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Optimal durations of paid family and medical leave to support health

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Thesis

OPTIMAL DURATIONS OF PAID FAMILY AND MEDICAL LEAVE TO SUPPORT HEALTH

by

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OPTIMAL DURATIONS OF PAID FAMILY AND MEDICAL LEAVE
TO SUPPORT HEALTH
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ABSTRACT

OBJECTIVE: We assessed the impact of paid family and medical leave durations on the health outcomes of employees and their families. Using previous literature and relevant studies, we aimed to formulate evidence-based recommendations for the duration of paid family and medical leave that would promote optimal health outcomes.

METHODS: PubMed was utilized to identify relevant literature. The concept of paid leave was organized into four main categories: maternity leave, parental leave, personal medical leave, and leave for children’s health needs. Literature searching, data abstraction, and analyses were performed. Weekly discussions with the Medical Decision Points team were also conducted to finalize article selection, organization, and data analysis.

RESULTS: Maternal mental health and breastfeeding continuation were positively associated with maternity (i.e., maternal disability) leave durations of 12 to 16 weeks and longer. Infant morbidity and mortality, vaccination uptake rate, breastfeeding continuation all improved with up to six months of parental (i.e., parent bonding) leave. There was limited evidence regarding personal medical leave and leave for children’s health needs. Typical durations of hospitalization, recovery, work and school absence were analyzed to formulate appropriate paid leave durations.

CONCLUSION: Evidence suggests that the 12 weeks of unpaid leave offered by the Family and Medical Leave Act (FMLA) is inadequate in providing employees and their families with health sustaining
benefits. We recommend at least four months of paid maternity leave and six months of paid parental leave for each new child. We also recommend up to six months of paid personal medical leave for each serious illness and at least six weeks (for up to six months) of paid family leave for each child’s serious illness, with substantial flexibility to account for both acute illness requiring sustained care and recovery periods requiring more intermittent care.
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<th>Abbreviation</th>
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<tr>
<td>AAOS</td>
<td>American Academy of Orthopaedic Surgeons</td>
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<td>AAP</td>
<td>American Academy of Pediatrics</td>
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<td>ACE</td>
<td>angiotensin converting enzyme</td>
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<td>AE</td>
<td>Alison Earle, Ph.D.</td>
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<td>AHRQ</td>
<td>Agency for Healthcare Research and Quality</td>
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<td>APA</td>
<td>American Psychiatry Association</td>
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<td>AS</td>
<td>Adam Schickedanz, M.D.</td>
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<td>CDC</td>
<td>Center for Disease Control and Prevention</td>
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<td>CES-D</td>
<td>Center for Epidemiologic Studies Depression Scale</td>
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<tr>
<td>CINAHL</td>
<td>Cumulative Index to Nursing and Allied Health Literature</td>
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<td>DD</td>
<td>difference-in-difference</td>
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<td>DDD</td>
<td>difference-in-difference-in-difference</td>
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<tr>
<td>ECLS_B</td>
<td>Early Childhood Longitudinal Study Birth Cohort</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>FDA</td>
<td>Food and Drug Administration</td>
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<td>FMLA</td>
<td>Family and Medical Leave Act</td>
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<td>FTE</td>
<td>full-time equivalent</td>
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<tr>
<td>HCUP</td>
<td>Healthcare Cost and Utilization Project</td>
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<tr>
<td>HRQoL</td>
<td>health-related quality of life</td>
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<tr>
<td>IFPS</td>
<td>Infant Feeding Practices Study</td>
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<tr>
<td>ILO</td>
<td>International Labour Organization</td>
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LMIC.......................................................... low-to-middle-income country
LOS .......................................................... length of stay
MeSH .......................................................... Medical Subject Heading
MI .......................................................... myocardial infarction
NHIS .......................................................... National Health and Interview Survey
NICE .......................................................... National Institute for Health and Care Excellence
NPWF ....................................................... National Partnership for Women & Families
NSAID .......................................................... nonsteroidal anti-inflammatory drug
OECD .......................................................... Organisation for Economic Co-operation and Development
OLSE .......................................................... Office of Labor Standards Enforcement
PB .......................................................... Priya Batra, M.D., M.S.
PC .......................................................... Paul Chung M.D., M.S.
PCERA ....................................................... Parental-Child Early Relational Assessment
PFL .......................................................... Paid Family Leave
QoL .......................................................... quality of life
ST .......................................................... Stephanie Tsoi, B.S.
TDI .......................................................... Temporary Disability Insurance
U.S. .......................................................... United States
WHO .......................................................... World Health Organization
WRR .......................................................... wage replacement rate
INTRODUCTION

Paid family and medical leave is a critical health issue in the United States. Under the Family and Medical Leave Act (FMLA), medical leave is defined as leave taken by employees for the care of their own illness. Family leave is defined as leave taken for the care of others, including when parents bond with a new child, parents care for an ill child, and family members care for an ill adult relative (e.g., elderly parent) (Gault, 2014). When taking time off, however, many employees risk their family’s financial stability and their own job security, both of which also carry major health implications. Paid leave policies may reduce these trade-offs, conferring potentially significant health benefits to employees and their families. These benefits, however, carry potential costs to employers. Therefore, determining the duration of leave that provides optimal health benefits might greatly inform policy debates.

Currently, the U.S is the last high-income country that does not have a federally paid work leave policy extending to both the public and private sectors of the labor force (Gault, 2014). Despite a lack of federal legislation on paid leave, this topic has gained the attention of state legislators, and specific leave policies have been established in several states and cities across the U.S. (NCLS, 2017). For example, Paid Family Leave (PFL) has been passed in five states (California, New Jersey, New York, Rhode Island, and Washington) and implemented in three (California, New Jersey, and Rhode Island). Across these states and municipalities, policies vary and provide a range of benefit coverages for duration of paid family leave and percentage of wages paid during these leaves. Currently, San Francisco leads the way for paid leave benefits in providing 100%
of pay (with a $2,133 weekly cap on benefits) (OLSE, 2017) during a guaranteed six week leave window (NPWF, 2016). With such varying levels of pay and duration, employers and employees across the country are being guided by differing standards of paid leave benefits. Any health benefits of paid leave are less clear when each city and state establishes different policy coverages providing different incentives for and barriers against participating.

**Current Federal Leave Status**

While federal paid leave policies have not been established, the concept of federal work leave has been visualized since the 1980s. FMLA was officially passed 1993 and stands as the first federal policy offering job protection by covered employers during work leave. This act has paved the way for subsequent improvements to employees’ benefits throughout the years, and continues to be an important foundation for the future of work leave policies. While FMLA has made a positive impact in the direction of employee benefits, there continue to be challenges in its administration and usage. Currently, FMLA provides employees with 12 weeks of job-protected leave for self or family caregiving (DOL, 2015), but it remains unpaid. FMLA eligibility is limited to employees who have worked for a covered employer for at least 1,250 hours over the past 12 months, and for an employer to be considered covered the company must have a minimum of 50 employees within 75 miles of the company’s primary location. These inclusion criteria have proven to be limiting, with only 59% of all employees in the U.S. deemed eligible for FMLA coverage. Within this population, 71% of eligible employees
are aware of the existence of FMLA, but only 13% of employees have used FMLA-qualifying reasons to take time off in any given year (Klerman, 2013). This significant disparity in benefits usage is most likely due to FMLA’s lack of compensation. Eligible employees may not choose to take leave because they cannot afford to do so (Vahratian, 2009). Lastly, employees may be unaware or have limited understanding of these policies, and it is often bureaucratically difficult or confusing to navigate the system in order to access benefits.

**Types of Paid Leave Defined**

The four categories of paid family and medical leave that will be defined and discussed as the foundation for establishing adequate medical leave durations are: maternity leave, parental leave, personal leave, and leave for children’s health needs.

*Maternity Leave*

New mothers face challenges after giving birth which include physical recuperation, caregiving to their infants, and various psychosocial changes that occur with motherhood. Maternity leave provides a period of time off from work during which mothers are able to address their health needs and recover from childbirth. During the postpartum period, mothers are especially vulnerable to health complications and decreased health-maintenance (Fahey, 2013). Studies have shown that this period is a critical time when mothers face increased probabilities of anxiety, depression, and decreased self-care (Tulman, 1990; Walker, 2000). When unresolved, these factors can
also negatively impact infant care practices. Studies have shown that negative health outcomes during the postpartum period may lead to early breastfeeding discontinuation, diminished parental bonding between mother and infant, and lower immunization rates (Fahey, 2013). Therefore, maternity leave aims to provide an appropriate time frame during which employed women can physically recover and participate in health-promoting activities.

Currently, maternity leave is globally recognized as an important aspect of health recovery and maintenance for women in the workforce. In 2014, The International Labour Organization recommended at least 14 weeks of job-protected leave and stressed the importance of allocating time to exclusive breastfeeding (Addati, 2014). In addition, almost all countries in the European Union (EU) provide mothers with at least two thirds of their regular salary during the allocated leave period. Despite the international effort in meeting the needs for health benefits and financial coverage for paid maternity leave, the U.S. remains the last high-income country that does not mandate federal paid leave (Gault, 2014). However, a few states and territories in the U.S. including Rhode Island, California, New Jersey, New York, Puerto Rico, and Hawaii offer Temporary Disability Insurance (TDI) programs that pay for disability benefits through surplus funds of state unemployment insurance programs. This has allowed these states to pay upwards of 50 to 60 percent of regular salary for a maximum of 52 weeks of leave for qualifying disabilities depending on state policies. Disability due to pregnancy is covered by TDI programs, and therefore women are able to take time off to care for their newborns and receive partial pay during their leave (U.S. Social Security Administration, 2012).
**Parental Leave**

Parental leave is defined as maternity or paternity leave taken for the health care needs of children after birth or adoption. The year after the birth or adoption of a child is a drastic transitional stage for parents and an important health and developmental period for children. Infants require ample nourishment for development, time to bond with their parents for social and emotional growth, and protection from illness, injury, and death. (CDC, 2017).

The existing literature on parental leave focuses on the impact that maternity leave has on the health of children due to the fact that fathers tend to participate less frequently, accounting for only 20% of all parental leave taken within any 18-month period. (NPWF, 2013) Additionally, for the purposes of this thesis, we will not explore the impact of parental leave on adopted children given the limited amount of existing literature on the topic. (Hellerstedt, 2008)

**Personal Medical Leave**

Paid personal medical leave is defined as leave taken for oneself for serious and/or chronic illnesses. When employees are ill for long periods of time, they need adequate time off to address their health needs. Chronic conditions like depression and musculoskeletal pain are especially recurrent, and employees may benefit from long-term leave so that they may fully recover before returning to work. (Vooijs, 2017; Huijs, 2017). Additionally, employees suffering from chronic and severe illness often cannot manage their illness within a short period of time and may leave the workforce entirely to
address their health issues (Huijs, 2017). Paid personal medical leave can provide employees with better financial stability and the necessary time off to recover so that they can return to work with optimal functionality.

*Leave for Children’s Health Care Needs*

Leave for children’s health care needs is designated for parents and other caregivers who must attend to the serious and/or chronic illnesses of their children. Childhood illnesses are common and contribute to 17% of all hospitalizations in the U.S. annually (Witt, 2014). It has been shown that children spend 31% less time in the hospital when their parents are present during a major illness (Taylor, 1989; Melnyk, 2006). While parent presence plays a critical role in the recovery and health maintenance of chronically ill children, parents often find that their time is limited by their work schedules and fear of losing pay during times when they take leave. As an alternative option, parents often use their own medical leave and vacation days to take time to care for their children. Studies show that parents are five times more likely to be able to care for their children if they have access to paid leave options (Heymann, 1996; Chung, 2007). Given the prevalence of child illness and the increased opportunity for child care when paid leave is available, specified paid leave policies regarding child illness may be prudent and beneficial for parents in the U.S.

**Specific Aims**

Current policy on paid family and medical leave is limiting in benefits and
accessibility to employees in the U.S. Additionally, the inconsistency of paid leave distribution across the U.S. overlooks serious health implications when leave is not established in alignment with healthy outcomes. We recognize that there are non-health related outcomes that also need to be considered including the financial security of employees and their families, the financial security of employers, the potential societal impacts, and other unanticipated externalities. While these additional outcomes must also be considered when creating paid leave policy, the health-related outcomes that we highlight will fill a major gap in the policy discussion. This thesis is an extension of the Medical Decision Points for Paid Leave project, a comprehensive analysis of paid leave policy and the health implications that policy changes may have on the health outcomes of American employees and their families. My study will specifically investigate the optimal durations of time of the four types of paid leave that I have defined. Therefore, we will utilize existing, evidence-based literature to analyze the implications for leave, provide rationale for the selection of prevalent medical conditions, accumulate data regarding the average duration of recovery time for each of the areas of focus, and most importantly, attempt to make appropriate recommendations for the duration of leave that will lead to the best health outcomes for employees and their families.
METHODS

The Medical Decision Points for Paid Leave Team

For this project, I conducted the literature search, data abstraction, and analyses of the selected studies. I worked with two academic pediatricians (PC and AS), one academic obstetrician (PB), one health policy researcher (AE), and one medical student (ST). As a team, we discussed project goals, brainstormed search strategies, and structured each leave policy recommendation. Group meetings took place via various methods of communication including: conference calls, in-person meetings, and e-mail. Conference calls were held weekly to provide the team with each member’s progress and feedback on the project.

Data Sources and Selection Criteria

I conducted literature searches for each of the four paid leave categories using search strategies that specified the subtopics within each type of leave. Using Boston University Medical Center Alumni Medical Library remote access, I applied the PubMed database as the primary source. I used Medical Subject Heading (MeSH) terms and controlled vocabulary for the searches strategies. In addition, I applied an English language filter with no limit on publication date range. In addition to PubMed, I also explored CINAHL and Grey Literature databases using less formal searches to confirm that the PubMed results were representative of existing literature. Using federal government websites, I also collected information on federal surveys, national hospitalization data, and national disease incidence registers.
All study designs were included in the eligibility criteria. Study designs included, but were not limited to cross-sectional studies, cohort studies, case-control studies, and randomized controlled trials. I also included previous systematic reviews and additional literature reviews in the collection. All of the selected references were stored in the reference manager software, Zotero and EndNote.

**Search Strategies and Article Selection**

**Maternity Leave and Parental Leave Search Strategies**

I began the search for maternity and parental leave articles by branching out from the core concept of ‘leave’ into sub-concepts, ‘maternity leave’ and ‘parental bonding leave’. Subsequently, I developed text keywords (parental leave, paternity leave, adoption leave, and adoption bonding) to search in combination with our sub-concept terms. In addition to the controlled vocabulary, I also added the MeSH term, ‘parental leave’ in our search. I produced the final search strategies (Appendix 1) using the OR operator to broaden the search with each of the text keywords.

**Maternity and Parental Leave Article Selection**

Studies identified from the search were categorized as relating to either maternal health or infant health impacts. Maternity leave categories included: maternal mental health, maternal physical recovery, breastfeeding effects on mothers, and antepartum leave. Parental leave categories included: infant morbidity due to premature birth and low
birth weight, infant mortality, breastfeeding effects on infants, vaccinations uptake, and parental bonding.

*Personal Medical Leave Search Strategies*

For paid personal medical leave, we selected for representative medical conditions in adults. We selected conditions based on three inclusion criteria: 1) contribution to lost work days, 2) prevalence, 3) associated health care costs. Our initial search of conditions with the largest contribution to lost work days was limited given that most sources only focus on occupational injury analysis when discussing lost work days. Therefore, we searched for conditions that are most prevalent in employed U.S. populations and lead to the most expensive national healthcare costs. Given that hospitalizations typically contribute most to health costs, we used the most recent data from the 2013 Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality (HCUP-AHRQ). We consolidated our HCUP-AHRQ search into two main categories: conditions causing most frequent hospitalizations, and conditions resulting in costliest hospitalizations. By examining the resulting conditions from both categories, we selected by consensus five high-prevalence, high-cost conditions for paid medical leave: myocardial infarction, mood disorders, osteoarthritis, lower back pain, and cancer. Pregnancy-associated hospitalization data were excluded due to the coverage of these topics in maternity leave.

For the paid medical leave search strategy, we refined the core concept of ‘leave’ with sub-concepts, ‘sick leave’, ‘disability leave’, and ‘personal leave’. We also included
the core concept ‘return to work’ in our search. Using the AND operator, we combined each of the sub-concept terms with each of the five selected conditions to produce various search strategies. (Appendix 1).

Personal Medical Leave Article Selection

Studies identified for paid personal medical leave were organized by relevance of work leave impacts on the health outcomes of each of the selected conditions (mood disorder, osteoarthritis, myocardial infarction, cancer, and low back pain). We approached our selection process by analyzing direct impact of paid medical leave impacts on the health outcomes of the selected conditions. We found most of our results to be of medical leave impacts on occupational injury. Therefore, we modified our search to focus more on each of our specific conditions. We looked at the progression of each conditions, ranging from acute phase (when employees are first hospitalized), recovery phase (when employees are recovering after treatment of their conditions), and maintenance phase (when employees’ health status is reevaluated after full recovery). Although this approach yielded useful articles, it also proved to be limiting. Therefore, we expanded our search and approached our question from the medical provider standpoint. We searched for clinical practice guidelines from professional health organizations to extrapolate information on specific time-points during which treatment, rehabilitation, condition monitoring, and medical interventions are scheduled to take place for each condition. The final set of selected guidelines were then approved by our team of clinicians and included in the results.
**Leave for Children’s Health Needs Search Strategies**

Similar to our search for conditions in paid personal medical leave, we utilized three main selection criteria: 1) contribution to lost work days, 2) prevalence, 3) associated health care costs. We found limited literature on child illness conditions that directly contributed to lost work days of parents. Therefore, we again used hospitalization data to find conditions with the highest prevalence and associated health care costs. Using HCUP-AHRQ data, we selected four high-prevalence, high-cost conditions that resulted from these criteria: respiratory illness, mood disorders, congenital heart disease, and pediatric cancer.


**Leave for Children's Health Needs Article Selection**

There were a limited number of studies that evaluated the effects of paid family leave usage on the health outcomes of ill children. Therefore, we decided to broaden our search for an appropriate duration of paid leave by searching for durations of time during which child illness progresses from acute to recovery phase. The acute illness phase includes hospitalizations upon incidence of a serious illness. These situations include care
for the initial presentation of a serious condition, and urgent or emergent care. The recovery phase includes care for a major illness until health returns to baseline. This phase involves health evaluation and time for recuperation. Additionally, we analyzed the maintenance period of illness which includes health monitoring, routine maintenance at baseline, and maintenance after episodic exacerbations of illness. We also evaluated durations and incidences of missed school days as indicators of duration and severity of illness.
RESULTS

The results section will be organized into two types of results: 1) Article Selection Results and 2) Evidence-Based Results. Article Selection Results will include results on the numbers of articles found, eliminated, and accepted into this study. Rationale for article exclusion for each type of leave can be found in Appendix II. The Evidence-Based Results section will include abstracted data from the selected studies and supporting information to supplement our findings.

Maternity Leave and Parental Leave Article Selection Results

Of the initial 823 search results from PubMed, 554 titles were excluded due to irrelevance to the core concept. The remaining 269 titles were screened for abstract content. 135 titles were eliminated because they did not meet the inclusion criteria. Of the remaining 134 articles that continued on to full-text review, 43 articles were accepted for the Medical Decision Points for Paid Leave project and 40 articles were selected for the construction of this thesis. Articles were then selectively added to an abstraction table to document significant findings that directly supported our objective. Maternity leave articles can be found in Tables 3.1-3.4 (Appendix III). Parental leave articles can be found in Tables 4.1-4.4 (Appendix IV).

Maternity Leave Evidence-Based Results

The following evidence will be organized into three main categories of maternal health outcomes: maternal mental health, maternal physical recovery, and breastfeeding
benefits to mothers. Additionally, antepartum leave impacts on maternal health outcomes will also be explored. Each section will include abstracted results from relevant studies that identify the impacts of leave duration on each corresponding health outcomes. In the cases where no studies were identified that met our main objective, supporting data regarding the general results of the maternal health effects were collected to provide insight on existing research gaps.

**Maternity Leave Impacts on Maternal Mental Health**

Postpartum depression was identified as a significant mental health condition affecting 10% to 20% of women following childbirth. Two epidemiologic studies found that postpartum depression most often occurred two to six months after delivery (Bobo, 2014; Pearlstein, 2009). In three non-experimental studies, increased duration of maternity leave was positively correlated with improved mental health. Of these, two prospective and one retrospective studies, women reported that their mental health began to improve at 12 to 15 weeks postpartum (Chatterji, 2012; Dagher, 2014; McGovern, 1997). Chatterji et al. utilized the Early Childhood Longitudinal Study Birth Cohort (ECLS_B), a nationally collected data bank of 3,350 mothers, to determine that when maternity leave durations were shorter than 12 weeks, postpartum depression symptoms increased in severity by 15% on the Center for Epidemiologic Studies Depression Scale (CES-D) (Chatterji, 2012). In addition, these studies found that leave durations of longer than six to seven months led to worsened mental health (Chatterji, 2012; Dagher, 2014; McGovern, 1997).
Maternity Leave Impacts on Maternal Physical Recovery

No articles were identified that directly studied the impact of maternity leave duration on maternal physical recovery. However, women reported improvements in a four-item vitality score (measures of energy and lack of fatigue (Stewart, 1992)) and general physical health beginning at 12 weeks postpartum when on maternity leave (McGovern, 1997; Dagher, 2014). Increased sleep hours were also reported to be positively correlated with increased vitality scores, with each additional hour corresponding to an increase in one half step of the vitality score. Dagher et al. utilized two validation instruments, Medical Outcome Study and Short Form Survey 12, to conclude that women who returned to work within six to 12 weeks after childbirth scored lower on the physical health scale than women who remained on maternity leave (Dagher, 2014).

Maternity Leave Impacts on Breastfeeding

Breastfeeding has important health benefits for mothers. Successfully established breastfeeding behavior has been studied as a positive result of maternity leave durations that last at least eight weeks (Skafida, 2011; Ogbuanu, 2011; Guendelman, 2009). Three studies have shown that when extending maternity leave duration for 12 to 16 weeks, there is a general increase in continued breastfeeding behavior (Mirkovic, 2014; Baker, 2008; Hawkins, 2007). Breastfeeding has many benefits including decreased incidences of Type 2 diabetes, breast cancer, and ovarian cancer (Ip, 2009; Chowdhury, 2015). One study used a meta-analysis procedure with data from six cohort studies with a total of
273,961 participants to conclude that in any 12 months of breastfeeding, there was an associated 9% reduction in mothers’ lifetime relative risks of Type 2 diabetes (Aune, 2014). In terms of the impact that lactation has on breast cancer risk, the Collaborative Group on Hormonal Factors in Breast Cancer sampled worldwide data from 47 epidemiological studies and found a 4.3% risk reduction for every 12 months of breastfeeding and an additional 7% reduction with every birth (Collaborative, 2002). Ursin et al. came to similar conclusions of a 5% risk reduction for every 12 months of breastfeeding when looking specifically into a sample of 4,567 white and African-American women in the U.S. (Ursin, 2004). In addition to the risk reduction of medical conditions of diabetes and cancer, breastfeeding has also been associated with improved birth spacing (Victora, 2016) indicating longer periods between subsequent pregnancies. Birth spacing has been shown to decrease the risk of maternal health complications such as nutrition depletion, anemia, and infection in mothers (Ganatra, 2016). Breastfeeding is responsible for the contraceptive properties of birth spacing because it induces longer periods of amenorrhea after birth, and therefore increasing the time before subsequent pregnancies (Victora, 2016).

*Antepartum Leave Impact on Uncomplicated Pregnancies*

Antepartum leave, or maternity leave taken before childbirth, was also explored for its impact on maternal health. Guendelman et al. sampled 447 pregnant women who were employed full-time (Guendelman, 2009). Participants were interviewed via telephone four months after giving birth. It was found that women who began maternity
leave four weeks before giving birth had four times lower odds of cesarean delivery and therefore maternal morbidity (Guendelman, 2009; Marshall, 2011).

**Parental Leave Evidence-Based Results**

The following section will be organized into five main categories of infant health outcomes as a result of parental leave impacts: premature births and low birth weight, infant mortality, vaccination rates, breastfeeding benefits to infants, and parental bonding. Each section includes abstracted data from selected studies that directly analyzed the impact of parental leave on infant health outcomes. Background information was also used from additional articles to support the significant findings in selected infant health impacts.

**Parental Leave Impacts on Premature Births and Low Birth Weight**

Premature birth is traditionally defined as delivery shorter than 37 weeks gestation. Recent literature, however, suggests that early-term birth (37-38 weeks) also poses long-term health risks for children (Boyle, 2012). Therefore, we define premature birth here as delivery shorter than 39 weeks gestation. Prematurity is the leading cause of infant morbidity and mortality due the critical complications that often occur in the nervous and respiratory systems (Saigal, 2008; Boyle, 2012). Additionally, premature birth is also associated with low birth weight (less than 2,500 grams (WHO, 2004)) as fetal weight is directly proportional to the stage of gestational development (Boyle, 2012). Three studies were identified that discussed the impact of parental leave on
premature births and low birth weight. In one international study, Cerón-Mireles et al. sampled 2,623 women after delivery and found that women who did not take any antepartum leave had three times the risk of premature delivery and twice the risk of giving birth to infants with low birth weights (Cerón-Mireles, 1996). In terms of existing policy, Stearns’ 2015 study utilized a difference-in-differences (DD) statistical analysis to determine that the usage of the Temporary Disability Insurance (TDI) paid leave coverage reduced overall low birth weight deliveries by 3% in the five states that utilize the TDI program. Lastly, Rossin’s difference-in-difference-in-difference (DDD) framework study found that FMLA unpaid parental leave benefits resulted in a 0.2% increase in birth weight, 0.04% increase in gestational length, 3% decrease in the risk of premature birth, and 3% decrease in the risk of low-birth-weight births (Rossin, 2011).

**Parental Leave Impacts on Infant Mortality**

Paid parental leave has been associated with significant decreases in infant mortality in both international and American studies. The earliest identified study used data from 17 OECD (Organisation for Economic Co-operation and Development) countries across four 10-year intervals (1959, 1969, 1979, 1989). This study determined that an additional week to the established paid parental leave duration was associated with a 2% to 3% overall decrease in infant mortality (Winegarden, 1995). Later in 2000, Ruhm’s ecological study analyzed data from 16 European countries with paid leave policies and found that with every 10 week increase in paid parental leave, there was a 2.5% to 3.4% reduction in infant mortality (Ruhm, 2000). However, unpaid parental
leave did not have any significant impact on infant mortality. A third statistical study in 2005, using data from 18 OECD countries, maintained the consistency in Ruhm’s study and found that a 10 week increase in paid parental leave resulted in a 2.5% decrease in infant mortality (Ruhm, 2000; Tanaka, 2005).

**Parental Leave Impacts on Vaccination Rates**

The CDC reports that infants are especially vulnerable to illness in the first six months of life. Vaccinating infants within this period has significant protective measures in decreasing the risk of infant morbidity and mortality (CDC, 2017). The rate of vaccination has been strongly correlated with parents’ availability and opportunity to keep up with vaccination schedules (Paschal, 2009). Generally, paid parental leave has been associated with higher rates of vaccination in a number of studies. Heymann et al. aimed to specify how the rate at which salary is replaced during parental leave affected employees’ opportunities to vaccinate their children during their time off. Therefore, the new measurement of full-time equivalent (FTE) weeks was developed using each country’s leave duration policy in conjunction with a measure of wage replacement rate (WRR) (Heymann, 2013). As a result, it was found that 10 FTE weeks of increase in paid parental leave led to a 15% to 25% increase in vaccination uptake (Daku, 2012; Heymann, 2013). An additional study was identified that utilized surveyed data from 20 low-to-middle-income countries (LMICs) to find that each additional week of paid parental leave (up to 20 weeks postpartum) generally increased the probability of vaccination uptake (Hajizadeh, 2015).
Parental Leave Impacts on Infant Health Outcomes of Breastfeeding

Breastfeeding, due to maternal immunity conferred through breastmilk, has been shown to have many health benefits for infants (WHO, 2017). Breastmilk provides high levels of nutrition and decreases the risk of chronic illness including inflammatory bowel disease, leukemia, lymphoma, obesity, and type 1 diabetes (Heymann, 2011; AAP, 2012). The American Academy of Pediatrics (AAP) states that establishing consistent breastfeeding behavior for at least six months after birth provides infants with the optimal nutrition and protection benefits. This was shown in several studies when paid parental leaves of at least 12 to 16 weeks have been associated with significant increases in continuous breastfeeding behavior in mothers (Baker; 2008; Mirkovic, 2014; Hawkin, 2007). Using data from the Infant Feeding Practices Study (IFPS) by the Food and Drug Administration (FDA), Huang et al. studied the improvements in breastfeeding rates after the Paid Family Leave (PFL) policy was implemented in California in 2004 (Huang, 2015). This study used two waves of IFPS data from 1993-1994 and 2005-2006 to compare breastfeeding rates before and after PFL implementation, respectively. It was found that exclusive breastfeeding rates increased from 12.6% to 20.5% in the first three months after birth and also increased 1.3% to 3.6% in the first 6 months after birth.

Parental Leave Impact on Parent-Child Interactions

Clark et al. used the Parental-Child Early Relational Assessment (PCERA) scale to evaluate the behavioral and emotional aspects of parent-child interactions (Clark, 1997). Scaled items were used as predictors for the quality of parental bonding when
comparing parental leave durations. 198 women were interviewed and observed with their child at four months postpartum. After evaluating four PCERA scale items that included positive and negative affect and behavior of both mother and child, it was found that mothers who took longer leaves (12 weeks) had more positive maternal affect and behavior and reported that their infants had better temperaments. However, mothers who took shorter leaves (six weeks) reported more negative maternal affects and higher incidences of depressive symptoms (Clark, 1997).

**Personal Medical Leave Article Selection Results**

Working with the search strategies for the selected five conditions (mood disorder, osteoarthritis, cancer, lower back pain, and myocardial infarction), we initially found 5,338 titles. 2,881 titles remained after de-duplicating across all the variations of search terms used. 2,214 titles were eliminated because they were not relevant to our core concept. The remaining 667 articles were reviewed for abstract relevance. 436 of these articles were eliminated, leaving 231 articles for full-text review. Finally, 81 articles were accepted for the Medical Decision Points for Paid Leave Project and 17 articles were included for this thesis. In addition to the results from PubMed, 15 guideline pieces in total were identified for the selected conditions.

**Personal Medical Leave Evidence-Based Results**

Personal medical leave evidence will be organized by the five selected conditions: mood disorder, osteoarthritis, myocardial infarction, cancer, and low back pain. For each
condition, the first section will describe abstracted data from selected studies to support health outcomes for each condition. The second section will describe information from the clinical practice guidelines to further support treatment and recovery recommendations for each condition.

*Personal Medical Leave Impact on Mood Disorder Outcomes*

Mood disorders affect a large population of working adults each year. Major depressive disorder is one of the most prevalent illnesses in American employees and was found to be associated with an annual average of 27.2 missed work days per ill employee (Kessler, 2006). Bipolar disorder, while less common in the workplace, is associated with 65.5 missed work days per year. Two German prospective cohort studies were identified for the direct effects of paid medical leave duration on mood disorder outcomes. Bermejo et al. recruited 118 patients and found that after eight weeks of leave, there were no significant differences in depressive symptoms between patients who had taken medical leave and those who had not (Bermejo, 2010). The second German study found that there were no significant associations between paid leave and symptomology improvements of the studied mood disorders, but post hoc analysis within the small population of 15 clinically depressive subjects revealed significant improvements in depressive symptoms at four to six months when the employees were given paid medical leave for a duration of at least three months (Tritt, 2005).
Mood Disorder: Clinical Guidelines

During the treatment and recovery period, psychiatric management plans are often implemented to evaluate and improve quality of life and psychiatric function. The American Psychiatry Association (APA) has structured the psychiatric management plan around three key phases: acute, continuation, and maintenance. These phases are structured to the specified timing of treatment modality and recovery evaluation established by the APA. The acute phase is the main target phase which lasts approximately 12 weeks. During this period, key choices of initial treatment modality are implemented with the goal of inducing remission and returning patients to their “baseline level of functioning” (Gelenberg, 2010). Within these 12 weeks, four to eight weeks are recommended as time to evaluate the responsiveness of patients to the treatments. In situations of nonresponsive outcomes, an additional four to eight weeks of adjusted treatments should follow. After a successful acute phase, the continuation phase is the duration of time in which treatments are to continue for four to nine months. The maintenance phase is comprised of intermittent durations of time that may be necessary after the continuation phase to minimize the chances of recurrent depressive episodes. It is estimated that 20% of patients will relapse within six months of treatment, and 50% to 85% of patients will experience a recurrence of depressive symptoms within two to three years (Gelenberg, 2010).

Guidance on recognizing and managing depression depend on the severity of depressive symptoms in the following range: subthreshold depressive symptoms, mild depression, moderate depression, and severe depression (NICE, 2009). Treatment and
recovery also depend on usages of recovery interventions. Most depression guidance recommend involvement of both psychosocial therapy and pharmacological interventions. Therapy sessions range from six to 10 sessions over eight to 12 weeks for subthreshold depressive symptoms, to 16 to 20 sessions in four to six months for mild to moderate depression. For patients who suffer from severe depression, the National Institute for Health and Care Excellence (NICE) also recommends 16 to 20 therapy sessions over a period of four to eight months but with higher intensity the first three to four weeks with two sessions per week (NICE, 2009).

**Personal Medical Leave Impacts on Osteoarthritis Outcomes**

Osteoarthritis is the most common type of arthritis in the U.S and affects about 27 million adults each year (Kotlarz, 2010). The studies that have been selected on osteoarthritis focus on recovery outcomes after surgical interventions. In a retrospective, multicenter study on work return outcomes, 790 patients responded to interview questions regarding their work status and recovery experiences after receiving hip surgery. Of the recruited patients, 714 of these patients took an average 6.9 weeks (with a range of 0 to 78 weeks) to return to work after their surgery (Nunley, 2011). Only one study was identified that directly evaluated the impact that paid leave availability had on osteoarthritis outcomes. Chen et al. conducted a cross-sectional study of 1,630 employees with osteoarthritis of the knee. When paid medical leave was available, fewer employees (33%) reported osteoarthritic symptoms compared to when paid medical leave was not available (48%) (Chen, 2007).
Osteoarthritis: Clinical Guidelines

Osteoarthritis occurs due to a physical imbalance of damage and repair of synovial joint tissues. Key risk factors that may contribute to this imbalance include trauma, overuse, and genetic predisposition (AAOS, 2013). The activities recommended for managing this condition are divided into two main categories: nonpharmacological management and pharmacological management. Time durations of recovery management have not been specified. However, recommended nonpharmacological activities that may promote functional recovery include exercise therapy, weight loss management, electrotherapy, and patient education (NICE, 2014). Pharmacological interventions include: oral analgesics, topical treatments, NSAIDs, and intra-articular injections. Joint surgery is not a preferred method of treatment, but may be recommended upon further evaluation. After initial holistic approach to patient symptoms, follow up sessions are recommended on an annual basis (NICE, 2014).

Personal Leave Impacts on Myocardial Infarction Outcomes

Myocardial infarction (MI) events occur at a rate of 735,000 events per year in the U.S. 71% percent of these heart attacks are first time events, and the remaining 29% are recurrent events (CDC, 2015). No studies were identified that directly analyzed paid medical leave impacts on MI recovery outcomes. One study was identified that evaluated the likelihood of work return when employees had paid medical leave. Earle et al., using data from the U.S. Nurses’ Health Study, surveyed 289 female employees who had experienced MI events in the past (Earle, 2006). Findings revealed that women who took
paid medical leave after their MI or angina event were generally more likely to return to work than women who did not have paid leave available to them.

Two additional studies were identified for the duration of time to return to work after an MI event. In 1988, Dennis et al. investigated the effectiveness of an occupational recovery intervention using a population of 201 male employees who had suffered from a MI event. It was found that the median duration of time to return to work was 75 days for employees who received “usual care” (no interventions were involved) (Dennis, 1988). In a more recent study from 2004, Abbas et al. found that 51% of patients had returned to work by one month and 78% of patients had returned to work by six months. Additionally, this randomized trial found that employees in the U.S. had a higher incidence (87%) of returning to work than international employees (70%) (Abbas, 2004).

Myocardial Infarction: Clinical Guidelines

The approach to recovery after a myocardial infarction event varies depending on patient lifestyle previous to the event and the severity of the event. Generally, the plan of care after myocardial infarction first involves pharmacological therapies (antithrombotic therapies, beta blockers, ACE inhibitors, statins, etc.) and cardiac rehabilitation with an exercise component. Physical activity is recommended at 30 to 60 minutes of moderate to intense aerobic activity for five to seven days per week (Qaseem, 2012). This rehabilitation is monitored for a duration of six months with a follow up appointment to assess the quality of recovery. Additionally, lifestyle conditions are important factors that vary from patient to patient. Dietary changes, alcohol consumption, smoking cessation,
and weight management are all lifestyle factors that may require more attention (NICE, 2013). Psychosocial factors including sexual activity, depression, and anxiety, may also be addressed following myocardial infarction events. Sexual activity may resume after about four weeks, and depression and anxiety conditions may be addressed with further patient counseling (O’Gara, 2013; NICE, 2013).

Personal Medical Leave Impacts on Cancer Outcomes

As of 2014, 14.5 million Americans were living beyond a cancer diagnosis. It is estimated that by 2024, the incidence of cancer survival is expected to increase to 19 million (National Cancer Institute, 2016). In selected studies that evaluated paid medical leave impacts on cancer outcomes, hematologic malignancies were associated with the longest durations of paid medical leave (Roelen; 2011). In a Swedish study by Glimelius et al., data from 1,082 employees with Hodgkin lymphoma were collected to analyze the usage of paid medical leave for cancer treatment and observation. This retrospective cohort study found that 80% of employees utilized paid medical leave during their first year after diagnosis. Employees diagnosed with advanced stages of hematologic cancers took longer durations of paid medical leave than employees diagnosed with other cancers (51 versus 33 work days, respectively) (Glimelius, 2015).

Breast cancer was also identified as an impacted cancer type with major paid medical leave usage. A cross-sectional study using data from the Dutch occupational health department register, identified 72 breast cancer cases from 2001 to 2005. The study found that early-stage cancer patients missed a mean duration of 11.4 months of
work with a standard deviation of 5.5 months. Of this population, only 35% of patients missed more than 12 months of work (Balak, 2008). In another European study conducted in France, 379 female patients were followed up with a questionnaire at a median time point of 36 months after initial recruitment. Results revealed that 82.1% of participants had returned to work by 36 months, and took a mean duration of 10.8 months of paid medical leave (Fantoni, 2010). One separate study was identified that evaluated the direct impact of paid medical leave on health outcomes after surgery. In a prospective cohort study, 204 Norwegian women were followed for 5 years after undergoing breast cancer surgery and enrollment in a rehabilitation program. This study evaluated health-related quality of life (HRQoL) dimensions that were measured using a scale of 0 to 100 points to quantify overall global health status. Paid medical leave was identified as a HRQoL dimension and it was found that each additional week of paid leave was associated with a 7.3 point increase in global health status (Sagen, 2009).

*Cancer: Clinical Guidelines*

Recovery for cancer involves managing the condition itself, in addition to the side effects caused by chemotherapy and radiation therapy. Physical side effects may include: pain, nausea and vomiting, anemia, lymphedema, infections, infertility, and fatigue. Emotional side effects include anxiety, depression, and fear (American Cancer Society, 2015) During recovery, nonpharmacological interventions that may help alleviate these side effects involve maintaining nutritional health and physical activity, while introducing psychosocial and mind-body interventions. Physical activity is recommended
at 150 minutes per week with two to three strength training sessions per week (Bower, 2014). Maintaining nutritional health is also important due to changes in appetite and digestion that occurs with chemotherapy and radiation therapy. Patients are encouraged to consume regular meals with high protein snacks and adjust with additional calories as needed. With chemotherapy and radiation therapy, patients may also experience weakened immune systems, therefore proper food-handling and cross-contamination mindfulness is recommended (American Cancer Society, 2015).

**Personal Medical Leave Impacts on Low Back Pain Outcomes**

No studies were identified that evaluated paid medical leave usage as a predictor of health outcomes in low back pain. One study was identified that revealed variations in low back pain-related work absences across multiple data collection settings. Wynne-Jones et al. conducted a meta-analysis of 45 studies conducted in settings which included insurance databases, healthcare settings, and workplace settings. Healthcare settings reported that the median duration of work absence was 14 to 24 days, database studies reported seven to 61 days, and workplace samples reported five to 28 days (Wynne-Jones, 2014)

**Low Back Pain: Clinical Guidelines**

Recovery from low back pain depends on the specific type of injury or dysfunction causing the pain. These categories include nonspecific or uncomplicated low back pain, uncomplicated sciatica, major neurologic dysfunction, major mechanical
problems, and infection or neoplasm (Rives, 2004; Chou, 2007). It has been documented that 60% to 70% of patients recover by six weeks and 80% to 90% of patients recover by 12 weeks. The mean duration of time to return to work is within three months (Rives, 2004). Within these periods, recovery plans involve both pharmacological interventions to manage pain symptoms for short-term usage, and nonpharmacological interventions to manage psychological, social, and behavioral aspects of recovery. The American Academy of Family Physicians and the National Institute for Health and Care Excellence recommends combination treatments of behavioral therapy and exercise therapy with a manipulation component (spinal manipulation) or acupuncture. In addition, massage, meditation, and yoga have also been documented to have some beneficial effects on low back pain recovery (Last, 2009).

**Leave for Children’s Health Needs Article Selection Results**

The search strategies in combination with the four selected conditions yielded 1,143 titles. 956 titles remained after deduplication. 591 titles were not relevant to the topic and eliminated. The remaining 365 articles were reviewed by abstract, of which 241 then passed for full-text review. Finally, 83 articles were accepted for the Medical Decision Points for Paid Leave Project, and 28 articles were included for this thesis.

**Leave for Children’s Health Needs Evidence Based Results**

Evidence for optimal duration of leave for children’s health needs is organized into the three main phases of illness progression: acute, recovery, and maintenance. Each
phase of illness will subsequently be organized into the four selected conditions: respiratory illness, mood disorder, congenital heart disease, and pediatric cancer. Within each section, direct data regarding the durations of each phase will be described. In cases where no studies were found, supplementary data regarding duration of missed work days, duration of missed school days, and other time indicators will be presented. The last segment of this section will provide information on caregivers’ own mental health impacts as a result of providing care to ill children.

**Acute Phase: Respiratory Illness**

Bronchiolitis and asthma were identified as two respiratory conditions with high levels of hospitalization in the U.S. In Corneli et al.’s secondary analysis of their previously conducted randomized trial (Corneli, 2007), bronchiolitis was identified as the most common infectious cause of acute hospitalization in infants (Corneli, 2012). Data from 598 infants were obtained using the Pediatric Emergency Care Applied Network database and found that of infants who were admitted through the emergency department, the average length of stay (LOS) was 3.3 days (Corneli, 2012). Asthma is another common respiratory illness that results in about 190,000 hospitalizations per year. Banasiak et al. reviewed five studies that evaluated the LOS of patients who were hospitalized and found that the range of mean duration of hospitalization was between 1.5 to 2.7 days (Banasiak, 2004).
Acute Phase: Mood Disorders

Mood disorders in children and adolescents commonly fall under the categories of depression, bipolar disorder, and anxiety disorders (Smith, 2002). Duration of hospitalization for mood disorders depends on symptomology and severity. The most severe category of depression is attempted suicide or suicide ideation, with a mean LOS of 17.7 days (Smith, 2002). Self-inflicted injury with depression was of the second highest severity with an average LOS of 2.7 days (Olfson, 2005). The average LOS for bipolar disorder was 5.7 days (Lasky, 2011). Additionally, the location of mood disorder treatment has been associated with LOS; acute care hospitalizations were on average 3.5 days, inpatient mental health facility stays were on average 10.5 days, long-term residential treatment facility stays were on average 28.5 days (Gifford, 2008)

Acute Phase: Congenital Heart Disease

Acute care for congenital heart disease is defined as care after major surgery to the structures of the heart and lungs. Depending on the severity of the heart defect and the organs involved, surgeries may occur shortly after birth or later in childhood when the structures involved have reached operable maturity. Liu et al. conducted a multi-site data analysis of records from 4,776 congenital heart surgeries performed in 12 New York hospitals from 2006 to 2009 (Liu, 2014). In this retrospective analysis, mean prolonged LOS (PLOS) was found to be 10.9 days with a range of 0 to 232 days depending on the type of surgery and incidence of postoperative complications. Johnson et al. also found
that LOS was twice as long when postoperative complication occurred and required further surgical procedures (Johnson, 2016).

Acute Phase: Pediatric Cancer

Acute care for pediatric cancer involves the initial diagnosis of cancer and identification of cancer type. During this period, children undergo invasive laboratory and imaging protocols to characterize cancer progression and determine the need for chemotherapy and radiation therapy treatments. According to the 2009 HCUP Statistical Brief on pediatric cancer, the average LOS for cancer-related hospitalizations was 12 days with a range of 2.5 days for thyroid cancers to 17.4 days for leukemias (HCUP, 2009).

Recovery Phase: Respiratory Illness

In a qualitative study, Robbins et al. reported that bronchiolitis recovery in children depended on symptom management in the days following hospital discharge (Robbins, 2006). In the 486 infants studied, 22% continued to have disrupted sleep, 16% experienced eating dysfunction, 56% continued coughing, and 27% continued wheezing. In the study, return to normal family function was a parameter that was closely associated with parents’ ability to return to work. In the sample population, 20% of families had not returned to normal function by five days after discharge and therefore, parents were more likely to continue to miss work for four to six days to care for their infants. Additionally, infants missed twice as many days of day care (three to six days depending on symptoms).
when families did not return to normal function (Robbins, 2006). One study was identified for asthma recovery predictors on caregivers’ tendency to miss work. In this prospective cohort study of 367 families, 45% of children missed three or more days of school and 24% of children missed five or more days of school. Of the 224 caregivers that worked away from home, 54% of caregivers reported missing one or more days of work, and 18% of caregivers reported missing three or more days of work (Stevens, 2001).

**Recovery Phase: Mood Disorders**

Studies on mood disorder recovery were found to be limited given the broad definition of recovery in this condition. No studies were identified that defined a consistent length of recovery. However, one study was identified that analyzed the usage of “aftercare” or follow-up therapy services (day treatment, family therapy, group therapy, individual therapy, and pharmacotherapy) as indication of recovery progression. Goldston et al. conducted a retrospective cohort analysis of 180 adolescents between the ages of 12 to 19 who had been admitted to a psychiatric unit for at least 10 days. It was found that 75% to 90% of the patients utilized any form of “aftercare” service. 88% of the patients continued the service one month after the initial usage, 74% of patients continued the service after 3 months, and 57% of patients continued the service after 6 months (Goldston, 2003).
Recovery Phase: Congenital Heart Disease

Children with congenital heart disease require a variety of monitoring and technical care after surgery. During the recovery phase after surgery, caregivers must familiarize themselves with complex medical equipment, medication schedules, and various types of physical therapy regimens (Schwalbe-Terilli, 2009). In one retrospective cohort analysis, Kogon et al. studied the postoperative feeding difficulties in infants with congenital heart defects. In this study of 83 discharged infants who had undergone surgery, the average number of days that it took for infants to begin feeding after surgery was 3.3 days (Kogon, 2007). Additionally, it took on average 9.8 days for most infants to reach a full feed. In these periods of feeding difficulties, parents need to operate feeding tubes and pumps to supplement the infants daily nutritional intake. In this study, 45% of the infants required home tube feedings and 10% of the infants required additional procedures including laparoscopic gastric tube placement (Kogon, 2007).

Recovery Phase: Pediatric Cancer

The recovery phase for pediatric cancer often involves surgery or chemotherapy regimens to manage the progression of the illness. Recovery is heavily dependent on how patients respond to these treatments and often take long periods of time to establish any type of improvement. In a review by Vance et al., 42 papers were selected to evaluate the impact of pediatric cancer on children’s absences, behavior, and social relationships at school. Of the 42 studies, 18 investigated school attendance and found that children
missed a range of 25 to 31 days of school in the first year after the diagnosis of cancer (Vance, 2002).

**Maintenance Phase: Respiratory Illness**

Maintaining baseline health in children with asthma is represented by caregivers’ work absences and children’s school absences. In a retrospective analysis using data from the French general practitioner computerized database, BKL-Thales, 211 caregivers were surveyed regarding their work absence due to their children’s asthma condition. 28.9% of caregivers reported work absence in the past 12 months and 13.3% of caregivers reported at least five days of absence (Laforest, 2004). Mean duration of work absence was 6.1 days with a range of one to 30 days. Additionally, it was found that increased severity of asthma in children was associated with longer durations of work absence in their caregivers (Laforest, 2004). In terms of school absence, a cross-sectional study of 543 children with asthma found that duration of school absence was positively associated with the severity of asthma. Durations of school absences ranged from 8.5 days for mild intermittent asthma to 11.6 days for severe persistent asthma (Moonie, 2006).

**Maintenance Phase: Mood Disorders**

Maintenance care of children with mental health disorders occur during periods of intermittent follow-up appointments and/or relapses in the mental health condition (Technow, 2015). No studies were identified that surveyed the duration of relapses or periods of maintenance care, but in a prospective cohort analysis of 382 adolescents with
depression, it was found that 63% of patients relapsed within the first 10 years of their condition. Each incidence of a depressive episode increased the probability at which a subsequent episode occurred. By the third major depressive episode, 90% of patients had experienced additional episodes (Technow, 2015).

**Maintenance Phase: Congenital Heart Disease**

Baseline health maintenance in children with congenital heart disease is represented when comparing children’s mean school absence duration with that of their healthy classmates. One retrospective cohort study was identified that aimed to compare the quality of life (QoL) of children with congenital heart defects (affected children) with that of children without the condition (unaffected children). In this self-reported survey of 477 children with congenital heart defects, affected children scored significantly lower on all scales of QoL measurements (overall QoL, physical, and psychosocial functioning) than the unaffected children. QoL was also found to be correlated with school absence; affected children were two times more likely to miss a week or more of school than unaffected children (37% and 18% respectively). Affected children were also three times as likely to miss a month or more of school than unaffected children (6% and 2% respectively) (Knowles, 2014).

**Maintenance Phase: Pediatric Cancer**

No studies were identified that quantified maintenance care duration after childhood cancer recovery. Instead, we represented children’s health maintenance by
self-reported survival status and quality of life. In a study by Hudson et. al., adult survivors of childhood cancer were surveyed regarding their survival experiences and health status in the years after treatment completion and cancer remission. In this Childhood Cancer Survivor Study, 9,535 adult cancer survivors were surveyed for their physical and mental health status 10 years after initial diagnosis. Of the six domains (general health, mental health, function status, activity limitations, cancer-related pain, and cancer related anxiety/fears) that were used to assess health, at least one domain was reported by 44% cancer survivors to be negatively impacted through their cancer treatment course (Hudson, 2003).

*Mental Health Burden on Caregivers of Ill Children*

In addition to child health outcomes, we also analyzed caregiver mental health outcomes as a result of caregiving. Several studies were identified that reported incidences of depression, anxiety, and post-traumatic stress disorder in caregivers after their children were first diagnosed with serious illnesses (Vrijmoet-Wiersma, 2008; Neu, 2014; Wijnberg-Williams, 2006; Rona, 1998). Two studies found that depression and anxiety persisted six months to five years after initial diagnosis. Wijnberg-Williams et al. found that caregivers of children with pediatric cancer manifested symptoms corresponding to clinically diagnosable depression at a rate of 27% compared to parents of healthy children at 15% (Wijnberg-Williams, 2006). In a study of children with congenital heart disease, Rona et al. also reported increased rates of severe anxiety and
depression at 43% and 18%, respectively compared to that in parents of healthy children at 15% and 5%, respectively (Rona, 1998).
DISCUSSION

Maternity Leave Recommendations

The evidence from our study suggests that increasing durations of maternity leave generally improves maternal health. Maternal mental health, maternal physical health, and breastfeeding establishment were all positively correlated with increased durations of maternity leave between 12 to 16 weeks. By 12 weeks of leave, positive self-reports of physical recovery in mothers were heightened (Dagher, 2014). After 15 weeks of leave, mental health risks were minimized (Chatterji, 2012; Dagher, 2014; McGovern, 1997). When reaching 16 weeks of leave, healthy breastfeeding behaviors were continuously practiced (Mirkovic, 2014; Baker, 2008; Hawkins, 2007). These findings suggest that 16 weeks of paid leave may be a reasonable starting point to support postpartum maternal health. Our evidence was collected on maternal populations that experienced uncomplicated births. Therefore, it is possible that our recommendations for maternity leave durations are not fully applicable to mothers who experience preterm birth, stillbirth, and other birth complications. However, our findings on antepartum leave for uncomplicated pregnancies suggest that in addition to the 16 weeks we recommend for maternity leave, 4 additional week of paid antepartum leave taken in preparation of delivery may also be beneficial in preventing complicated births (Guendelman, 2009).

Parental Leave Recommendations

Evidence for parental leave impacts on infant health is similarly reciprocated by maternity leave impacts on maternal health. However, there exists more explicit
recommendations by the AAP and CDC on the health of infants in terms of their nutritional, immunological, and developmental needs. The 6-month period after birth is heavily documented as a critical window for development and health risk prevention (AAP, 2012; CDC, 2017). Therefore, we evaluated studies that explored health factors (continued breastfeeding behavior, vaccination rates, infant morbidity and mortality, and parental bonding) in comparison to health standards set by these organizations.

Breastfeeding is beneficial to infants as it is to mothers. Continuous breastfeeding behavior was most often observed when paid parental leave was at least 12 to 16 weeks long (Guendelman, 2009). Additionally, when parental leave included the final four weeks of the prenatal period, risk of infant morbidity due to premature birth was also minimized.

Additional benefits from lengthened paid parental leave include increased vaccination uptake, lowered infant mortality, and promotion of parental bonding. Vaccination rates increased significantly beginning at 10 weeks of leave (Daku, 2012; Heymann, 2013; Hajizadeh, 2015) because parents are more likely to keep up with vaccination schedules when they have extended time off from work. Infant mortality also decreased with each additional 10 weeks of leave added to existing paid leave policy durations in OECD countries (Ruhm, 2000; Tanaka, 2005). The parental bonding supported by longer parental leave comparison (6 weeks versus 12 weeks) is also indicative of the healthful benefits to lengthened leave (Clark, 1997). However, more studies may be needed to evaluate how much longer past 12 weeks is most beneficial for parental bonding. In sum, our findings suggest that six months of paid parental leave may
be adequate to support optimal health outcomes in infants, as evidently proposed by the CDC and AAP. Additionally, we continue to support the four weeks of antenatal leave also be included in parental leave durations.

**Personal Medical Leave Recommendations**

Overall, we found that optimal paid personal medical leave durations are difficult to define because each medical condition varies considerably in the duration of symptoms, optimal time period of treatment, and duration of recovery. The prognosis of medical conditions also varies in terms of acute presentation or chronic exacerbation. We found very few studies that explicitly explored the impact of paid medical leave duration on the health outcomes of each selected conditions (mood disorder, osteoarthritis, myocardial infarction, cancer, and low back pain). We instead attempted to analyze the impact of leave availability on rate of work return. However, these studies were limited to two (myocardial infarction and osteoarthritis) of our five selected conditions.

We analyzed clinical guidelines for treatment protocols in an attempt to identify recovery durations for each of our selected conditions. However, we were unable to identify recommendations that specified recovery duration for all conditions. Acute phase for mood disorders lasts for a duration of 12 weeks and is targeted for therapy interventions to promote recovery (Gelenberg, 2010). The continuation phase that follows is recommended to last an additional four to nine months (Gelenberg, 2010). For myocardial infarction events, guidelines recommend paid medical leave for duration of six months for rehabilitation (NICE, 2013). Despite these recommendations, the clinical
guidelines did not explicitly state that patients should take these durations of time off from work. It is possible that patients may be able to work and participate in the recommended therapy and rehabilitation programs. For chronic conditions which include cancer, osteoarthritis, and low back pain, only general recommendations regarding treatment and therapy were available. Guidelines for cancer patients made recommendations for a weekly physical activity (Bower, 2014), but did not specify a duration that would optimally benefit them. This is understandable given that cancer is an extensive condition that varies greatly in type, presentation, prognosis, and recovery.

Low back pain was similarly challenging to provide specific recommendations for given the various causes and presentations of symptoms (Rives, 2004; Chou, 2007).

The available evidence for paid medical leave duration was scarce and limited. The period of treatment and level of medical attention needed during the initial presentation of illness varies greatly from the time and care needed during the recovery and maintenance of health. Conditions require flexibility in the duration of paid medical leave given the varying types of chronicity and severity of illness. We believe that an adequate paid medical leave duration should allow for continuous assessment of recovery by medical providers on a case-by-case basis. At the end of leave, employees should be able to return to work with optimal functionality. Therefore, we recommend up to six months for all five of the selected conditions given the median durations and distributions of missed work days presented for each condition. More importantly, we recommend that paid medical leave durations be structured in alignment with the recovery and therapeutic
maintenance of each condition accordingly and reevaluated by medical providers on an individual basis.

**Leave for Children’s Health Needs Recommendations**

The evidence from our study suggests that chronically ill children and children with serious illnesses require intensive care and lengthy time commitments from their parents and other caregivers. While studies on the direct impact of paid family leave duration on child illness outcomes were limited, we were able to supplement our research with information on the progression of each of our selected conditions. Additional information to help establish recommendations for leave was inferred from data on hospitalization durations, school absence duration, and work absence duration and can be found in Table 5.1 (Appendix V).

Studies regarding the acute phase of each of the conditions we studied for leave for children’ health needs were strongest in providing specific hospitalization durations. All of the selected conditions had mean LOS under four weeks (Corneli, 2012; Banasiak, 2004; Smith, 2002; Lasky, 2011; Gifford, 2008; Liu, 2014; Price, 2012).

For the recovery phase, the results were less conclusive because we analyzed several parameters of time including work absence duration, school absence duration, continuation of aftercare utilization, and days until feeding initiation. However, evidence from respiratory illness and pediatric cancer was analyzed more comparably due to both of these conditions having been measured with durations of school absence. Mood disorder recovery was dependent on the type of therapy or care service taken, with the
highest usage of aftercare services in the first month after initial treatment. However, it is not clear if these services were utilized consistently or sporadically within the one month period. Recovery from congenital heart surgery was distinctive in that we analyzed evidence from infants’ feeding initiation (Kogon, 2007). We recognize that overcoming feeding difficulties is not indicative of all recoveries from congenital heart surgery. More evidence is needed in order to draw conclusive results.

The maintenance phase of our selected conditions varied in definition and time duration. Respiratory illness and mood disorders were found to be recurrent in exacerbations and relapses. Congenital heart disease and pediatric cancer were comparatively more resolved after recovery and therefore required different definitions for maintaining baseline health.

In summary, acute phase presents very differently from recovery or maintenance phase across chronic conditions. Additionally, children’s conditions vary significantly in the time commitment and level of care required from caregivers. Therefore, we recommend a paid leave duration beginning at six weeks with an emphasis on flexibility for more time off when deemed necessary by a medical provider. At six weeks, medical providers can assess the recovery status of children and approve up to six months of time off for caregivers to attend to the needs of their children. We believe that a policy with this level of flexibility backed by the accountability of professional recommendations would greatly benefit children’s health.
CONCLUSION

This study strongly suggests that the current federal leave policy is not sufficient to support optimal health outcomes in employees and their families. First, current FMLA benefits do not incorporate any financial compensation. Second, the time duration of leave provided by FMLA is insufficient for the recovery and caregiving/bonding needs of mothers and infants as discussed in this study. Given the varying durations of leave recommended by our study, it may be necessary to create separate laws for major types of leave to address the specific needs of leave recipients. Especially for personal medical leave and leave for children’s health needs, leave policies should be written broadly enough to incorporate sufficient flexibility so that leave may be individually tailored based on medical provider recommendations regarding the prognosis, recovery, and ongoing health needs of the individual. Additionally, these policies should encourage employees to take leave when needed and subsidize employers when longer leaves are deemed medically necessary. Finally, policies may need to account for the socioeconomic status of leave recipients to determine adequate financial compensation that would promote adequate leave-taking behavior among more vulnerable populations.

This study provides a starting point for rationally assessing employee health-related benefits and changing how family and medical leave legislation is considered and constructed.
APPENDIX I

Search Strategies used in PubMed

Maternity Leave and Parental Leave Search Strategies:

1. “parental leave”[Mesh]
2. (("maternity leave"[Text Word]) OR "paternity leave"[Text Word]) OR
   "parental leave"[Text Word])

Personal Medical Leave Search Strategies:

Selected Condition Category
1. Mood disorders
   a. Sick leave AND mood disorder
   b. Sick leave AND depression
   c. Sick leave AND psychia*
   d. Disability leave AND mood disorder
   e. Disability leave AND depression
   f. Disability leave AND psychia*
   g. Personal leave AND mood disorder
   h. Personal leave AND depression
   i. Personal leave AND psychia*

2. Osteoarthritis
   a. Sick leave AND osteoarthritis
   b. Sick leave AND arthritis
   c. Disability leave AND osteoarthritis
   d. Disability leave AND arthritis
   e. Personal leave AND osteoarthritis
   f. Personal leave AND arthritis

3. Back Pain
   a. Sick leave AND back pain
   b. Disability leave AND back pain
   c. Personal leave AND back pain

4. Myocardial infarction
   a. Sick leave AND myocardial infarction
   b. Disability leave AND myocardial infarction
   c. Personal leave AND myocardial infarction

5. Cancer
   a. Sick leave AND cancer
b. Disability leave AND cancer
c. Personal leave AND cancer

Return-to-work Category
1. Mood disorders
   a. Return to work AND mood disorder
   b. Return to work AND depression
   c. Return to work AND psychia*

2. Osteoarthritis
   a. Return to work AND osteoarthritis
   b. Return to work AND arthritis

3. Back Pain
   a. Return to work AND back pain

4. Myocardial infarction
   a. Return to work AND myocardial infarction

5. Cancer
   a. Return to work AND cancer

Leave for Children's Health Needs Search Strategies

Family Burden Category
1. Family burden AND sick child
2. Family burden AND child illness
3. Family burden AND ill child
4. Caregiver burden AND ill child
5. Caregiver stress AND ill child

Selected Condition Category
1. Heart disease
   a. caregiver burden AND child AND heart disease
   b. caregiver stress AND child AND heart disease
   c. family burden AND child AND heart disease
   d. acute hospitalization AND child AND heart disease
   e. acute phase AND child AND heart disease
   f. acute care AND child AND heart disease
   g. recovery duration AND child AND heart disease
   h. maintenance care AND child AND heart disease

2. Respiratory Illness
   a. caregiver burden AND child AND respira*
b. caregiver stress AND child AND respira*
c. family burden AND children AND respira*
d. acute hospitalization AND child AND respira*
e. acute phase AND child AND respira*
f. acute care AND child AND respira*
g. recovery duration AND child AND respira*
h. maintenance care AND child AND respira*

3. Mood disorders
   a. caregiver burden AND child AND (psychia*OR mood)
   b. caregiver stress AND child AND (psychia* OR mood)
   c. family burden AND child AND (psychia* OR mood)
   d. acute hospitalization AND child AND (psychia* OR mood)
   e. acute phase AND child AND (psychia* OR mood)
   f. acute care AND child AND (psychia* OR mood)
   g. recovery duration AND child AND (psychia* OR mood)
   h. maintenance care AND child AND (psychia* OR mood)

4. Cancer
   a. caregiver burden AND pediatric cancer
   b. caregiver stress AND pediatric cancer
   c. family burden AND pediatric cancer
   d. acute hospitalization AND pediatric cancer
   e. acute phase AND pediatric cancer
   f. acute care AND pediatric cancer
   g. recovery duration AND pediatric cancer
   h. maintenance care AND pediatric cancer
APPENDIX II

Medical Decision Points for Paid Leave Article Exclusion Rationale

Maternity and Parental Leave

1. 16 articles excluded due to focus on labor outcomes of paid leave policy
2. 24 articles excluded due to studies conducted in low-income countries (not reflective of U.S. labor conditions)
3. 12 articles excluded due to focus on the paid leave impacts on the health outcomes of child illness
4. 22 articles excluded due to focus on gender equity issues within paid leave policy
5. 17 articles excluded due to focus on legislative analysis of paid leave policy

Personal Medical Leave

1. 65 articles excluded due to focus on work interventions that improve health outcomes
2. 27 articles excluded due to focus on occupational injury studies
3. 34 articles excluded due to focus on employer strategies on improving the workplace
4. 13 articles excluded due to focus on employee presenteeism
5. 11 articles excluded due to studies conducted in low-income countries

Leave for Children’s Health Needs

1. 52 articles excluded due to non-relevant conditions
2. 56 articles excluded due to focus on clinical interventions
3. 9 articles excluded due to focus on caregiving to a population other than children
4. 41 articles excluded due to studies conducted in low-income countries
## APPENDIX III

Maternity Leave Abstraction Tables

### Table 3.1: Maternity Leave Impacts on Maternal Mental Health

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and sample size</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>McGovern, 1997 (United States:</td>
<td>Cross sectional (survey;</td>
<td>Telephone interview of random sample of postpartum women 6-9 months after</td>
<td>Predictor: self-reported maternity leave duration (“time off work”)</td>
<td>Positive mental health effect of time off work seen at 15 weeks postpartum</td>
</tr>
<tr>
<td>Minnesota)</td>
<td>outcomes assessed at single</td>
<td>birth (1991-1992) – Included: English-speaking women working for 1 year before</td>
<td>Outcome: self-reported 5-item mental health scale from Medical Outcomes</td>
<td>Mental health measure starts to decline at 6 months</td>
</tr>
<tr>
<td></td>
<td>time point)</td>
<td></td>
<td>Study (depression, anxiety, general affect)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>654</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chatterji, 2012 (United States:</td>
<td>Retrospective cohort 3,350</td>
<td>Early Childhood Longitudinal Study – Birth Cohort (2001) – Included: employed</td>
<td>Predictor: self-reported total length of maternity leave (levels: &lt;8 weeks,</td>
<td>&lt;12 weeks of maternity leave associated with 15% increase in CES-D score and increased the probability of severe depression by 2%</td>
</tr>
<tr>
<td>national sample)</td>
<td></td>
<td>mothers of singletons interviewed 9 months after birth</td>
<td>&lt;12 weeks)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Outcome: Center for Epidemiologic Studies Depression Scale (CES-D)</td>
<td></td>
</tr>
<tr>
<td>Dagher, 2014 (United States:</td>
<td>Prospective cohort (non-</td>
<td>Women admitted for childbirth in 3 study hospitals (2001) – 4</td>
<td>Predictor: self-reported total length of maternity leave</td>
<td>In the first 12 months, each additional day of leave decreases</td>
</tr>
<tr>
<td>Minnesota)</td>
<td>randomized)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2: Maternity Leave Impacts on Maternal Physical Health

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and sample size</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Dagher, 2014 (United States: Minnesota)| Prospective cohort (non-randomized)  | Women admitted for childbirth in 3 study hospitals (2001) – 4 phone interviews from 6 weeks to 12 months postpartum | Predictor: self-reported total length of maternity leave  
Outcome: self-reported health using Short Form Survey | Women returning to work 6 or 12 weeks after birth had statistically significantly lower Short Form Survey scores than women still on leave (<1 point difference) |

Table 3.3: Maternity Leave and Parental Leave Impacts on Duration of Breastfeeding

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and sample size</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawkins, 2007</td>
<td>Prospective cohort</td>
<td>Millennium Cohort Study – (2001)</td>
<td>Predictors: self-reported return to work</td>
<td>Return to work after 4-6 months associated with</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Sample Size</td>
<td>Data Source and Description</td>
<td>Predictor</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>-----------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>(United Kingdom: national sample)</td>
<td></td>
<td>6,917</td>
<td>postpartum interviews of mothers of infants aged 9 months</td>
<td></td>
</tr>
<tr>
<td>Baker, 2008 (Canada: national sample)</td>
<td>Retrospective cohort</td>
<td>5,092</td>
<td>National Longitudinal Study of Children and Youth (1998-2003)</td>
<td>Predictor: birth after 2001 reformed Canadian maternity leave policy (benefits and job protections extended from 6 to 12 months)</td>
</tr>
<tr>
<td>Guendelman, 2009 (United States: California)</td>
<td>Retrospective cohort</td>
<td>770</td>
<td>Juggling Work and Life During Pregnancy participants (sample drawn from state prenatal screening program)</td>
<td>Predictor: self-reported maternity leave duration</td>
</tr>
</tbody>
</table>

Returning to work at <6 weeks was the strongest predictor of discontinuing breastfeeding.
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Cohort Size</th>
<th>Included Details</th>
<th>Predictor: self-reported</th>
<th>Outcome: self-reported</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ogbuanu, 2011</td>
<td>Retrospective cohort</td>
<td>6,150</td>
<td>Early Childhood Longitudinal Study – Birth Cohort</td>
<td>Self-reported: length of maternity leave (total and paid)</td>
<td>Outcome: self-reported breastfeeding</td>
<td>Women returning to work ≥13 weeks postpartum had a higher probability of breastfeeding at 3 months. Women returning to work &gt;6 weeks postpartum had greater odds of initiating breastfeeding and of continuing any breastfeeding at 6 months.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Included: singletons with mothers who worked in the year before delivery and were interviewed at 9 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Included: 2004-2005 births; mothers interviewed 10 months postpartum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mirkovic, 2014</td>
<td>Prospective cohort</td>
<td>1,172</td>
<td>Infant Feeding Practices Study, Wave II – women employed in pregnancy who</td>
<td>Predictor: self-reported maternity leave duration (&lt;6 weeks, &lt;12 weeks)</td>
<td>Probability of not fulfilling the plan to breastfeed at least 3 months was greater in</td>
<td></td>
</tr>
</tbody>
</table>
plan to breastfeeding ≥3 months | Outcome: self-report of any breastfeeding for at least 3 months | women who returned to full-time work before 12 weeks

Table 3.4: Antepartum Leave Impacts on Uncomplicated Pregnancies

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and sample size</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guendelman, 2009 (United States: California)</td>
<td>Retrospective cohort 447</td>
<td>Juggling Work and Life During Pregnancy participants (sample drawn from state prenatal screening program) Included: pregnant women who worked until delivery in comparison to pregnant women who took leave before delivery</td>
<td>Predictor: whether or not leave was taken before delivery Outcome: risk of cesarean delivery</td>
<td>Taking leave 4 weeks before due date decreased odds 4-fold of cesarean delivery</td>
</tr>
</tbody>
</table>
# APPENDIX IV

## Parental Leave Abstraction Tables

### Table 4.1: Parental Leave Impacts on Premature Births and Low Birth Weight

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and sample size</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerón-Mireles, 1996 (Mexico)</td>
<td>Prospective cohort 2,623</td>
<td>Women admitted for childbirth in 3 study hospitals (1992) during 3-month period</td>
<td>Predictor: self-reported antepartum leave taking</td>
<td>Not taking antepartum leave was associated with three times the risk of premature delivery and twice the risk of infant with low birth weight. Results: Individual-level effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Included: worked at least 3 months during pregnancy</td>
<td>Outcome: gestational age of infant and weight-for-gestational age</td>
<td></td>
</tr>
<tr>
<td>Rossin, 2011 (United States: nationwide)</td>
<td>Retrospective cohort</td>
<td>The National Vital Statistics System natality data (1989-1997)</td>
<td>Predictor: Usage of FMLA maternity leave</td>
<td>Usage of FMLA maternity leave was associated with a 0.2% increase in birth weight, 0.04% in gestational age, 3% decrease in risk of premature birth, 3% decrease in risk of low birth weight</td>
</tr>
</tbody>
</table>

Results:

Table 4.2: Parental Leave Impacts on Infant Mortality

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and study sample</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winegarden, 1995</td>
<td>Ecological 17 countries</td>
<td>Studies conducted in OECD countries sampled during 10 year intervals (1959, 1969, 1979, 1989)</td>
<td>Predictor: weeks of paid maternal leave Outcome: infant mortality rate (annual number of deaths per 1000 live births)</td>
<td>Each additional week of paid parental leave was associated with a 2-3% reduction in infant mortality</td>
</tr>
<tr>
<td>Ruhm, 2000 (Europe)</td>
<td>Ecological 16 countries</td>
<td>Deaths in Studies conducted in European countries during 1969-1994</td>
<td>Predictor: duration and wage replacement of paid leave Outcome: rate of infant mortality (annual number of deaths per 1000 live births)</td>
<td>Each 10 week increase in paid parental leave was associated with a 2.5-3.4 reduction in infant mortality</td>
</tr>
</tbody>
</table>
Tanaka, 2005 (United States, Japan, Europe)  | Ecological 18 countries | Yearbook of Labour Statistics Global Survey on Protection of Working Mothers Studies conducted in European countries in addition to the U.S. and Japan (1969-2000) | Predictor: duration and wage replacement of paid leave Outcome: rate of infant mortality (annual number of deaths per 1000 live births) | Each 10 week increase in paid parental leave was associated with a 2.5% reduction in infant mortality rate

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and study sample</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Daku, 2012 (International) | Ecological 185 countries | World Legal Rights Data Centre, ILO NATLEX database | Predictor: number of parental leave FTE weeks (dependent upon WWR of each country) Outcome: vaccination coverage rates | 10 FTE weeks of increased paid parental leave was associated with 15-25% increase in vaccination coverage

Table 4.3: Parental Leave Impacts on Vaccination Rates
<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design and sample size</th>
<th>Data source</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clark, 1997 (United States: Wisconsin)</td>
<td>Prospective cohort 198</td>
<td>Interview and videotape mother-child interactions sampled through the Wisconsin Maternity Leave and Health Project Included: employed mothers in their 12-21 week of pregnancy</td>
<td>Predictor: Self-reported parental leave taking Outcome: PCERCA scale item (“negative” and “positive” mother and infant affect and behavior)</td>
<td>Shorter duration of leave (6 weeks) were associated with more items from the “negative” PCERCA scale for mothers</td>
</tr>
</tbody>
</table>
### APPENDIX V

**Leave for Children’s Health Needs Condition Progression**

**Table 5.1: Prevalent Childhood Major Illnesses and their Acute, Recovery, and Maintenance Phase Durations**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Overall Average Number of Hours of Family-Provided Health Care (Cleary, 1986)</th>
<th>Acute Phase</th>
<th>Recovery Phase</th>
<th>Maintenance Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children with Asthma</strong></td>
<td>63% receive family-provided care at home This care requires 4.7 hours per week, on average</td>
<td>Average hospital stay: 3.3 days (Corneli, 2012)</td>
<td>Average missed school: 3 to 6 days (Robbins, 2006)</td>
<td>Average missed school: 8.5 to 11.6 days (Laforest, 2004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average hospital stay: 1.5 to 2.7 days (Banasiak, 2004)</td>
<td>Average missed school: 45% at 3 or more days 24% at 5 or more days (Stevens, 2011)</td>
<td>Average missed work: 54% at 1 or more days 18% at 3 or more days (Stevens, 2011)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Missed work: 54% at 1 or more days 18% at 3 or more days (Stevens, 2011)</td>
<td>Missed work: 54% at 1 or more days 18% at 3 or more days (Stevens, 2011)</td>
<td>Missed work: 54% at 1 or more days 18% at 3 or more days (Stevens, 2011)</td>
</tr>
<tr>
<td><strong>Children with Mood disorders</strong></td>
<td>48.7 % receive family-provided care at home This care requires 7 hours per week, on average</td>
<td>Average stay for suicide ideation: 17.7 days (Smith, 2002)</td>
<td>Average aftercare usage: 10 days (Goldston, 2003)</td>
<td>No quantitative studies identified for duration of maintenance phase</td>
</tr>
<tr>
<td>Children with Congenital Heart Disease</td>
<td>57.6 percent receive family-provided care at home. This care requires 9.1 hours per week, on average</td>
<td>Average stay for self-inflicted injury: 2.7 days (Olfson, 2005)</td>
<td>Average stay for bipolar disorder: 5.7 days (Lasky, 2011)</td>
<td>No quantitative studies identified for duration of maintenance phase</td>
</tr>
<tr>
<td>Children with Cancer</td>
<td>67.7 percent receive family-provided care at home. This care requires 8.9 hours per week, on average</td>
<td>Average hospital stay: 10.9 days with a range of 0 to 232 days (Liu, 2014)</td>
<td>Average feeding initiation: 3.3 days (Kogon, 2007)</td>
<td>Average missed school: 25 to 31 days (Vance, 2002)</td>
</tr>
</tbody>
</table>
REFERENCES


Chowdhury, Ranadip, Bireshwar Sinha, Mari Jeeva Sankar, Sunita Taneja, Nita Bhandari, Nigel Rollins, Rajiv Bahl, and Jose Martines. 2015. “Breastfeeding and


_American Academy of Orthopaedic Surgeons_, May. 


