THE MOTHERHOOD PENALTY IN THE 21st CENTURY
A REPLICATION AND EXTENSION

By

Anu Raina

A dissertation submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements
for the degree of Doctor of Business Administration
Belk College of Business

Charlotte

2024

Approved by:

Dr. Justin Webb

Dr. Laura Stanley

Dr. Franz Kellermanns

Dr. Sunil Erevelles

ABSTRACT

ANU RAINA. THE MOTHERHOOD PENALTY IN THE 21ST CENTURY: A REPLICATION AND EXTENSION (under the direction of DR. JUSTIN WEBB)

Evaluating the impact of motherhood on a woman's career is complex. There are interrelated mechanisms resulting in conflicting results. The wage disparity for mothers is noted within the literature to range from 0 – 20 percent, with a similar spectrum of negative impact on career progression, when compared with fathers and childless men and women. In this research I summarize the predominant theory-based explanations for the motherhood penalty and review a sample of the research published from 1979 to August 2023. This study shows evidence that a wage penalty for motherhood continues to persist ranging from 14 percent to 32 percent. From the NLSY97 sample of working women (2004-2021), there is evidence of a wage boost for married and divorced mothers, women who choose to delay fertility may experience a wage boost, race and a woman's level of grittiness have no significant impact on women's wages, and human capital considerations continue to matter and may work to attenuate any wage penalty for motherhood.

Keywords: motherhood and career progression, motherhood penalty, motherhood wage gap, mothers in leadership, women in leadership.

DEDICATION

"If I have seen further, it is by standing on the shoulders of giants."
Sir Isacc Newton

Today I see further than I did yesterday and have the giants in my life to thank.

To my parents, Santosh and Surendra Sharda, whose unwavering support, love, and guidance are my foundation. To my brother, Amit Sharda, thank you for being my OG partner in adventure.

To my husband, Avinash Raina, thank you for being my companion and north star on this journey.

To my children, Armaan, Aydhan and Aanand, all that I do is for you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CEE	central and eastern Europe
CWD	compensating wage differentials
GPA	grade point average
Grit-S	short grit survey
NLSY79	national longitudinal survey of youth 1979
NLSY97	national longitudinal survey of youth 1997
U.S.	United States
U.S.A.	United States of America

CHAPTER 1: INTRODUCTION

It is well documented in both popular and academic literature that legislation allowing women to participate in the labor force in the United States was first passed in the 1920s, just after the original Women's Rights Movement (1848 – 1917). Women gained the right to vote in the United States with the 19th amendment to the constitution in 1920. Women also began trailblazing a path into higher education beginning in the early 1900s and outnumbered their male counterparts in earning undergraduate degrees by 1978. Despite these efforts, women were not seen as capable of delivering the same value, competence, or commitment to the labor force as their male counterparts, leading into the Women's Liberation Movement in the 1960s and 1970s. The Women's Liberation Movement pushed beyond legislation and pursued equal opportunity and personal freedom of choice for women – this was the beginning of the workplace gender equity discussion, and we are still discussing today.

Within the gender equity in the workplace realm of study, there is a specific phenomenon known as "The Motherhood Penalty" that has potential far reaching consequences, both for industry and for society as a whole. The motherhood penalty, also known as the cost of motherhood, is defined as negative impact on women's earnings and career progression in the labor market as a result of childbearing and/or child-rearing (Budig and England, 2001). Although the definition seems simple, the issue is complex and multifaceted. Mothers' remuneration and career progression have been compared to that of childless women, men and fathers, but the question remains - have efforts dedicated to attaining gender equity in the workplace been beneficial towards reducing the motherhood penalty.

Societal beliefs about the position and capability of women continues to evolve, and so evolves the definition of fatherhood, parenthood, and roles within the structure of a family. This

evolution is far too sizeable to discuss and review here but should not be overlooked as an intersecting topic to women in the workplace.

Although this literature review is limited to research publications related specifically to the motherhood penalty, looking at this specific research without a cursory review of impacting phenomena would be an oversimplification to a complex and dynamic topic.

- At the 1978 Women's Exposition, Marilyn Loden coined the term "glass ceiling" referring to the invisible barriers women may encounter rising to the top of the corporate ladder. The phenomenon of Loden's "glass ceiling" sparked like wildfire in the academic community leading to over 2000 peer reviewed research publications and academic conference presentations to date (Loden, 1987).
- In the autumn of 1979, Martha Hill published novel research titled "The Wage Effects of Marital Status and Children" in The Journal of Human Resources and "The Motherhood Penalty" was conceived (Hill, 1979).
- Catherine White Berheide was conducting research in 1992 (State University of New York) on women in low paying employment, she coined the term "sticky floor". The sticky floor refers to the inability of women in low paying jobs to move up due to limited education and training investment in women at these levels (Harlan and White Berheide, 1994).
- Elizabeth Cabrera (George Mason University) have led research and publications into fixing "the leaky pipeline". The concept of the leaky pipeline began with research about understanding women's underrepresentation in science, technology, engineering and math (STEM) careers (generally higher paying) and evolved into a

movement to encourage young women to pursue higher education leading into these traditionally male dominated and higher paying careers Cabrera, 2009).

- "The mommy track" is another related topic of academic interest. The mommy track refers to mothers putting priority on family life and receiving accommodation in the workplace, such as flexible hours. Studies have shown that the mommy track provides fewer opportunities for career advancement (Chen, 2003).
- Separate from the glass ceiling concept, which is defined as invisible barriers women may encounter rising to the top of the corporate ladder, the "maternal wall" is thought to be another mechanism that prevents mothers from progressing in their careers, well before discussions of the top of the corporate ladder are a consideration. The maternal wall can be described as women encountering discrimination in the workplace due to past, present or future pregnancies or maternity leaves. This genre of study is related to maternal stereotyping that leads to discrimination encountered by working mothers in seeking employment, promotion, or any measure of career progression (Crosby et al, 2004).

Figure 1 associates the mechanisms discussed above to pictorially demonstrate their connection. Specifically, a discussion of the motherhood penalty would be incomplete without at least an overview about these interrelated mechanisms, as they are possible contributors to the motherhood penalty. Overall, conceptually – and practically – a lot of important work has emerged over the last few decades to understand and advance women's career outcomes.

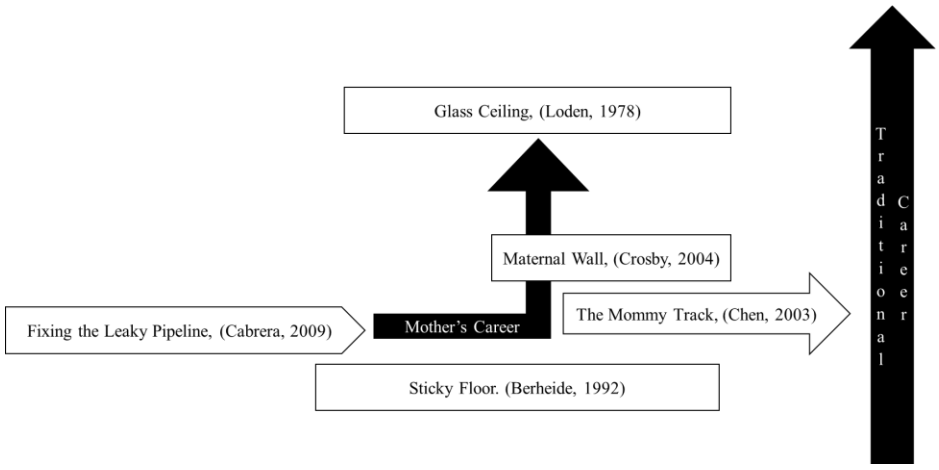


Figure 1: Broad interrelated phenomena associated with mothers in the workplace

There are five literature reviews (Waldfogel, et al., 1998; Benard, 2007; Gough and Noonan, 2013; Pepping and Maniam, 2020; Wang et al., 2023) and two meta-analyses (Cukrowska-Torzewska et al., 2020; de Linde Leonard, 2020) published in the last few decades on the topic of the motherhood penalty. Agreement on magnitude and cause of the motherhood penalty is not unified within the literature. Research has shown the wage disparity for mothers is noted to range from 0% - 20%, with a similar spectrum of negative impact on career progression in terms of promotions and impressions of competence. Studies have shown antecedents of the motherhood penalty include valuing power versus valuing family values as a gendered contrast that may contribute to employment opportunities accepted by women versus men (Lips and Lawson, 2009). Other identified antecedents discussed in the literature are cultural beliefs about motherhood (Misra et al., 2011) and gender norms (Brown, 2010, Goldin, 2014; Almond, 2023). Despite women comprising almost half of the U.S. workforce and being responsible for the majority of consumer spending, there remains a pervasive, albeit often subconscious, belief that women's earnings are not essential to their families' financial stability (Ruggles, 2015).

Although research and analysis to date are thorough, the U.S.-based studies have primarily leveraged data from the National Longitudinal Survey of Youth 1979. The landscape with respect to policy and gender roles has and continues to evolve since the topic of the motherhood penalty came into focus in the 1990s. In their seminal paper, Budig and England (2001) analyzed data from the NLSY79 survey (years 1982 – 1993) and cited depreciation of human capital as the theoretical mechanism explaining an average 7% per child motherhood penalty. Their research has been the springboard for subsequent endeavors to understand and mitigate the motherhood penalty. Despite the significant amount of research that has emerged over the past few decades on the motherhood penalty, an important concern now exists: how has the motherhood penalty changed over time? Given the evolution in gender roles and given changes in how women -- and mothers specifically – have worked to gain human capital through education- and career-related changes, there is good reason to suspect that the motherhood penalty has changed over time. Herein this dissertation, I seek to theoretically and empirically examine how gender roles and changes in mothers' human capital over time have led to concomitant changes in the motherhood penalty.

To achieve this aim, I first undertake a comprehensive literature review. Three theoretical lenses have predominantly guided research on the motherhood penalty, including gender role theory, human capital theory, and research on compensating wage differentials. Accordingly, I initially describe each of these theoretical frameworks and then subsequently frame the literature review primarily in these three lenses. The focus of this dissertation and literature reviewed first examines motherhood penalty dependencies on presence and number of children (Budig and England, 2001; Kahn et al., 2014), marital status (Budig and England, 2001; Musick et al., 2020), fertility delays (Miller et al., 2011), race (England, et al., 2016; Looze, 2017), mother's

educational attainment (Amuedo-Dorantes and Kimmel, 2005) and other human capital measures such as years of experience and seniority (Budig and England, 2001). For completeness I also capture additional idiosyncratic studies that have leveraged other random theories and I review this literature that explores these other factors that have been researched as positive and negative influences on the motherhood penalty such as job effort required (Cha et al., 2013; Glauber et al., 2023), mother's job mobility (Looze, 2017), work-family policies (Misra et al., 2011; Hallden et al., 2016; Baranowska-Rajat and Matysaik, 2016; O'Rourke et al., 2023), industry sector (Ishisuka et.al., 2020 and Hallden et al., 2016), differences in findings based on geography - country level differences based on policy and cultural norms (Budig and England, 2001; Gangl and Ziefle, 2009; Felfe et al., 2012; Davis and Pierre, 2005; Molina and Monteunga, 2009; Hsu et al., 2021; Kang et al., 2023) and research regarding status, cognitive and gender bias that may lead to status and normative discrimination as they related to the motherhood penalty (Budig and England, 2001; Heilman and Okimoto, 2008; Benard and Correll, 2010; Kricheli-Katz, 2012; Morgenroth et al., 2020; Wang et al., 2023), as well as findings related to the long-term impacts of the motherhood penalty (Abendroth et al., 2014; Kahn et al., 2014; Kingsbury, 2019; Van Winkle et al., 2020; Lorenti et al., 2023).

As noted, in addition to digesting the evolution of research and theoretical foundations of the motherhood penalty, this dissertation attempts to contribute by building on Budig and England's (2001) seminal study by theoretically updating how changes in gender roles and human capital have changed the nature of the motherhood penalty and then empirically examining this concern. With the recent release of the full National Longitudinal Survey of Youth 1997 data set (NLSY97: surveys conducted from 1997 – 2020), using an appropriately time framed pooled sample to empirically assess if and how things have changed in both

quantitative and theoretical terms since Budig and England's (2001) work using NLSY79 data from approximately 25 years ago. In doing so, I provide an updated understanding of the reported average 7% per child motherhood wage penalty and examine relevant moderators including marital status, race, mother's age at first birth and human capital to determine if changes in the landscape have impacted the motherhood penalty in the U.S. work environments.

In addition to the influences considered by Budig and England (2001) leveraging NLSY79 dataset elements available, my research attempts to contribute to the body of knowledge with the addition of Grit into the conversation. Grit is defined as perseverance and passion for long-term goals (Duckworth et al., 2007). Not available in the NLSY79, the NLSY97 dataset measures Grit, using the Short Grit Scale (Grit-S), based on the work of Duckworth et al. (2009). Research to date has shown validity between Grit-S results and educational attainment, students predicted GPA, predicted retention among West Point cadets and final round attainment among Scripps National Spelling Bee competitors (Duckworth et al., 2009). Grit has also been shown to be a predictor of academic achievement (Lam et al., 2019) and positively related to well-being (Vainio and Daukantaite, 2016). Given that about half the questions of the Grit measure are related to resilience and the other half of the questionnaire is related to consistent interests over a long period of time (Duckworth et al., 2007), I consider Grit relevant in understanding the relationship between motherhood and career success measures (wages and career progression). I find Grit particularly interesting to review with respect to the motherhood penalty as it brings a behavioral element into focus to complement the predominant extant focus on human capital (i.e., knowledge and experience-based differences between mothers and non-mothers) and more culturally defined gender roles of mothers. Can the grit of mothers influence the penalty placed upon them? I also find grit interesting as the concept is more subjectively

measured, which might surface questions as to the accuracy of one's perception of themselves and whether this perception, if accurate, has an impact on how they are evaluated. In my dissertation I attempt to empirically assess the influence of Grit as a moderator on the motherhood penalty.

This dissertation makes several important contributions to the motherhood penalty research. First, I contribute by providing an updated understanding of the motherhood penalty. As scholars, we have learned so much from the study of the motherhood penalty. However, the theories that have driven the vast majority of this research have been tested using data from over 20 years ago, and the world has changed dramatically over this period of time. Without updating our understanding of the motherhood penalty with contemporary data, our theory, research, and implications are at risk of becoming obsolete. Therefore, I seek to provide an updated understanding of gender role theory and human capital in regard to the motherhood penalty, and empirically assess this updated understanding using the most current data. Second, there is significant reason to believe key aspects leading to a wage penalty for mothers have evolved as evidenced today by mothers increased labor force participation, women's' increased educational attainment, trends in women delaying marriage and entry into motherhood. Gender roles and norms have shifted which has afforded mothers increased opportunity to specialize in their labor force activities. I hope to reveal how the relationship between having children and mothers' wages is impacted now by commonly examined moderators including marital status, race, mother's age a first birth and human capital. Finally, I contribute by examining Grit and the motherhood penalty. Grit has not been previously assessed within the motherhood penalty literature and is a non-cognitive measure, not rooted in norms. I hope to forward understanding of the motherhood penalty with the addition of Grit into the conversation.

From the perspective of practice, with the outcomes of my dissertation, I hope to point to potential influences that could inform policy and workplace practice to narrow any divide between mothers and non-mothers in the workplace. As an example, incorporating comprehensive paid paternity leave into workplace parental policies could have a transformative effect on gender roles within the domestic sphere and significantly boost mothers' transition back into the workforce. By permitting fathers to dedicate time to care for their newborns, such policies organically distribute early childcare responsibilities more equitably, allowing mothers the necessary time to recuperate and prepare for resuming professional roles. This shared responsibility can mitigate the physical and psychological obstacles that potentially impede a smooth return to work for new mothers. Also, paid leave for fathers encourages the active involvement of both parents in early childhood care, challenging long-standing gender norms that typically place the responsibility of child-rearing solely on mothers. This progressive shift not only supports maternal interests but also signals an equitable family-friendly work environment that recognizes and facilitates the dual roles of both parents, paving the way for a more balanced, inclusive, and productive workplace.

CHAPTER 2: LITERATURE REVIEW

The motherhood penalty women face in the workplace is not single sourced; it is a multi-dimensional problem. In order to better understand known concepts impacting mothers in the workplace, a literature review is necessary. As the literature will reveal, although mothers have made strides in many areas, differences between mothers and non-mothers (both men and women) persist beginning from entry into the workforce through life course (Goldin, 2014). This literature review will reveal the complexities related to inequities mothers face in the workforce ranging from theoretical foundations explaining the motherhood penalty (Waldfogel, 1997; Budig and England, 2001; Avellar et al., 2004; Correll et al., 2007; Heilman and Okimoto, 2008; Lips et al., 2009; Benard and Correll 2010; Gangl et al., 2009; Budig and Hodges, 2010; Misra et al., 2011; Budig et al., 2012; Felfe et al., 2012; McIntosh, 2012; Abendroth et al., 2014; Cukrowska-Torzewska and Matysiak, 2020; Albiston, 2023; Bari et al., 2023; O' Neil et al., 2003, cultural beliefs about motherhood (Misra et. al, 2011; Budig et al., 2012; Goldin, 2014; Socratous et.al., 2016; Weeden et al., 2016; Albiston et al., 2023; Kang et al., 2023) ideal worker norms embedded in organizational culture (Brown, 2010; Goldin, 2014) quantification of the motherhood penalty (Waldfogel, 1998a; Waldfogel 1998b; Budig and England, 2001; Anderson et al., 2002; Anderson et al., 2003; Avellar and Smock, 2003; Benard, 2007; Gangl and Ziefle, 2009; Jee et al., 2019; England et al., 2016; Rose, 2023), factors influencing the motherhood penalty (Budig and England, 2001; England et al., 2001; Anderson, 2003; Amuedo-Dorantes and Kimmel, 2005; Hamil-Luker, 2005; Glauber, 2007; Loughran and Zissimopoulos, 2009; Miller, 2011; Misra et al., 2011; McIntosh, 2012; Cha et al., 2013; Kahn et al., 2014; Looze, 2014; Baranowska-Rataj, 2016; Looze, 2017; Jee et al., 2019; Musick, 2020; Van Winkle and Fasang, 2020; Glauber et al., 2023) and the longer-term impacts of the motherhood penalty (Abendroth,

et al., 2014; Kahn, et al., 2014; Kingsbury, 2019; Van Winkle and Fasang, 2020; Lorenti et al., 2023).

It is necessary to note this literature review is comprehensive. Although my study focuses on a limited number of theoretical foundations and is confined to data from the United States of America, I synthesize a sample of published research from 1975 – August 2023 for completeness. I begin this literature review by outlining my search methodology and process for inclusions. I then move to a review of all theoretical foundations used in the literature included, followed by a discussion of all the main themes within the literature included. I do not leverage all theories or main themes discussed in the development of my hypotheses but still include them in my review for completeness. This comprehensive review is necessary to focus on crucial aspects that may impact the motherhood penalty and manifest expertise on the topic of the motherhood penalty.

2.1 Identifying literature reviewed

2.1.1 Search strategy and identification

As a necessary first step of achieving robust research, a systematic literature search was conducted. In this review a search was performed for relevant peer reviewed literature, leaving out conference papers, dissertations and works in progress, using Google Scholar. Various combinations of keywords were selected that include “motherhood and career progression”, “motherhood penalty”, “motherhood wage gap”, “mothers in leadership” and “women in leadership”. I searched for articles from 1975 - August 2023.

The search resulted in a collection of 257 studies. Following a preview of the studies, 64 studies were removed from consideration as duplicates or revisions. Abstracts were reviewed of the remaining 193 publications, of which 44 were eliminated as they did not directly address the

subject. 149 full papers were evaluated for inclusion, of which 64 were excluded as they were found not to be original research or opinion pieces (27), used obscure measures (12), had an alternative focus (17), were literature reviews or meta-analyses (8). During review of full papers, references of the published literature were scrutinized to ensure completeness of inclusions within my literature search. No additional publications were added during this verification process. Included within the following literature review are 85 English, peer reviewed journal articles (refer to Table 1: Summary table of included research publications). Figure 2 summarizes the process and eventual inclusion of literature within this literature review section.

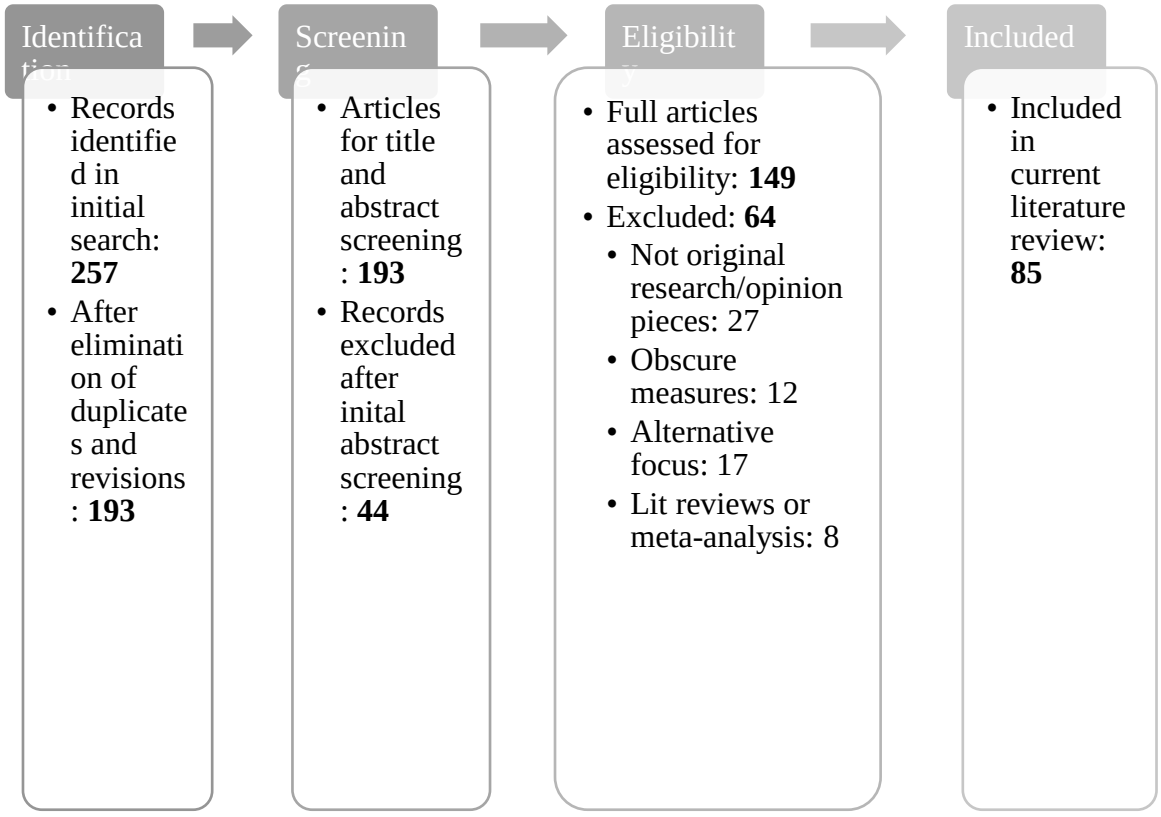


Figure 2: Research selections for inclusion

2.1.2 Summary of inclusions

Eighty-five original research studies are included in this review. For the purpose of completeness, 6 literature reviews and 2 meta-analyses were evaluated but excluded from the summaries. Of the 85 original studies, 46 are from the United States (U.S.), 17 are cross-national and 22 focus on a single country outside of U.S.A., including the United Kingdom, Germany, Spain, Denmark, and a single study from China, Cyprus, Scotland, Canada, Finland, Korea, Ireland, Israel, Japan, Poland, Russia each. The majority of these studies are quantitative, cross-sectional in nature, with a few qualitative and mixed methods studies. Various data sources are cited across the body of research, including interviews as well as laboratory and field experiments for qualitative papers. It is interesting to note that longitudinal studies are scarce on the topic of the motherhood penalty. Longitudinal studies often have the ability to provide time-based sequence of possible causes and effects, consistent with causal relationships - this type of evidence is markedly absent from motherhood penalty research.

Although literature reviewed includes multiple data sources and varying geographies for completeness (please refer to Table 1: Summary table of included research publications), of particular interest to my research are data sources that include the use of U.S.-based, government-conducted surveys including the Current Population Survey, National Longitudinal Survey of Young Men 1968, National Longitudinal Survey of Young Women 1968, Panel Survey of Income Dynamics and National Longitudinal Survey of Youth 1979 (NLSY79). Of the 85 studies included in this section, ~30% include the use of data either solely or in combination from NLSY79. Table 1 provides a summary of publication year, author, source, theoretical foundations, data source(s), geography and study design of research included within the literature review of this dissertation.

Table 1: Summary table of included research publications

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
1979	Hill	J. of Human Resources	Gender Role Theory	Panel Study of Income Dynamics	USA	Quantitative Cross-sectional
1997	Waldfogel	American Sociological Review	Human Capital Theory	National Longitudinal Survey of Young Women 1968	USA	Quantitative Cross-sectional
1998	Waldfogel	J. of Labor Economics	Human Capital Theory	National Longitudinal Survey of Youth 1979 and National Child Development study (UK)	Cross National	Quantitative Cross-sectional
2001	Budig	American Sociological Review	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
2002	Anderson	American Economic Review	Compensating Wage Differentials	National Longitudinal Survey of Young Women 1968	USA	Quantitative Cross-sectional
2003	O'Neill	American Economic Review	Gender Role Theory	National Longitudinal Survey of Youth 1979 and Current Population Survey	USA	Quantitative Cross-sectional
	Hotchkiss	American Economic Review	Signaling Theory	Health and Retirement Survey	USA	Quantitative Cross-sectional
	Anderson	Industrial and Labor Relations Review	Human Capital Theory Signaling Theory	National Longitudinal Survey of Young Women 1968	USA	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2003	Avellar	J. of Marriage and Family	Human Capital Theory	National Longitudinal Survey of Young Women 1968 and National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
2005	Amuedo-Dorantes	Review of Economics of the Household	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Davies	J. of Labor Economics	Human Capital Theory	German Socio-Economic Panel, British household panel survey	Cross National	Quantitative Cross-sectional
	Hamil-Luker	Social Science Quarterly	Human Capital Theory	National Longitudinal Survey of Young Women 1968 and National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
2007	Correll	American Journal of Sociology	Status Characteristics Theory	Experiment and Audit Study	USA	Mixed Methods Cross-sectional
	Glauber	J. of Marriage and Family	Economic theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
2008	Heilman	J. of Applied Psychology	Gender Role Theory	Laboratory Study	USA	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2009	Loughran	J. of Human Resources	Discrimination Theory	National Longitudinal Survey of Youth 1966 - 1968, National Longitudinal Survey of Youth 1979, National Longitudinal Survey of Young Men 1966, National Longitudinal Survey of Young Women 1968	USA	Quantitative Cross-sectional
	Gangl	Demography	Human Capital Theory	Harmonized longitudinal data from British Household Panel survey (BHPS), German socioeconomic panel (GSOEP), NLSY 79	Cross National	Quantitative Cross-sectional
2009	Molina	J. of Family and Economic Issues	Human Capital Theory	European Community Household Panel	Spain	Quantitative Cross-sectional
	Lips	Sex Roles	Expectancy Value Theory	Laboratory Study	USA	Quantitative Cross-sectional
	Cohen	Work and Occupations	Gender Role Theory	U.S. Decennial Census data	USA	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2010	Budig	American Sociological Review	Human Capital Theory Compensating Wage Differentials	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Benard	Gender and Society	Discrimination Theory	Laboratory Study	USA	Quantitative Cross-sectional
2010	Brown	Employee Relations	None	Interviews	USA	Qualitative
2011	Miller	J. of Population Economics	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Misra	Community, Work and Family	Human Capital Theory	Luxemburg Income Study	Cross National	Quantitative Cross-sectional
2012	Kricheli-Katz	Law and Society Review	Theory of Choice Theory of Constraints	Current Population Survey and Experiment	USA	Mixed Methods Cross-sectional
	Budig	Social Politics	Gender Role Theory	Luxemburg Income Study	Cross National	Quantitative Cross-sectional
	Gayle	J. of Labor Economics	None	Standard and Poor's Executive Compensation Database	USA	Quantitative Cross-sectional
	Felfe	Labor Economics	Compensating Wage Differentials	German Socio-Economic Panel	Germany	Quantitative Cross-sectional
2012	Herman	J. of Social Issues	Social Comparison Theory	Interviews	Cross National	Qualitative
	McIntosh	Gender in Management	Human Capital Theory	NHS Nurses Database	Scotland	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2013	Cha	Gender and Society	Gendered Organizations	Survey of Income and Program Participation	USA	Quantitative Cross-sectional
	Kricheli-Katz	J. of Empirical Legal Studies	Theory of Choice Theory of Constraints	Laboratory Study	USA	Mixed Methods Cross-sectional
	Killewald	American Sociological Review	Specialization Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
2014	Aranda	Group Processes and Intergroup Relations	Signaling Theory	Laboratory Study	Spain	Quantitative Cross-sectional
	Budig	Third Way, 2	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Rahim	Review of Economics of the Household	Economic theory and Preference theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Kahn	J. of Marriage and Family	Human Capital Theory	National Longitudinal Survey of Young Women 1968	USA	Quantitative Cross-sectional
	Abendroth	American Sociological Review	Human Capital Theory Compensating Wage Differentials	European Community and Housing Panel	Cross National	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2014	Goldin	American Economic Review	Human Capital Theory Ideal Worker Norms	Current Literature	Cross National	Qualitative
	Looze	J. of Marriage and Family	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Viitanen	Review of Economics of the Household	Human Capital Theory	UK National Child Development Study	UK	Quantitative Cross-sectional
2015	Ruggles	Demography	Various	Various U.S. Bureau of Labor Statistics	USA	Quantitative Cross-sectional
	Gonzalez	Interdisciplinary Science Reviews	Life Course Theory	SICA database - Andalusian System of Scientific Information	Spain	Quantitative Cross-sectional
2016	England	American Sociological Review	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
	Budig	Work and Occupations	Human Capital Theory Compensating Wage Differentials	Luxemburg Income Study Original Policy Data	Cross National	Quantitative Cross-sectional
	Cukrowska-Torzewska	Economics of Transition	Theory of Specialization	Household Budget Survey and Polish Labor Survey	Poland, Hungary	Quantitative Cross-sectional
	Baranowska-Rataj	J. of Labor Research	Economic Theory	EU Survey on Income and Living Conditions	Cross National	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2016	Hallden	Social Politics	Discrimination Theory	European Community and Housing Panel	Cross National	Quantitative Cross-sectional
	Socratous	Equity, Diversity and Inclusion	Preference Theory	Interviews	Cyprus	Qualitative
	Weeden	J. of the Social Sciences	Human Capital Theory	Current Population Survey	USA	Quantitative Cross-sectional
2017	Blau	J. of Economic Literature	Various	Panel Study of Income Dynamics	USA	Quantitative Cross-sectional
	Looze	Social Science Research	Human Capital Theory	National Longitudinal Survey of Youth 1979	USA	Quantitative Cross-sectional
2018	Andersen	J. of Marriage and Family	Economic Theory	Statistics Denmark	Denmark	Quantitative Cross-sectional
	Weisshaar	American Sociological Review	Human Capital Theory Signaling Theory	Laboratory Study	USA	Quantitative Cross-sectional
2019	Kingsbury	Frontiers in Sociology	Human Capital Theory	Russian Economic Study	Russia	Quantitative Cross-sectional
	Jee	J. of Marriage and Family	Human Capital Theory	Panel Study of Income Dynamics	USA	Quantitative Cross-sectional
	Glynn	American Progress	Human Capital Theory	Current Literature	USA	Qualitative

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2020	Van Winkle	J. of Marriage and Family	Human Capital Theory	National Longitudinal Survey of Youth 1979 National Longitudinal Survey of Youth 1997	USA	Quantitative Cross-sectional
	Kelley	J. of Academic Librarianship	Expansionist Theory	Survey to Members of Association of Research Libraries (English speaking)	Cross National	Quantitative Cross-sectional
	Musick	American Sociological Review	Human Capital Theory	U.S. Panel Study of Income Dynamics German Socio-Economic Panel, British Household Panel Study	Cross National	Quantitative Cross-sectional
	Skora	Sustainability	Human Capital Theory Job Search Theory	German Socio-Economic Panel	Germany	Quantitative Cross-sectional
	Cukrowska-Torzewska	Social Science Research	Discrimination Theory	EU Survey on Income and Living Conditions	Cross National	Quantitative Cross-sectional
2021	Ishisuka	Demography	Discrimination Theory	Field Experiment	USA	Quantitative Cross-sectional
	Herbst-Debby	Advances in Life Course Research	Life Course Theory	National Insurance Institute	Israel	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2021	Mari	European Sociological Review	Human Capital Theory	Socio-economic Panel	Germany	Quantitative Cross-sectional
	Hsu	Advances in Life Course Research	Human Capital Theory	Japanese Panel Survey of Consumers	Japan	Quantitative Cross-sectional
	Thebaud	Gender and Society	Gendered Organizations	Interviews	USA	Qualitative
	Morgenroth	J. of Applied Social Psychology	Gender Role Theory	Laboratory Study	USA	Quantitative Cross-sectional
	Niemisto	Work, Employment and Society	Critical theory	Interviews	Finland	Qualitative
	Benny	Institute of Social and Economic Research	Economic Theory	UK National Child Development Study	UK	Quantitative Cross-sectional
	Borghorst	Tinbergen Institute Discussion Paper	Compensating Wage Differentials	Longitudinal Administrative Register	Denmark	Quantitative Cross-sectional
2022	Wuestenenk	Social Science Research	Compensating Wage Differentials	European Sustainable Workforce Survey	Cross National	Quantitative Cross-sectional
	Ma	J. of Asian Economics	Human Capital Theory	Chinese household income project	China	Quantitative Cross-sectional
2023	Lorenti	Max Planck Institute for Demographic Research	Human Capital Theory	Statistics Finland Register, Italian Survey on Household Income and Wealth, U.S. Panel Study on Income Dynamics	Cross National	Quantitative Cross-sectional

Table 1: Summary table of included research publications (cont.)

Year	Author	Source	Theory	Data Source(s)	Geography	Study Design
2023	Glauber	Community, Work and Family	Theory of Specialization	U.S. Department of Labor's Occupational Information Network and National Longitudinal Survey of Youth 1997	USA	Quantitative Cross-sectional
	O'Rourke	Women's Studies International Forum	Discrimination Theory	Corporate Policy Review	USA	Qualitative
	Albiston	Law and Social Inquiry	Gender Role Theory	Field Experiment	USA	Quantitative Cross-sectional
	Rose	University of Manchester Press	Discrimination Theory	Labor Force Survey	UK	Quantitative Cross-sectional
	Glauber	osf.io	Gender Role Theory	Current Population Survey	USA	Quantitative Cross-sectional
	Bari	J. of Family and Economic Issues	Human Capital Theory	Survey on Income and Living Conditions	Ireland	Quantitative Cross-sectional
	Almond	National Academy of Sciences	Economic Theory of Identity	U.S. Unemployment Insurance Database	USA	Quantitative Cross-sectional
	McGannon	Communication and Sport	Framing Theory	Canadian Media Stories	Canada	Qualitative
	Zheng	International Labor Review	Human Capital Theory	National Bureau of Labor Statistics	China	Quantitative Cross-sectional
	Kang	Family Relations	Economic Theory Human Capital Theory	Luxemburg Income Study, Korean Labor Study and U.S. Income Panel Survey	Cross National	Quantitative Cross -sectional

2.2 From a theory perspective

Researchers have rooted studies in a number of theories to explain aspects of the motherhood penalty - there are three main theories that are prevalent within the literature: Human Capital Theory, Compensating Wage Differentials and Gender Role Theory.

2.2.1 Human capital theory

Of the 85 studies included in this review, over 50% cite Becker's Human Capital Theory as a grounding. In their seminal paper, Budig and England (2001) consider measures of human capital to include education, years of full-time and part-time work experience and years of full-time and part time seniority (i.e., experience in the organization for which one currently works) (Budig and England, 2001). According to Becker (2009), education is considered human capital as it enhances individual capabilities, contributes to economic growth, and plays a vital role in the overall development of individuals and societies. Education is an investment in productivity of individuals, with long-term benefits for both the individual and society. Experience is a second valuable component of human capital. Experience enriches people with practical knowledge, skills, and insights that are essential for success. Employers recognize the significance of experience when evaluating the capabilities and potential contributions of individuals in the workforce (Waldfogel, 1997). Finally, seniority is valued as wealth of experience, knowledge, and skills it brings to an organization (Budig and England, 2001).

According to Waldfogel (1997), Becker's theory of human capital suggests that the wage gap between mothers and non-mothers can be attributed to the decreased labor market experience of mothers who spend more time outside of the workforce for childbearing and childrearing. Additionally, women with family responsibilities may bring less effort to their jobs due to the time and effort they invest in household activities. Human capital of women acquired

prior to a motherhood-related career break of a significant length appears to become weakened by motherhood-related workplace absence, leading to a lifetime of mothers playing career catch up (McIntosh, 2012). Earnings typically increase with the accumulation of human capital over the course of one's life, which includes age, experience, and education. However, for mothers, this effect is diminished compared to women without children due to the time and energy constraints associated with childbearing and child rearing. The Human Capital theory also considers children as commodities or goods within modern families, with the presence or number of children being factors that influence parents' decisions and financial abilities. Families with higher incomes are often able to afford more children. Disparities in income resulting from parenthood and family size stem from differences in experiential or other forms of human capital between mothers and fathers. Research has shown that the wage gap can be attributed to mothers accumulating less human capital due to career interruptions, time spent out of the labor market, or working fewer hours compared to women without children and fathers (Bari et al., 2023; Cukrowska-Torzewska and Matysiak, 2020; Gangl et al., 2009; Misra et al., 2011; Waldfogel, 1997).

2.2.2 Theory of compensating wage differentials

The theory of compensating wage differentials (CWD) was first proposed by Adam Smith in 1776 and formalized by Rosen in 1986. CWD establishes that jobs are parcels of wages and non-wage characteristics and that the loss in one aspect should be compensated by a gain in the other. Of the studies included in this review, approximately 8% are grounded in CWD.

It is assumed that women, once having children, may experience a loss in wages seeking an improvement in their work conditions to better accommodate increased practicalities and burden associated with child rearing. A key element considered is work schedule. Presented with

the challenge that time becomes a scarce resource for women once having children, a reduction in working hours may be a compensating choice (Abendroth et al., 2014). Employment that routinely requires an unconventional working schedule, such as night shift or rotating shifts may not be compatible with the operating schedules of childcare institutions, so wages may be traded for employment during traditional working hours, with mothers accepting lower wages to have the more favorable daytime working hours and the ability to avail of childcare resources such as daycare institutions (Felfe et al., 2012). Another consideration grounded in CWD is degree of flexibility of a job such as flexible working hours and the possibility of remote working arrangements. These attributes may allow a mother to set and adjust her working schedule to suit the needs of her children, where higher wages are traded for reduced commuting time or flexibility around specific fixed working hours. The potential for reduction in physical and mental effort required by an occupation, as well as limited exposure to health hazards a mother is exposed to while performing paid work is another relevant dimension grounded in CWD, where mothers may choose to trade higher paying, more mentally or physically taxing occupations for lower paying "safer" ones to compensate for increased workload potentially associated with child rearing. The theory of compensating differentials suggests that in a competitive market, all jobs will need to offer a balance of monetary and non-monetary benefits in order to be equally appealing to all workers (Budig and England, 2001).

When comparing studies citing human capital theory and compensating wage differentials theory, results show that a significant motherhood penalty persists at all earnings levels but having children imposes the largest penalty on low-wage women. Compensating wage differentials account for a greater portion of the penalty among low earners and by contrast, for higher earning mothers, the motherhood penalty is smaller and largely explained by loss or

depreciation over time in human capital. Using a pooled sample from 1979 – 2004 waves of the NLSY79, Budig and Hodges (2010) found that the motherhood penalty is largest for the lowest-paid mothers and highly attributed to reduced work effort. Their study indicates that women in lower-earning type jobs experience difficulty managing work and family obligations, due to the nature of lower paid work often demanding inconsistent work schedules and lack of autonomy in setting the pace and intensity of work. With the combined demands of family life, mothers on the lower end of the pay scale may more often choose to accept lower paying positions with more flexibility in an attempt to balance workload associated with both children and paid work. Conversely, diminished human capital, and more specifically, reduction in job experience during career breaks, accounts for the majority of the motherhood penalty in terms of reduced earnings, among medium- to high-earning mothers (Budig and Hodges, 2010).

2.2.3 Gender role theory, discrimination and gender stereotyping

In her seminal paper, Claudia Goldin states “the converging roles of men and women are among the grandest advances in society and the economy in the last century. These aspects of the grand gender convergence are figurative chapters in a history of gender roles” (Goldin, 2014). The Oxford dictionary defines gender role theory as “the environmental causes of gender roles and the impact of socialization, or the process of transferring norms, values, beliefs, and behaviors to group members, in learning how to behave as a male or a female”. Environmental causes of gender roles relate to expectations of individual men or women’s behaviors as they relate to family, education and peer groups, culminating in women having less time and energy for paid work due to tasks related to household expectations, perpetuating gender stereotypical behaviors. Of the studies reviewed, ~15% are rooted in Gender Role Theory, stereotyping and discrimination.

Laboratory experiments, audit studies, and qualitative research indicate that gender stereotypes influence evaluations of mothers (O' Neil et al., 2003; Heilman et al., 2008; Morgenroth 2021; Albiston 2023; Correll et al., 2007). Studies have discovered two particular mechanisms in this area: status discrimination and normative discrimination (Correll et al., 2007; Benard and Correll 2010). Status discrimination is linked to descriptive stereotypes, which are commonly held beliefs about certain groups of individuals. For instance, there is a perception that mothers are less dedicated to their jobs compared to women without children (Budig et al., 2012). Status discrimination manifests as motherhood and childcare related leave as devalued status characteristics resulting in employers having lower expectations of the workplace competence and commitment of mothers compared with other types of workers. Throughout the literature reviewed, the readings assert that a portion of the motherhood penalty is attributable to discrimination based on the assumption that mothers are less competent and committed to paid work than other types of workers. When evidence is presented of mothers' superior abilities or committed efforts, they experience status discrimination shifting to normative discrimination (Benard and Correll, 2010). Normative discrimination occurs where employers may have an unconscious belief (or conscious) that for a mother to succeed, particularly in a traditionally male role, they need to deviate from culturally expected mother behaviors such as warmth and nurturing and demonstrate dominance and assertiveness (Benard and Correll, 2010). In their laboratory experiment, Benard and Correll had undergraduates at a private university in northwest U.S. (n = 260) evaluate a pair of job applicants for a mid-level marketing position. Fictitious completed job applications were created to manipulate sex (male or female), parental status (parent or non-parent) and past workplace and personal performance (GPA, performance ratings ranging from low to high). Raters completed surveys with respect to each reviewed

applicant's competence, commitment, promotability, warmth, likability and ability to perform the job. The study participants were also asked to suggest a starting salary from a pre-determined salary range. The study found participants rated successful mothers as significantly less likable compared to otherwise identical fathers and a substantial proportion of lower starting salary recommendations for mothers was mediated by the perception that successful mothers are less warm, nurturing and more assertive.

Interestingly, in Heilman and Okimoto's 2008 study, one of the findings suggests that parenthood equally negatively affects perception of job commitment for both male and female parents, but only negatively impacts mothers in a measure of anticipated competence (Heilman and Okimoto, 2008). Heilman and Okimoto's experiment draws attention to job incumbents applying for promotion in traditionally male positions. Measuring anticipated achievement striving, job commitment, competence and focus, their findings demonstrate status bias against mothers in anticipated competence and suggest heightened association with gender stereotypes for mothers that influence greater negativity to be directed towards mothers than at nonmothers, when career advancement decisions are made.

2.2.4 Other theoretical perspectives in the literature

There are several other theories used to ground research concerning the motherhood penalty throughout literature. Lips et al., 2009 cite Expectancy Value Theory (Atkinson, 1964) proposing that, given heavy household and childcare responsibilities, the constraints mothers expect to face in the workplace and the resulting low expectancy of success, women may place less value on work and more on family. According to economic theory, the effects of family size (Baranowska-Rataj et al., 2016) job flexibility (Benny et al., 2021) and total household income (Andersen et al., 2018; Kang, 2023) on employment are more likely to be negative for women

with a low earning potential who potentially prioritize spending time with their children and have a lower inclination towards paid work, are more likely to face negative repercussions on their employment.

Correll et al., 2007 and Benard et al., 2007 root their work in Status Characteristics Theory. Status characteristic theory states that expectations about performance capacity have two dimensions: competence (or ability) and effort - stereotypes or cultural beliefs tend to associate greater worth or competence with members of some categories (Heider, 1958). Motherhood is considered a status characteristic based on findings indicating that mothers are often viewed as less competent overall compared to fathers or women who do not have children (Wuestenenk et al., 2022). In Wuestenenk and Begall's vignette experiment based on 4 European countries (n = 7040), they asked respondents to rate desirability of 2 sets of 2 fictitious job openings that differed in salary, flexibility, overtime requirements and training. They found results contrary to the studies rooted in Compensating Wage Differentials. The findings suggest that mothers are equally willing to apply for lower-paying jobs if they offer more work flexibility and less overtime, compared to scenarios where the pay is lower without these benefits. In these situations, mothers were more inclined to apply for such positions compared to childless women and men, regardless of the presence of flexible working conditions. It is interesting to note that there were no consistent differences observed across the countries of Finland, Germany, Spain, and Hungary, despite variations in the level of institutional and cultural support for maternal employment.

Kricheli-Katz work in 2012 and 2013 argued that when characteristics are perceived to be controllable, the individuals who hold them are penalized, combining the theory of choice versus the theory of constraints. Through her controlled lab experiment, Kricheli-Katz found that

mothers are penalized in terms of hiring, salary recommendations, and competence evaluations compared with men and non-mothers when motherhood is perceived as voluntary, but when motherhood is perceived to be beyond an individuals' control, mothers are actually placed at an advantage compared with non-mothers. In her experiment, Kricheli-Katz first primed the participants with ideas about choice or constraints, founded in existing state government available funding for abortions for low-income women (prior to the overturning of Roe versus Wade in 2022), then asked the participants to examine job applications submitted by two equally qualified female applicants with differing maternal status. Study participants were then asked to offer an entry-level salary for both applicants and to recommend only one of them for hiring. She found that in participants primed with ideas about choice, mothers were discriminated against more strongly, in terms of hiring and salary recommendations (Kricheli-Katz, 2012; Kricheli-Katz, 2013).

In the experiments grounded in Signaling Theory (Aranda et al., 2014; Morgenroth et al., 2021) research indicates benefits to mothers with respect to hiring and perception of competence when dedication to work over family is signaled. Aranda and Glick's Spain based study had participants evaluate 2 candidates application materials. Materials submitted differed in work-family orientation in response to the application question "describe your life priorities". With identical opening statements (applicant was always described as married, with 2 children), the work-orientated profile then used language to signal dedication to work – for example, I am aware working requires sacrifices. The family-oriented application profile used language to signal dedication to family – for example, I love devoting time to my family and seeing my two small children grow up. Study participants were then asked to make a hiring recommendation and the study found that family devoted mothers were penalized in hiring recommendations, and

the same result was not found for family-devoted fathers. While Aranda and Glick's study used student participants, Morgenroth's 2021 study used US based participants with at least 1 year of work experience. Contrary to the finding of Aranda and Glick (2014), building on the "think-manager-think-male" paradigm, Morgenroth et al., (2021) experiment did not reveal a motherhood penalty with respect to managerial stereotypes.

The Theory of Specialization in the motherhood penalty research is essentially a theory of how partnership differentially affects mothers and fathers (Kilewald et al., 2013). Research shows larger motherhood wage penalties for married mothers than for unmarried mothers, as married mothers are thought to have spousal financial support, allowing them to choose to specialize in the household and trade off wages, where unmarried mothers, not having spousal financial support do not have the same option (Budig and England 2001; Glauber, 2007). Specialization within the household is considered a possible explanatory theory of women's motherhood penalty. This theory proposes that couples may adopt a strategy for dividing labor that enhances the overall well-being of the household. This includes considering the level of effort men and women are willing to invest in paid work outside the home, which can influence their earnings from employment.

Of the studies included in this literature review, quantitative studies applying various deductive theory far outnumber qualitative studies applying grounded theory. Qualitative research is thought to more deeply explore insights into real world problems by gathering participants' experiences, perceptions and behavioral observations in an attempt to answer the "how" and the "why", rather than the quantitative approach of analyzing numerical data points answering the "how much" question. Perhaps a shift to a qualitative approach earlier in the

lifecycle of this research domain may have shortened the conversation that has been ongoing since Martha Hill was first published in 1979 (Hill, 1979).

Each of the theories underpinning research adds a valuable perspective to the motherhood penalty conversation, highlighting a complexity of factors influencing the manifestation of the motherhood penalty. Based on the literature reviewed, each theory tells a valid story, but none have been found to explain the motherhood penalty in its entirety.

2.3 Discussion of main themes in the literature reviewed

Under the various theories discussed in the previous section, scholars have continued to refine understanding of the motherhood penalty by exploring influences that may impact mothers in the workplace. The remainder of this literature review explores the nuances discussed in the literature. Although, this dissertation focuses on updating our U.S.-based understanding of the motherhood penalty with respect to quantification, number of children, marital status, fertility delays, race, measures of human capital and Grit, this literature review is comprehensive and includes key aspects of positive and negative influence discussed in the literature.

2.3.1 Quantifying the motherhood penalty

Quantifying the motherhood penalty is complex. Researchers have attempted to quantify mother's earnings and the impacts of mother's age at first birth, number of children, mother's level of education, industry sector, maternal support policies, early childcare support structures and other elements. Societal norms, discrimination and motivation are discussed but are less simple to quantify. Of the literature reviewed there is no consensus on an actual percentage penalty mothers endure or even if the motherhood penalty exists at all, due to the complexity of evaluating interconnected factors and differing measures. The wage differential of mothers is noted within the literature to range from 0% - 20%. In terms of trends, research shows the wage

disparity between childless women and mothers has not declined substantially despite the rise in female labor force participation (Avellar and Smock, 2003; Jee et al., 2019). Comparing two cohorts of U.S. based women, Avellar and Smock (2003) found that the relationship between motherhood and wage loss did not diminish between 1975 and 1985 in the United States. In a study published in 2019 Jee, Misra and Murry-Close attempt to understand if the motherhood wage gap has changed over time. In the U.S. between 1986 – 2014 women's involvement in the workforce significantly increased as well as women's average level of education over the same time span. They used data from the U.S. Panel Study of Income dynamics. Controlling for education and experience, the study suggests that the average motherhood penalty in the United States has increased from 8% to 14% for mothers with one child and slightly reduced for mothers with multiple children. Specifically, for mothers with one child, between 1986 to 1995 and 2006 to 2014, the motherhood penalty remained steady when controlling for education and experience. Despite marked improvement in education and experience over time, the motherhood wage penalty remained stable. For mothers with multiple children during the same period, there appears to be a reduction in the wage gap, which disappears once the researchers control education and experience. The study found that education is a more significant human capital factor in narrowing the wage gap for mothers with one child, where experience is more important to mother's wages for mothers of two or more children. Jee et. al (2019) conclude that the efforts of women to maintain human capital through motherhood-related career breaks and investment in education may not be sufficient measures to lower the motherhood penalty in the United States.

Other U.S.-based studies indicate the effects of motherhood on the wages are estimated to be 20% per child (Waldfogel, 1998b), 17.5% per child (Waldfogel, 1998a), 15 % per child

(Anderson et al., 2002), 3–5 % per child (Anderson et al., 2003), 15 % per child (Gangl and Ziefle, 2009), 7% per child (Budig and England, 2001; Rose, 2023), 10% per child for privileged women (England, 2016), 5% per child (Benard, 2007). The differences in quantifying the motherhood penalty in the literature revolve around nuances with each study. Where varying industry contexts, geographies, data sources, methods and measures are used in analysis to quantify the wage gap for mothers, with the same eventual broader finding of evidence of a wage penalty for mothers in the workplace.

There are two meta-analyses on the Motherhood Penalty published in 2020 (de Linde Leonard and Stanley, 2020; Cukrowska-Torzewska and Matysiak, 2020). Both analyses are cross-national and discuss the challenges of interpreting the available studies. de Linde Leornard found a motherhood penalty of about 4% ±2%, per child, for U.S. mothers and interpret the results to be consistent with a perceived productivity effect or with discrimination, while Cukrowska-Torzewska found an average motherhood penalty of around 3.6–3.8% per child, explained by loss of mothers' human capital during child-related career breaks. Both studies indicate geographical differences based on policies, cultural norms and childcare availability differences.

2.3.2 Number of children

Studies have demonstrated that the presence of children can impact women's employment status, particularly in terms of leaving the labor market. Research indicates that each additional child is linked to a decreased likelihood of maintaining employment, with the first child posing the greatest risk of exiting the labor market (Kahn et al., 2014). The gap in earnings between women without children and mothers is most significant in their 20s but diminishes as they age. By the time they reach their 40s and 50s, penalties are only evident for mothers with three or

more children. Pregnancy and caring for children are linked to reduced participation in the workforce, but as children get older, mothers' employment rates rebound.

The extent to which women experience obstacles in advancing their careers is influenced by the age of their school-aged children, with a more significant negative impact seen when children are younger (McIntosh, 2012). Women who take extended career breaks of over two years tend to face limitations and setbacks in their professional advancement. Findings demonstrate that while gender has a somewhat positive impact on male career growth, women see a gradual decline in career progression with each additional child. Additionally, part-time employees experience diminished career advancement regardless of whether they are mothers or fathers (England et al., 2016).

2.3.3 Marital status

In the U.S., never-married women experience lower motherhood penalties than married or divorced women and the motherhood penalty impact is exacerbated by having more than one child according to a study by Budig and England (2001). The average 7% per child motherhood penalty calculated by this study and the difference seen between never married, married and divorced mothers implies that marital status has an impact on the magnitude of wage gap experienced by mothers (Budig and England, 2001).

In a cross-national study, Musick and her colleagues (2020) compared individual earnings within a couple across the United States, Germany and the United Kingdom, using panel data from each respective geography. Their results indicate significant declines in “her share” of couple earnings after first birth across all three countries that are sustained for several years. Declines were found to be smallest in the United States and thought to be due to U.S. mothers’ higher employment rates and propensity for longer work hours. Consistent with the notions of

Goldin's seminal work on gender role convergence (Goldin, 2014), Musick's results point to gender inequality within couples as a critical pivot point in resolving the motherhood penalty (Musick, 2020).

Loughran and Zissimopoulos (2009) compare U.S.-based couple's wages in the year of marriage and the year of first birth. Their findings indicate a possible impact of both events with marriage lowering female and male wages 2%–4% in the year of marriage and first birth lowering only female wages 2%-3%, with no impact on male wages. The researchers note that for most women, marriage and childbearing occur closely in time – within 16 months and elaboration within their research note that the negative impact of marriage is more accurately reflected as lowering women's wage growth by 2.7% - 3.6%, rather than a direct impact on earnings (Loughran and Zissimopoulos, 2009).

2.3.4 Mother's educational attainment and fertility delays

The choice to delay motherhood for the benefit of a career has potentially broader reaching implications than career progression and wage differentials. Biology is biology and it is well documented that older mothers face issues of fertility and an increased risk of age-related birth defects. A broader discussion than the scope of this review is necessary to understand the societal impact wholistically of delaying motherhood. Extensive research shows a notable decrease in the percentage of women having their first child before the age of 30 over the last three decades, accompanied by a rise in first-time births occurring after the age of 30 among women holding four-year college degrees. Research indicates that a delay in entering motherhood is thought to allow mothers-to-be some additional time to accumulate human capital prior to taking a motherhood-related career break and potentially divided attention between the workplace and motherhood-related responsibilities upon return to the workplace. Based on data

from the National Longitudinal Survey of Youth (NLSY79), Amuedo-Dorantes and Kimmel (2005) present a theoretical model to support the existence of a statistically significant motherhood wage penalty and go on to report that women who have completed higher education more frequently delay childbearing by an average of approximately 6 years. Their research also indicates that college-educated women who delay entering into motherhood earn approximately 19% more than non-mothers and approximately 21% more than college educated women who do not delay motherhood. This essentially amounts to a motherhood wage boost for college educated women who delay entering into the motherhood phase of their lives until after the age of 30 (Amuedo-Dorantes and Kimmel, 2005).

In her research, Miller (2011) explores the underlying mechanism of birth timing effect. She suggests that a motherhood delay could potentially influence timing of work experience, allowing mothers to greater accumulate human capital prior to entering motherhood-related career breaks. Miller uses data for women with at least one child born during the survey period of 1979 – 2000 from the NLSY79. She further limits the data to those who experienced their first birth between ages 21 and 33 and within the years 1983 – 2000. The restricted use of data focuses on potential tradeoffs between work and family. Delayed motherhood is found to result in an average 10% increase in earnings for each year of delay. Like Amuedo-Dorantes and Kimmel, Miller's findings are consistent with the pattern of results from their analysis that delaying motherhood into a woman's thirties is beneficial to earnings and the same pattern is not seen for childless women or men (Amuedo-Dorantes and Kimmel, 2005; Miller, 2011).

In contrast to Amuedo-Dorantes and Kimmel (2005) and Miller (2011), Anderson et al., (2003) approached their study strictly from the perspective of educational attainment, Anderson (2003) found that the most pronounced differences in the motherhood penalty present among

education groups. Women with higher educational attainment, that is college-educated mothers, do not endure a wage penalty for having children, while high school dropouts face a 3% per child penalty. On the other hand, individuals who have completed high school, particularly those who re-enter the workforce when their children are older, experience ongoing penalties of 4-6% per child until their children reach high school age (Anderson et al., 2003).

"An investment in knowledge pays the best interest" - do the words of Ben Franklin hold true when we are discussing the motherhood penalty? Jee (2019) conclude that the efforts of women to maintain human capital through investment in education may not be sufficient to lower the motherhood penalty in the United States (Jee et al., 2019). However, Hamil-Luker (2005) found women who fail to enhance their skills over time have seen their real wages remain stagnant or decrease, contributing to an increasing wage disparity among individuals with similar levels of education. Women lacking a high school diploma who participate in on-the-job training tend to reap the highest benefits from such training, ultimately narrowing the wage gap based on initial levels of education. Hamil-Luker concludes that an investment in education and training in adulthood can deflect the accumulation of a mother's wage disadvantage (Hamil-Luker, 2005).

But is education enough to protect mothers from system shocks disrupting childcare and educational systems? Findings from very recent research borne of the Covid-19 pandemic found evidence indicating that by 2022, three years into the pandemic, college-educated mothers experienced an average 6% increase in motherhood penalty, while college-educated childless women and women without a college degree did not experience a substantial change during the pandemic (Glauber et al., 2023).

2.3.5 Race

In her 2017 study, Looze builds upon her earlier work to investigate whether race plays a role in how motherhood influences job transitions. Her research indicates that having children, specifically during pregnancy and the preschool years, can lead to a higher probability of voluntarily leaving the workforce for family-related reasons. Additionally, it decreases the likelihood of making voluntary job changes that could lead to career advancement and increased wages. The biggest negative impact on job mobility appears to be faced by highly educated White mothers, with reduced effects for Black and Hispanic mothers. Looze attempts to explain the race-ethnicity-motherhood penalty predicament by suggesting that differences in family-support mechanisms within each culture favor Black and Hispanic mothers' ability to rely on family for early childcare and home support, allowing them to focus on their careers, including progression through job mobility (Looze, 2017). England (2001) approached the race conversation from the position of privilege, and consistent with Looze's findings, reported that among White women, the total motherhood penalty is highest—10 % per child for women with high skills and high wages when compared to black women. Their analysis revealed that privilege appears to have a downside—larger comparable motherhood penalties (England et al., 2001). Van Winkle's research reveals that the wage penalties associated with motherhood are primarily seen in Black and Hispanic families when caring for preschool and early school-aged children. These penalties are most pronounced between the ages of 5 and 10, typically around age 30, and diminish regardless of the number of children. However, for White women with three or more children, the motherhood penalties are more enduring, with significant and long-lasting effects on wages up to the age of 40 (Van Winkle and Fasang, 2020). These findings are

consistent with the notion that cultural differences in family support structures may better support Black and Hispanic mothers.

In her 2007 study using data from the NLSY79, Glauber examined whether the motherhood wage penalty varied among African American, Hispanic, and White mothers in the United States based on their marital status. She analyzed factors such as women's hourly wages, motherhood status, number of children, marital status, and race across the 1982 to 2004 waves of the NLSY79. In line with previous research by England (2001) and Waldfogel (1997), Glauber discovered that racial disparities persisted even after accounting for differences in marriage rates. African American and Hispanic mothers experienced a smaller wage penalty compared to White mothers, regardless of their marital status (Glauber, 2007).

2.3.6 Antecedents of the motherhood penalty

From the current body of knowledge, there are categories of antecedents identified that may contribute to the motherhood penalty – power and family values, cultural beliefs about motherhood and evolving gender norms.

2.3.6.1 Valuing power and family values

Although there is a tremendous body of research on the motherhood penalty, there are relatively few publications that dig deep into personal motivation. Within this literature review period, a study conducted by Hilary Lips and Katie Lawson (2009) illustrates deep rooted ideological differences between male and female survey respondents, even before they enter the labor market. Rooted in expectancy value theory, the researchers surveyed 229 university students enrolled in business and psychology programs (112 = female, 117 male) in the U.S., to understand if there is a difference in motivation between male and female pay expectation, work commitment expectation and value placed on family (accommodation for family life, time for

maternity leave) and power value (promotional opportunity, status, salary advancement). Male survey contributors report placing more importance on power-related values than family-related values with the opposite findings in female survey respondents. In both genders, valuing power was directly linked to higher pay expectations. An unexpected finding of this study is that men that value family anticipated working a smaller number of weeks per year, but did not expect a lower peak salary, where women who anticipated working fewer weeks per year lowered their expectations related to peak salary. Recognizing the limited sample of this study and potential for unravelling longstanding gender-based pay discrepancies, further study with a larger sample to understand the difference in male and female pay expectations' relationship to family values would be beneficial in highlighting to industry and to inform policy of the impact of motherhood on women's career lifecycle (Lips and Lawson, 2009).

2.3.6.2 Cultural beliefs about motherhood and evolving gender norms

"Cultural traditions interact with social institutions" (Misra et. al, 2011). Policies related to work-family have been introduced globally within the last 30 years. Although this may sound like a significant length of time, is it enough time to change tradition? There are many who assert that attributes related to career success are the ability to spend long hours working, the ability to be ever present and ever available for the organization and that work for pay should be performed within standardized hours in a standardized location (Albiston et al., 2023; Goldin C., 2014; Weeden et al., 2016). Although they may be correct in their assumptions, these norms leave little flexibility to accommodate the demands of home life while raising young children and these norms do not account for output, productivity or actual performance. Are mothers leaving or reducing participation in the workforce out of choice? Are mothers intentionally passing up or not working towards career promotion? Have mothers accepted the motherhood

penalty as “the way things are”? Research suggests that gender and ideal worker norms related to the responsibility of mothers in caring for children and the definition of success in the workplace are contributing factors to the motherhood penalty and culture plays a role in influencing policy. Budig et al., (2012) found that parental leave policies and publicly funded childcare are indeed linked with higher earnings for mothers, but only when cultural support for maternal employment is significant and culturally embedded. Conversely, these same policies have a negative relationship with mother’s earnings where cultural attitudes support the male breadwinner/female caregiver philosophy (Budig et al., 2012).

In her mixed methods, U.S.-based study, Laura Brown (2010) finds mothers making career adjustments, despite family-friendly policies due to “gendered” norms of work organizations reflecting male values. More specifically, lengthy in-office, face time during prescribed hours are recognized over actual contributions and results, leading to working mothers, who are seeking career advancement feeling impacted with respect to promotion and professional advancement within the workplace. The respondents of Brown’s study “perceive that motherhood has an impact on the rate of a woman’s professional advancement” (Brown, 2010). These findings are consistent with a Cyprus-based qualitative study. Women are considered the main caregivers for children in Cyprus due to cultural norms. Upon entering motherhood, women are encouraged to prioritize family over work, which directly or indirectly impacts their career progression (Socratous, et.al., 2016). Kang’s research findings are similar but in different geographical contexts. Their international study reveals that in East Asian societies, where Confucian values and traditional family norms are prevalent to uphold family harmony, there is a historical perception of men as primary earners and women as homemakers.

This entrenched gender-based division of labor enforces strong family values but also contributes to a decrease in both employment opportunities and wages for mothers (Kang, et al., 2023).

A study on careers in science-technology-engineering (SET) in Italy, France and the Netherlands suggests that work flexibility that enables a healthy family life with young children is seen as a favor which must be returned to an organization in reduced compensation and slower or reduced career progression, even if work is condensed and not reduced (Herman and Lewis, 2012). A similar Spanish study reviewing male and female career trajectories in the sciences reveal a linear career path for men and a non-linear career path for women. In their study Gonzalez and her colleagues (2015) obtained professional achievement-related information, such as date of graduation, authorship in books, research publications and citations, grants, contracts, awards and positions from the Andalusian System of Scientific Information database (SICA). Registration in the database is mandatory for researchers within the SICA network. Analysis revealed that men and women achieve academic milestones at different ages. While men's academic achievement patterns based on age were found to be consistent, academic achievement in women generally did not show the same linear progression with age, revealing patterns showing lagged progression. "The existence of gender bias in science is based on male rules and a general acceptance of the idea that non-interrupted, accumulative and linear careers are the only kind of careers that evidence excellence" (Gonzalez, et.al., 2015). The non-linear career path is attributed to social and family context, institutional barriers and gender stereotypes limiting mothers' career progression.

Niemisto (2021) conducted qualitative research in Finland to understand sentiments around the gendered nuances of motherhood and careers. Through 81 iterative interviews with 23 women and 19 men, results of their study found 3 main themes (1) partnership in the home (2)

challenges with time management and (3) societal expectations related to being a good mother. Niemisto highlights “to succeed in their careers, these women professionals adopted masculine career patterns and the ideal worker norm…and prove themselves at home to meet expectations of good mothers”, highlighting that concepts of ‘ideal worker’ norms and ‘good motherhood’ norms are at odds with each other, particularly in organizations where women pursue high-demand careers (Niemisto, et al., 2021).

But research indicates that gender norms are changing (Goldin, 2014; Almond, 2023). According to the U.S. Bureau of Labor Statistics, there has been a rise in the population of stay-at-home fathers in the United States, with men expressing a heightened interest in allocating more time to their families (Glynn, 2019). However, there is still an assumption that women bear the responsibility of unpaid domestic work, dedicating more time to childcare and household chores compared to men with similar demographic profiles and parental roles (Goldin, 2014). Despite women comprising almost half of the U.S. workforce and being responsible for the majority of consumer spending, there remains a pervasive, albeit often subconscious, belief that women's earnings are not essential to their families' financial stability (Ruggles, 2015).

Early studies (Budig et al., 2001; Waldfogel et.al. 1997, 1998) focus on establishing the existence of a motherhood penalty and attempting to quantify the impact. The literature then progresses to endeavoring to understand factors that may attenuate or exacerbate the phenomenon, such as age, level of education, number of children, timing of children in career lifecycle, industry, policy and discrimination. More recent studies have shifted attention to long term impacts such as mother’s pension implications and the ability of a mother to “catch up” both in terms of wages and career progression as well as redefining elements that lead to success in the workplace and expansion of study topic geography. This research is vital, not only for the

purpose of reflecting on ongoing mechanisms that cause the motherhood penalty, but also summarizing evolution of research and being able to suggest where industry and policy changes, training and further research are required.

2.3.7 Job effort required

The concept of worktime intensity encompasses various factors such as flexibility, hours worked, job pressure, and the subjective feeling of having sufficient time to meet both work and family responsibilities. Studies indicate that mothers are less inclined than women without children to opt for occupations that require substantial effort and long work hours (Glauber et al., 2023). Cha (2013) found that when compared to men and childless women, mothers are more likely to leave male-dominated professions where they are expected to work in excess of fifty hours per week. In both these studies, the outcome is the appearance of a higher percentage motherhood penalty (Cha et al., 2013). Contrary to the job effort-required explanation of the motherhood penalty, Anderson (2003) found that medium-skill mothers (proxy for medium job effort) suffer drastic and longer-lasting wage losses than either low-skilled (proxy for low job effort) or high-skilled mothers (proxy for high job effort). Although job effort may indeed be a factor contributing to the motherhood penalty, current research is not convincing of job effort as a primary explanation as Anderson's research finds more educated women are likely to accept careers in which job effort is important, but do not experience a motherhood penalty in wages (Anderson et al., 2003).

2.3.8 Mother's job mobility

Looze has led the conversation on the impact of job mobility on mother's wages. Looze published 2 research papers (2014 and 2017) both using panel data from NLSY79. In her 2014 study, Looze investigates the difference in patterns of and subsequent wage of job change returns

between mother and non-mothers as potential contributors to the motherhood penalty. Her findings suggest that in early career phases young mothers with less education experience a job mobility wage disadvantage due to their inability to voluntarily change jobs, presumably related to lack of resources in their lowering paying job, and as a result, are unable to take advantage of a job change-related wage boost. Highly educated mothers experience a job mobility wage advantage but make fewer voluntary job changes. In later career phases, Looze posits that highly educated childless women continue to make a significantly larger number of job changes, resulting in job mobility wage advantage and women with children change jobs less frequently resulting in a statistically significant motherhood wage penalty based on job mobility. In her 2017 publication, Looze expands on her previous research in an attempt to understand if race is a differentiating factor in the relationship between motherhood and job changes. Her research findings indicate that being pregnant and having preschool-aged children can raise the probability of leaving the workforce voluntarily for family-related reasons. Additionally, it reduces the likelihood of making voluntary job changes that could lead to career advancement and increased earnings. The biggest impact appears to be faced by highly educated White mothers, with reduced effects for Black and Hispanic mothers. Looze attempts to explain the race-ethnicity-motherhood penalty predicament by suggesting that differences in family support mechanisms within each culture favor Black and Hispanic mothers' ability to rely on family for early childcare and home support, allowing them to focus on their careers, including progression through job mobility. In both studies, Looze suggests non-pecuniary job benefits may also be a contributor to reduced voluntary job changes for mothers, but further study into the specifics is required (Looze, 2014; Looze, 2017).

2.3.9 Work-family policies

Work-family policies vary by country, organization and even region in some cases. Work-family policies are in place to support families in 2 main ways: (1) support for mothers during the time of childbirth (2) support for families in raising preschool aged children. The introduction of work-family policies like the United States Family and Medical Leave Act (FMLA), enacted in 1993, provides job protection during family leave. Duration and financial support of family building policies vary across the globe. On one side of the range, FMLA provides 12 weeks of job protected unpaid leave to new mothers, on the other end of the range, there are 13 countries that provide their new mothers with their full salary for varying durations of maternity leave, Croatia and Chile for 30 weeks, Luxemburg, Estonia and Poland for 20 weeks as examples.

Although the research reviewed agrees that the availability of publicly funded preschool childcare is associated with a decrease in the motherhood penalty, findings are not aligned with respect to the length of paid leave impact on the motherhood penalty. Baranowska-Rataj and Matysaik (2016) find in their study, using 2004 – 2011 data from the European Survey of Income and Living Conditions (EU-SILC) that in countries where public support for working parents is weak, there are "negative effects on the probability of working and on the number of working hours among women" (Baranowska-Rataj, 2016). Their study measured women's labor market involvement in terms of the probability of performing paid work outside the home and number of hours worked in different European settings. Their result revealed that in countries where public support for working parents is weak such as Ireland and the United Kingdom and families presumably rely on extended family or private daycare for their childcare needs, mothers participated less in paid work. Conversely, no significant negative effects on women's employment were found in the Nordic and CEE countries due to strong family support policies

in place for the last three decades. The Nordic and CEE policies include provisions for high quality childcare offerings and parental leave that encourages an equal division of household labor between partners for young children (Baranowska-Rataj, 2016).

Misra (2011) find that maternity leave can have a positive effect on mother's career outcomes, but only if the leave is of moderate length. Findings indicate that countries with none, very short or very long maternity leave durations have negative impacts on mother's career outcomes. The motherhood penalty associated with long maternity leaves is attributed to a significant loss of human capital while not participating in the labor force. Motherhood penalty associated with short, or the absence of maternity leave policy is explained by not being able to live up to the norms linked with career success, being long hours and constant availability, due to the needs of young children and household management. In their study, Misra and her colleagues analyze data on employed women aged 25-45 from the Luxembourg Income Study for 21 countries across Eastern and Western Europe, North America, Israel, and Australia. They examine wage and employment hour differences per child crossed with country level data on protected parenthood leave and childcare policy. They found that countries with supportive work-family policies are associated with positive work-related outcomes for mothers versus childless women - in countries with available and affordable childcare for pre-school aged children. For countries that encourage long motherhood-related leave from the workforce, mothers are less likely to return to paid work quickly. These protected long maternity leave policies may be creating a circumstance where the development of childcare programs for pre-school aged children is no longer seen as a societal priority (Misra et al., 2011).

Research conducted by Hallden (2016) using data from the European Community Housing Panel (ECHP) find that a significant number of pre-school aged children in publicly

funded childcare and long paid maternity leaves result in a decrease in motherhood wage penalty, regardless of job skill level. Where Misra's study included several European countries, Australia and North America, the focus of Hallden's study was strictly ten European countries (Hallden et al., 2016).

However, is a universal policy effective in meeting the diverse needs of different parents? Research indicates that mothers who prioritize homemaking tend to have more children and take longer leaves for each child compared to adaptive mothers, who in turn take longer leaves than career-focused mothers (Rahim et al., 2014). These results support the need to investigate more dynamic policies and make the case for different combinations of wages and maternity related absences.

There is a relativity new U.S.-based trend in workplace around "family-building" policy in terms of medical benefits. Some employers claiming to be more family friendly now include medical treatments such as IVF, genetic testing and most recently egg-freezing as medically reimbursable under their employee health plans. Critics of the egg-freezing benefit claim that motherhood remains devalued in workplaces where ideal masculine worker norms persist. "Egg-freezing will not be a genuine choice unless it is one of many benefits offered to all women in the employment market, including paid maternity and paternity leave, and the abolition of the 'fertility' or 'motherhood penalty' and the perception of pregnant women as less abled employees." (O'Rourke, Vella, DeJonge, 2023).

Although parental support policies are intended to help mothers maintain connection to the paid work, extended parental leave policies may work to reinforce that mothers should exit the labor market for long periods to attend to childbearing, child rearing and household demands

– setting back the gender equality in the workforce conversation from the perspective of employers investing in mothers' growth, development and career progression.

2.3.10 Industry

Women continue to be underrepresented in prestigious and high-paying professions in the United States (England, 2016). One example is the field of academic science and engineering. In 2017, women in the U.S. held just 24% of senior, full-time faculty positions (i.e., associate and full professors) in the natural sciences and 15% in engineering (Thebaud et al., 2021). While there has been an increase in the representation of women in STEM (science, technology, engineering, and mathematics) PhD programs, women who earn PhDs are less likely than men to seek tenure-track faculty positions at research-focused universities and less likely to secure these positions (National Academies Press, 2010). In Canadian universities, only 15.5% of higher education institutions have female leaders, and just 10% of universities with the authority to grant doctoral degrees have female presidents; women make up 36% of the members of academic decision-making bodies (Wang et al., 2023). Herman and Lewis' (2012) interview-based study concerning the of sustainability of mothers in STEM careers in Italy, France and the Netherlands attests to the persistent power of gendered organizational assumptions, preventing mothers and women in general for achieving gender parity in academia (Herman and Lewis, 2012).

Contrary to the findings in academics and STEM careers, Kelley, Galbraith and Strong (2020) studied 808 female professional academic librarians to evaluate the difference between non-mothers and mothers with respect to salary, position and perceived wellbeing. Within their sample, they found no evidence of limitation of being a mother on any aspect of wages or career progression and in fact found a motherhood advantage (higher reported job satisfaction and

greater reported happiness) in certain situations. The advantages are attributed to ability to find balance between career and family life in a specific workplace setting (Kelley, 2020). Compared to librarians, McIntosh, McQuaid, Munro and Dabir-Alai (2012) conducted a study in registered nurses using data from the National Health Department of the Scottish Government (n = 46,565). They find men's careers in nursing are not negatively affected by career breaks, but "motherhood results in the devaluation of women's abilities, denial of opportunity and penalization with respect to careers" (McIntosh et al., 2012).

Considering a shift to the gig economy, Zheng (2023) finds the motherhood penalty vanishing, while traditional benefits fathers accrue may degrade. In the gig economy, there is a penalty stemming from work demands and the gender divide in job types, which may require men to juggle work and childcare responsibilities in a manner that may not be as pronounced in other sectors. One potential reason for the reduced motherhood penalty in this setting is that gig work offers increased flexibility for managing childcare responsibilities alongside paid work (Zheng et al., 2023).

2.3.11 Geographical considerations

Given differing cultural norms, gender norms and country specific policies, it should come as no surprise that motherhood penalties exist in varying degrees based on country context. A comprehensive review of global studies by Grimshaw and Rubery (2015) revealed that lower-income or developing countries exhibit the highest unadjusted motherhood wage penalty, averaging at 42% in daily wages. In contrast, penalties are notably lower in high-income nations, such as 2% for married and 12% for unmarried mothers in the United States (Budig and England, 2001), 13% in hourly wages in Germany (Felfe, 2012), and either no penalty or a positive impact in countries like Denmark and France (Davis and Pierre, 2005). In Spain, the estimated

motherhood penalties stand at 6% for one child, 14% for two children, and 15% for three children (Molina and Montuenga, 2009).

In an empirical assessment using governmental survey data of American, British and West German mothers, Gangl and Ziefle (2009) followed career prospects after motherhood around the 1960s. They found an average motherhood wage penalty of 9% - 18% per child. The wage penalty was found to be higher for West German mothers and attributed to discrimination. Findings also suggest that European mothers are largely penalized as a group despite significant policy support, due to societal expectations and discrimination where American mothers' penalty is attributed by the loss of human capital during career breaks (Gangl and Ziefle, 2009). In a meta-analysis of 241 European focused quantitative studies related to the motherhood penalty, Cukrowska-Torzewska and Matysiak (2020) find an average motherhood wage gap of 3.6% - 3.8% per child attributable to mother's lost experience, tenure and motherhood related professional breaks (depreciation of human capital). The theory of compensating wage differentials is cited to explain the larger motherhood penalty experienced at birth of first child. Mothers, more often with their first child, select to exit the labor force or return to lower paying, part-time or less demanding jobs, allowing for flexibility to manage home and professional life (Cukrowska-Torzewska and Matysiak, 2020).

In Korea, the presence of children under the age of 3, as well as having children in elementary school, is associated with decreased employment rates among married women. Additionally, having children under the age of 6 is linked to a higher likelihood of mothers exiting the labor force compared to those with children aged 6 to 18 years (Kang et al., 2023). In their cross-national study, Kang and his colleagues compared marriage and motherhood penalties between Western and East Asian countries by examining employment status, wage and labor

income from various governmental surveys. Their study found mothers experience varying motherhood penalties across countries, with East Asian women bearing both a marriage and then motherhood penalty, not seen in U.S. based studies, due to the strong and well documented cultural association between marriage and motherhood in East Asian countries (Kang et al., 2023).

In Japan, analyzing longitudinal data from the Japanese Panel Survey of Consumers spanning from 1993 to 2015, it was observed that both the first and second childbirths resulted in immediate reductions in earnings for women. While employment rates among women showed some improvement over time, wage levels remained notably lower than before pregnancy. These outcomes suggest that motherhood in Japan leads to persistent long-term earnings disadvantages for women (Hsu et al., 2021).

2.3.12 Discrimination and bias

In their seminal work, Budig and England (2001) calculate an average 7% per child motherhood wage penalty in the United States using 1982-1993 data from the NLSY79. Their study finds one third of the average 7% per child can be attributed to loss of human capital factors such as job experience and seniority (Budig and England, 2001). This leaves two thirds remaining unexplained after exploring various other factors such as number of children, job characteristics, social status, race, marital status. Budig and England (2001) suggest the ~4% per child penalty unexplained motherhood wage gap is attributable to effects of motherhood on productivity and/or from workplace discrimination because of motherhood status (Budig and England, 2001). For example, an employer may assign mothers to less fulfilling roles, offer fewer promotion opportunities or simply pay them less than men or childless women in similar roles. Unlike wages (measured in local currency per hour or annually), discrimination is difficult

to measure. This challenge is reflected in research and published literature. Although studies have attempted to quantify the effect of discrimination and bias on mothers, study outcomes vary depending on study design and study measures.

In Heilman and Okimoto's 2008 study and Benard and Correll's 2010 study (both U.S.-based, experiments) evaluators were asked to rank competence and commitment of non-parents, mothers and fathers, given unquestionable evidence of previous career success. Benard and Correll find that successful mothers, compared to successful fathers, are seen as less likeable, cold and even hostile (interpersonally flawed). These same qualities are not expressed in evaluations of fathers. The study supports the idea that discrimination against mothers is multifaceted. When a mother overcomes the hurdle of career success (reduction of status-based discrimination), there is a possibility that she may perceived being deficient in characteristics generally assumed to be motherly such as warmth, empathy and nurturing (normative discrimination) (Benard and Correll, 2010). Generally unfavorable views of parents (both mothers and fathers) related to work focus are suggested by participants of Heilman and Okimoto's (2008) study. The study results also confirm participants' bias against mothers in anticipated competence and recommendation for promotion. Both studies suggest that motherhood can impede women's career advancement as a result of discrimination and gender bias.

A laboratory hiring experiment published in 2012 looks at discrimination leading to the motherhood penalty from a different perspective. With more women choosing to delay motherhood or bypass motherhood altogether to pursue a career and abortion support in many states, motherhood may be perceived as a choice which may lead to choice-based discrimination in the workplace resulting in a motherhood penalty. Comparing hiring salary recommendations

of like educated and experienced mothers and non-mothers in states where abortion is publicly funded versus states where abortion is not publicly funded, this experiment conceives a causal relationship between the choice to become a mother and discrimination against mothers, resulting in a motherhood penalty (Kricheli-Katz, 2012).

A study using the Think-Manager-Think-Male paradigm was conducted in an attempt to investigate the fatherhood advantage and the motherhood penalty (gender-based bias). Survey participants were asked to rate attributes associated with women, mothers, men, fathers, managers and ideal managers. The research finds no evidence of bias against mothers, rather suggests a parenthood advantage, with parents being perceived as having nurturing and supportive attributes that are sought by organizations today (Morgenroth et al., 2021). Although unclear, perhaps the difference between suggestions offered by Heilman and Okimoto (2008) and Morgenroth (2021) regarding the desirability of traits such as perceived warmth and nurturing in the workplace is reflective of a shift in workplace expectations. Where Heilman and Okimoto's study found successful mothers to be perceived as interpersonally flawed in the late 2000s, those same traits in Morgenroth's 2021 study are perceived as desirable within organizations.

Due to the pervasive nature of bias, the traditional idea of the motherhood penalty could be extended to all women who may become mothers. If childless women have the potential to become pregnant, then they may also experience negative treatment. Recent research indicates that discrimination against motherhood starts when there is the probability that a woman will be a mother. Women are disadvantaged in the labor market for more of their life than has previously been recognized (Wang et al., 2023).

2.3.13 Long-term costs of the motherhood penalty

From a life-course perspective, motherhood is thought to have both short- and long-term costs. A European-focused quantitative study indicates that motherhood has both short-term and long-term impacts. Occupational status does not recover over time, but rather accumulates as children age and additional children are introduced to the family setting (Abendroth, et al., 2014). Similar results are seen in a Russian study, where long career breaks of mothers due to lack of support for pre-school aged children result in a long-term reduction in mother's pension incomes (Kingsbury, 2019). Due to the Russian policy structure, while mothers are not working due to child related career breaks, they are not able to contribute to their pensions, the troubling concern is that the mothers are not working because they do not have a choice due to lack of support in terms of pre-school aged childcare options (Kingsbury, 2019).

A U.S.-focused longitudinal analysis suggests that the negative effects of career progression attenuate over time. Children may initially reduce labor force participation of mothers, but for the majority of mothers (fewer than 3 children) wages eventually align with those of childless women. A similar trend is seen in terms stabilizing of occupational status, with some sectors reflecting an occupational premium for mothers, with grown children, in their 50s (Kahn, et al., 2014). Building on Kahn's 2014 research and using the same data source, Van Winkle finds motherhood wage penalties limited to caring for pre-school are early school aged children for Black and Hispanic families but are longer lived for White families (Van Winkle and Fasang, 2020). Mothers who have three or more children anticipate having the shortest retirement period, suggesting a possible requirement to remain in the workforce for a longer duration. The effects of mothers reducing or leaving their jobs to care for their children are becoming more significant in Western nations. This is particularly crucial as population aging

necessitates a substantial extension of individuals' working lives to ensure the viability of social support systems (Lorenti et al., 2023).

Table 2: Summary table of key findings provides relevant findings of each of the 85 research papers included within the literature review section of this dissertation. Agreement on magnitude and cause of the motherhood penalty is not unified within the literature. It is noteworthy that research has shown a broad wage disparity for mothers from 0% - 20%, with a similar spectrum of negative impact on career progression in terms of promotions and impressions of competence. As previously discussed, key findings vary based on geography, country specific policy, industry, study design and measures.

Table 2: Summary table of key findings

Year	Author	Source	Key findings from literature reviewed
1979	Hill	J. of Human Resources	Analyzing how marital status and the number of children impact wages as indicators of work experience, training, and labor force engagement, this research identifies that individuals with increased financial obligations to support their families (married men regardless of race and black women) receive higher wages than their counterparts. Causal mechanisms not identified.
1997	Waldfogel	American Sociological Review	*Seminal paper:* (1) Children have a direct impact on the wages of women. (2) Proposed models suggest that the apparent positive effects of being married or divorced, as opposed to being single, may be attributed to unobserved differences among individuals. (3) Women currently employed part-time face a wage penalty, and there is a slight wage penalty for part-time versus full-time work experience. While adjusting for part-time status lessens the adverse effects of children on mothers' wages, it does not completely eliminate them.
1998	Waldfogel	J. of Labor Economics	*Seminal paper:* Although there is evidence of narrowing of the gender gap, the gap in pay between women with children and women without children shows evidence of growing larger and attributable to U.S. based institutional structure. The U.S. had emphasized equal pay and equal opportunity policies, but inadequate family-building policy, specifically related to maternity leave and childcare.
2001	Budig	American Sociological Review	*Seminal paper:* Using 1982 - 1993 data from NLSY79, authors find a 7% per child penalty on mothers' earnings, slightly lower for unmarried women. The authors indicate mothers may earn less than childless women as child related career breaks cause loss of experience and this loss of human capital explains one third of the 7% per child penalty. Discrimination in the workplace may be a plausible, but unrest explanation for the remainder of the motherhood penalty.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2002	Anderson	American Economic Review	This study found (1) low skilled mothers do not endure lower wages after becoming mothers; (2) an average 15% per child wage penalty for college educated mothers with 2 or more children explainable by years out of workforce; (3) high school graduates and black college graduates endure an ~7% wage gap, which is only marginally attributable to years out of workforce.
2003	O'Neill	American Economic Review	Evaluating the U.S. Current Population Survey, the presence of young children reveals a strong effect on mother's participation in the workforce. 34% of women with children were out of the labor force, compared to 16% of women without children. The presence of children was found to increase men's work involvement. This is explained by certain job characteristics and women's occupational choices in balancing mother's dual roles.
	Hotchkiss	American Economic Review	Evaluating women's labor market intermittency using data from the U.S. 1992 Health and Retirement Survey the study finds the likelihood of employer preferences or demand factors as significant factors in the determination of the wage gap associated with labor market intermittent activity.
	Anderson	Industrial and Labor Relations Review	Main findings of analysis of NLSYM 1968-88 include (1) younger children (0-2) cause a higher motherhood wage penalty than older children, regardless of mother's race (2) wages for college educated mothers are not impacted (3) high school dropout mothers face a 3% wage penalty per child for younger children (4) high school graduate mothers face persistent wage penalties of 3-5% per child, until their children are high school aged. These finding are 55-57% explained by human capital factors and unobserved heterogeneity.
	Avellar	J. of Marriage and Family	Comparison of women from NLSY79 cohorts 1975-1985 versus 1986-1998 reveal a persistent motherhood penalty on wages that has not diminished over time.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2005	Amuedo-Dorantes	Review of Economics of the Household	Analyzing 19 waves of NLSY79, this study finds (1) college educated mothers do not face a motherhood wage penalty and in fact enjoy a wage boost (2) fertility delays enhance the wage boost for college educated mothers. These findings are explained by college educated mothers selection into family friendly work, with firms offering greater advancement opportunity for mothers.
	Davies	J. of Labor Economics	Ten of the 11 European countries compared in this research were found to exhibit a motherhood wage penalty of varying magnitudes from 2%-18% per child. Differences are explained by country specific social policy regarding taxation, maternity related career breaks and childcare for pre-school aged children
	Hamil-Luker	Social Science Quarterly	Support of women's investment in human capital in the form of training, particularly company provided training returns greater wage growth than women who undertook outside training. Women in the analysis of U.S. panel data who did not update skills experienced stagnation with respect to wages. Comparing women's wage growth rates from NLSY79 data, childless women had greater increases in pay overtime than did mothers, but the same pattern was not observed in the NLSYW68 dataset.
2007	Correll	American Journal of Sociology	*Seminal paper:* In their laboratory experiment, this study discovered that mothers faced penalties in perceived competence and recommended starting salary, whereas men experienced penalties and occasionally advantages based on their parental status. The audit study indicates that discrimination based on status against mothers, but not fathers, could potentially contribute to the motherhood penalty.
	Glauber	J. of Marriage and Family	Using NLSY79 data, this study attempts to understand the effects of race and marriage on the motherhood penalty. The study finds no motherhood penalty in wages for Hispanic mothers while married African American mothers of 2 or more children pay a wage penalty for motherhood. All White mothers, regardless of marriage status endure a motherhood wage penalty.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2008	Heilman	J. of Applied Psychology	In this study, current employees were competing for promotions to roles traditionally held by men. Both student evaluators and employed evaluators showed prejudice against mothers in terms of perceived competence and recommendations for advancement. The results indicate that motherhood could impede women's career progression as a result of gender stereotypes.
2009	Loughran	J. of Human Resources	Using NLSY79 to estimate the effect of marriage and childbearing on wages, this study finds marriage lowers women's wages 2%-4% and first birth lowers mothers' wages by 2%-3% but has no impact on father's wages.
	Gangl	Demography	This cross-national study analyzed various geography specific government-based surveys and found motherhood wage penalties ranging from 9% - 18% per child. They suggest that for American and British mothers, work interruptions and reduced job mobility are the primary factors and German mothers face statistical discrimination more so than American and British mothers.
	Molina	J. of Family and Economic Issues	Empirical analysis of ECHP 1994-2001 confirm evidence of a wage gap for Spanish mothers. The study finds a 9% wage gap for mothers in the year of first birth and an increasing motherhood wage gap with two children (14% per child) and three or more children (15% per child) living in the household.
	Lips	Sex Roles	This experiment aims to explore the correlation between prioritizing family values versus power values. The results indicate that men prioritize power over family, while women tend to value family more than power. Prioritizing power is associated with higher projected peak salary, while valuing family is linked to lower expected work dedication.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2009	Cohen	Work and Occupations	Utilizing U.S. Decennial Census data spanning from 1980 to 2000, this research examines the position of women in managerial roles. The findings reveal a significant rise in the proportion and compensation of female managers with young children during the 1980s, increasing from 6.1% to 10.5%. However, this progress plateaued in the 1990s. Factors contributing to the reduction of the gender pay gap include more women entering lower-paying managerial positions, a greater presence of women in traditionally male-dominated industries, and an increase in women's average experience compared to men.
2010	Budig	American Sociological Review	Analyzing data from 1979 - 2004 from NLSY79, this study attempts to understand variations between low-wage, middle-wage and high-wage white mothers. The study finds a persistent motherhood penalty across all levels, but largest for low-wage mothers. Family resources, work effort and compensating wage differentials are explanatory mechanisms for low wage mothers while loss in human capital explains the motherhood penalty for high earning mothers.
	Benard	Gender and Society	The results of this labor market evaluation experiment support the notion of normative discrimination on the part of female evaluators
	Brown	Employee Relations	In her qualitative study, the author finds a contradiction between mother's expected response and reality. Findings suggest mothers choose to slow down careers despite family friendly policies.
2011	Miller	J. of Population Economics	Analyzing NLSY79 data, this research finds that delaying motherhood leads to an increase in earnings of 9% per year of delay supporting the human capital mechanism explaining the motherhood penalty.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2011	Misra	Community, Work and Family	In this international study, the aim is to examine the connections between work-family policies and the employment outcomes of mothers. The research indicates that work-family policies are linked to favorable employment results for mothers. Policies that support work, such as childcare initiatives, have a positive impact on mothers' employment hours and wages. On the other hand, policies aimed at reducing work, such as parental leave, have positive effects for a moderate duration, but potentially negative consequences if the leaves are prolonged.
2012	Kricheli-Katz	Law and Society Review	After analyzing state level differences in motherhood wage penalty from 1988-2004 CPS, a hiring experiment is conducted to evaluate if states where motherhood is seen as a choice based on availability of abortion support results in evidence of discrimination. Findings suggest where motherhood is viewed as a choice, there is evidence of discrimination against mothers.
	Budig	Social Politics	This comparative study explores the differences between countries in terms of the impact of motherhood on earnings, taking into account cultural attitudes towards women, childcare, and parental leave policies. The findings indicate that parental leave and public childcare are linked to increased earnings for mothers, particularly in societies where there is strong cultural backing for women's employment. However, in cultures that endorse the traditional male breadwinner/female caregiver model, the relationship between parental leaves, public childcare, and earnings outcomes for mothers is less positive and may even be negative.
	Gayle	J. of Labor Economics	This study suggests that women in top executive ranks are generally beyond childbearing age and are more likely to exit positions for personal and other household reasons than men. Analysis of Dec. 2006 version of Standard and Poor's Executive Comp databased finds women in executive positions earn higher wages than men, experience higher income uncertainty and exit executive positions at higher rates than their male counterparts.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2012	Felfe	Labor Economics	Results of analysis using GSEOP data find mothers returning to their original employer after childbirth, adjust working hours, but when changing employers, mothers adjust different aspects of the work, such as schedule and tend to select employers that would result in reduction of stress balancing home and paid work responsibilities.
	Herman	J. of Social Issues	In this qualitative research, the focus is on examining the effects of motherhood within the predominantly male-dominated science, engineering, and technology fields in Italy, France, and the Netherlands. The results reveal the enduring influence of gendered organizational structures, with mothers opting to reduce their working hours being shaped by ideological, normative, and policy frameworks.
	McIntosh	Gender in Management	Focusing on data from NHS Scotland, this study of nurses finds mother's nursing career progression negatively impacted by children to school age and mothers who take a career break of greater than two years suffer long term career restrictions. The same patterns are not seen in male nurses, regardless of parenthood status.
2013	Cha	Gender and Society	Examining data from the U.S. Survey of Income and Program Participation, this research explores whether competing time pressures from work and family contribute to higher exit rates for mothers in occupations dominated by men. The results showed that mothers are more inclined to leave male-dominated occupations when working more than 50 hours per week, whereas this trend was not observed among men or women without children.
	Kricheli-Katz	J. of Empirical Legal Studies	In this hiring investigation, the study demonstrates that biases arise in the labor force against individuals with stigmatized traits that may be perceived as controllable, such as gay men, individuals who are overweight, and mothers. When participants viewed these traits as choices, individuals with these stigmatized characteristics were found to be penalized in terms of hiring decisions, salary suggestions, and assessments of competence when compared to equally skilled candidates.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2013	Killewald	American Sociological Review	Examining the concept of specialization within couples where one partner focuses on paid employment while the other takes on home care responsibilities, the researchers investigate data from the NLSY79. Their results indicate that childless men and women both experience a marriage premium, with the increase in wages being greater for men than for women. Additionally, the wages of mothers play a role in influencing the connection between marriage and men's earnings.
2014	Aranda	Group Processes and Intergroup Relations	In this hiring experiment, participants evaluated equally qualified male and female applicants for an engineering position. Candidates were equally qualified and differed only in expression of devotion to work or devotion to family. Results found family-devoted mothers are subjected to strong hiring discrimination, but work-devoted mothers and work-devoted fathers did not experience the same discrimination.
	Budig	Third Way, 2	Budig's study reveals that the benefits of fatherhood vary by income level, with employers valuing fatherhood as a sign of commitment, stability, and merit. Unlike high-income mothers who do not experience a motherhood penalty, low-income mothers face the most significant challenges associated with motherhood.
	Rahim	Review of Economics of the Household	Based on NLSY79 data, this study indicates that mothers who prioritize homemaking tend to have more children and longer leaves compared to adaptive and career-focused mothers. While 80% of career-oriented mothers return to work within 6 months, only 70% of home-oriented mothers do so. The study emphasizes the need for policy makers to reconsider uniform family support measures.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2014	Kahn	J. of Marriage and Family	Analyzing data from the NLSYW this research attempts to understand the changing impact of motherhood as women age (20s - 50s). The study finds childbearing and child rearing reduce mother's labor force participation and any impact to wages is eliminated by their 40s and 50s. The motherhood wage gap persists across lifespan for women with 3 or more children.
	Abendroth	American Sociological Review	Using data from the European Community and Housing panel between 1994 - 2001, for 13 EU countries, this study attempts to understand the occupational status motherhood penalty across lifespan. Findings suggest that status is negatively impacted accumulate over career lifespan. Limiting family to one child is not a solution and there is a strong association with public policy and an occupational status penalty mothers pay.
	Goldin	American Economic Review	*Seminal paper:* This paper discusses needed changes from a societal perspective to address motherhood and gender pay gaps. The solution is not solely government intervention and true partnership in the home but focuses on organizations rewarding structured and long hours and shows evidence based on changes made in technology, science and healthcare firms versus corporate, financial and legal firms.
	Looze	J. of Marriage and Family	Analyzing data from NLSY79, this study attempts to understand the impact of differences in wage returns related to job mobility. Findings suggest that younger mothers undertake fewer wage boosting job changes than their childless counterparts and women with less education are more significantly impacted.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2014	Virtanen	Review of Economics of the Household	Focusing on U.K. based data from the National Child Development Survey, this study attempts to estimate the impact of children on wages across life course. The study finds negative effects of children in terms of wages across life course, even 30 years after entering into motherhood.
2015	Ruggles	Demography	This paper proposes suggestions to explain transformation of the American family over the last 200 years.
	Gonzalez	Interdisciplinary Science Reviews	Using data from the SICA database, this research observes academic and family milestones impacts to the career paths of men and women as scientists. Findings reveal linear careers paths for males, and non-linear careers for women with motherhood emerging as the reasons for deviation from a linear career path for women.
2016	England	American Sociological Review	Analyzing data from NLSY79, this study examines the size of the motherhood wage gap with respect to a women's advantage. Findings reveal high skilled white women experience the highest penalty in terms of wage gap explained by the loss of experience during career breaks.
	Budig	Work and Occupations	In this study analyzing the relationship between policies and the wage gap based on motherhood in 22 countries, the researchers discovered that policies promoting mothers' engagement in the labor market, such as moderate-length parental leaves, accessible public childcare, reduced tax rates for secondary earners, and parental leave for fathers, are linked to reduced wage disparities for mothers.
	Cukrowska-Torzewska	Economics of Transition	This research focuses on difference between men and women's wages in Poland and Hungary and how children contribute to the differences in wages. The study finds the fatherhood wage premium as an explanatory factor, particularly in Poland, and an insignificant gender pay gap among the childless.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2016	Baranowska-Rataj	J. of Labor Research	Examining cross-country differences in how family size impacts women's employment in European nations, this study indicates that larger families have an adverse impact on women's likelihood of employment and their working hours in most country groups, except for the Nordic and CEE countries.
	Hallden	Social Politics	The results of this study, which analyzed data from the European Community Housing Panel survey in ten countries, suggest that the availability of publicly funded childcare and extended paid maternity leaves are linked to a decrease in the wage gap experienced by mothers across skill levels.
	Socratous	Equity, Diversity and Inclusion	In this qualitative, Cyprus based study, the authors offer potential explanations of impacts to career progression for mothers. The research suggests that cultural norms and notions that women should be the primary caregiver to children are a barrier to mother's career advancement and there is a lack of family and policy level support.
	Weeden	J. of the Social Sciences	In this U.S.-based research using various government panel datasets, this study finds that differences between gender and parental status groups in 50+ work hour careers, and rising hourly wages contribute to wage gender gaps, motherhood wage penalties, and fatherhood wage premiums.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2017	Blau	J. of Economic Literature	*Seminal paper:* Using microdata over the period of 1980 - 2010 from the U.S. Panel Study of Income Dynamics, this research looks at trends in the gender pay gap. With motherhood identified as an important difference between men and women, this research finds evidence of a continue motherhood wage gap for women and marriage premium for men, with human capital depreciation during motherhood related career breaks, mother's trading off careers for more family friendly jobs to allow for management of household duties and discrimination against mothers as possible explanations.
	Looze	Social Science Research	This study seeks to explore the connection between motherhood and women's job transitions by analyzing data from the NLSY79. The results indicate that having preschool-age children serves as a constraint for white women, impeding voluntary job changes associated with wage growth. In contrast, no similar effects were observed for Black or Hispanic women.
2018	Andersen	J. of Marriage and Family	The purpose of this study is to shed light on the relationship between father's paternity leave and motherhood wage gap using data from Statistics Denmark. Results indicated that a father's paid leave is beneficial to a mother's wages and father's strong involvement is needed for gender equality in paid work.
	Weisshaar	American Sociological Review	This study examines the decision of parents to temporarily leave the workforce to prioritize childbearing and childcare responsibilities, along with their reentry into the labor market. The research reveals that opting out is perceived as a deviation from the norms of an ideal worker, particularly affecting mothers more than fathers. Those who temporarily opt out, especially mothers caring for their families, face challenges in terms of employment opportunities compared to individuals who lost their jobs due to unemployment.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2019	Kingsbury	Frontiers in Sociology	This study examines Russian family policy and pension calculations contributions to the Russian motherhood wage gap. Findings suggest shortage in childcare invoke mother's labor market exit and associated loss of earnings and childcare breaks are not considered as time periods where pension savings may accumulate, leading to negative long-term impacts on mother's earnings and pension savings.
	Jee	J. of Marriage and Family	This study assesses the motherhood wage penalty changes in the U.S. between 1986 - 2014 using 3 data timepoints from the U.S. Panel Study of Income Dynamics. Findings suggest that the motherhood wage penalty has remained stable over time and mothers' investment in human capital may not be sufficient to lower the motherhood wage penalty in the U.S.
	Glynn	American Progress	This study investigates the evolving pattern of more mothers becoming primary breadwinners and fathers opting to stay at home. Despite this shift, mothers continue to bear the primary responsibility for unpaid household work, dedicating more time to caring for children and managing household tasks. The factors contributing to the wage gap for mothers are complex, with disparities stemming from differential treatment of women and men in educational institutions, workplaces, and society at large.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2020	Van Winkle	J. of Marriage and Family	This study aims to track the extent, duration, and continuity of wage discrepancies related to parenthood among Black, Hispanic, and White individuals in the United States. Analyzing data from NLSY79 and NLSY97, age-specific wage disparities due to parenthood between 20 and 40 years are computed. The results indicate that for minority men and women, parenthood wage gaps occur during specific short intervals in their lives, whereas persistent wage penalties are observed only for White mothers with multiple children.
2020	Kelley	J. of Academic Librarianship	This study surveyed female members of the Association of Research Libraries who were proficient in English to investigate variances in salary and other aspects between mothers and non-mothers working in academic libraries. The findings reveal that, based on this sample, there are no disadvantages for mothers in terms of salary, job position, and perceived well-being compared to non-mothers.
	Musick	American Sociological Review	This research examines the proportion of couple earnings contributed by mothers and how it varies based on the mother's education within a 10-year period surrounding the birth of their first child. The study utilizes harmonized panel surveys from the 1990s and 2000s in the United States, United Kingdom, and Germany. The findings demonstrate a decrease in the mother's share of couple earnings after the first birth in all three countries, and this decline continues for several years following the birth.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2020	Skora	Sustainability	This study examines how changes in commuting patterns after becoming parents affect the motherhood wage gap using data from the German Socio-Economic Panel (GSOEP) covering the years 2001 to 2017. The results show that following the birth of their first child, women reduce their commuting distance by 33%, while fathers do not exhibit a similar shift. Mothers who shorten their commute after having children face a greater wage penalty compared to those who maintain their commuting distance. The research indicates that 23% of the motherhood wage gap can be attributed to lower wages associated with decreased commuting distance.
	Cukrowska-Torzewska	Social Science Research	This study examines data from 26 EU countries to investigate how parenthood influences the gender wage gap and the impact of institutional factors. Results indicate that fathers receive a wage premium regardless of cultural norms and policies, leading to an increased gender wage gap when compared to the wage penalties experienced by mothers (vary among countries). The largest disparities are observed in Eastern European nations, where policies and societal norms often result in extended absences from work. In Continental Europe, Anglo-Saxon countries, and Nordic countries, moderate to minor penalties are identified, accompanied by higher levels of maternal employment. In contrast, Southern European countries show no penalties for motherhood, as mothers typically re-enter the workforce swiftly or exit permanently.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2021	Ishisuka	Demography	In this hiring field experiment, different forms of motherhood signals are included in job applications for low-wage service and professional/managerial positions in six U.S. cities. The findings show that employers exhibit discrimination against mothers compared to childless women of the same qualifications in both job contexts.
	Herbst-Debby	Advances in Life Course Research	This Israeli study investigates poverty risks for men and women during changes in family status (marriage, divorce, widowed). Analyzing panel data of individuals aged 18–60 who married in 2003 and experienced divorce or widowhood by 2015, it shows that poverty risks are linked to how the marriage ended and the number of children in the household. Divorce increases poverty risks for women but decreases them for men, with the motherhood penalty playing a role in these outcomes.
	Mari	European Sociological Review	This study analyzes German Socio-Economic Panel data for first time mothers to understand changes in the motherhood penalty based on social reforms. Results reveal motherhood wage penalties were 20%–30% of pre-birth wages and remained stable during the 1990s. The parental leave reform in the late 2000s, reduced the motherhood penalty for German mothers partially due to shorter work interruptions and increased work hours.
	Hsu	Advances in Life Course Research	Using data from the Japanese Panel Survey of Consumer spanning from 1993 to 2015, this research examines the influence of children on women's wages, employment status, working hours, and earnings in Japan. The findings indicate that both the first and second births result in temporary reductions in earnings due to significant gaps in employment. Although women's employment rates bounce back, the enduring effects on work hours and wage rates are notable in the long run.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2021	Thebaud	Gender and Society	Utilizing insights from 57 detailed interviews with PhD students and postdoctoral scholars in the U.S., this research explores the factors contributing to the lower retention rates of young women compared to their male counterparts in academic science and engineering fields. The study reveals that within academic science and engineering, motherhood is often depicted as undermining professional credibility, evoking fear, rejection, and public debate—referred to as the "specter of motherhood." This specter dissuades young women from pursuing academic careers and heightens apprehensions about balancing motherhood with an academic vocation.
	Morgenroth	J. of Applied Social Psychology	In this experiment, the researchers investigate whether the traditional think-manager-think-male bias is influenced by parenthood. The findings indicate that there is no evidence of a fatherhood advantage or a motherhood penalty in gender and managerial stereotypes. Instead, the study reveals that stereotypes related to parenthood offer benefits to both mothers and fathers, suggesting an overall advantage associated with parenthood in terms of stereotypes.
	Niemisto	Work, Employment and Society	This interview based Finnish study examines gendered dynamics of motherhood and careers. Findings suggest the emergence of three themes (1) it takes two to tango (2) time management and (3) what is good motherhood 2.0. Despite egalitarian policy, Finnish women continue to struggle with the contradiction between good mothering and ideal worker norms. These pressures root from women themselves, male colleagues, organizations and society.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2021	Benny	Institute of Social and Economic Research	This U.K based study models labor supply and demand to evaluate the importance of occupational flexibility's impact on the gender wage gap over life course for college graduates. Findings suggest the gender wage gap in inflexible occupations is particularly high through childbearing and childrearing years - until about age 40 for women, along with changes to women's inclination towards more flexible occupations.
	Borghorst	Tinbergen Institute Discussion Paper	Using data from Denmark's Administrative Register, this study attempts to understand the relationship between commuting, children and any associated wage gap. Findings reveal for female workers with one child, a one standard deviation increase in commuting distance triggers a penalty of ~10% of their pre-child wage. For men and childless women, the same change in commuting triggers a difference of 3-4% less in wages.
2022	Wuestenenk	Social Science Research	This hiring experiment conducted in four European countries investigates the concept of compensating wage differentials by examining how childless individuals, as well as fathers and mothers, prioritize family-friendly work conditions over higher wages. The results do not align with the compensating wage differentials theory, showing that mothers are inclined to choose job positions with lower wages regardless of other job features.
	Ma	J. of Asian Economics	This research investigates the gender wage disparity in urban China in 2002 and 2018 by examining information from the Chinese household income survey. The results highlight three interconnected outcomes: the wage disadvantage faced by mothers, the wage advantage experienced by fathers, and the gender pay gap within the childless demographic, all contributing to the creation of the overall gender wage gap.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2023	Lorenti	Max Planck Institute for Demographic Research	This study analyzes the career paths of women and men in mid-life in Finland, Italy, and the United States. The results show varied trends across these countries, with education playing a significant role. In Finland, both genders see an increase in years employed with each child, leading to a minor gender gap. In the U.S., the link between children and years employed is steady except for those with two or more children, where a gender gap appears. Conversely, in Italy, women's employment years decline with children while men's increase. Education positively impacts employment duration in Finland, and highly educated mothers in the U.S. and Italy have a smaller gender pay gap compared to less-educated mothers.
	Glauber	Community, Work and Family	Analyzing data from 2000-2022 U.S. Current Population Survey, this study examines the impact of Covid-19 on the motherhood wage penalty. The study finds mother's wages began to decline at the onset of the pandemic and continued through the period of study. By the end of 2022, college educated mothers paid a 6% wage penalty for motherhood compared to college-educated childless women and women without a college degree.
	O'Rourke	Women's Studies International Forum	This study explores the concept of employer-sponsored egg freezing for women in the workforce, arguing that providing this benefit poses several obstacles and does not address the underlying workplace obstacles and systemic issues affecting women's reproductive choices. The research proposes that to effectively assist employees, employer-funded egg freezing should be paired with larger societal and institutional adjustments that integrate pregnancy and reproductive decision-making into the workplace setting.
	Albiston	Law and Social Inquiry	Conducting a hiring experiment, this research tests the theory that family-leave laws mitigate status bias of gender and motherhood by conveying support that both men and women can equally combine work and family. The results revealed support for the notion and suggest implementation ideas for practice.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2023	Rose	University of Manchester Press	Analysis of the British Labor Force Survey finds hourly pay of mothers of all ethnicities is consistently lower than that of fathers. Except Chinese and Black Caribbean mothers, mothers of all other ethnicities endure a wage penalty compared to their childless counterparts and fathers are paid consistently more per hour than men without children.
	Glauber	osf.io	This research utilizes data from various U.S. panel surveys to explore the relationship between motherhood, women's leadership roles, and their underrepresentation in demanding occupations. The findings reveal that mothers who continue full-time employment are less likely than childless women to stay in such demanding roles. The differences in time-intensive job requirements contribute to about 45% of the occupational authority gap between mothers and non-mothers. In contrast, there are minimal disparities between mothers and childless women in their likelihood of working in high-pressure, competitive fields, or those requiring substantial effort and persistence.
	Bari	J. of Family and Economic Issues	This study seeks to examine the influence of parenthood and family size on the earnings of both mothers and fathers. The results highlight a gendered effect of parenthood on wages, indicating a decrease in earnings for mothers (motherhood wage penalty) and an increase for fathers (fatherhood wage premium) in both annual and hourly wages. The impact is particularly pronounced for mothers with three or more children.
	Almond	National Academy of Sciences	Using quarterly earnings histories from the U.S. unemployment insurance program, this study aims to analyze instances where the motherhood penalty is expected to be small or absent: couples where woman earns more that her male counterpart before childbirth, firms headed by women, firms that are predominantly women. Contrary to anticipated results, finding reveal none of the 3 contexts diminish the motherhood penalty in wages.

Table 2: Summary table of key findings (cont.)

Year	Author	Source	Key findings from literature reviewed
2023	McGannon	Communication and Sport	Thematic analysis of media coverage of Canadian elite athletes, who are also mothers reveal themes of sexism and discrimination against mothers in elite sport.
	Zheng	International Labor Review	This research, based on data from the National Bureau of Statistics of China, aims to investigate the impact of parenthood on income in the gig economy, examining income shifts before and after parenthood for both mothers and fathers. The results indicate that the motherhood penalty is no longer present, potentially attributed to mothers' flexibility in setting their work schedules and durations to accommodate their maternal responsibilities. Conversely, the fatherhood premium transitions into a fatherhood penalty, likely due to increased work demands and pressures faced by fathers.
	Kang	Family Relations	The purpose of this study was to understand differences in marriage and motherhood penalties between Western and East Asian countries. Results suggest that married East Asian mothers face a greater motherhood penalty (2.9% - 4.5% per child) compared to Western mothers.

CHAPTER 3: RESEARCH QUESTIONS, HYPOTHESES AND THEORETICAL MODEL

With this dissertation, I advance understanding of the motherhood penalty by evaluating three research questions:

1. Has the average motherhood wage penalty found in Budig and England's seminal research (2001), based on NLSY79 data (1982 – 1993) decreased from the average 7% per child reported, based on more current data, namely NLSY97?
2. How is the relationship between having children and the motherhood wage penalty impacted now by commonly examined moderators including marital status, race, mother's age a first birth and human capital?
3. Adding a new dimension to the research how does a mother's measure of Grit impact the motherhood wage penalty?

Hypothesis #1: Using a pooled sample, years 1982 – 1993, from the NLSY79 dataset for their research, Budig and England (2001) found an average motherhood wage penalty of 7% per child. Given the recent release of data collected for the NLSY97, I extend the work of Budig and England (2001), employing similar statistical methods to understand if a pooled sample from survey years 2004-2021 NLSY97 dataset shows continued evidence of a motherhood wage penalty, and if so, whether there has been a change from the previously reported 7% per child wage penalty (Budig and England, 2001).

I expect to observe the motherhood wage penalty continues to persist yet is reduced from the previously reported average 7% per child for several reasons. First, evidence from the U.S. Bureau of Labor Statistics, Women in labor force databook (2021-Report 1092 and 2004 – Report 973) outlines labor force participation for women has increased over time. In the 1970s, 43% of women participated in the labor force, leaving 57% to unpaid work. Women's

participation rose steadily and peaked at 60% in 1999 but has remained fairly stable since the peak (2019, 57.4% women's labor force participation). By comparison, labor force participation for men was 69% in 2019, 17% below its peak of 87% in 1948. While men continue to be the majority of the U.S. labor force, the percentage difference between men and women has narrowed over time but has not reached parity. Figure 3 extracted from the U.S. Bureau of Labor Statistics Women in the labor force databook graphically expresses changes over time between men and women's participation in the U.S. labor force. Interestingly, the U.S. Census Bureau Population Pyramid for the United States: 2000, 2010 and 2020 indicates population by sex distribution remains essentially balanced over time, while women's labor force representation remains lower than that of their male counterparts. Figure 4 extracted from the U.S. Census Bureau graphically represents U.S. population pyramids in 2000, 2010 and 2020. By comparison, the U.S. Bureau of Labor Statistics reports that mothers with children show significantly increased labor force participation, in particular with school aged children in the household. With women's overall labor force participation at its peak 60% in 1999, labor force participation of mothers with school aged children around 1999 constituted almost 77% of women in the labor force, but still pales in comparison to fathers with similar aged children, which is 94% labor force participation. Figure 5 extracted from the U.S. Bureau of Labor Statistics Women in the labor force databook graphically expresses the makeup of mothers' participation in the U.S. labor force over time.

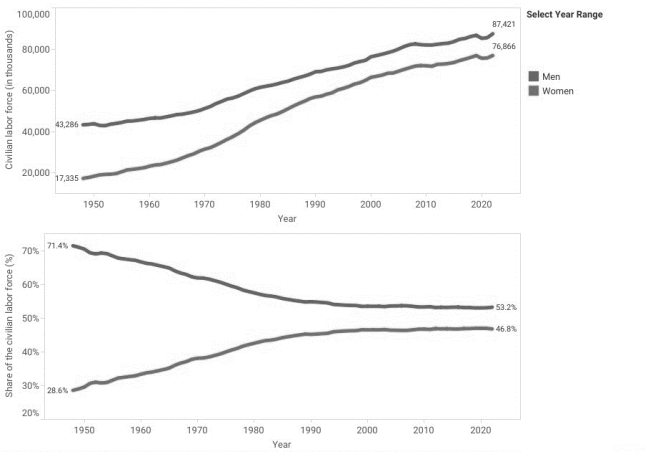


Figure 3: Comparison of men and women's participation in U.S. labor force

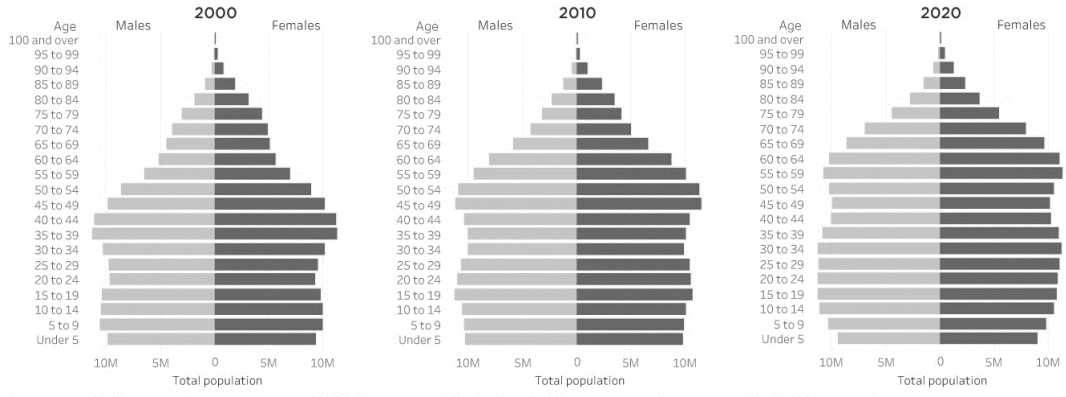


Figure 4: U.S. Population Pyramids: 2000, 2010, 2020

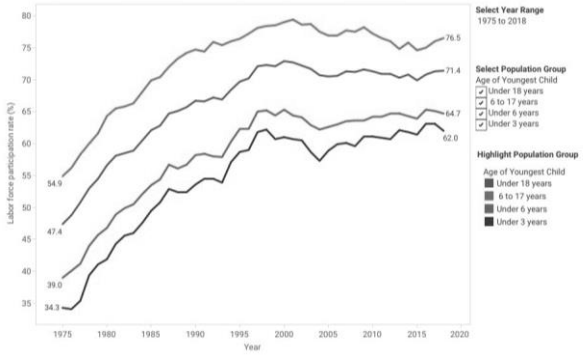


Figure 5: Mother's participation rates in the U.S. labor force

Explanations for mothers' increased labor force participation begin with evolution in cultural beliefs about motherhood and gender norms. Research indicates that gender norms are changing (Goldin, 2014; Almond, 2023). The U.S. Bureau of Labor Statistics reports that there has been an increase in the number of U.S. based stay-at-home fathers and men report a strong desire to spend more time with their families (Glynn, 2019). This shift allows increased labor force participation for mothers, and it has become more culturally acceptable to share child caring responsibilities within the family unit, and no longer solely the mother's responsibility. Evidence by the U.S. Census Bureau reporting in 2019 indicates an increase in father's taking career leave after birth of their first child has risen nearly 60% since the 1970s. Figure 6 extracted from the U.S. Census Bureau graphically expresses the change over time of father's leave after birth of their first child.

In summary gender norms are shifting in important and keyways that I expect to influence the magnitude of the motherhood penalty. As mothers continue to increase participation in the labor force and more partners choose to share in child caring responsibilities (choose to stay at home and/or increase participation in child rearing responsibilities after childbirth) the historically traditional expectation of mothers being primary child carers is changing. More specifically the primary child caring role is shifting towards more of a balance between mothers and their partners. According to gender role theory and how it has been traditionally applied to the motherhood penalty, mothers' wages have been penalized due to the perception that as the primary custodian of children, mothers devote less time and energy to their business responsibilities (Goldin, 2014; O' Neil et al., 2003; Heilman et al., 2008; Morgenroth 2021; Albiston, 2023; Correll et al., 2007). Yet as the primary childcaring role becomes more evenly shared between parents, gender role theory would seem to suggest that the motherhood

penalty would be reduced and, although out of scope of this dissertation, the motherhood penalty may in fact be more evenly shared by mothers and fathers. In other words, with traditional gender roles converging with respect to mothers and non-mothers childcare related task sharing, the motherhood penalty – that is the difference in wages between mothers and non-mothers is expected to be reduced relative to what was found in research for the prior 20 years.

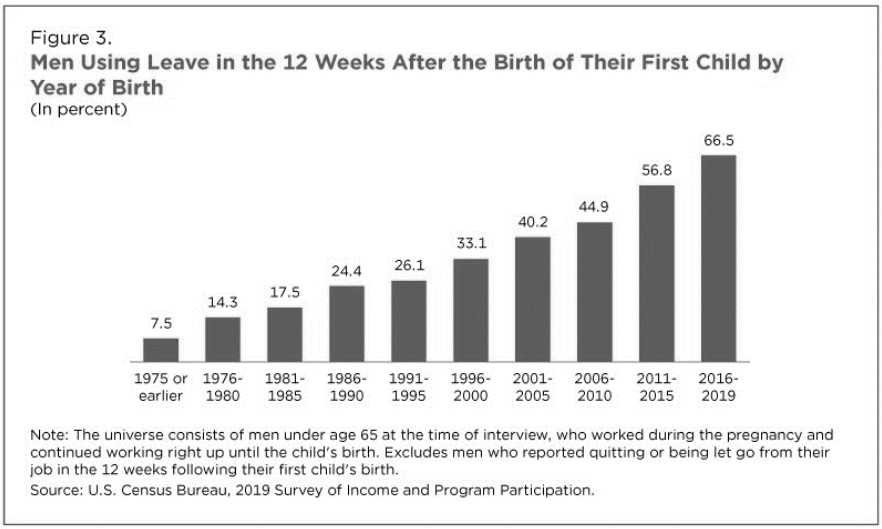


Figure 6: Father's leave after birth of their first child

Second, evidence from the U.S. Bureau of Labor Statistics, Women in labor force databook (2021-Report 1092 and 2004 – Report 973) outlines earnings for women have increased over time: women working full time earned 62% of what men earned in 1979 and 82% in 2019. Literature has suggested various improvements in mother's accumulation and retention of human capital over time, such as experiential capital (work experience and work seniority) to explain the narrowing of the wage gap. Although the gap is narrowing, we are unable to report parity. Figure 7 extracted from the U.S. Bureau of Labor Statistics Women in the labor force databook graphically represents median annual earnings of men and women is the U.S. labor force over time.

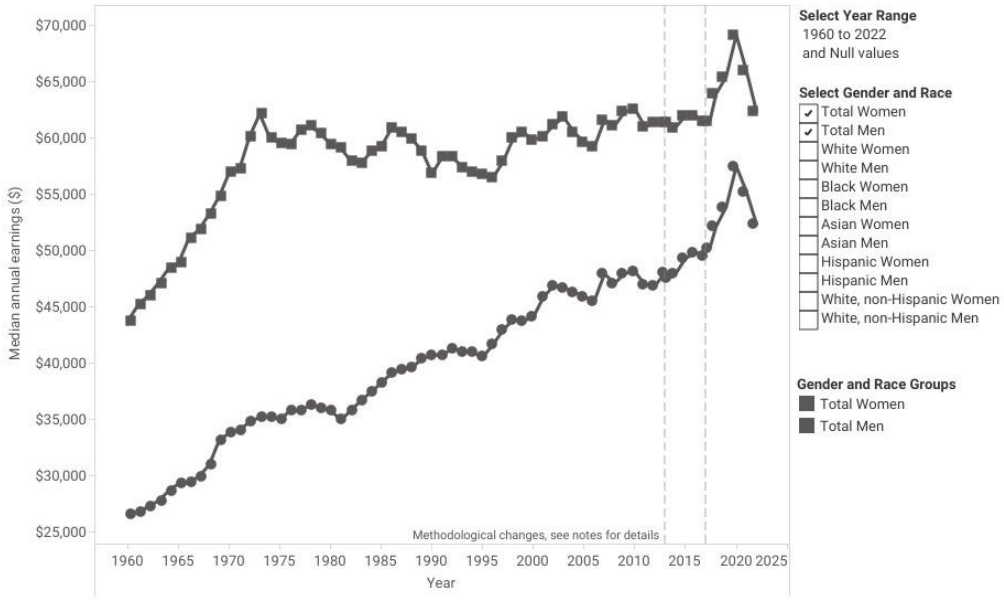


Figure 7: Median annual earnings of men and women in the U.S. labor force

In short, mothers' distribution and accumulation patterns of human capital are evolving in significant ways that I expect to impact the magnitude of the motherhood wage penalty. More specifically, as human capital of mothers increases, I expect the magnitude of the motherhood wage penalty to decrease. According to human capital theory (Becker, 1985) and how it has been traditionally applied to the motherhood penalty, mothers have been undervalued in terms of wages as they are perceived to have depreciated human capital due to absences or breaks from the labor force (Waldfogel, 1997; Budig and England, 2001; McIntosh, 2012; Avellar et al., 2004; Cukrowska-Torzewska and Matysiak, 2020; Bari et al., 2023). With evidence of mothers increased labor force participation over time, it is my assertion that mothers' work experience and seniority are also on the rise. As mothers' work experience and seniority increase, their perceived value should be rewarded with increased wages, and given increased experience and seniority, these mothers become increasingly valuable firm resources with opportunities for career progression and related wage increases. But evidence from the U.S. Labor Bureau

presented in Table 5: Median Annual Earning of Men and Women in the U.S. Labor Force, indicates we have not reached wage parity and I expect that a wage penalty for mothers, although reduced from Budig and England's (2001) average 7% per child, will persist. As mothers increase labor force participation, following human capital theory application principles would suggest that earnings across life course are increasing with human capital accumulation and the motherhood related wage gap evidenced in previous research will be reduced, as gender norms continue to evolve. So, following gender role theory, and given the perception that employers may have regarding mothers' roles in non-paid work, employers may continue to hold the notion that mothers are not fully able to dedicate themselves to labor force participation as mothers' foci are split between labor force participation and devotion to childbearing and child rearing duties.

Given evidence of mothers increased labor force participation, and an increase in median annual earnings of women since Budig and England (2001) reported a 7% per child average wage penalty for mothers, I expect to observe a decrease of the per child penalty for mother's simply based on differences in portion of mother's salary and labor force participation increasing over time, but not fully eliminated due to lingering perceptions of mothers' dedication and prioritization of her children.

> *Hypothesis 1: Based on an NLSY97 pooled sample (2004 – 2021) of all working women, the presence of children in the household will decrease women's wages when compared with childless women.*

Hypothesis #2a: Previous research has focused less on the impact of marriage on a woman's income and more on the impact of motherhood on a woman's income. Since historically, a women's age at first marriage was closely related to mother's age at first birth, and

childbirth is the bigger disruptor of women's labor force participation perhaps this was acceptable in the past. However, the coupling of marriage followed by childbirth has weakened over time which indicates that marriage could act independently of childbearing in terms of impact on women's wages. In the U.S. never-married women experience lower motherhood penalties than married or divorced women (Budig and England, 2001). The average 7% per child motherhood penalty reported by this study and the difference seen between never married, married and single mothers implies that marital status has an impact on the magnitude of wage gap experienced by mothers. Loughran and Zissimopoulos (2009) findings indicate for married couples, first birth lowers only female wages 2%-3%, with no impact on male wages. The fact that marriage increases the motherhood wage penalty suggests that a portion could be explained by time and energy mothers dedicate to children versus paid employment is influenced by other potential sources of financial support, aside from their own earnings. Partners could be a source of financial support that allows married mothers to focus more on their children than single women (Loughran and Zissimopoulos, 2009).

Evidence from the U.S. Census Bureau indicates that marriage rates have dropped ~30% over the past half century. Figure 8 extracted from U.S. Census Bureau is a visualization of declining marriage rates. Based on findings from previous research, and evidence of a declining marriage rate, I expect the motherhood wage penalty will continue to persist for married mothers when compared with unmarried mothers but will be reduced from the previously reported 9-10% per child.

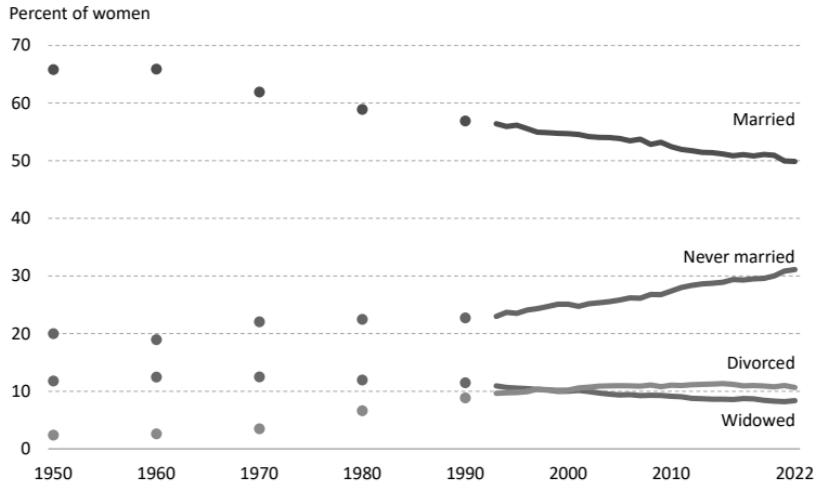


Figure 8: Women's marital status trend over time in U.S.

As previously mentioned, gender norms are shifting in influential ways that I expect to influence the magnitude of the motherhood penalty based on marriage status. Mothers choose to marry or remain single, and marriage patterns are evolving. In the case of married mothers, gender role theory has been applied to suggest mothers' wages have been penalized due to the perception that they remain primary caregivers and responsible for home related unpaid work with a partner to support the family structure through paid work. In the case of unmarried mothers, with no second source of financial assistance, the single mother is solely responsible for wages to support her children. Although mothers' marriage rates are declining, their labor force participation is increasing. According to gender role theories traditional explanation of the motherhood penalty, mothers' wages have been penalized due to the perception that as the primary custodian of children, mothers devote less time and energy to their business responsibilities. Yet as marriage status of mothers evolves, gender role theory would seem to suggest that the motherhood penalty would be reduced.

I expect married mothers who participate in the labor force to endure a higher motherhood wage penalty. One potential reason why marriage could impair the wages of mothers is that successful career development may require some degree of mobility (Looze, 2014; Looze, 2017). It may require several attempts to achieve an ideal employer-employee pairing and mothers who are geographically constrained in their search may have fewer opportunities to achieve that pairing compared with mothers who can search freely and not be limited by a partner's geographical career considerations. In other words, marriage may limit a mother's job mobility as she may need to take the requirements of her partner's career decisions into consideration. Given the challenge of optimizing two careers rather than just one and gender role theory explanations of women bearing the role of primary caregiver to children, in married couples, the arrival of children may cause many women to reduce their labor supply which results in lower experience and reduced wages.

Conversely, I expect unmarried working mothers to experience reduced impact on wages. An unmarried mother may have fewer job mobility limitations in making career search choices to optimize her employer-employee pairing as she may not need to consider her partner's career optimization decisions resulting in increased job mobility. But I do not expect wage parity for the unmarried mother as childcare responsibilities may fall on her entirely. These childcare responsibilities may impact her labor force devotion. The human capital argument would assert that the time spent by the single mother outside of paid labor and devoted to childbearing and child rearing would reduce labor market experience resulting in a motherhood wage penalty.

In summary, with traditional gender roles changing and married mothers having increased support from their partners with unpaid family care responsibilities and unmarried mothers increasing in numbers in the labor force, the wage penalty for mothers – that is the

difference in wages between mothers and non-mothers based on marital status will continue to persist, but should be reduced relative to what was found in research for the prior 20 years, and mothers marital status will impact the magnitude of the motherhood wage penalty.

Hypothesis 2a: Mother's marital status will impact the relationship between presence of children and mother's hourly wage. Working married mothers will experience lower hourly wages when compared to working unmarried mothers.

Hypothesis #2b: For women, pregnancy, childbirth and the immediate postpartum period are likely to lower labor market participation and productivity, at least temporarily. Research indicates that a delay in entering motherhood is thought to allow mothers-to-be additional time to accumulate human capital in terms of education and work experience prior to taking a motherhood-related career break and potentially be required to divide attention between the workplace and motherhood-related responsibilities upon return to the workplace. Amuedo-Dorantes and Kimmel's (2005) research finds fertility delays enhance what their study reports as a wage boost among college educated women delaying entry into motherhood (Amuedo-Dorantes and Kimmel, 2005). Evidence from the U.S. Census Bureau shows not only a decline in overall fertility rates over time, but also a shift over time of women's fertility rates peaking in the 1990s for women between the ages of 25-29 and in 2019 those same fertility rates are at their maximum for women ages 30-34. Figure 9 is extracted from the U.S. Census Bureau is a graphical representation of the shift in fertility rates over time.

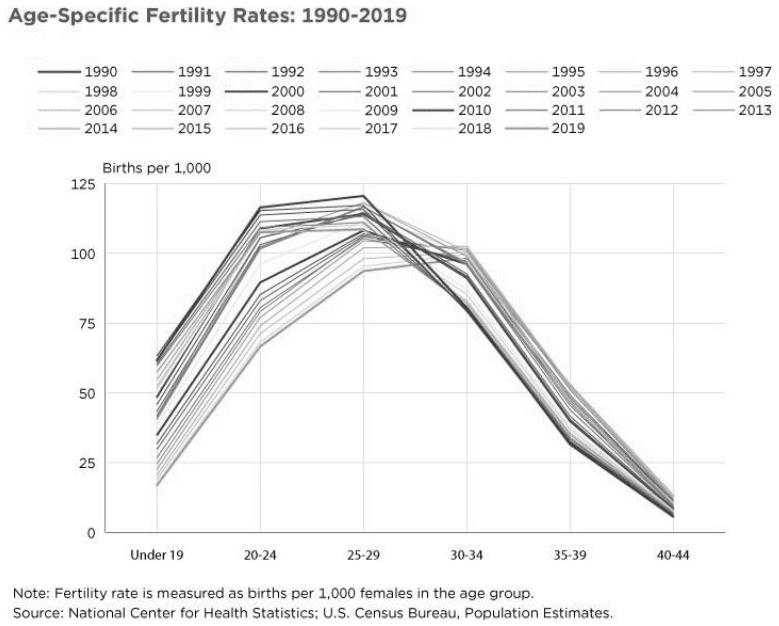


Figure 9: Age specific fertility rates 1990-2019

Accumulation of human capital in terms of education and work experience are important factors that impact mothers' wages. According to human capital theory and its historical application to the motherhood wage penalty, time out of the labor market for childbearing and childrearing amounts to a depreciation in human capital leading to a motherhood wage penalty.

Prior research indicates that a delay entering motherhood is thought to allow mothers-to-be additional time to accumulate human capital prior to taking a motherhood-related career break and potentially having to divide attention between the workplace and motherhood-related responsibilities upon return to the workplace (Amuedo-Dorantes and Kimmel, 2005). Findings suggest delaying motherhood into a woman's thirties is beneficial to earnings and the same pattern is not seen in fathers' earnings and findings suggest a wage boost (~10%) for mothers who choose to delay fertility into their 30s when compared to younger mothers (Miller, 2001).

Given evidence from the U.S. Census Bureau presented in Figure 9: Age Specific Fertility Rates 1990-2019, the trend is that mothers are delaying entry into motherhood and

human capital theory would assert that accumulation of more human capital in terms of education and work experience prior to child-related career breaks, when compared to younger mothers would lead to a decrease in the motherhood wage penalty.

A possible explanation for an increased motherhood wage penalty experienced by women who choose to have children in their 20s and earlier is their lack of opportunity to establish work experience, seniority and potentially even attain high education before finding themselves needing to balance work and family responsibilities. Younger mothers, presumably in the foundational portion of their careers, may find themselves struggling to balance the responsibilities of paid work versus responsibilities associated with their children. This conflict may lead to less engagement in work interactions and the experience may undermine their ability to learn from those experiences and truly appreciate the cause-and-effect between their work-related decisions and outcomes. As such, these younger mothers are not able to develop the same level of human capital through work experience that women who delay entry into motherhood can.

Conversely, mothers who choose to delay fertility into their 30s and beyond should have early uninterrupted energy and effort to devote to labor market experiences. Without the potential time and effort conflict required to manage career and children simultaneously, mothers who choose to delay fertility have the opportunity to fully engage in gaining work experience, gain seniority, and arguably, higher levels of educational attainment prior to adding the complexities of balancing work and child-rearing related responsibilities, leading to a lower impact for older mothers' wages and career outcomes.

Given previous research findings and evidence of changes over time in women delaying entry into motherhood, I expect to find mother's age at first birth impacts the motherhood wage

penalty. I expect a mother's age at first birth to influence the magnitude of the motherhood wage penalty, specifically, younger mothers will endure a higher motherhood wage penalty and women who delay entry into motherhood to face very little, if any, motherhood wage penalty.

Hypothesis 2b: In a sample of university educated women, mother's age at first birth will impact the relationship between presence of children and mother's hourly wage. University educated working women who delay entry into motherhood will experience a lower impact on hourly wages than university educated working women who do not delay entry into motherhood.

Hypothesis 2c: Previous research related to race and the motherhood wage penalty is conflicting. Budig and England (2001) found similar motherhood wage penalties for Black and White mothers but slightly reduced penalties for Hispanic mothers (Budig and England, 2001). Glauber (2007) found racial differences do exist, with African American and Hispanic mothers paying a smaller wage penalty than White mothers suggesting that differences in family-support mechanisms within each culture favor African American and Hispanic mothers' ability to rely on family for early childcare and home support, consequently allowing them to focus on their careers (Glauber, 2007). Evidence from the U.S. Department of Labor shows an increasing overall trend in women's median annual earnings over time and across races with a peak in 2020 for all races. Hispanic and African American women's median annual earnings are consistently below that of all women and show a trend of significant downside deviation from the average median annual earnings for all women. White women's median annual earnings appear to be consistent with the average of all women and trends for Asian women's median annual earnings are consistently above the average for all women, with a significant upside deviation in the later

timepoints. Figure 10 is extracted from the U.S. Department of Labor, graphically represents changes over time in women's median annual earnings by race.

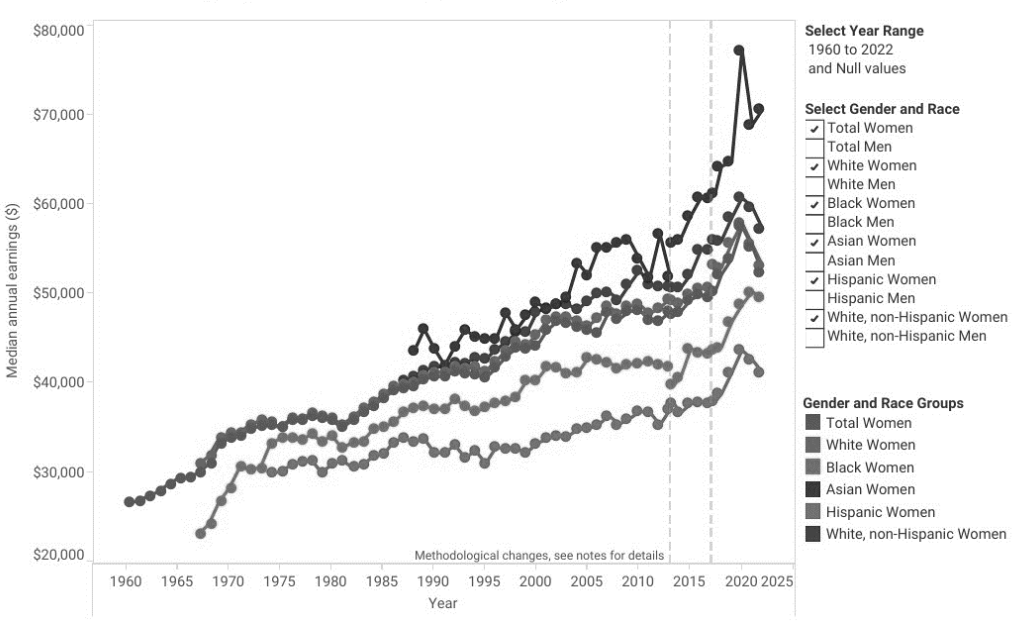


Figure 10: Women's median annual earnings by race

In addition, based on data from the U.S Department of Labor, the racial composition of the U.S.-based workforce continues to evolve. Black women's labor force participation rose steadily and peaked at 64% in 1999, followed by a steady decline. White women's labor force participation also rose steadily, peaking around the same time at 60% and has declined only slightly. Asian women's labor force participation has shown little fluctuation since first reported in 2000 and Hispanic women's labor force participation rose steadily to 2000 and has remained stable since. Figure 11 is extracted from the U.S. Department of Labor graphically represents the change over time of women's labor force participation by race.

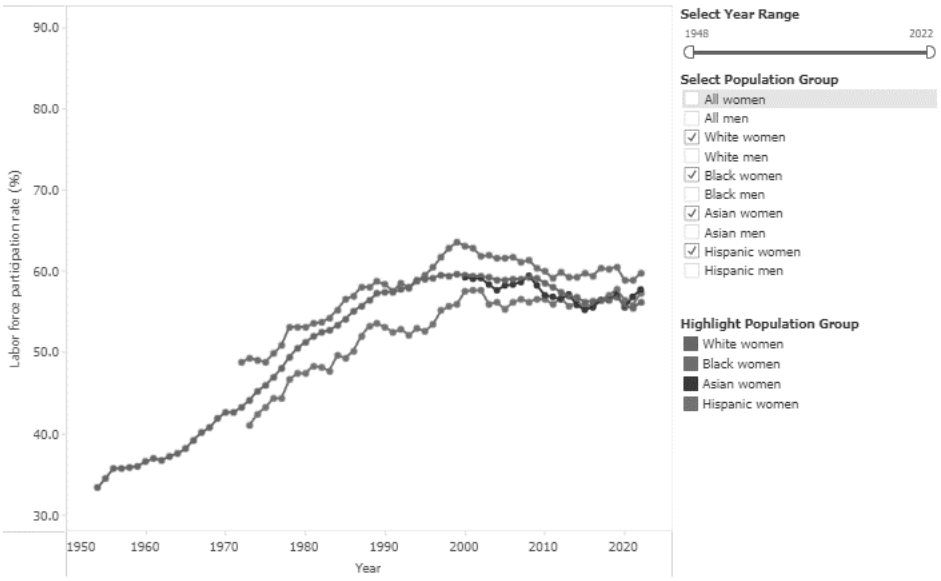


Figure 11: Women's labor force participation by race

Although at first glance, one might presuppose racial discrimination is the theoretical mechanism at play, that element is not in consideration within my dissertation. As noted by Budig and England (2001), discrimination is difficult to quantify and not available within the NLSY datasets (Budig and England, 2001). Based on research, the theory of specialization suggests that a focus on individual- and household-level mechanisms is a possible explanation of differences experienced between races as it relates to the motherhood wage penalty. The Theory of Specialization in motherhood penalty research is essentially a theory of how partnerships differentially affect family outcomes (Kilewald et al., 2013). Specialization within the household is a possible explanatory mechanism of women's motherhood penalty, broadly suggesting a strategy for labor division between family members that can maximize the well-being of the household (Becker, 1985) and more specifically the extent of effort mothers are willing and able to put into paid work outside the home.

Research related to cultural family-level differences suggest that races that have collectivist belief systems, such as African Americans, Hispanics and Asians, demonstrate stronger commitment to providing support to family than do races with an individualist belief system (Cichy et al., 2014). Additionally, the research reveals that individualist families, referred to as European Americans (White) minimize their within-family caregiving and rely on formal support options, such as paid daycare and paid eldercare, versus collectivist families' use of family member caregiving to build ongoing family ties (Pyke and Bengston, 1996).

For White families following an individualistic belief system, focus is contained to the nuclear family – individuals living within a single household. The motherhood penalty related research has revealed that White mothers tend to have the least amount of extended family support for childrearing activities (Glauber, 2007). With fewer "hands to help", individuals within the household may be required to expend energy balancing paid labor commitments and child related duties, with little outside informal support by means of extended family. White mothers may find themselves specializing in childbearing and child-rearing-related responsibilities, leaving their partners to specialize in financial support of the family by paid labor. White mothers in this situation may find they are unable to devote time and energy to labor market experiences due to their focus on childbearing and child rearing. Without adequate time to accrue human capital in terms of work experience and seniority that is valued by employers, White mothers may find they must endure a larger motherhood wage gap.

Comparatively, within Asian, Hispanic and African American families following a collectivist belief system, mothers may find "more hands to help" from within the extended family. With these mothers having reduced levels of anxiety and financial commitment to child rearing/childcare, they are able to continue to specialize in paid labor to maximize family income

and wellbeing. Asian, Hispanic and African American mothers should be able to devote the necessary time to labor market employment and participate more fully than their individualistic family colleagues in paid work experiences. With adequate time and energy to focus on accruing human capital in terms of work experience and seniority that is valued by employers, Asian, Hispanic and African American mothers may find they experiences a smaller motherhood wage gap when compared to White mothers.

In summary, the theory of specialization would suggest that with strong extended family support, African American, Asian and Hispanic mothers (England et al., 2001) can specialize in labor market participation while weaker extended family support for White mothers leaves the possibility of a larger motherhood penalty as White mothers may need to specialize in care of the household rather than paid work.

Given inconsistent previous research findings related to race's impact on the motherhood wage penalty, a steady increase in women's overall wages, documented differences in median annual earnings trends by race and differing cultural family support structures by race, I expect to find race impacts the motherhood wage penalty. I expect to find African American, Asian and Hispanic mothers to experience smaller motherhood related wage gaps with higher wage gaps for White mothers.

Hypothesis 2c: Mother's race will impact the relationship between presence of children and mother's hourly wage. African American, Hispanic and Mixed Race working mothers will endure a smaller impact to hourly wages due to motherhood, while White mothers will experience lower hourly wages due to motherhood.

Hypothesis #2d: Of the research reviewed in preparation for this dissertation, over 50% cite Becker's Human Capital theory as a grounding. In Budig and England's (2001) seminal

work, they consider education, years of experience and years of seniority as measures of human capital. Their findings suggest that depreciation of human capital in mothers related to childbearing and child rearing explains ~70% of the 7% per child wage penalty. Human capital theory predicts that education, seniority and experience bring increased worker productivity and that productivity is rewarded with increased wages in an effort to retain employees (Budig and England, 2001;Misra et al., 2011; Waldfogel, 1997). Conversely, losing experience due to motherhood related career breaks or reduced productivity with the need for mothers to exert less effort in the workplace in order to conserve energy to meet the demands of children, adversely affects mother's remuneration (Cukrowska-Torzewska and Matysiak, 2020). Consistent with Budig and England (2001), I intend to investigate human capital as education, years of experience and years of seniority within this dissertation.

With respect to trends in educational attainment of women over time in the U.S., evidence from the U.S. Bureau of Labor Statistics, Women in labor force databook (2021-Report 1092 and 2004 – Report 973) outlines educational attainment of women ages 25 to 64 in the labor force has progressed over time. The U.S. Census Bureau reports that women overtook men in the early 1990s in terms of educational attainment, and the upward trend for women continues through the reporting period ending in 2015. Figure 12 is extracted from the U.S Census Bureau graphically represents the trend in women's educational attainment.

Figure 12: Percentage of population with a bachelor's or higher degree by sex

In his research, Anderson (2003) found that the largest differences in the motherhood penalty arise among educational groups. Women with higher educational attainment did not endure a wage penalty for having children (Anderson et al., 2003). Figure 13 from the U.S Bureau of Labor Statistics provides graphical representation of women's labor force participation rates by educational attainment in 2016. Trends indicate a large disparity, with men outnumbering women's workforce participation within the less educated population, with the disparity narrowing as higher levels of education are attained. At the doctoral level, women slightly outnumber men in labor force participation.

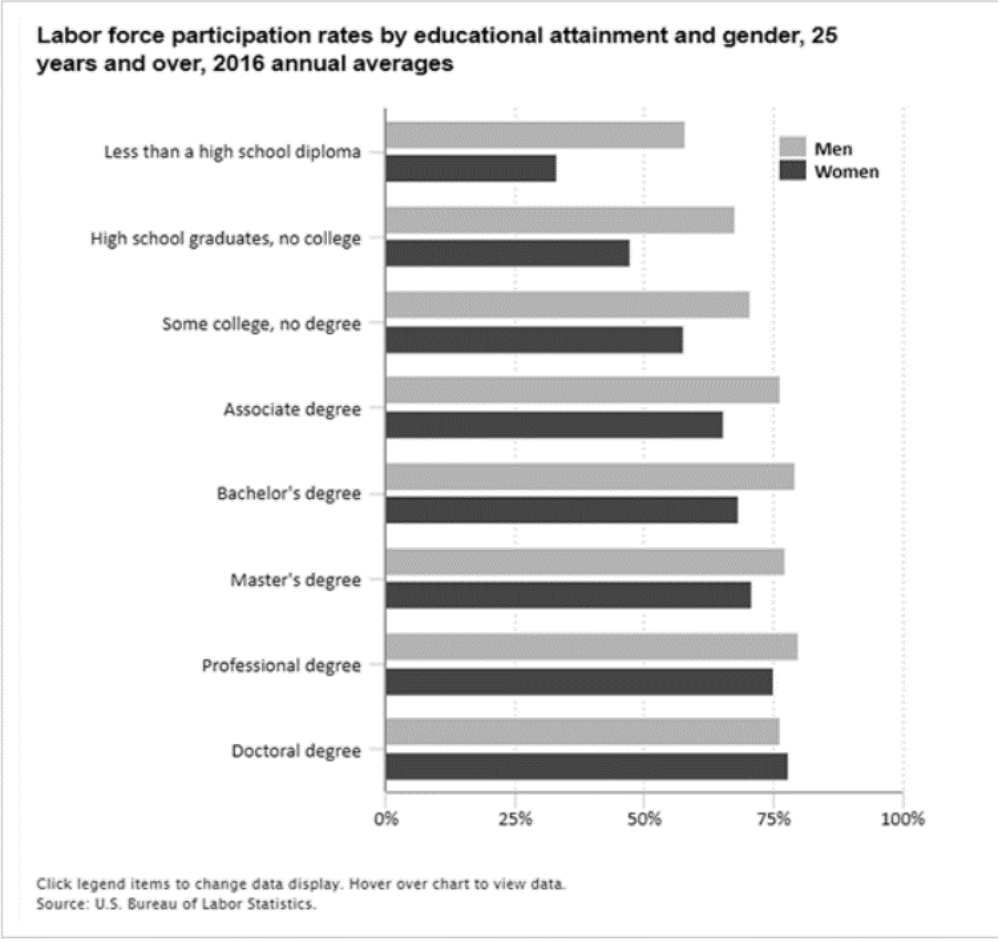


Figure 13: Labor force participation by gender and educational attainment

Accumulation of human capital in terms of education, work experience (duration in the labor force) and seniority (duration working for the same employer) are important factors that impact mothers' wages. According to human capital theory's application to the motherhood wage penalty, time out of the labor market for childbearing and childrearing amounts to a depreciation in human capital causing a motherhood wage penalty.

There may be a variety of reasons why a woman may not have had the opportunity to gain work experience, establish seniority and potentially attain higher education before entering into motherhood or while attempting to balance motherhood with labor market participation.

These reasons may include early fertility, child related career breaks, lack of opportunity to pursue higher education, and lack of family support. But regardless of the reasons, I expect the outcome to be consistent. That is mothers with lower levels of human capital will endure a higher motherhood wage penalty than mothers with higher levels of human capital.

Given the trend of women's growth in educational attainment, the trend of mothers increased labor force participation amounting to human capital increases of experience and potentially seniority, I expect that measures of human capital will continue to be a primary explanation for any noted motherhood wage penalty. Specifically, mother's higher educational attainment, employment experience and seniority will reduce the motherhood wage penalty.

Research has shown that primary determinants of wages are human capital factors of education, experience and seniority (Winkler, 2022), with experience being gained through labor force participation and seniority gained through labor force participation with the same employer. Given the noted trends of increased labor force participation of mothers and increased educational attainment of women, I expect that measures of human capital will continue to impact the relationship between a mother's total number of children and hourly wage. Specifically, mothers with higher educational attainment, employment experience and seniority will reduce any motherhood wage penalty. Conversely, mothers lower in measures of human capital will endure a higher motherhood wage penalty.

> *Hypothesis 2d: Mothers' measures of human capital will moderate the relationship between number of children and hourly wage. Specifically, increases in mothers' educational attainment, experience and seniority (human capital measures) will lead to a decreased impact on mothers' hourly wages.*

Hypothesis #3: Grit is defined as perseverance and passion for long-term goals. Working tirelessly through challenges, maintaining effort and interest over long periods of time, overcoming failure, difficulty and stalled progress is how gritty individuals are described (Duckworth et al., 2007). Research to date has shown validity between Grit-S (validated short grit questionnaire) results and educational attainment, students predicted GPA, predicted retention among West Point cadets and final round attainment among Scripps National Spelling Bee competitors (Duckworth et al., 2009). Grit has also been shown to be a predictor of academic achievement (Lam et al., 2019) and positively related to well-being (Vainio and Daukantaite, 2016). Given that about half the questions of the Grit measure are related to resilience and the other half of the questionnaire is related to consistent interests over a long period of time (Duckworth et al., 2007), I consider Grit to be relevant in understanding the relationship between motherhood and career success measures in terms of the impact of grit on mothers' wages. Achievement of challenging goals needs not only talent but also the sustained and persistent application of that talent over time (Duckworth et al., 2007). It is an undisputable fact that successfully raising children requires both long term commitment and perseverance as does career achievement, particularly in higher level careers, specifically those careers requiring a 4-year university degree or higher.

Grit research reports conflicting results with respect to grit and career achievement. Using the Grit-S scale Clark and Clark (2019) examined whether grit predicted career success in U.S.-based working adults. Their findings indicate that grit does not predict career success. In a non-U.S-based cross-national study (Clark and Clark, 2019). In their 2019 study, Danner and colleagues explored the relationship between grit and both objective (income) and subjective (job satisfaction) career success, revealing that grit was positively linked to income and job

satisfaction in certain countries (Danner et al., 2019). Lechner et al., (2019) studied how grit related to career success and engagement in a sample of German full-time employees. Their study reveals grit is incrementally associated with all the study indicators of career success, including income (Lechner et al., 2019).

Although grit has, to the best of my knowledge, not been traditionally applied to research within the context of the motherhood penalty I theorize there is relevance. Within the grit theoretical framework, grit is essential to high achievement. Duckworth et al. (2007) found more highly educated adults were higher in grit rating (the maximum score on the Grit-S is 5 [extremely gritty], and the lowest is 1 [not at all gritty]) (Duckworth et al., 2007) . One possible explanation for motherhood penalty-related wage difference among women is their level of grittiness. Grittier mothers will presumably persist, if they feel passion for their career, though challenging situations like managing the demands of a career with the demands of a household with children. Grittier mothers may find creative ways to immerse themselves more fully in labor market engagement, leading to increased valuable employment experience (making them a valuable asset to an organization) resulting in being rewarded with higher wages. Comparatively, less gritty mothers may not push as hard to persist through challenging situations. As a result, they may lose employment related opportunities to accumulate human capital and advance their careers.

As has been previously discussed, trends indicate a large disparity, with men outnumbering women's workforce participation within the less educated population, with the disparity narrowing as higher levels of education are attained (reaching parity at the doctoral level) and Anderson et al., (2003) found that the largest differences in the motherhood penalty arise among educational groups - women with higher educational attainment do not endure a

wage penalty for having children (Anderson et al., 2003). Despite conflicting findings of grit being only marginally related to income and applying human capital theory principles, I expect that mothers with a minimum 4-year university degree and higher on the grit scale to endure little to no motherhood wage penalty, conversely, I expect mothers with a minimum 4-year university degree and lower on the grit scale to endure a larger motherhood wage penalty.

> *Hypothesis 3: In a sample of university educated women, women's Grit-S rating impacts the relationship between presence of children and mother's hourly wage. Specifically, university educated working mothers with higher levels of reported grittiness will experience a lower impact on hourly wages than university educated mothers with reported lower levels of grittiness.*

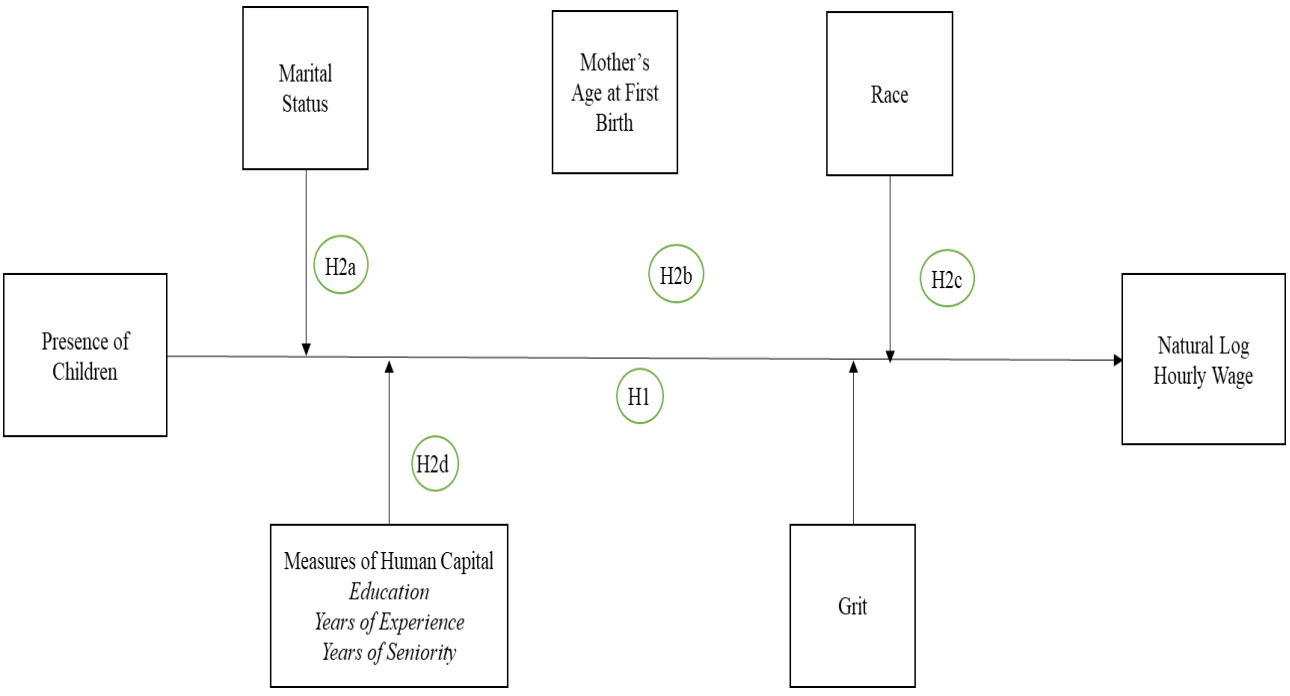


Figure 14: Theoretical Model

CHAPTER 4: METHODS

4.1 Overview

In their seminal study, Budig and England (2001), used data from the U.S. Bureau of Labor Statistics National Longitudinal Survey of Youth 1979 and found an average motherhood wage penalty of 7% per child among American women. The authors measured this penalty as the natural log of hourly wage using data from a pooled sample from 1982 – 1993 of women employed full time or part time in at least 2 of those years (Budig and England, 2001).

For the purposes of this study, I extend Budig and England's seminal study using the U.S. Bureau of Labor Statistics National Longitudinal Survey of Youth 1997. In addition to some of the elements from the original study, the NLSY97 respondents completed Duckworth's Short Grit Scale (Grit-S), a validated measure of perseverance and passion for long-term goals (Duckworth et al., 2009). Grit-S surveys were administered in round 17 and 18 for those not surveyed in round 16.

4.2 Data

The National Longitudinal Survey of Youth 1997 by the U.S. Bureau of Labor Statistics comprises a nationally representative group of 8,984 individuals, both men and women, born between 1980 and 1984 and residing in the United States during the initial survey in 1997. The participants were between the ages of 12 and 16 as of December 31, 1996. Surveys were carried out annually from 1997 to 2011, and thereafter biennially until 2021, resulting in a total of 18 survey administrations for this cohort.

I pooled the 2004- 2021 waves of the National Longitudinal Survey of Youth (NLSY). I limit my sample to women employed during at least two of the years from 2004-2021, since fixed effects regression models require at least two observations per person. Out of the 4385

women in the 1997 NLSY, 3,728 women had employment data. After cleansing of person-years data for missing values and outliers from the variables of interest, and ensuring the sample was limited to working women, that is, women who reported at least 2 instances of hourly wage and had reported experience, this analysis is based on 9,323 person years as units of analysis, which is an average of 13 years of data for each of the 729 women. Approximately 16 percent of person-years were lost during data cleansing due to outliers and missing values.

4.3 Analytical Method

Fixed effects regression was chosen as the statistical tool for this study to analyze NLSY97 panel data for time-variant variables. It is the most common tool used to analyze panel data as it effectively controls for individual-specific effects and allows for understanding of individual-specific effects and changes over time. Fixed effects regression captures the heterogeneity and individual dynamics in panel data allowing for analysis of how individual may change over time (Bruderl and Ludwig, 2015). Fixed effects regression accounts for individual-specific characteristics that vary over time, so by including fixed effects for each individual the model controls for heterogeneity at the individual level. Fixed effects models focus on within-group variation, allowing for the capture of changes in variables within each individual over time, reducing bias from time-invariant individual specific factors. By controlling for unobserved individual-specific factors that may correlate with the variables of interest, fixed effects regression manages endogeneity issues and omitted variable bias. The properties of fixed effects estimation does not require the assumption of data being perfectly normal to provide valid and reliable estimates (Acock, 2008). Fixed effects regression was conducted for hypothesis testing for time variant variables (number of children, natural log of hourly wage and marital status), with effects fixed for person-years. For time invariant variables (mother's age at first birth, race,

measures of human capital and Grit), OLS regression was used for hypothesis testing. A condition of fixed effects regression is that at least 2 observations for each individual be available for evaluation. Based on NLSY97 data available, and the nature of variables, a working woman's race, highest level of educational attainment, years of experience, years of seniority and Grit-S had a single response per survey participant. Using fixed effects regression would treat these variables as time variant characteristics, and any unique impacts would not be distinguishable. OLS regression was used for analyses related to time invariant variables.

4.4 Measures

Dependent Variable

Natural Log of Hourly Wage: The dependent variable of this study is the natural log of hourly wage. In this study, I compare the natural log of hourly wage of working women with children to that of working women without children, each with at least two reports of hourly wage across the survey period (as a condition for fixed effects regression). The NLSY97 survey reports hourly wages in two formats. The first format is self-reported hourly wage (NLSY97 reference: YEMP-22900). Self -reported hourly wage excludes overtime, tips and commissions. The response rate for self-reported hourly wage for survey years 2004-2021 was approximately 40 percent. With this low response rate, removal of missing values and outliers removed, using self-reported hourly wage led to a very low number of usable observations (pooled 4371). The second format is calculated hourly wage (NLSY97 reference: CV_HRLY_PAY). Calculated hourly wage factors in reported pay, rate of pay time unit, and hours worked. This year over year data from 2004 – 2021 produced extremely low and extremely high pay rates and were not edited in the NLSY97 dataset. After removal of missing values and outliers, using calculated hourly wage led to a more reasonable number of usable observations (pooled 31467). After careful

inspection of NLSY97 data available related to hourly wage, this study used calculated hourly wage (NLSY97 reference: CV_HRLY_PAY) for analysis, with due care given to removing extreme values. Appendix A outlines the process used in creating the final natural log of hourly wage variable. As recommended by Acock (2008), each individual year's wage data was evaluated prior to creation of the pooled sample and outliers removed. The natural log of the pooled pay variable was calculated and an inspection of the histogram with overlaying normality plot led to the removal of observations with a natural log of under six (see Appendix A). Histogram with overlaying normality plot was inspected. Although a Shapiro-Wilks test for normality revealed that the data was not perfectly normal, based on the histogram with overlaying normality plot, the Q-Q plot (see Appendix A) and the ability of fixed-effects regression to handle data that does not grossly violate normality assumptions (Wooldridge, 2015), analysis was conducted.

Independent Variable

Presence of Children in the Household: The main independent variable is the presence of biological children in the household (categorical: 0 = children not present, 1 = child(ren) present). In an alternative specification, I measure children with dummy variables for one child = 1, two children = 2 and three or more children = 3, with no children = 0 as the reference category.

Moderators

Variables evaluated for moderation effects are as follows. (1) mother's marital status (2) mother's age at first birth in college educated women (3) mother's race (4) mother's measures of human capital (highest level of educational attainment, years of experience, years of seniority) (5) mother's measure of self-reported Grit S.

Mother's Marital Status: Dummy coded variables were created for marital status with never married as the reference category. Married and divorced (with divorced capturing widowed and separated respondents) were each coded as 1 in their respective categories.

Mother's Age at First Birth: Indicator variables for mother's age a first birth include age 24 and below as the reference category, ages 25 - 29 , ages 31-36, age 37+.

Race: I created a dummy coded variables for race. Mixed race was the reference category, Black, Hispanic and White were each coded as 1 in their respective categories. Although the NLSY97 questionnaire included response categories for White; Black or African-American; Hispanic or Latino; American Indian, Eskimo or Aleut; and Asian or Pacific Islander races, to simplify the race identification process, a single combined variable (NLSY97 reference: KEY!RACE_ETHINICITY R14826) was reported which include American Indian, Eskimo or Aleut; and Asian or Pacific Islander races within the Mixed-Race data.

Measures of human capital: Measures of human capital include highest level of educational attainment, years of experience and years of seniority. These measures cover the entire survey lifecycle (1997-2021). Education includes highest level of educational attainment and indicator variables were created for high school = 1, undergraduate degree = 2, graduate degree = 3 and beyond, with no education = 0 as the reference category. Years of experience is a continuous variable and indicates years worked since the age of 20 per respondent. Years of seniority is also a continuous variable and indicates longest tenure at a particular job during the survey period.

Grit-S: The 8-question Grit-S was administered as validated by Duckworth and Quinn (2009) in 2013 and respondents missed in 2013, were captured in 2015 or 2017 survey years. Grit was used as intended as a continuous variable with a response of 5 considered "very gritty"

and a response of 1 considered “not gritty at all”. Prior to conducting analyses, the dataset was visually inspected and next steps determined for each variable of interest. Prior to creating the pooled sample, the following is a summary of pre-analysis steps taken to ensure dataset readiness. For all observations, negative values (indicating survey was not completed in that particular year) were replaced with a missing indicator that could later be easily excluded from analysis. Since the sample for this study is limited to working women, zero values for years of experience were excluded. The original NLSY97 questionnaire was inspected for each of the eight Grit-S questions and found that questions 2, 4, 7 and 8 were reverse coded (1 = very gritty through 5 = not gritty at all). The reverse coded Grit-S questions were recoded to indicate 1= not gritty at all through 5 = very gritty. CFA was performed and based on factor loadings and additional fit analyses, responses for question 2, question 4 and question 8 were dropped. A standardized composite GritS sample was created. Process and results for each step of the CFA are outlined in Appendix D. Table 3 presents descriptive statistics for all (pooled) variables.

Table 3: Study variables descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Natural log of hourly wage	9,323	7.28396	. 4592509	6.028278	8.517193
Child(s) present	9,323	.984018	.1254123	0	1
Number of children	9,323	2.30162	.8838248	0	3
Marital status	9,304	.6041488	.8380067	0	4
Race	9,323	3.129465	1.2423	1	4
Age at first birth	5,110	27.68705	5.428412	20	41
Education	9,285	3.033279	1.343226	0	7
Years of experience	9,323	17.7512	2.130805	1	22
Years of seniority	9,323	9.396761	4.788886	1	25
Grit-S	5,110	2.926147	.5032571	1	5

4.5 Results

Table 4 presents analysis coefficients and R-squared for the effects of presence of children on all working women. Table 5 presents analysis coefficients and R-squared for the effects of presence of children on working women with a college education (undergraduate, graduate and beyond, including masters, PhD and professional degrees). Complete regression results for all analyses, for all variables, are presented in Appendix B. Based on all regression coefficients, transformation calculations from the natural log of hourly wage to percent impact on hourly wage are presented in Appendix C. Correlation tables are presented in Appendix E.

Hypothesis 1 analysis: I conducted fixed effects regression analysis to evaluate the impact of the presence of children on all working mothers from the NLSY97 sample, with effects fixed for person-years, as previously described. The coefficient (std err) from this analysis was found to be -0.232 (0.048) and results were found to be statistically signification at the 95% confidence interval (t-value -4.77, p-value 0.000) suggesting a significant negative relationship between the presence of children and the natural log of hourly wage rate (natural log of hourly wage rate). The overall model fit indicated an R-squared value of 0.0004, explaining 0.04% of the variance in natural log of hourly wage rate can be attributed to the presence of children. The within-group R-squared of 0.0047 indicates that approximately 0.47% of the variability in the natural log of hourly wage rate is explained by the presence of children within each group. A between-group R-squared value of 0.0291 suggests that there is a ~3% variation in natural log of hourly wage rate that can be attributed to differences between the groups. Given the coefficient of analysis (-0.232), on average, working mothers make ~20% less than their childless counterparts. This result represents a sizable increase from the previously reported 7% wage gap

for motherhood (Budig and England, 2001). F-statistic = 22.71 and Prob > F = 0.0000, indicating the model overall is statistically significant.

Hypothesis 1 (alternative) analysis: In an alternative specification for the independent variable of presence of children, analysis was conducted to understand if the number of children a working woman has in her household provided different insights. Fixed effects regression for one child, two children and three or more children resulted in coefficients (and standard errors) as follows: -.228 (.049), -.155 (.051), -.397 (.052), all yielding results significant for the 95% confidence interval. This equates to a motherhood wage penalty of ~20% for one child, ~14% for two children and 32% for three or more children. Based on R-squared values the overall explanatory power of the model is low (0.1%), with a within-group variability of ~4% and between groups of ~3%. For this analysis F-statistic = 49.89 and Prob > F = 0, indicating the model overall is statistically significant.

Results of these analyses provide support for hypothesis 1 - *based on an NLSY97 pooled sample (2004 – 2021) of all working women, the presence of children in the household will decrease women's wages when compared with childless women.*

Hypothesis 2a analysis: Understanding the moderation effects of marital status on the relationship between presence of children and natural log of hourly wage rate for this sample of working women yielded significant results for the direct effect (-0.171 (0.067)) married (0.553 (0.105)) and divorced (0.408 (0.101)) working women at the 95% confidence interval as compared to never married working women (reference category). These results suggest that having children is associated with a decrease in natural log of pay within individuals and in this sample of working women, they experience an ~17% pay decrease when they have children compared to their childless counterparts. Being married suggests a wage boost compared to their

never married counterparts as does being divorced. The coefficients for all interaction terms were not found to be statistically significant at the 95% confidence interval and were as follows; coefficients (std. err.), married -0.141 (0.104), divorced 0.101 (0.101). These findings suggest that being married does not moderate the relationship between having children and natural log of hourly wage. Based on R-squared results, ~15% of the variation is explained within individuals, ~1% between individuals and ~%6 overall. The F-statistic (146.17) and p-value (0.0000) indicates the overall regression model is statistically significant. Overall, these results suggest (1) having children is associated with a decrease in women's pay, when compared to their childless counterparts, within individuals over time; (2) being married is associated with higher natural log of hourly wage compared to other marital status categories examined. Specifically, the coefficient for the interaction terms show that the impact of having children on the natural log of hourly differs based on marital status, in particular, being married or divorced is associated with increased pay compared to never being married and (3), the interaction terms suggest that marital status does not have a moderating effect on the relationship between the presence of children and natural log of hourly wage rate. Overall, these results do not support hypothesis H2a - *Mother's marital status will impact the relationship between presence of children and mother's hourly wage. Working married mothers will experience lower hourly wages when compared to working unmarried mothers.*

Hypothesis 2b analysis: Analysis to understand the potential moderating effect of mother's age at first birth on the relationship between the presence of children and natural log of hourly wage rate in college educated women resulted in significant finding. Coefficients (std. err.) for terms in each category analyzed are as follows (with ages 24 and under as the reference category): direct effect of presence of children -0.169 (0.057) ages 25-29 -0.410 (0.134); ages

30-36 -0.52 (0.134), ages 37 and beyond -0.154 (0.082). Coefficients (std. err.) for interaction terms in each category analyzed are as follows (with ages 24 and under as the reference category): ages 25 – 29 0.573 (0.134); ages 30-36 0.692 (0.134); age 37 and beyond 0.252 (0.083). Although both R-squared and adjusted R-squared values indicate a low model explanatory power (~1%), F-statistic results (10.46, Prob > F 0.000) indicated the model has some, but low explanatory power. These results suggest that having a child present in the household is associated with a statistically significant decrease in pay. Exploring the results of the interaction terms provide support for my hypothesis that *in a sample of university educated working women who delay entry into motherhood will experience a lower impact on hourly wages than university educated working women who do not delay entry into motherhood*. The positive and significant interaction terms imply that the negative effect of having children on a woman's wages is moderated by mother's age a first birth, particularly for the 25-29 and 30-36 age groups. As a mother's age a first birth increases, it lessens the negative impact of having children on her wages.

Race: In terms of race, evaluating the coefficients for direct effects and interactions terms did not suggest meaningful results. For direct effects - Child present -0.395 (0.233); Black -0.588 (0.239); Hispanic -.224 (0.258); mixed race omitted as the reference category; White -0.544 (0.232)). For interaction terms – Black 0.418 (0.245); Hispanic 0.186 (0.263); Mixed race omitted as the reference category; White 0.539 (0.238). The F-statistic is 19.09 with a p-value of 0.000 indicating the model overall is statistically significant, but the low R-squared and adjusted R-squared (~1%) indicate low explanatory power. These findings indicate that, according to the data analyzed, race does not significantly moderate the effect of presence of children on the

natural log of hourly wage rate within our sample. These non-significant results regarding the moderation effect of race indicates that hypothesis H2c is not supported.

Human Capital: Evaluating human capital variables for their potential moderation effects on the presence of children and natural log of hourly wage rate was accomplished assessing mother's highest level of education, years of experience and years of seniority over the reported survey period. The coefficient (std err.) for child present is 0.125 (0.206). However, this coefficient is not statistically significant at the 95% confidence interval (p-value = 0.545), indicating that the presence of a child may not have a significant impact on pay in this model. The coefficients for the different education levels indicate the change in pay associated with each level of education. None of the coefficients for education levels are statistically significant, suggesting that education level may not have a significant effect on pay in this model. Coefficients (std err) are as follows: Child present 0.125 (0.206), high school -0.079 (0.133), undergraduate 0.135 (0.150), masters or higher 0.578 (0.219). The coefficient for years of experience is 0.0453 (0.016). This coefficient is statistically significant (p-value = 0.007), indicating that for each additional year of experience, pay increases by 0.0453431 units. The coefficient for years of seniority is 0.019 (0.009). This coefficient is statistically significant (p-value = 0.038), suggesting that years of seniority have a positive impact on pay. The coefficients for the interaction terms between education levels and years of experience and years of seniority indicate the combined effect of these variables on pay. None of the interaction terms are statistically significant, suggesting that the interactions between education levels and years of experience, years of seniority may not significantly influence pay in this model. Overall, the model explains 12.90% of the variability in pay (R-squared = 0.1301). The statistically significant variables in the model are years of experience and years of seniority, indicating that

these factors are important predictors of pay. These results do not provide support for hypotheses 2d - *Mothers' measures of human capital will moderate the relationship between number of children and hourly wage. Specifically, increases in mothers' educational attainment, experience and seniority (human capital measures) will lead to a decreased impact on mothers' hourly wages.*

Grit: The final hypothesis tested in this research was to determine if Grit, based on the validated Grit-S survey (Duckworth et al., 2009) moderates the relationship between the presence of children and natural log of hourly wage rate in college educated women. The coefficient for child present is -0.142 (0.076). This coefficient indicates that the presence of a child is negatively associated with pay. However, the coefficient is not statistically significant at the 0.05 level (p-value = 0.062), suggesting that the effect of having a child on pay may not be statistically significant in this model. The coefficient for Grit is 0.110 (0.087). This coefficient suggests that higher levels of grit are associated with higher pay, but the effect is not statistically significant (p-value = 0.205). Therefore, the relationship between grit and pay may not be statistically significant in this model. The coefficient for child present x Grit is -0.067 (0.087). The coefficient is also not statistically significant (p-value = 0.439), indicating that the interaction between the standardized grit score and the other variable does not have a significant impact on pay in this model. Overall, the model explains a very small proportion of the variability in pay (R-squared = 0.005 and Adj R-squared = 0.004), and none of the coefficients for are statistically significant. This suggests that Grit does not moderate the relationship between a woman's number of children and hourly wage and does not provide support for hypothesis 3 – In a sample of university educated *women Grit-S rating impacts the relationship between presence of children and mother's hourly wage. Specifically, university educated*

working mothers with higher levels of reported grit will experience a lower impact on hourly wages than university educated mothers with reported lower levels of grit.

Table 4: Coefficients, standard errors and R-squared (all working women)

Hypothesis	Variable	Coefficient (std. err.)	R-squared Within	Between	Overall
H1:	Presence of children	-.232* (.048)	0.0047	0.0290	0.0004
	One child	-.228* (.049)			
	Two children	-.155* (.051)	0.0477	0.0355	0.0010
	Three or more children	-.397* (.052)			
H2a:	Presence of children	-.0.171* (0.067)	0.154	0.011	0.058
	Married	0.553* (0.105)			
	Divorced	0.408* (0.101)			
	Child present x married	-0.141 (0.104)			
	Child present x divorced	-0.101 (.101)			
H2c:	Presence of children	-0.395 (0.233)	0.0141 (Adj 0.0134)		
	Black	-0.558* (0.239)			
	Hispanic	-0.224 (0.258)			
	Mixed race	-			
	White	-0.544* (0.232)			
	Child present x Black	0.418 (0.245)			
	Child present x Hispanic	0.186 (0.263)			
	Child present x Mixed race	-			
	Child present x White	0.539* (0.238)			

Table 4: Coefficients, standard errors and R-squared (all working women) cont.

Hypothesis	Variable	Coefficient (std. err.)	R-squared
H2d:	Child present	0.125 (0.206)	0.1233 (Adj 0.1226)
	High School	-0.079 (0.133)	
	Undergrad	0.135 (0.150)	
	Masters and higher	0.578* (0.219)	
	Years of experience	0.045* (0.016)	
	Years of seniority	0.019* (0.009)	
	Child present x High School	0.217 (0.137)	
	Child present x Undergrad	0.214 (0.153)	
	Child present x Masters and higher	-0.113 (0.222)	
	Child present x Years of experience	-0.014 (0.017)	
	Child present x Years of seniority	-0.014 (0.009)	

*$p < .05$

Table 5: Coefficients, standard error and R-squared for the effect of presence of children on college educated working women

Hypothesis	Variable	Coefficient (std. err.)	R-squared
H2b	Presence of children	-0.169* (0.057)	0.022 (Adj 0.0212)
	Ages 25-29	-0.410* (0.134)	
	Ages 30-36	-0.521* (0.134)	
	Ages 37 and beyond	-0.154* (0.082)	
	Child present x ages 25-29	0.573* (0.134)	
	Child present x ages 30-36	0.692* (0.134)	
	Child present x ages 37 and beyond	0.252* (0.083)	
H3	Presence of children	-0.142 (0.076)	0.0050 (0.0044)
	Grit (standardized)	0.110 (0.087)	
	Child present x Grit (standardized)	-0.067 (0.087)	

*$p < .05$

CHAPTER 5: DISCUSSION AND CONCLUSION

Overview

The following discussion delves into the key findings and implications of analyses conducted to investigate the impact of the presence of children on women's hourly wages. The study aimed to untangle the complex interplay between motherhood, marital status, age at first birth, race, human capital variables, and grit in shaping women's earnings trajectories. By analyzing these relationships, this dissertation sought to shed light on the underlying mechanisms perpetuating the wage disparities faced by working mothers.

Through a critical examination of the significant relationships and moderating effects uncovered in the analyses, this discussion explores theoretical and factors contributing to the motherhood penalty in wages. It delves into the implications of these findings for policymakers, employers, and society at large, advocating for systemic changes that support women's economic empowerment, work-life balance, and gender equality in the workforce. Additionally, it highlights avenues for future research aimed at addressing the persistent challenges faced by working mothers and advancing the goal of inclusive and equitable workplaces.

Findings

Presence of children and their impact on working women's wages. The results of this dissertation provide persuasive evidence that the presence of children significantly impacts women's earnings, which aligns with earlier research indicating a motherhood penalty in wages. The robust negative relationship between the presence of children and women's hourly wage rates exhibits a clear pattern: having children is associated with a reduction in earnings for women. This wage penalty persists regardless of the number of children, which suggests a systemic issue rather than a scaling problem tied to family size. Despite changes in women's

labor force participation and, in particular, increases in mother's labor force participation; an increasing trend in father's taking leave after the birth of their first child; a steady rise in working women's income (reported by the U.S Bureau of Labor Statistics), the results of this study find the wage penalty for motherhood not only continues to persist, but has increased from the previously reported 7 percent per child (Budig and England, 2001) ranging from ~20 percent for one child to ~30 percent for three or more children. An interesting finding of this study is the reduction of percent penalty from one child (~20%) to two children (~14%) and a subsequent increase for three or more children (~30%). Gender role theory would suggest the adjustment from having no children to one child is a drastic change in level of effort a mother may be required to commit to her non-paid duties inside the home. As a result, she has less time to focus on paid work. Going from one child to two children may be less of an adjustment or adjustments already made at child one, resulting in a lower percent penalty when transitioning from one to two children in the household. From a compensating wage differential point of view, it may be that the shock of child one, drives first time mothers to make drastic adjustments in the form of lower paying jobs, closer to home and less demanding, to cope with additional home-based responsibilities, but with the arrival of child two, those adjustments are made and no or fewer changes are required (daycare already in place from child one, adjustments to working style, balance of home responsibilities between parents, etc.). The arrival of child number three, where parents are outnumbered, additional considerations may be required - prohibitive cost of daycare for three children, mom severely distracted with the home-based needs and a revisit of division of responsibilities between partners to cope with not only the arrival of a newborn, but also the ongoing care of 2 additional children, all contributing to a reported motherhood wage penalty of ~30 percent for there or more children.

Previous research indicates that gender norms are changing (Goldin, 2014; Almond, 2023). According to gender role theory and how it applies to the motherhood penalty, mothers' wages are penalized due to the perception that as the primary caregivers of children, mothers are less able to devote time and energy to their business responsibilities (Goldin, 2014; O' Neil et al., 2003; Heilman et al., 2008; Morgenroth 2021; Albiston, 2023; Correll et al., 2007). Almost 30 percent of the female respondents during the survey period reported taking a parenthood related career break. By comparison, less than 15 percent of male respondents reported taking a parenthood related career break. From the perspective of gender role theory, the results of this study appear to be a reflection of deeply engrained expectations of men and women that lead to differences in decision making with respect to professional and family advancement, despite cultural shifts and slow progress towards equity. Slow advancement in workplace paid family leave policies may also be a reflection of engrained gender norms that contribute to the continued wage penalty for motherhood. Although progress is being made, individual employer policies may be more generous for maternity leave than they are for paternity leave, reinforcing traditional gender roles. Gender role theory suggest that both cultural gender norms (societal expectations) and structural gender norms (workplace policy) must be in place to support both mothers' and fathers' commitments to paid work and family responsibilities achieve parity in both domains. This discussion extends beyond economic implications, touching on societal structures and the implicit biases within them. The persistence of the wage gap in the presence of children highlights ingrained inequalities that affect women's economic stability and career progress. The motherhood penalty might be a reflection of employer bias, reduced work hours, or limited opportunities for promotion that mothers face, suggesting that current workplace policies and cultural norms may not adequately support work-life balance.

Does marital status matter? The relationship between marital status and a woman's wages is nuanced. The significant differences in wages among married, divorced, and never-married women indicate that social and economic supports linked to marital status also affect earnings. While the findings on moderating effects were not statistically significant, they open the door to the potential intersectional pressures upon married and divorced women that warrant further exploration. Loughran and Zissimopoulos (2009) findings indicated that for married couples, first birth lowers only female wages 2%-3%. The fact that marriage increases the motherhood wage penalty in previous research, suggests that a portion could be explained by time and energy mothers dedicate to children versus paid employment is influenced by other potential sources of financial support, aside from their own earnings. Evidence from the U.S. Census Bureau indicates that marriage rates have dropped ~30% over the past half century. According to gender role theory explanations of the motherhood penalty, mothers' wages are penalized as they devote less time and energy to their business responsibilities. Yet as marriage demographics of mothers declines as reported by the U.S Census Bureau, gender role theory would seem to suggest that the motherhood penalty would be reduced. The results of this study do not align with the findings of Loughran and Zissimopoulos (2009). Overall, results suggest that being married is associated with a wage boost compared to single mothers. These findings may indeed be indicative of a shift in gender norms, where support for child rearing and home-based work is being shared more equally between both partners in the home.

The impact of mother's age at first birth. Extensive public evidence reveals a consistent trend over the last three decades showing a decrease in the rate of first births before age 30 across all women, and a rise in the rate of first births after age 30 specifically among women holding four-year college degrees. Based on data from the National Longitudinal Survey of

Youth (NLSY79), Amuedo-Dorantes and Kimmel (2005) present a theoretical model to support the existence of a statistically significant motherhood wage penalty and go on to report that women who have completed higher education more frequently delay childbearing by an average of approximately 6 years and earn approximately 19% more than non-mothers and approximately 21% more than college educated women who do not delay motherhood. The age at first birth information available in the NLSY97 dataset began at mother's aged 20 and the highest reported mother's age at first birth was 41. The mother's age at first birth emerged as a significant moderator in this study, bringing attention to temporal dimensions of career development. Older mothers experiencing less wage penalty could be due to accumulated human capital or more stable career progression before motherhood, which aids in mitigating the earnings gap post-children, suggesting that delaying motherhood can lessen the decline in earnings for educated working women.

Does a mother's race matter? Previous research regarding the impact of race on the motherhood wage gap is inconsistent. The work of Glauber (2007) was conducted analyzing data from the NLSY79 to determine if the motherhood wage penalty differs among African Americans, Hispanics and White mothers in the U.S.-based on marital status. She analyzed women's hourly wage, motherhood status and number of children, marital status and race from 1982 – 2004 waves of the NLSY79. Consistent with prior research (England, 2001; Waldfogel, 1997) Glauber found racial differences do exist. Van Winkle finds motherhood wage penalties limited to caring for pre-school are early school aged children for Black and Hispanic families, concentrated in a brief childhood age range of 5–10 years around age 30 and then attenuate irrespective of the number of children, but are longer lived for White women with three or more children, who endure large and persistent adjusted motherhood penalties up to age 40 (Van

Winkle and Fasang, 2020). The findings of this study found no significant effects of race on the impact of mother's wages. Given the multicultural nature of this dataset and changes in racial composition of the U.S.-based workforce throughout the survey period as reported by the U.S. Bureau of Labor Statistics, not only are shifting gender norms at play, but shifting cultural norms of individuals within the sample may have impacted the results. Further research is required to fully understand the impact of a woman's race on her earnings as she transitions life course from childlessness through motherhood.

Human capital influences in terms of a woman's highest level of educational attainment, years of experience and years of seniority. Previous research suggests that a woman's accumulation of human capital (defined as level of education, years of experience and years of seniority) explains a substantial portion of the motherhood wage penalty (Avellar et al., 2004; Budig and England, 2001; Cukrowska-Torzewska et al., 2020; McIntosh, 2012; Waldfogel, 1997). Extant literature suggests education is shown to play a significant role in explaining the wage gap for mothers (Cukrowska-Torzewska et al., 2020). Experience is said to enrich people with practical knowledge, skills, and insights that are essential for success. Employers recognize the significance of experience when evaluating the capabilities and potential contributions of individuals in the workforce (Waldfogel, 1997). Seniority is valued as wealth of experience, knowledge, and skills it brings to an organization (Budig and England, 2001). Although finding from this study did not point to moderation, there is a notable link between a mother's years of experience, years of seniority and the wage she earns. Given trends of increased labor force participation of mothers as reported by the U.S. Bureau of labor statistics, human capital theory explanations continue to support the relationship between a working woman's motherhood status and her hourly wage. Specifically, mothers with higher

employment experience, seniority experience and at the highest level of educational attainment earn more for their work outside the home.

Does a woman's level of grittiness matter? Consistent with extant research, but applied in a different context, a mother's level of grit was not found to impact her earnings. Using the Grit-S scale Clark and Clark (2019) examined whether grit could be used to predict career success in U.S.-based working adults. Their findings indicate that grit does not predict career success. This may be attributable to survey method of administration or the nature of the women in the sample. Further research is recommended to fully understand if there is truly no relationship.

Overall findings. These analyses did not unearth significant moderating effects from marital status, race, education, experience, seniority, or grit, This suggests the motherhood penalty transcends these variables, indicating a more pervasive and complex issue. Notably, the lack of moderation by grit challenges the notion that individual resilience and determination can overcome structural and societal barriers, highlighting the need for systemic change.

Limitations

There are several limitations I have identified in this study. Given the NLSY97 is a longitudinal dataset, loss of participants over time may have affected the outcomes of my study. Given the multicultural nature of this dataset, not only are gender norms at play, but cultural norms of individuals within the sample may have impacted the results. The data collected for all variables of interest in my study were self-reported. Reliance on self-reported data, particularly for sensitive information such as wage, experience and seniority may be subject to the reporter's bias and lead to inaccurate representations as well as incomplete data. Also, participants may respond in a way they believe is socially acceptable or desirable rather than how they truly feel

or behave (social desirability bias). Although the NLSY97 is intended to be a representative sample of the population, the demographics of the population in the United States has changed significantly since the initial survey year of 1997. Another limitation of this study is missing study variables that may have impacted the study outcomes, such as industry type, specific workplace polices related to family leave and potential differences in marital structure, such as differences between same-sex married couples and heterosexual married couples. Additionally, the moderators chosen for this study represent areas of significant change in the U.S. over the last 20 years as reported by BLS (marriage rates dropping, labor force participation changes, fertility delays, changes in labor force demographics). There was no inclusion of a woman's orientation toward work or family, which I believe is key in understanding decision related to a woman's choice of employment and ultimately the wage she would receive.

Future Research Considerations

To further refine our understanding of the impact of children on women's career progression, I present seven potential opportunities for future research. (1) With evidence from this study suggesting that the motherhood wage penalty continues to persist, future study calls for solutions. By examining a subset of working mothers who have found strategies to overcome negative wage impacts due to motherhood and identifying strengths and differences in those mothers, we may be able to better understand how to support working mothers and reduce the motherhood wage penalty. This information can also inform policy makers on potential interventions or policies that could help address the systemic inequalities faced by working mothers. Additionally, further research on the factors that contribute to the wage penalty and how they interact with individual characteristics and organizational practices can provide insights into how to promote equality in the workplace for all working parents. Ultimately, studying

successful working mothers can help create a more equitable and supportive work environment. (2) Mothers of three or more children face the largest wage penalty. Further exploration into reasons and coping strategies can provide valuable insights into ways to support and empower these mothers in the workforce. By examining the unique challenges faced by mothers of three or more children, researchers can uncover the specific barriers that contribute to the wage penalty for this demographic. Additionally, identifying effective coping strategies utilized by these mothers can offer guidance on how to mitigate the negative impacts of motherhood on their wages. This knowledge can inform the development of targeted interventions and policies that address the needs of mothers with larger families, ultimately working towards creating a more inclusive and supportive work environment for all mothers. (3) Although fixed effect regression is a powerful tool, consideration should be given to time-series analysis as an analytical technique. Time series analysis allows for the time-ordered sequence of data points to understand observations. Given past research and common sense, mothers have increased time and energy constraints while their children are young. Time series analysis may uncover specific periods over life course that additional support for parents may minimize the impact on wages. (4) Further research and inclusion of behavioral constructs to understand reasons for a reduction of wages for mothers. For example, does personality type impact the effects of children on a mother's wage? Additional exploration of grit is also warranted. Exploration of behavioral constructs as they relate to the motherhood penalty may provide mothers with insights to signal competence and commitment to her career progression, which could in turn minimize impact on her wages due to childbearing or child rearing. (5) Study of the motherhood penalty has been traditionally limited to employee type jobs. Expansion into the impact of motherhood in entrepreneurship is another potential avenue for future research. (6) Markedly absent from the

literature is the impact of motherhood from the perspective of an organization. When a parent avails of family leave either through FMLA or an organizational policy, organizations are left to contend with a potential void in skillset for a period of time. The impact of parenthood on an organization could be evaluated from the both the financial (long term employee retention when we have a paternity wage top up policy) and cultural perspectives (how does my team perform when someone is out on maternity leave or how does my team perform with a new mother on the team) would be a worthwhile endeavor. (7) There is scant qualitative research on the motherhood penalty. Qualitative research can inject richness and depth and add contextual understanding of elements that may trigger a wage penalty for mothers that has not yet been considered in the literature.

Contributions

This dissertation makes several important contributions to the motherhood penalty research. First, I contribute by providing an updated understanding of the motherhood penalty. Not only has the previously reported wage penalty for mothers not dissipated but based on my analysis of a sample of working women from 2004 through 2021, the wage penalty for mothers has increased. Although there is evidence of gender roles changing in terms of fathers taking workplace leave to share childcare responsibilities, those changes have not culturally penetrated enough to reduce the impact on mother's earnings.

Second, given key aspects leading to a wage penalty for mothers have evolved as evidenced today by mothers increased labor force participation, women's increased educational attainment, trends in women delaying marriage and entry into motherhood. Gender roles and norms have shifted which has afforded mothers increased opportunity to specialize in their labor force activities. This research suggests mother's age at first birth matters. Women who chose to

establish their careers prior to entering into motherhood face a smaller penalty for motherhood. Finally, I contribute by examining Grit and the motherhood penalty. Grit had not been previously assessed within the motherhood penalty literature and is a non-cognitive measure, not rooted in norms. Although this study did not suggest a significant impact of a woman's level of grittiness on her earnings, I call for exploration of other behavioral constructs and their potential impact on the motherhood penalty.

Conclusions

The phrase "demography is destiny," is attributed to Auguste Comte and implies that the demographic characteristics of a population are a key determinant of a nation's future (Kando, 2015). Today, women constitute slightly greater than 50 percent of the population in the United States. This means women represent slightly over 50 percent of the available U.S. labor force. Biology being biology, women are also responsible for childbearing (future labor force). A society's view on gender roles is important. Creating opportunities for both women who are currently mothers and future mothers, through family friendly organization level policy, support for childcare, encourages mothers to participate in the labor force and views their contributions as a benefit. This in turn benefits the economy. The saying "Demography is destiny" implies that the makeup of a population determines its future, particularly regarding its economic vitality and social landscape.

This study delves into exploring the complexities surrounding the motherhood wage penalty, aiming to shed light on the impact of various factors on women's earnings. This study highlights that gender norms are truly changing, and we are on a path forward towards equitable recognition of the skills and abilities of mothers and their contributions in the workplace. The findings emphasize the multifaceted nature of the motherhood wage penalty, revealing nuances

in how various moderators such as marital status, mother's age at first birth, and human capital influence the relationship between motherhood and earnings. While some results align with prior research, others present novel insights, challenging conventional assumptions and pointing towards shifting societal dynamics. The inclusion of the novel dimension of grit in examining the motherhood wage penalty adds a unique perspective to the discussion. Although no significant impact of grit on mother's earnings was observed in this study, it opens avenues for further exploration into behavioral constructs and their role in managing the wage penalty faced by mothers. Within the limitations of the study, including data biases and evolving demographic trends, several opportunities for future research are outlined. These potential research avenues involve a deeper dive into behavioral constructs, exploration of motherhood in entrepreneurship, and understanding the organizational perspective on parenthood. This study contributes to the evolving narrative on gender equality in the U.S.-based workforce, emphasizing the need for inclusive policies, supportive environments, and a nuanced understanding of the challenges faced by working mothers. As we navigate towards a future where diversity and equity shape the foundation of our societal landscape, acknowledging the unique contributions of mothers in the labor force becomes imperative.

In conclusion, this investigation confirms the substantial economic disadvantage faced by working mothers, with a marked decrease in hourly wages directly associated with the presence of children. The wage disparities underscore a critical societal issue that demands attention and action from policymakers, employers, and the community at large. Mother's age at first birth influences this wage penalty, suggesting that life course dynamics do affect earnings outcomes. However, the lack of significant effects from other potential moderators indicates that the issue is deeply rooted and not easily countered by individual attributes or choices. The implications of

these findings are profound and multifaceted. They call for a reconsideration of workplace policies, such as the provision of flexible working arrangements, accessible and affordable childcare, and equitable parental leave for both mothers and fathers. Moreover, there is a need to challenge and change workplace cultures and societal norms that penalize women for their reproductive choices. In policy terms, these findings advocate for the strengthening of equal pay legislation, enforcement of anti-discrimination laws, and initiatives to promote women's return to the workforce, such as career re-entry programs. Greater support for working parents, in the form of both policy and cultural acceptance, could play a pivotal role in narrowing the wage gap. Ultimately, the persistence of the motherhood penalty in wages is a stark reminder of the continuing inequalities in the labor market. Addressing these issues is not only a matter of economic justice but is crucial for the advancement of gender equality and the well-being of future generations.

The changing face of demography signals a new era of possibilities, where recognizing and empowering mothers in the workplace not only benefits individuals but also fosters economic growth and social prosperity. This study serves as a steppingstone towards a more equitable and inclusive future, where the skills and abilities of all individuals, including mothers, are duly acknowledged and valued.

REFERENCES

Abendroth, A. K., Huffman, M. L., and Treas, J. (2014). The parity penalty in life course perspective: Motherhood and occupational status in 13 European countries. *American Sociological Review*, *79*(5), 993-1014.

Acock, A. C. (2008). *A gentle introduction to Stata*. Stata press.

Agrawal, D., Chukkali, S., and Singh, S. (2022). Antecedents and consequences of grit among working adults: a transpersonal psychology perspective. *Frontiers in Psychology*, *13*, 896231.

Albiston, C., and Correll, S. (2023). Law's Normative Influence on Gender Schemas: An Experimental Study on Counteracting Workplace Bias against Mothers and Caregivers. *Law and Social Inquiry*, 1-39.

Almond, D., Cheng, Y., and Machado, C. (2023). Large motherhood penalties in U.S. administrative microdata. *Proceedings of the National Academy of Sciences*, *120*(29), e2209740120.

Amuedo-Dorantes, C., and Kimmel, J. (2005). The motherhood wage gap for women in the United States: The importance of college and fertility delay. *Review of Economics of the Household*, *3*(1), 17-48.

Andersen, S. H. (2018). Paternity leave and the motherhood penalty: New causal evidence. *Journal of Marriage and Family*, *80*(5), 1125-1143.

Anderson, D. J., Binder, M., and Krause, K. (2002). The motherhood wage penalty: Which mothers pay it and why? *American economic review*, *92*(2), 354-358.

Anderson, D. J., Binder, M., and Krause, K. (2003). The motherhood wage penalty revisited: Experience, heterogeneity, work effort, and work-schedule flexibility. *ILR Review*, *56*(2), 273-294.

Anuar, N., Muhammad, A. M., Daud, N. S. M., and Awang, Z. (2021). Grit as a Moderator Between Students' Intention and Oral Presentation Performance: A Conceptual Study. *International Journal of Asian Social Science*, *11*(6), 270-277.

Aranda, B., and Glick, P. (2014). Signaling devotion to work over family undermines the motherhood penalty. *Group processes and intergroup relations*, *17*(1), 91-99.

Avellar, S., and Smock, P. J. (2003). Has the price of motherhood declined over time? A cross-cohort comparison of the motherhood wage penalty. *Journal of marriage and family*, *65*(3), 597-607.

Baranowska-Rataj, A., and Matysiak, A. (2016). The causal effects of the number of children on female employment-do European institutional and gender conditions matter? *Journal of Labor Research*, *37*, 343-367.

Bari, L. (2023). Gendered Divergence in the Impact of Parenthood on Wages: The Role of Family Size, Human Capital and Working Time. *Journal of Family and Economic Issues*, 1-16.

Barigozzi, F., Cremer, H., and Thibault, E. (2023). The motherhood wage and income traps.

Bear, J. B., and Glick, P. (2017). Breadwinner bonus and caregiver penalty in workplace rewards for men and women. *Social Psychological and Personality Science*, *8*(7), 780-788.

Becker, G. S. (1957). The economics of discrimination. Chicago: University of Chicago Press.

Becker, G. S. (1976). The economic approach to human behavior. Chicago: University of Chicago Press.

Becker, G. S. (1981). A treatise on the family. Cambridge: Harvard University Press.

Becker, G. S. (1985). Human capital, effort, and the sexual division of labor. Journal of Labor Economics, 3, S33–S58

Becker, G. S. (2009). Human capital: A theoretical and empirical analysis, with special reference to education. University of Chicago press.

Benard, S., and Correll, S. J. (2010). Normative discrimination and the motherhood penalty. *Gender and Society*, *24*(5), 616-646.

Benard, S., Paik, I., and Correll, S. J. (2007). Cognitive bias and the motherhood penalty. *Hastings LJ*, *59*, 1359.

Benny, L., Bhalotra, S. R., and Fernández, M. (2021). *Occupation flexibility and the graduate gender wage gap in the UK* (No. 2021-05). ISER Working Paper Series.

Blau, F. D., and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of economic literature*, *55*(3), 789-865.

Borghorst, M., Mulalic, I., and Van Ommeren, J. (2021). *Commuting, children and the gender wage gap* (No. TI 2021-089/VIII). Tinbergen Institute Discussion Paper.

Brown, L. M. (2010). The relationship between motherhood and professional advancement: Perceptions versus reality. *Employee Relations*, *32*(5), 470-494.

Bruderl, J., and Ludwig, V. (2015). Fixed-effects panel regression. *The Sage handbook of regression analysis and causal inference*, 327-357.

Budig, M. J. (2014). The fatherhood bonus and the motherhood penalty: Parenthood and the gender gap in pay. *Third Way*, *2*.

Budig, M. J., and England, P. (2001). The wage penalty for motherhood. *American sociological review*, 204-225.

Budig, M. J., and Hodges, M. J. (2010). Differences in disadvantage: Variation in the motherhood penalty across white women's earnings distribution. *American Sociological Review*, *75*(5), 705-728.

Budig, M. J., and Hodges, M. J. (2014). Statistical models and empirical evidence for differences in the motherhood penalty across the earnings distribution. *American Sociological Review*, *79*(2), 358-364.

Budig, M. J., Misra, J., and Boeckmann, I. (2012). The motherhood penalty in cross-national perspective: The importance of work–family policies and cultural attitudes. *Social Politics*, *19*(2), 163-193.

Budig, M. J., Misra, J., and Boeckmann, I. (2016). Work–family policy trade-offs for mothers? Unpacking the cross-national variation in motherhood earnings penalties. *Work and Occupations*, *43*(2), 119-177.

Bureau of Labor Statistics, NLS Investigator: *https://www.nlsinfo.org/investigator/pages/login*

Cabrera, E. F. (2009). Fixing the leaky pipeline: five ways to retain female talent: the glass ceiling is not what prevents most women from rising beyond certain levels in organizations. Most women are leaving their organizations voluntarily long before hitting the ceiling. A" leaky pipeline" is a more accurate description of what is occurring. *People and Strategy*, *32*(1), 40-46.

Cha, Y. (2013). Overwork and the persistence of gender segregation in occupations. *Gender and society*, *27*(2), 158-184.

Chen, V. (2003). Cracks in the ceiling. American Lawyer, 25(6).

Cichy, K. E., Stawski, R. S., and Almeida, D. M. (2014). A double-edged sword: Race, daily family support exchanges, and daily well-being. *Journal of Family Issues*, *35*(13), 1824-1845.

Clark, R. S., and Plano Clark, V. L. (2019). Grit within the context of career success: A mixed methods study. *International Journal of Applied Positive Psychology*, *4*, 91-111.

Cohen, P. N., Huffman, M. L., and Knauer, S. (2009). Stalled progress? Gender segregation and wage inequality among managers, 1980-2000. *Work and Occupations*, *36*(4), 318-342.

Correll, S. J., Benard, S., and Paik, I. (2007). Getting a job: Is there a motherhood penalty? *American journal of sociology*, *112*(5), 1297-1338.

Crosby, F. J., Williams, J. C., and Biernat, M. (2004). The maternal wall. *Journal of Social Issues*, *60*(4), 675-682.

Cukrowska-Torzewska, E., and Lovasz, A. (2016). Are children driving the gender wage gap? Comparative evidence from Poland and Hungary. *Economics of Transition*, *24*(2), 259-297.

Cukrowska-Torzewska, E., and Lovasz, A. (2020). The role of parenthood in shaping the gender wage gap–A comparative analysis of 26 European countries. *Social Science Research*, *85*, 102355.

Cukrowska-Torzewska, E., and Matysiak, A. (2020). The motherhood wage penalty: A meta-analysis. *Social science research*, *88*, 102416.

Danner, D., Lechner, C. M., and Rammstedt, B. (2019). A cross-national perspective on the associations of grit with career success. *Compare: A Journal of Comparative and International Education*.

de Linde Leonard, M., and Stanley, T. D. (2020). The wages of mothers' labor: A meta-regression analysis. *Journal of Marriage and Family*, *82*(5), 1534-1552.

Davies, R., and Pierre, G. (2005). The family gap in pay in Europe: A cross-country study. *Labour Economics*, *12*(4), 469-486.

Dias, F. A., Chance, J., and Buchanan, A. (2020). The motherhood penalty and the fatherhood premium in employment during covid-19: evidence from the United States. *Research in social stratification and mobility*, *69*, 100542.

Duckworth, A. L., and Quinn, P. D. (2009). Development and validation of the Short Grit Scale (GRIT–S). *Journal of personality assessment*, *91*(2), 166-174.

Duckworth, A. L., Peterson, C., Matthews, M. D., and Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of personality and social psychology*, *92*(6), 1087.

Duckworth, A., and Gross, J. J. (2014). Self-control and grit: Related but separable determinants of success. *Current directions in psychological science*, *23*(5), 319-325.

England, P., Bearak, J., Budig, M. J., and Hodges, M. J. (2016). Do highly paid, highly skilled women experience the largest motherhood penalty? *American sociological review*, *81*(6), 1161-1189.

Felfe, C. (2012). The motherhood wage gap: What about job amenities? *Labour Economics*, *19*(1), 59-67.

Gangl, M., and Ziefle, A. (2009). Motherhood, labor force behavior, and women's careers: An empirical assessment of the wage penalty for motherhood in Britain, Germany, and the United States. *Demography*, *46*, 341-369.

Gayle, G. L., Golan, L., and Miller, R. A. (2012). Gender differences in executive compensation and job mobility. *Journal of Labor Economics*, *30*(4), 829-872.

Glauber, Rebecca. 2007. “Marriage and the Motherhood Wage Penalty among African Americans, Hispanics, and Whites.” Journal of Marriage and Family 69:951–61.

Glauber, Rebecca. 2008. “Race and Gender in Families and at Work: The Fatherhood Wage Premium.” Gender and Society 22:8–30

Glauber, R. (2023). Time-intensive occupations and the motherhood gap in authority. *Community, Work and Family*, 1-26.

Glauber, R., Yavorsky, J., and Qian, Y. (2023). The COVID-19 Pandemic and a Resurgence of Motherhood Wage Penalties in the United States.

https://www.americanprogress.org/article/breadwinning-mothers-continue-u-s-norm/

Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review*, *104*(4), 1091-1119.

González Ramos, A. M., Navarrete Cortes, J., and Cabrera Moreno, E. (2015). Dancers in the dark: Scientific careers according to a gender-blind model of promotion. *Interdisciplinary Science Reviews*, *40*(2), 182-203.

Goodwin, M. (2023). Opportunistic Originalism: Dobbs v. Jackson Women’s Health Organization. *The Supreme Court Review*, *2022*(1), 111-190.

Gough, M., and Noonan, M. (2013). A review of the motherhood wage penalty in the United States. *Sociology Compass*, *7*(4), 328-342.

Gough, M. (2017). Birth spacing, human capital, and the motherhood penalty at midlife in the United States. *Demographic Research*, *37*, 363-416.

Hair, J. F. (2009). Multivariate data analysis.

Halldén, K., Levanon, A., and Kricheli-Katz, T. (2016). Does the motherhood wage penalty differ by individual skill and country family policy? A longitudinal study of ten European countries. *Social Politics: International Studies in Gender, State and Society*, *23*(3), 363-388.

Hamil-Luker, J. (2005). Women's wages: cohort differences in returns to education and training over time. *Social Science Quarterly*, *86*, 1261-1278.

Harlan, S. L., and White Berheide, C. (1994). Barriers to workplace advancement experienced by women in low-paying occupations.

Heilman, M. E., and Okimoto, T. G. (2008). Motherhood: a potential source of bias in employment decisions. *Journal of Applied Psychology*, *93*(1), 189.

Herbst-Debby, A., Endeweld, M., and Kaplan, A. (2021). Differentiated routes to vulnerability: Marital status, children, gender and poverty. *Advances in Life Course Research*, *49*, 100418.

Herman, C., and Lewis, S. (2012). Entitled to a sustainable career? Motherhood in science, engineering, and technology. *Journal of Social Issues*, *68*(4), 767-789.

Hill, M. S. (1979). The wage effects of marital status and children. *Journal of Human Resources*, 579-594.

Hotchkiss, J. L., and Pitts, M. M. (2003). At what level of labor-market intermittency are women penalized? *American Economic Review*, *93*(2), 233-237.

Hsu, C. H. (2021). Parity-specific motherhood penalties: Long-term impacts of childbirth on women's earnings in Japan. *Advances in Life Course Research*, *50*, 100435.

Ishizuka, P. (2021). The motherhood penalty in context: Assessing discrimination in a polarized labor market. *Demography*, *58*(4), 1275-1300.

Jee, E., Misra, J., and Murray-Close, M. (2019). Motherhood penalties in the US, 1986–2014. *Journal of Marriage and Family*, *81*(2), 434-449.

Jordan, S. L., Hochwarter, W. A., Ferris, G. R., and Ejaz, A. (2018). Work grit as a moderator of politics perceptions: Workplace outcomes relationships: A three-study convergent investigation. *Career Development International*, *23*(6/7), 576-594.

Kahn, J. R., García-Manglano, J., and Bianchi, S. M. (2014). The motherhood penalty at midlife: Long-term effects of children on women's careers. *Journal of Marriage and Family*, *76*(1), 56-72.

Kando, T. (2015). Demography is destiny: an essay on the primary correlate of violence. *International Journal on World Peace*, *32*(2), 7.

Kang, J. Y., Lee, W., Ham, S., and Wang, J. S. H. (2023). Motherhood or marriage penalty? A comparative perspective on employment and wages in East Asia and Western countries. *Family Relations*.

Kelley, H., Galbraith, Q., and Strong, J. (2020). Working moms: Motherhood penalty or motherhood return? *The Journal of Academic Librarianship*, *46*(1), 102075.

Killewald, A., and Bearak, J. (2014). Is the motherhood penalty larger for low-wage women? A comment on quantile regression. *American sociological review*, *79*(2), 350-357.

Killewald, A., and Gough, M. (2013). Does specialization explain marriage penalties and premiums? *American sociological review*, *78*(3), 477-502.

Kingsbury, M. A. (2019). Expanding understanding of motherhood penalty: how gaps in family policies contribute to gaps in old-age earnings in Russia. *Frontiers in Sociology*, *4*, 67.

Kricheli-Katz, T. (2012). Choice, discrimination, and the motherhood penalty. *Law and Society Review*, *46*(3), 557-587.

Kricheli-Katz, T. (2013). Choice-based discrimination: Labor-force-type discrimination against gay men, the obese, and mothers. *Journal of Empirical Legal Studies*, *10*(4), 670-695.

Lam, K. K. L., and Zhou, M. (2019). Examining the relationship between grit and academic achievement within K-12 and higher education: A systematic review. *Psychology in the Schools*, *56*(10), 1654-1686.

Latham, G. P., and Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annu. Rev. Psychol.*, *56*, 485-516.

Lechner, C. M., Danner, D., and Rammstedt, B. (2019). Grit (effortful persistence) can be measured with a short scale, shows little variation across socio-demographic subgroups, and is associated with career success and career engagement. *PLoS One*, *14*(11), e0224814.

Lips, H., and Lawson, K. (2009). Work values, gender, and expectations about work commitment and pay: Laying the groundwork for the "motherhood penalty"? *Sex roles*, *61*, 667-676.

Loden, M. (1987). Recognizing women's potential: No longer business as usual. *Management review*, *76*(12), 44.

Looze, J. (2014). Young women's job mobility: the influence of motherhood status and education. *Journal of Marriage and Family*, *76*(4), 693-709.

Looze, J. (2017). Why Do (n't) they Leave? Motherhood and women's Job Mobility. *Social Science Research*, *65*, 47-59.

Lorenti, A., Jessica, N., Mencarini, L., and Myrskylä, M. (2023). Gendered parenthood-employment gaps in midlife: a demographic perspective across three different welfare systems. Max Planck Institute for Demographic Research

Loughran, D. S., and Zissimopoulos, J. M. (2009). Why wait? The effect of marriage and childbearing on the wages of men and women. *Journal of Human resources*, *44*(2), 326-349.

Ma, X. (2022). Parenthood and the gender wage gap in urban China. *Journal of Asian Economics*, *80*, 101479.

Marentes-Castillo, M., Castillo, I., Tomás, I., Zamarripa, J., and Alvarez, O. (2022). Understanding the antecedents of healthy and unhealthy weight control behaviours: Grit, motivation and self-control. *Public Health Nutrition*, *25*(6), 1483-1491.

Mari, G., and Cutuli, G. (2021). Do parental leaves make the motherhood wage penalty worse? *European Sociological Review*, *37*(3), 365-378.

McGannon, K. R., Kulkarni, S., Hladun, W., Bundon, A., and Pegoraro, A. (2023). Exposing a motherhood penalty in sport: a feminist narrative inquiry of media stories of Canadian athlete mothers' journeys to the 2020 Tokyo Games. *Communication and Sport*, 21674795231187916.

McIntosh, B., McQuaid, R., Munro, A., and Dabir-Alai, P. (2012). Motherhood and its impact on career progression. *Gender in Management: an international journal*, *27*(5), 346-364.

Miller, A. R. (2011). The effects of motherhood timing on career path. *Journal of population economics*, *24*, 1071-1100.

Misra, J., Budig, M., and Boeckmann, I. (2011). Work-family policies and the effects of children on women's employment hours and wages. *Community, Work and Family*, *14*(2), 139-157.

Molina, J. A., and Montuenga, V. M. (2009). The motherhood wage penalty in Spain. *Journal of Family and Economic Issues*, *30*, 237-251.

Mooradian, T., Matzler, K., Uzelac, B., and Bauer, F. (2016). Perspiration and inspiration: Grit and innovativeness as antecedents of entrepreneurial success. *Journal of Economic Psychology*, *56*, 232-243.

Morgenroth, T., Ryan, M. K., and Sønderlund, A. L. (2021). Think Manager–Think Parent? Investigating the fatherhood advantage and the motherhood penalty using the Think Manager–Think Male paradigm. *Journal of Applied Social Psychology*, *51*(3), 237-247.

Musick, K., Bea, M. D., and Gonalons-Pons, P. (2020). His and her earnings following parenthood in the United States, Germany, and the United Kingdom. *American Sociological Review*, *85*(4), 639-674.

Musick, K., Gonalons-Pons, P., and Schwartz, C. R. (2022). Change and Variation in U.S. Couples' Earnings Equality Following Parenthood. *Population and Development Review*, *48*(2), 413-443.

Niemistö, C., Hearn, J., Kehn, C., and Tuori, A. (2021). Motherhood 2.0: slow progress for career women and motherhood within the 'Finnish dream'. *Work, Employment and Society*, *35*(4), 696-715.

Nyhus, E. K., and Pons, E. (2012). Personality and the gender wage gap. *Applied Economics*, *44*(1), 105-118.

O'Neill, J. (2003). The gender gap in wages, circa 2000. *American Economic Review*, *93*(2), 309-314.

O'Rourke, A., Vella, K., and de Jonge, A. (2023, May). Employer funded egg freezing: An advance for women in the workplace or a return to the unencumbered employee? In *Women's Studies International Forum* (Vol. 98, p. 102698). Pergamon.

Pepping, A., and Maniam, B. (2020). The motherhood penalty. *Journal of Business and Behavioral Sciences*, *32*(2), 110-125.

Perry-Jenkins, M., and Gerstel, N. (2020). Work and family in the second decade of the 21st century. *Journal of Marriage and Family*, *82*(1), 420-453.

Perry-Jenkins, M., and Gerstel, N. (2020). Work and family in the second decade of the 21st century. *Journal of Marriage and Family*, *82*(1), 420-453.

Pyke, K. D., and Bengtson, V. L. (1996). Caring more or less: Individualistic and collectivist systems of family eldercare. *Journal of Marriage and the Family*, 379-392.

Rahim, F. (2014). Work-family attitudes and career interruptions due to childbirth. *Review of Economics of the Household*, *12*, 177-205.

Rose, J., Li, Y., and Ville, L. (2023). The Ethnicity Motherhood Pay Penalty.

Ruggles, S. (2015). Patriarchy, power, and pay: The transformation of American families, 1800–2015. *Demography*, *52*(6), 1797-1823.

Sicilian, P., and Grossberg, A. J. (2001). Investment in human capital and gender wage differences: evidence from the NLSY. *Applied Economics*, *33*(4), 463-471.

Skora, T., Rüger, H., and Stawarz, N. (2020). Commuting and the motherhood wage gap: Evidence from Germany. *Sustainability*, *12*(14), 5692.

Socratous, M., Galloway, L., and Kamenou-Aigbekaen, N. (2016). Motherhood: an impediment to workplace progression? The case of Cyprus. *Equality, Diversity and Inclusion: An International Journal*.

Srivastava, S. B., and Sherman, E. L. (2015). Agents of change or cogs in the machine? Reexamining the influence of female managers on the gender wage gap. *American Journal of Sociology*, *120*(6), 1778-1808.

STATA LLC, *STATA YouTube Channel* [YouTube Channel]; https://www.youtube.com/watch?v=0DRXnoR-Q1c

Thébaud, S., and Taylor, C. J. (2021). The specter of motherhood: Culture and the production of gendered career aspirations in science and engineering. *Gender and Society*, *35*(3), 395-421.

U.S. Bureau of Labor Statistics, Women in the Labor Force Databook – Report 973, 2004. https://www.bls.gov/opub/reports/womens-databook/archive/womenlaborforce_2004.pdf

U.S. Bureau of Labor Statistics, Women in the Labor Force Databook – Report 1092, 2021. https://www.bls.gov/opub/reports/womens-databook/2020/home.htm

Vainio, M. M., and Daukantaitė, D. (2016). Grit and different aspects of well-being: Direct and indirect relationships via sense of coherence and authenticity. *Journal of Happiness Studies*, *17*, 2119-2147.

Van Winkle, Z., and Fasang, A. E. (2020). Parenthood wage gaps across the life course: A comparison by gender and race. *Journal of Marriage and Family*, *82*(5), 1515-1533.

Viitanen, T. (2014). The motherhood wage gap in the UK over the life cycle. *Review of Economics of the Household*, *12*, 259-276.

Waldfogel, J. (1997). The effect of children on women's wages. *American sociological review*, 209-217.

Waldfogel, J. (1998). The family gap for young women in the United States and Britain: can maternity leave make a difference? *Journal of labor economics*, *16*(3), 505-545.

Waldfogel, J. (1998). Understanding the 'family gap in pay for women with children. *Journal of economic Perspectives*, *12*(1), 137-156.

Wang, J. (2023). An analysis of factors influencing the career success of Chinese women scientists. *Cultures of Science*, *6*(1), 6-22.

Wang, P., and Chen, J. Fertility-based employment discrimination and family policy: Evidence from a field experiment. *Social Policy and Administration*.

Weeden, K. A., Cha, Y., and Bucca, M. (2016). Long work hours, part-time work, and trends in the gender gap in pay, the motherhood wage penalty, and the fatherhood wage premium. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *2*(4), 71-102.

Weisshaar, K. (2018). From opt out to blocked out: The challenges for labor market re-entry after family-related employment lapses. *American Sociological Review*, *83*(1), 34-60.

Wilde, E. T., Batchelder, L., and Ellwood, D. T. (2010). *The mommy track divides: The impact of childbearing on wages of women of differing skill levels* (No. w16582). National Bureau of Economic Research.

Winkler, A. E. (2022). Women's labor force participation. *IZA World of Labor*.

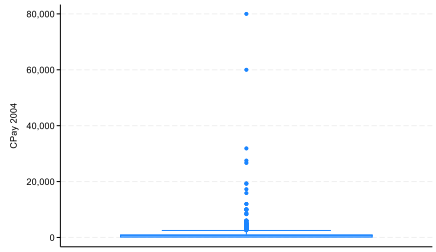
Wooldridge, J. M. (2015). Introductory econometrics: A modern approach: Nelson Education. Scarborough, ON, Canada.

Wuestenenk, N., and Begall, K. (2022). The motherhood wage gap and trade-offs between family and work: A test of compensating wage differentials. *Social science research*, *106*, 102726.

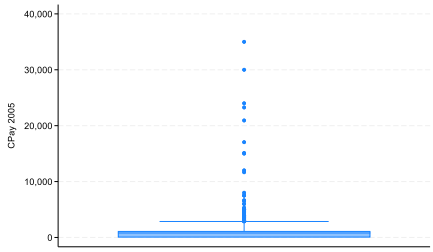
Zheng, Q., QIU, Z., and YANG, W. Shifting Motherhood Penalty and Fatherhood Premium in China's Gig Economy: Impact of Parental Status on Income Changes. *International Labour Review*.

APPENDIX A: HOURLY WAGE RAW DATA EVALUATION, CLEANSE AND TRANSFORMATION

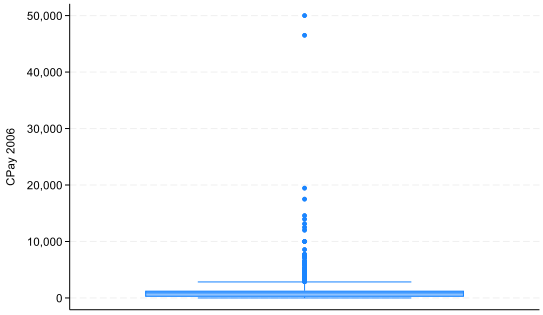
2004



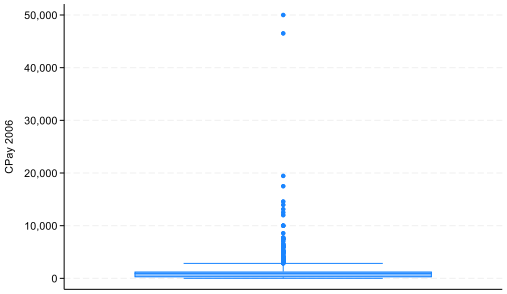
2005



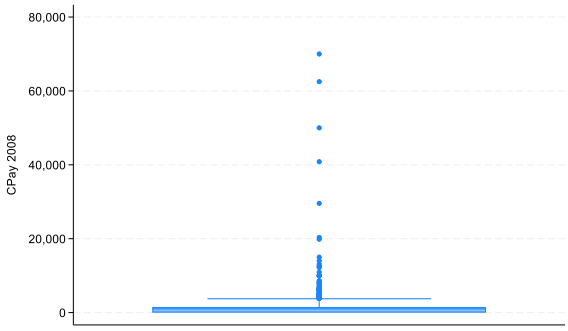
2006



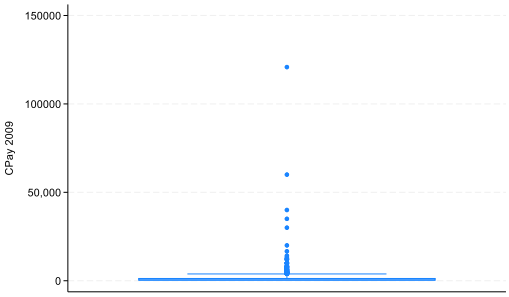
2007



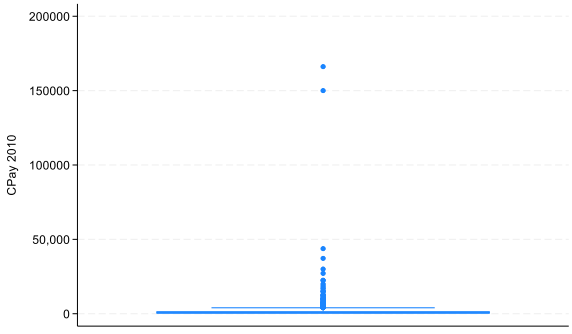
2008



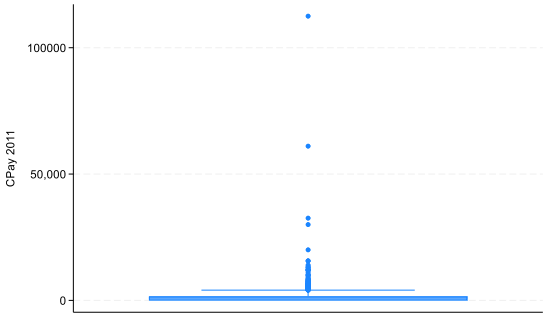
2009



2010

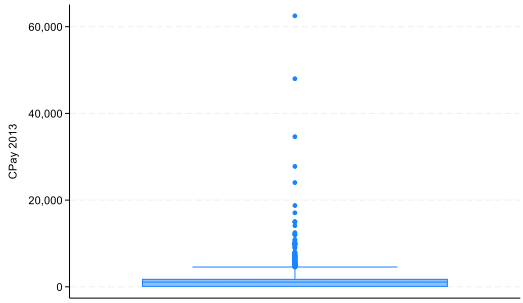


2011

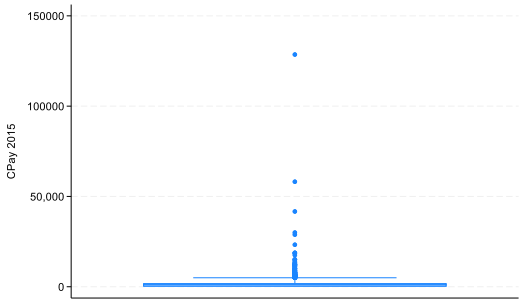


APPENDIX A: HOURLY WAGE RAW DATA EVALUATION, CLEANSE AND TRANSFORMATION (CONT.)

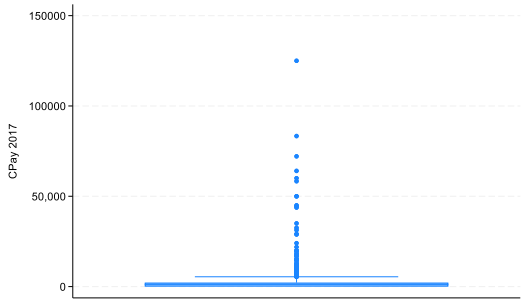
2013



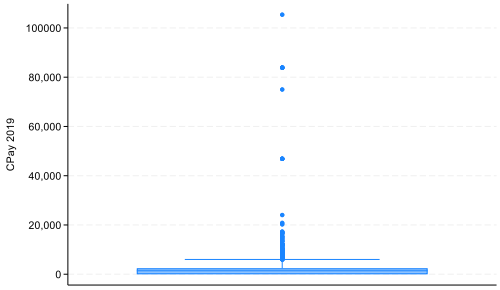
2015



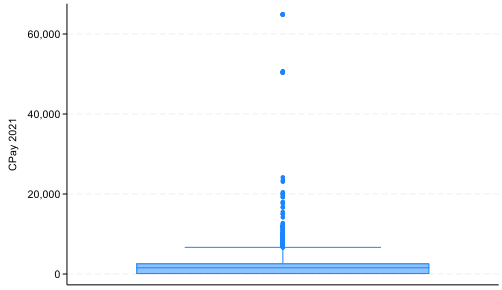
2017



2019



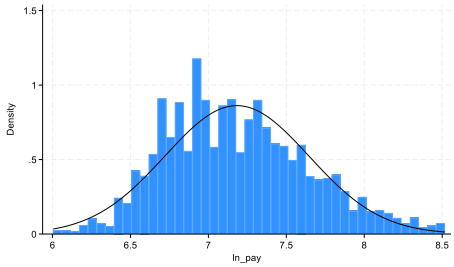
2021



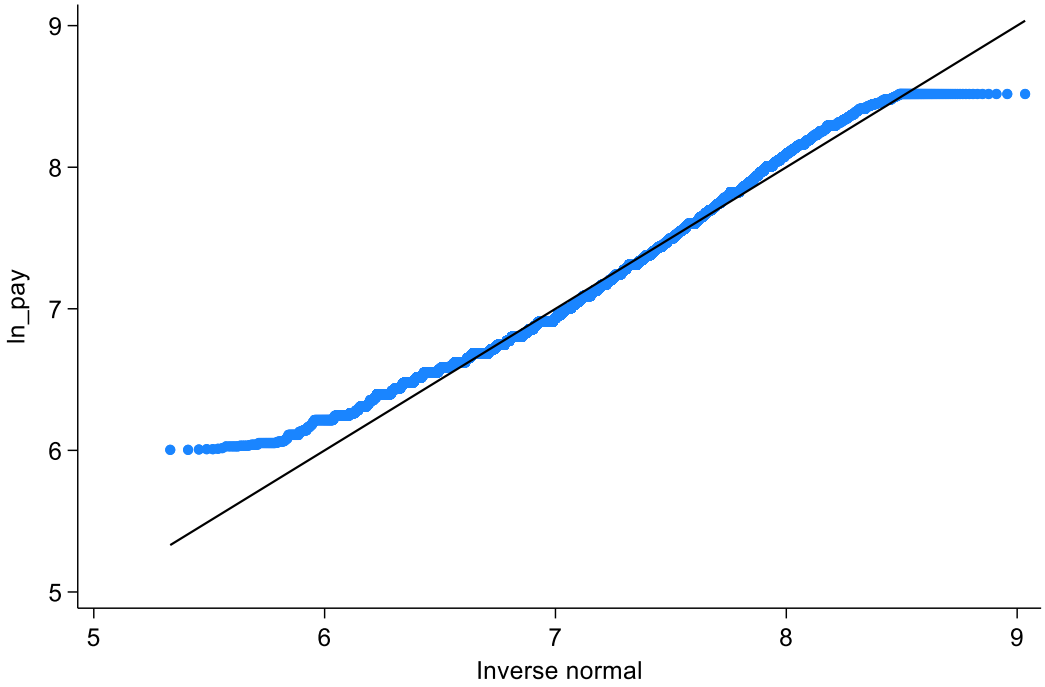
APPENDIX A: HOURLY WAGE RAW DATA EVALUATION, CLEANSE AND TRANSFORMATION (CONT.)

Based on visual inspection of boxplots for raw hourly wage data per year, observations > $50/hr. were removed prior to pooling and transforming. Dataset was then pooled, and log transformed.

Histogram ln_pay



Q-Q Plot ln_pay



Although, the criterion for normality is not met using Shapiro Wilk (see results below), fixed effect regression is resilient to non-perfectly normal data. Given visual inspection of the above histogram and Q-Q plots, the deviation from normal following data cleanse and log transformation is not substantial and will be adequate for this analysis.

Shapiro–Wilk W test for Normality

Variable	Obs	W	V	z	Prob>z
Ln_pay	31,670	0.98607	180.664	4	14.292 0.00000

APPENDIX B: HYPOTHESIS TESTING OUTPUTS

Hypothesis 1 testing: results of analysis

Fixed-effects (within) regression			Number of obs		9,323	
Group variable: id			Number of groups		729	
R-squared:			Obs per group:			
Within = 0.0047			min		2	
Between = 0.0290			avg		12.8	
Overall = 0.0004			max		13	
			F(1, 728)		22.71	
corr(u, I, Xb)=	-0.1264		Prob > F		0.0000	
nlog_pay	Coefficient	Robust std. err.	t	P > | t |	[95% conf.	interval]
Child present	-.2326851	.0488274	-4.77	0.000	-.3285445	-.1368257
_cons	7.512927	.0480471	156.37	0.000	7.418599	7.607254
sigma_u	.30511063					
sigma_e	. 36133638					
rho	. 41622983					

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Hypothesis 1(alternative) testing: results of analysis

Fixed-effects (within) regression			Number of obs		9,323	
Group variable: id			Number of groups		729	
R-squared:			Obs per group:			
Within = 0.0477			min		2	
Between = 0.0355			avg		12.8	
Overall = 0.0010			max		13	
			F(3, 728)		49.89	
corr(u, I, Xb)=	-0.2898		Prob > F		0.0000	
nlog_pay	Coefficient	Robust std. err.	t	P > | t |	[95% conf.	interval]
OneChild	-.2282559	.04966	-4.60	0.000	-.3257497	-.1307621
TwoChild	-.1551615	.0512141	-3.03	0.003	-.2557064	-.0546166
ThreePlusChild	-.3971538	.0520831	-7.63	0.000	-.4994047	-.2949028
_cons	7.592125	.0492936	154.02	0.000	7.49535	7.688899
sigma_u	.32505269					
sigma_e	.35348089					
rho	.4581769					

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Hypothesis 2a testing: marital status results of analysis

Fixed-effects (within) regression	Number of obs =	9,323
Group variable: id	Number of groups =	729
R-squared:	Obs per group:	
Within = 0.1543	min =	1
Between = 0.0110	avg =	12.8
Overall = 0.0586	max =	13
	F(5, 728) =	146.17
corr(u_i, Xb) = -0.3238	Prob > F =	0

nlog_pay	Coefficient	Robust std. err.	t	P>t	[95% conf.	interval]
Child present	-0.171949	0.067761	-2.54	0.011	-0.30498	-0.03892
Married	0.5539825	0.105178	5.27	0.000	0.347494	0.760471
Divorced	0.4088954	0.101735	4.02	0.000	0.209167	0.608623
Child present x married	-0.1417611	0.10464	-1.35	0.176	-0.34719	0.063672
Child present x divorced	0.1013768	0.10191	0.99	0.320	-0.0987	0.30145
_cons	7.260753	0.067319	107.86	0.000	7.128592	7.392915
sigma_u	0.3300801					
sigma_e	0.3331615					
rho	0.4953541					

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Hypothesis 2b testing: college educated mother's age at first birth results of analysis

Source	SS	df	MS	Number of obs	=	5,110
				F(6, 5103)	=	10.46
Model	13.54115	6	2.256859	Prob > F	=	0
Residual	1100.75	5,103	0.215706	R-squared	=	0.0122
				Adj R-squared	=	0.011
Total	1114.291	5,109	0.218104	Root MSE	=	0.46444

nlog_pay	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
Child present	-0.16958	0.05754	-2.95	0.003	-0.2823698	-0.05679
Ages 25-29	-0.4108	0.134055	-3.06	0.002	-0.6735777	-0.14802
Ages 30-36	-0.52131	0.134055	-3.89	0	-0.7840825	-0.25853
Ages 37+	-0.15418	0.082748	-1.86	0.052	-0.3163834	0.008023
Child present x ages 25-29	0.573082	0.134798	4.25	0	0.3088482	0.837315
Child present x ages 20-36	0.692284	0.134922	5.13	0	0.427807	0.95676
Child present x ages 37+	0.252206	0.083609	3.02	0.003	0.0883132	0.416099
_cons	7.3588	0.056794	129.57	0	7.247472	7.470128

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Hypothesis 2c testing: race results of analysis

Source	SS	df	MS	Number of obs	=	9,323
				F(7, 9315)	=	19.09
Model	27.80289	7	3.971841	Prob > F	=	0
Residual	1938.313	9,315	0.208085	R-squared	=	0.0141
				Adj R-squared	=	0.0134
Total	1966.116	9,322	0.210911	Root MSE	=	0.45616

nlog_pay	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
Child present	-0.39505	0.233326	-1.69	0.09	-0.85242	0.06232
Black	-0.55817	0.239786	-2.33	0.02	-1.02821	-0.08814
Hispanic	-0.2246	0.25862	-0.87	0.385	-0.73156	0.282348
White	-0.54435	0.232935	-2.34	0.019	-1.00095	-0.08775
Child present x Black	0.418074	0.245024	1.71	0.088	-0.06223	0.898375
Child present x Hispanic	0.186755	0.263551	0.71	0.479	-0.32986	0.703372
Child present x White	0.539333	0.238145	2.26	0.024	0.072517	1.006149
_cons	7.715457	0.228082	33.83	0	7.268367	8.162548

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Hypothesis 2d testing: human capital considerations results of analysis

Source	SS	df	MS	Number of obs	=	9.323
				F(11, 8738)	=	118.77
Model	238.8136	11	21.71033	Prob > F	=	0
Residual	1597.185	8,738	0.182786	R-squared	=	0.1301
				Adj R-squared	=	0.129
Total	1835.999	8,749	0.209852	Root MSE	=	0.42753

nlog_pay	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
Child present	0.125261	0.206974	0.61	0.545	-0.28046	0.53098
High School	-0.07945	0.133416	-0.6	0.552	-0.34098	0.182077
Undergrad	0.135913	0.150303	0.9	0.366	-0.15871	0.430542
Masters and higher	0.578251	0.219962	2.63	0.009	0.147074	1.009428
Years of experience	0.045343	0.016834	2.69	0.007	0.012344	0.078342
Years of seniority	0.019954	0.009599	2.08	0.038	0.001139	0.03877
Child present x High School	0.216997	0.137258	1.58	0.114	-0.05206	0.486055
Child present x Undergrad	0.214882	0.153753	1.4	0.162	-0.08651	0.516274
Child present x Masters and higher	-0.11313	0.222558	-0.51	0.611	-0.5494	0.323137
Child present x Years of experience	-0.01476	0.017022	-0.87	0.386	-0.04812	0.018608
Child present x Years of seniority	-0.01497	0.00966	-1.55	0.121	-0.0339	0.00397
_cons	6.300166	0.20125	31.31	0	5.90567	6.694663

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Hypothesis 3 testing: college educated women Grit-S results of analysis

Source	SS	df	MS	Number of obs	=	5,110
				F(3, 5106)	=	8.61
Model	5.607375	3	1.869125	Prob > F	=	0
Residual	1108.684	5,106	0.217134	R-squared	=	0.005
				Adj R-squared	=	0.0044
Total	1114.291	5,109	0.218104	Root MSE	=	0.46598

nlog_pay	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
Child present	-0.14218	0.076192	-1.87	0.062	-0.29155	0.007193
Grit (standardized)	0.110587	0.087156	1.27	0.205	-0.06028	0.281451
Child present x Grit (standardized)	-0.06787	0.087645	-0.77	0.439	-0.23969	0.103949
_cons	7.552479	0.075909	99.49	0	7.403664	7.701293

APPENDIX B: HYPOTHESIS TESTING OUTPUTS (CONT.)

Full regression table - all models

	Model 1	Model 1a	Model 2	Model 3	Model 4	Model 5	Model 6
Independent variable							
Presence of children	-0.232*		-0.171*	-0.169*	-0.395	0.125	-0.142
One child		-0.228*					
Two children		-0.155*					
Three or more children		-0.397*					
Moderators							
Marital status - married			0.533*				
Marital status - divorced			0.408*				
Mothers age at first birth 25-29				-0.410*			
Mothers age at first birth 30-36				-0.521*			
Mothers age at first birth 37+				-0.154*			
Black					-0.558*		
Hispanic					-0.224		
White					-0.544*		
High school						-0.079	
Undergrad						0.135	
Masters+						0.578*	
Years of experience						0.045*	
Years of seniority						0.019*	
GritS							0.110
Interaction terms							
Presence of children*married			-0.141				
Presence of children*divorced			-0.101				
Presence of children*Mothers age at first birth 25-29				0.573*			
Presence of children*Mothers age at first birth 20-36				0.692*			
Presence of children*Mothers age at first birth 37+				0.252*			
Presence of children* Black					0.418		
Presence of children*Hispanic					0.186		
Presence of children*White					0.539*		
Presence of children*High school						0.216	
Presence of children*Undergrad						0.214	
Presence of children*Masters+						-0.113	
Presence of children*Years of experience						-0.014	
Presence of children*Years of seniority						-0.014	
Presence of children*GritS							-0.067
R-squared				0.012	0.014	0.130	0.005
Adj. R-squared				0.011	0.013	0.129	0.004
Within	0.00470	0.0477	0.1543				
Between	0.02900	0.0355	0.011				
Overall	0.00000	0.001	0.0586				
F-statistic	22.71*	49.89*	146.17*	10.46*	19.09*	118.77*	8.61*
n	9,323	9,323	9,323	5,110	9,323	9,323	5,110

*$p < .05$

APPENDIX C: BACK CALCULATIONS FROM COEFFICIENT OF NATURAL LOG OF HOURLY WAGE TO PERCENT WAGE IMPACT

Variable	Coefficient	Exp(coefficient)	Percent = (Exp -1)*100
All working women			
Presence	-0.232	0.792946123	-20.71
One child	-0.228	0.79612426	-20.39
Two children	-0.155	0.856415177	-14.36
Three or more children	-0.397	0.672334026	-32.77

APPENDIX D: CFA PROCESS AND RESULTS FOR GRITS QUESTIONS

CFA to generate loading factors for as is grit 1 – grit 8 questions

Endogenous variables measurement: grit1 grit2r grit3 grit4r grit5 grit6 grit7r grit8r
Exogenous variable (latent): Grit

View of standardized factors loadings, additional fit statistics analyses and next steps

Question	Factor Loading (Coefficients)	Factor loading should be > |0.5|
Grit 1	.543	Acceptable
Grit 2	.0959	Not acceptable
Grit 3	.646	Acceptable
Grit 4	.383	Not acceptable
Grit 5	.668	Acceptable
Grit 6	.734	Acceptable
Grit 7	.554	Acceptable
Grit 8	.293	Not acceptable

LR test of model vs. saturated: chi2(20) = 2067.86 Prob > chi2 = 0.0000

Since chi-square test (LR test) is highly significant, this indicates the model may not fit perfectly, but given ~9000 observations and knowing chi-square is sensitive to sample size, additional analysis with tests for additional fit indices were conducted.

Additional fit statistics

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(20)	2067.860	model vs. saturated
p > chi2	0.000	
chi2_bs(28)	14282.911	baseline vs. saturated
p > chi2	0.000	
Population error		
RMSEA	0.105	Root mean squared error of approximation
90% CI lower bound	0.101	
90 % CI upper bound	0.109	
pclose	0.000	Probability RMSEA <= 0.05
Baseline comparison		
CFI	0.856	Comparative fit index
TLI	0.799	Tucker–Lewis index
Size of residuals		
SRMR	0.069	Standardized root mean squared residual

APPENDIX D: CFA PROCESS AND RESULTS FOR GRITS QUESTIONS (CONT.)

Analysis of additional fit statistics results

For Chi2 (likelihood ratio test), comparing initial assessment of grit 1 – grit 8 to a perfect model is statistically significantly different from a perfect model, suggesting low likelihood of fit, but Chi2 is known to be sensitive to large samples sizes, additional analysis is required considering alternative fit indices. For RMSEA, results should be <0.05 for a good fit, where analysis results are 0.105, suggesting poor fit. For Comparative fit index (CFI), results should be ~0.95. Result of my analysis are 0.856, suggesting poor fit. For Tucker Lewis Index (TLI), results should be ~0.95. Result of my analysis is 0.799 indicating suggesting poor fit. For standardized root mean squared residual (SRMR), result should be < 0.08. Result of my analysis is 0.069 – this is a positive sign of model fit looking at residuals. Given the coefficients and evaluation of additional fit indices, questions 2, 4 and 8 were dropped and CFA re-evaluated for fit.

CFA analysis after removal of grit 2, grit 4 and grit 8

Endogenous variables measurement: grit1 grit3 grit5 grit6 grit7r
Exogenous variables (latent): Grit

View of standardized factors loadings, additional fit statistics analyses and next steps

Question	Factor Loading (Coefficients)	Factor loading should be > |0.5|
Grit 1	.565	Acceptable
Grit 3	.673	Acceptable
Grit 5	.685	Acceptable
Grit 6	.725	Acceptable
Grit 7	.504	Acceptable

LR test of model vs. saturated: chi2(5) = 104.15 Prob > chi2 = 0.0000

APPENDIX D: CFA PROCESS AND RESULTS FOR GRITS QUESTIONS (CONT.)

Additional fit statistics

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(20)	104.147	model vs. saturated
p > chi2	0.000	
chi2_bs(28)	10649.818	baseline vs. saturated
p > chi2	0.000	
Population error		
RMSEA	0.046	Root mean squared error of approximation
90% CI lower bound	0.039	
90 % CI upper bound	0.054	
pclose	0.782	Probability RMSEA <= 0.05
Baseline comparison		
CFI	0.991	Comparative fit index
TLI	0.981	Tucker–Lewis index
Size of residuals		
SRMR	0.017	Standardized root mean squared residual

Analysis of additional fit statistics results after removal of grit2, grit4 and grit8

For Chi2 (likelihood ratio test), comparing to a perfect model is statistically significant, implying additional fit indices analysis is required, as Chi2 is known to be sensitive to large samples sizes. For RMSEA, results should be <0.05 for a good fit, where analysis results are 0.046, suggesting good fit. For Comparative fit index (CFI), results should be ~0.95. Result of my analysis are 0.991, suggesting good fit. For Tucker Lewis Index (TLI), results should be ~0.95. Result of my analysis is 0.981 suggesting good fit. For standardized root mean squared residual (SRMR), result should be < 0.08. Result of my analysis is 0.017 – this is a positive sign of model fit looking at residuals. Given analysis of additional fit indices suggest a good fit following the removal of grit2, grit4 and grit8, a standardized composite sample was created for the purpose of regression analysis.

APPENDIX E: CORRELATION TABLE

	nlog_pay	Exp.	Sen.	Grit	Edu.	Marital	Race	Age at first birth	Child present	Child num
nlog_pay	1.000									
Exp.	0.2409* 0.0000	1.000								
Sen.	0.1558* 0.0000	0.5072* 0.0000	1.000							
Grit	-0.0349* 0.0272	0.0777* 0.0000	0.0554* 0.0005	1.000						
Edu.	0.4183* 0.0000	0.2461* 0.0000	0.0784* 0.0000	-0.0093 0.5551	1.000					
Marital	0.2156* 0.0000	0.0777* 0.0000	0.0705* 0.0000	-0.0307 0.0522	0.0921 0.0000	1.000				
Race	0.1261* 0.0000	0.0834* 0.0000	-0.0582* 0.0002	-0.1272* 0.0000	0.1247* 0.0000	0.2648* 0.0000	1.000			
Age at first birth	0.1574* 0.0000	0.1039* 0.0000	0.0497* 0.0017	-0.0356* 0.0242	0.0802* 0.0000	0.1612* 0.0000	0.0610* 0.0001	1.000		
Child present	0.0382* 0.0156	0.1003* 0.0000	0.0963* 0.0000	0.0116 0.4641	0.0887* 0.0000	0.0141 0.3718	-0.0016 0.9195	-0.0988* 0.000	1.000	
Child num	0.0465* 0.0033	0.0316 0.0518	0.0500* 0.0016	0.0049 0.7555	0.0321* 0.0426	0.1409* 0.0000	0.029 0.0663	0.1455* 0.0000	0.4862* 0.0000	1.000

APPENDIX E: CORRELATIONS TABLE (CONT.)

Interpretation: Correlations involving natural log of hourly wage (nlog_pay)

Years of experience. A correlation coefficient of 0.2409 suggests a moderate positive relationship with `nlog_pay`, meaning that individuals with more years of experience tend to have higher log pay. The p-value is less than 0.05, indicating this is statistically significant.

Years of seniority. A coefficient of 0.1558 implies a positive relationship with `nlog_pay` and suggests that increased seniority is associated with higher pay, with the relationship being statistically significant.

Grit. A small negative coefficient of -0.0349, though statistically significant, suggests a minimal inverse relationship with `nlog_pay`, so higher scores Grit scores may be slightly associated with lower pay.

Mother's highest level of educational attainment (education). A higher coefficient of 0.4183 indicates a moderate positive relationship with `nlog_pay`, suggesting that higher education levels are associated with higher log pay, which is statistically significant.

Marital status. A coefficient of 0.2156 indicates a small positive relationship with `nlog_pay`. As this is a categorical variable, suggesting a small association with marital status categories and 'nlog_pay'.

Race. There's a positive but weak correlation of 0.1261 with `nlog_pay`, which is statistically significant, suggesting a slight association between race categories and normalized log pay.

Mother's age at first birth. A coefficient of 0.1574 with nlog_pay suggests a small positive correlation, implying higher pay is associated with this category.