.011	0.038**	0.012	0.024**
	(0.006)	(0.007)	(0.015)	(0.015)	(0.011)	(0.012)
Post reform			-0.036	-0.036	0.002	0.005
			(0.039)	(0.039)	(0.029)	(0.029)
Additional Controls	No	Yes	No	Yes	No	Yes
R-squared	0.016	0.029	0.030	0.047	0.018	0.023
Observations	19,203		6,263		9,022	
Dependent variable mean	0.245		0.285		0.213	

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Outcome variable is a binary indicator of induction of labor. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4: Birth Outcomes among Physicians vs. Lawyers: Extreme Outcomes

	Full Sample				Ages 26-31				Ages 34-45			
	Very Low Birthweight		Very Pre-term Delivery		Very Low Birthweight		Very Pre-term Delivery		Very Low Birthweight		Very Pre-term Delivery	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Physician post reform					-0.007	-0.006	-0.005	-0.005	0.009	0.008	0.015**	0.014**
					(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Physician	0.002	0.000	0.002	0.001	0.006*	0.006*	0.005	0.005	-0.002	-0.003	-0.004	-0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Post reform					0.003	0.005	-0.008	-0.007	-0.004	-0.004	0.001	0.001
					(0.008)	(0.008)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.003	0.013	0.005	0.012	0.005	0.014	0.009	0.013	0.008	0.018	0.012	0.020
Observations	19,203		19,203		6,263		6,263		9,022		9,022	
Dependent variable mean	0.015		0.017		0.010		0.013		0.018		0.020	

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Very low birthweight indicates a birthweight of less than 1,500 grams. Very pre-term birth consists of pregnancies that were less than 32 weeks at time of birth. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A5: Birth Outcomes among Physicians vs. Lawyers with Asian American Mothers

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Abnormal Newborn Conditions	
	Indian	Chinese	Indian	Chinese	Indian	Chinese	Indian	Chinese	Indian	Chinese	Indian	Chinese	Indian	Chinese
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Physician	0.045	0.110**	0.082*	0.164***	0.008	0.118**	-157.538***	-337.759***	-0.247	-0.618**	-0.052	0.008	0.003	0.058
	(0.035)	(0.051)	(0.044)	(0.055)	(0.037)	(0.046)	(58.824)	(95.122)	(0.251)	(0.277)	(0.052)	(0.082)	(0.035)	(0.042)
R-squared	0.083	0.186	0.095	0.159	0.065	0.192	0.068	0.203	0.064	0.225	0.099	0.140	0.079	0.170
Observations	548	234	513	226	521	226	548	234	521	226	548	234	548	234
Dependent variable mean	0.137	0.162	0.218	0.173	0.119	0.159	3013	3057	38.35	38.15	0.420	0.346	0.108	0.107

Note: Each model includes year and county of birth fixed effects and additional controls for mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Included mothers were born in the United States. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A6: Birth Outcomes among Surgeons vs. Non-Surgeons - Younger Physicians

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Surgeons (26-32 years old)	0.021	0.049***	-0.007	0.007	0.028	0.063***	-12.710	-83.770***	-0.062	-0.416***	-0.055**	0.038	0.015	0.029*
	(0.016)	(0.017)	(0.016)	(0.016)	(0.018)	(0.019)	(28.084)	(29.428)	(0.111)	(0.116)	(0.023)	(0.025)	(0.015)	(0.016)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.011	0.025	0.010	0.035	0.013	0.027	0.018	0.055	0.015	0.040	0.019	0.050	0.011	0.020
Observations	7,060	7,060	6,792	6,792	6,886	6,886	7,060	7,060	6,886	6,886	7,060	7,060	7,060	7,060
Dependent variable mean	0.108	0.108	0.123	0.123	0.139	0.139	3174	3174	38.22	38.22	0.416	0.416	0.0949	0.0949

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of prior live births, and number of cigarettes smoked during pregnancy. Surgeon category includes physicians in the specialties: General Surgery, OBGYN, Orthopedics, Otolaryngology, Plastic Surgery, and Urology. Younger physicians are between 26 and 32 years old. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A7: Birth Outcomes among Physicians by Burnout Level

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
High Burnout	0.005	0.003	0.012	0.011	-0.002	-0.004	-29.751*	-22.324	-0.028	-0.001	-0.015	-0.014	-0.011	-0.012
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(16.294)	(16.038)	(0.063)	(0.062)	(0.014)	(0.014)	(0.008)	(0.008)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.012	0.024	0.010	0.035	0.013	0.025	0.019	0.055	0.016	0.038	0.018	0.050	0.011	0.020
Observations	7,033		6,766		6,860		7,033		6,860		7,033		7,033	
Mean dependent variable	0.108		0.123		0.139		3174		38.22		0.416		0.095	

Note: Each model includes year and county of birth fixed effects. High burnout observations are those in a specialty with reported shares of burnout of 47 or higher in the Physician Burnout & Depression Report 2022. Additional controls include mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, indicator for if the mother was born in the United States, the number of prior live births, and number of cigarettes smoked during pregnancy. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include, NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A8: Birth Outcomes among Physicians By Specialties with High Call/Shift Length

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
High Call/Shift Length	0.019***	0.019***	0.002	0.007	0.013*	0.010	-13.580	-21.364*	-0.095*	-0.082*	-0.001	0.000	0.002	0.002
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(11.976)	(11.846)	(0.048)	(0.048)	(0.010)	(0.010)	(0.006)	(0.006)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.008	0.018	0.008	0.029	0.010	0.022	0.012	0.043	0.011	0.032	0.018	0.053	0.010	0.018
Observations	9,839		9,472		9,603		9,839		9,603		9,839		9,839	
Mean dependent variable	0.104		0.125		0.134		3172		38.25		0.415		0.093	

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for if the mother was born in the United States, the number of prior live births, indicator for a prior poor pregnancy outcome, and number of cigarettes smoked during pregnancy. Specialties that are considered to have high call/shift length are Internal Medicine, Pediatrics, Family Medicine, General Surgery, OBGYN, Orthopedics, Otolaryngology, Plastic Surgery, and Urology. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A9: Birth Outcomes among Physicians vs. Lawyers - First Births

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Physician	0.026***	0.018***	0.047***	0.021***	0.014*	0.015*	-119.113***	-74.617***	-0.159***	-0.111**	-0.018*	-0.036***	0.006	-0.001
	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(12.662)	(13.287)	(0.053)	(0.056)	(0.011)	(0.011)	(0.007)	(0.007)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.010	0.025	0.013	0.026	0.008	0.027	0.024	0.052	0.013	0.044	0.014	0.054	0.012	0.025
Observations	8,912		8,553		8,666		8,912		8,666		8,912		8,912	
Dependent variable mean	0.098		0.128		0.122		3199		38.48		0.429		0.098	

Note: Sample only includes mothers who did not have a prior live birth. Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, and number of cigarettes smoked during pregnancy. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A10: Birth Outcomes among Physicians vs. Lawyers without Judges

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Physician	0.020***	0.015***	0.037***	0.019***	0.012**	0.013**	-120.394***	-80.557***	-0.172***	-0.128***	-0.035***	-0.044***	0.002	0.001
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(8.728)	(9.200)	(0.034)	(0.036)	(0.007)	(0.008)	(0.004)	(0.005)
R-squared	0.007	0.015	0.009	0.024	0.006	0.018	0.020	0.042	0.009	0.033	0.014	0.044	0.008	0.018
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	19,167	19,167	18,441	18,441	18,670	18,670	19,167	19,167	18,670	18,670	19,167	19,167	19,167	19,167
Dependent variable mean	0.0946	0.0946	0.107	0.107	0.128	0.128	3232	3232	38.34	38.34	0.433	0.433	0.0908	0.0908

Note: Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A11: Birth Outcomes among Physician vs. Lawyers - Fathers Only

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Physician	0.007*	0.002	0.023***	0.012***	0.000	-0.002	-60.744***	-30.069***	-0.042	0.004	-0.047***	-0.043***	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(7.295)	(7.648)	(0.029)	(0.030)	(0.006)	(0.006)	(0.004)	(0.004)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.005	0.014	0.007	0.016	0.007	0.018	0.013	0.034	0.009	0.030	0.017	0.056	0.009	0.016
Observations	26,634		25,643		26,027		26,634		26,027		26,634		26,634	
Mean dependent variable	0.083		0.096		0.117		3270		38.44		0.394		0.084	

Note: Does not include any couple where the mother is a physician. Each model includes year and county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, indicator for the mother being born in the United States, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, number of cigarettes smoked during pregnancy, and number of prior live births. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A12: Impact of Duty Hour Reform on Birth Outcomes of Physicians without Judges

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Ages 26-30														
Physician post reform	-0.034**	-0.030*	-0.062***	-0.062***	-0.028	-0.024	73.126**	64.768*	0.127	0.067	-0.040	-0.035	-0.000	-0.002
	(0.017)	(0.017)	(0.020)	(0.020)	(0.019)	(0.019)	(35.096)	(34.710)	(0.142)	(0.143)	(0.030)	(0.030)	(0.017)	(0.017)
Physician	0.039***	0.029***	0.063***	0.038***	0.033***	0.034***	-153.261***	-108.446***	-0.211**	-0.140	-0.029	-0.045**	0.013	0.012
	(0.011)	(0.011)	(0.013)	(0.013)	(0.012)	(0.012)	(22.093)	(22.840)	(0.087)	(0.089)	(0.019)	(0.020)	(0.010)	(0.011)
Post reform	-0.002	-0.003	0.024*	0.023*	0.005	0.005	4.910	9.465	0.180*	0.199**	-0.032	-0.037*	0.003	0.004
	(0.011)	(0.011)	(0.013)	(0.014)	(0.013)	(0.013)	(24.529)	(24.630)	(0.093)	(0.094)	(0.021)	(0.021)	(0.011)	(0.011)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.021	0.030	0.020	0.040	0.019	0.028	0.037	0.056	0.017	0.032	0.027	0.033	0.014	0.018
Observations	4,349	4,349	4,193	4,193	4,247	4,247	4,349	4,349	4,247	4,247	4,349	4,349	4,349	4,349
Dependent variable mean	0.0784	0.0784	0.110	0.110	0.0982	0.0982	3262	3262	38.63	38.63	0.346	0.346	0.0756	0.0756
Panel B: Ages 34-45														
Physician post reform	0.002	0.001	-0.017	-0.019	0.019	0.017	-5.372	1.748	-0.092	-0.088	0.035	0.030	0.019	0.018
	(0.013)	(0.013)	(0.014)	(0.014)	(0.016)	(0.015)	(26.689)	(26.400)	(0.106)	(0.105)	(0.022)	(0.022)	(0.013)	(0.013)
Physician	0.013	0.014	0.040***	0.025***	-0.002	0.008	-108.877***	-84.697***	-0.091	-0.120*	-0.064***	-0.054***	-0.015*	-0.011
	(0.008)	(0.009)	(0.008)	(0.009)	(0.010)	(0.010)	(16.375)	(16.815)	(0.064)	(0.066)	(0.014)	(0.014)	(0.008)	(0.009)
Post reform	0.002	0.002	0.018*	0.017*	-0.013	-0.011	-14.827	-14.737	0.112	0.098	-0.021	-0.018	-0.009	-0.008
	(0.009)	(0.009)	(0.010)	(0.009)	(0.011)	(0.011)	(19.933)	(19.841)	(0.078)	(0.077)	(0.016)	(0.016)	(0.010)	(0.010)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.009	0.022	0.011	0.024	0.011	0.025	0.021	0.044	0.015	0.035	0.017	0.044	0.013	0.026
Observations	8,991	8,991	8,615	8,615	8,727	8,727	8,991	8,991	8,727	8,727	8,991	8,991	8,991	8,991
Dependent variable mean	0.105	0.105	0.105	0.105	0.145	0.145	3210	3210	38.14	38.14	0.500	0.500	0.101	0.101

Note: Each model includes county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, indicator for if the mother was born in the United States, the number of prior live births, and number of cigarettes smoked during pregnancy. The DID model compares physician and lawyer mothers who gave birth prior to the 2011 duty hour change to physician and lawyer mothers who gave birth after the rule change. 'Physician post reform' estimates the impact of the effect of the 2011 duty hour rule change on physician mothers' birth outcomes. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A13: Impact of Duty Hour Reform on Birth Outcomes of Physicians – Smaller Age Segments

VARIABLES	Low Birthweight (1)	(2)	Small for Gestational Age (3)	(4)	Pre-term Delivery (5)	(6)	Birth Weight (grams) (7)	(8)	Pregnancy Length (weeks) (9)	(10)	Caesarean Delivery (11)	(12)	Newborn Abnormal Conditions (13)	(14)
Panel A: Ages 26-27														
Physician post reform	-0.047	-0.039	-0.002	-0.006	-0.061	-0.055	196.683**	187.834*	-0.209	-0.231	-0.029	-0.004	0.033	0.035
	(0.048)	(0.048)	(0.058)	(0.058)	(0.052)	(0.052)	(97.007)	(97.463)	(0.382)	(0.384)	(0.079)	(0.078)	(0.052)	(0.053)
Physician	0.062**	0.052	0.006	-0.025	0.053*	0.060*	-188.198***	-164.871**	0.025	0.056	-0.062	-0.080	0.021	0.020
	(0.031)	(0.032)	(0.036)	(0.037)	(0.031)	(0.034)	(62.358)	(65.747)	(0.243)	(0.254)	(0.049)	(0.051)	(0.029)	(0.031)
Post reform	-0.002	-0.001	0.004	-0.008	0.015	0.022	-65.197	-58.642	0.355	0.343	-0.044	-0.051	0.012	0.010
	(0.031)	(0.029)	(0.040)	(0.040)	(0.037)	(0.037)	(64.593)	(64.660)	(0.253)	(0.248)	(0.059)	(0.058)	(0.033)	(0.033)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.054	0.075	0.062	0.100	0.069	0.089	0.085	0.114	0.050	0.062	0.085	0.120	0.049	0.061
Observations	640		616		626		640		626		640		640	
Dependent variable mean	0.086		0.125		0.101		3254		38.61		0.311		0.089	
Panel B: Ages 26-28														
Physician post reform	-0.059**	-0.055*	-0.064*	-0.067*	-0.079**	-0.073**	124.344**	121.271**	0.088	0.019	-0.089*	-0.080	-0.005	-0.009
	(0.029)	(0.029)	(0.036)	(0.036)	(0.034)	(0.034)	(61.945)	(61.806)	(0.256)	(0.258)	(0.051)	(0.051)	(0.030)	(0.031)
Physician	0.056***	0.049***	0.058***	0.031	0.059***	0.064***	-177.105***	-148.345***	-0.134	-0.080	-0.045	-0.059*	0.023	0.024
	(0.018)	(0.019)	(0.022)	(0.023)	(0.020)	(0.021)	(37.628)	(39.623)	(0.151)	(0.155)	(0.031)	(0.033)	(0.018)	(0.019)
Post reform	0.013	0.013	0.024	0.019	0.045*	0.048*	-47.832	-44.713	0.040	0.049	-0.014	-0.014	0.003	0.004
	(0.020)	(0.020)	(0.025)	(0.026)	(0.025)	(0.025)	(44.069)	(44.453)	(0.165)	(0.166)	(0.039)	(0.039)	(0.021)	(0.021)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.037	0.057	0.034	0.062	0.043	0.062	0.055	0.077	0.023	0.040	0.059	0.070	0.026	0.038
Observations	1,507		1,451		1,472		1,507		1,472		1,507		1,507	
Dependent variable mean	0.075		0.116		0.100		3262		38.64		0.317		0.080	

Table A13 cont.: Impact of Duty Hour Reform on Birth Outcomes of Physicians – Smaller Age Segments cont.

	Low Birthweight		Small for Gestational Age		Pre-term Delivery		Birth Weight (grams)		Pregnancy Length (weeks)		Caesarean Delivery		Newborn Abnormal Conditions	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel C: Ages 26-29														
Physician post reform	-0.049**	-0.046**	-0.076***	-0.075***	-0.053**	-0.049**	115.563**	109.420**	0.068	-0.003	-0.060	-0.056	-0.020	-0.023
	(0.021)	(0.021)	(0.026)	(0.026)	(0.024)	(0.024)	(44.896)	(44.423)	(0.183)	(0.184)	(0.037)	(0.037)	(0.022)	(0.021)
Physician	0.054***	0.047***	0.069***	0.043***	0.049***	0.053***	-167.933***	-133.323***	-0.194*	-0.138	-0.026	-0.037	0.028**	0.029**
	(0.013)	(0.013)	(0.016)	(0.017)	(0.014)	(0.015)	(26.978)	(28.299)	(0.108)	(0.113)	(0.023)	(0.024)	(0.013)	(0.014)
Post reform	0.008	0.008	0.031*	0.027	0.023	0.025	-4.281	0.131	0.169	0.176	-0.023	-0.026	0.010	0.011
	(0.014)	(0.014)	(0.018)	(0.018)	(0.016)	(0.016)	(31.527)	(31.567)	(0.118)	(0.119)	(0.027)	(0.027)	(0.014)	(0.014)
Additional Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.025	0.035	0.022	0.041	0.029	0.042	0.039	0.059	0.025	0.047	0.039	0.043	0.016	0.026
Observations	2,747		2,645		2,686		2,747		2,686		2,747		2,747	
Dependent variable mean	0.073		0.115		0.091		3268		38.68		0.324		0.074	

Note: Each model includes county of birth fixed effects. Additional controls include mother's age, number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, indicator for if the mother was born in the United States, the number of prior live births, and number of cigarettes smoked during pregnancy. The DID model compares physician and lawyer mothers who gave birth prior to the 2011 duty hour change to physician and lawyer mothers who gave birth after the rule change. 'Physician post reform' estimates the impact of the effect of the 2011 duty hour rule change on physician mothers' birth outcomes. Low birthweight indicates a birthweight of less than 2,500 grams. Small for gestational age births have a birthweight below the 10th percentile for their gestational age. Pre-term birth consists of pregnancies that were less than 37 weeks at time of birth. Newborn abnormal conditions include NICU admission, surfactant replacement therapy, required antibiotics for suspected neonatal sepsis, seizure or serious neurologic dysfunction, and significant brain injury. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A14: Demographic Balance Test for Physician Mothers Before and After 2011 Reform

	Before Reform Mean	After Reform Mean	Difference	T-Test p-value
Mother's age	33.553	33.758	0.205	0.007
Prenatal visits (n)	10.802	10.884	0.082	0.288
Cigarettes smoked during pregnancy (n)	0.016	0	-0.016	0.034
Diabetic	0.045	0.052	0.007	0.125
White	0.505	0.472	-0.033	0.002
Black	0.075	0.092	0.017	0.003
Asian	0.269	0.271	0.002	0.882
Hispanic	0.139	0.136	-0.003	0.711
Mother born in United States	0.653	0.643	-0.010	0.302
Prior live births (n)	0.792	0.778	-0.014	0.439
Prior poor pregnancy outcome	0.007	0.015	0.008	0

Note: There are 6,062 physician mother births prior to the 2011 reform and 3,777 physician mother births after the 2011 reform. Births on or after April 1, 2012 are considered post reform.

Table A15: Difference-in-Difference - Total Births

	Full Sample				Ages 26-31	
	OLS	OLS	Poisson	Poisson	OLS	Poisson
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Physician post reform	1.206	1.206	0.077	0.077	0.100	0.019
	(5.764)	(1.059)	(0.398)	(0.067)	(0.522)	(0.087)
Physician	0.240	0.240	0.018	0.018	-0.418	-0.072
	(3.301)	(0.619)	(0.250)	(0.045)	(0.356)	(0.061)
Post reform	1.395	1.395**	0.101	0.101**	0.153	0.025
	(3.989)	(0.692)	(0.286)	(0.048)	(0.362)	(0.059)
R-squared	0.000	0.968			0.949	
County of Birth FE	No	Yes	No	Yes	Yes	Yes
Observations	1,376	1,376	1,376	1,376	1,072	1,072
Dependent variable mean	13.95	13.95	13.95	13.95	5.843	5.843

Note: There are 669 zeros in the full balanced panel and 549 zeros in the 26-31 balanced panel. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A16: Impact of Duty Hour Reform on Mother's Age

VARIABLES	(1) Mother's Age	(2) Mother's Age
Physician post reform	0.033	0.128
	(0.110)	(0.103)
Physician	0.395***	0.102
	(0.069)	(0.068)
Post reform	0.188**	0.091
	(0.080)	(0.075)
Additional Controls	No	Yes
R-squared	0.019	0.139
Observations	19,203	19,203
Dependent variable mean	33.49	33.49

Note: Each model includes county of birth fixed effects. Additional controls include number of prenatal visits, diabetes indicator, race indicators for white, Black, Asian, and Hispanic, indicator for a prior poor pregnancy outcome, indicator for if the mother was born in the United States, the number of prior live births, and number of cigarettes smoked during pregnancy. The DID model compares physician and lawyer mothers who gave birth prior to the 2011 duty hour change to physician and lawyer mothers who gave birth after the rule change. 'Physician post reform' estimates the impact of the effect of the 2011 duty hour rule change on physician mothers' birth outcomes. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1