

**Slacker Gen Xers or Workaholic Boomers?:  
An Analysis of Age, Gender, Cohort and Period Effects on  
Hours Worked in Patient Care**

Erin P. Fraher, PhD(cand) MPP  
Director, NC Health Professions Data System  
Cecil G. Sheps Center for Health Services Research  
University of North Carolina at Chapel Hill

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## Introduction

After years of projecting a physician surplus in the United States, policy makers have reversed their positions and are actively considering proposals to address a predicted physician shortage. The Association of American Medical Colleges (AAMC) has called for a 30% increase in medical school enrollments by 2015<sup>1</sup> and The American Medical Association has both acknowledged a shortage and called for mechanisms to improve the distribution of physicians in rural and underserved areas.<sup>2</sup> Since increasing the number of medical school graduates will have little effect on physician supply without increasing the number of residency slots, the Council on Graduate Medical Education (COGME) has also recommended a 15% increase in graduate medical education training and capacity over the next decade.<sup>3</sup>

While some have questioned whether expanding physician supply is the appropriate way to address concerns about access to health care in the United States,<sup>4</sup> many states have heeded the call to expand medical school enrollments. Over 85% of existing medical schools have already increased first-year enrollments, or plan to do so within the next five years, and more than a dozen new medical schools are planned.<sup>5</sup> The net result of this growth is an expected 30% increase in first-year medical school enrollments by 2017.<sup>6</sup>

Despite these significant investments, concerns have been voiced that planned increases may not be large enough to forestall a future shortage due to demographic shifts in the physician workforce.<sup>7,8</sup> Numerous studies cite evidence that female physicians and physicians in younger cohorts do not work the same number of hours as their predecessors,<sup>9,10,11,12</sup> however, with few exceptions, this evidence is based on cross-sectional and qualitative studies. Few empirical analyses exist that explore whether there are, in fact, differences in the hours worked by physicians in different birth cohorts. More specifically, medical workforce research to date has generally not investigated the interplay of period, cohort, gender and age effects on the productivity of the US physician workforce.<sup>13,14</sup>

Physician workforce models need to be sensitive to the fact that social norms **change over time** and that physician careers are located in **specific historical times** and **places** that shape their content, pattern, and direction.<sup>15</sup> In this paper, I apply the conceptual framework and analytical tools of life course research to an investigation of the factors that affect the number of hours worked in patient care by

physicians in North Carolina between 1980 and 2006. North Carolina is the subject of the research due to the fact that the state has a unique longitudinal database that tracks physicians over time. The age and gender distribution of the North Carolina physician workforce is generally similar to the US physician workforce and thus should be generalizable to trends in national physician supply. However, whether or not the substantive findings from the research are generalizable to the physician workforce in the US or other countries, the results suggest a need for more sophisticated and dynamic modeling techniques that incorporate gender, age, period and cohort effects into physician workforce supply estimates.

### **Conceptual Framework of Life Course Research Generates Research Aims**

Life course theory is a relatively new lens through which to examine the old and often contentious issue of projecting physician supply, and it makes two important contributions to physician workforce research: (1) it stresses the importance of longitudinal analyses for understanding the dynamic nature of physicians' workforce participation; and (2) in contrast to economic models that focus on individual agency and rational actor frameworks, life course theory stresses the importance of placing the physician's career decisions in the context of changing medical and social structures. This perspective is well articulated by Riley (1998) who suggests that "[i]n the continuing dialectic between changing lives and changing structures, it is not only lives that change; structures also change. Full understanding of how lives change (as in the life course approach) also requires understanding the process of change in the surrounding structures."<sup>16</sup>

#### ***Period Effects***

The practice of medicine in North Carolina (and nationally) has undergone dramatic change in the past twenty years. Fee-for-service and private insurance arrangements have declined while the number of uninsured patients and those covered by public insurance plans (i.e. Medicaid and Medicare) has grown. Lengths-of-stay in hospitals have dropped dramatically and many medical procedures that formerly required inpatient stays are now performed on an out-patient basis. Practice arrangements for physicians have also changed. Fewer physicians practice in traditional self-employed practitioner offices and more are salaried in group practices.

Despite the fact that these changes in the context of medical practice are fairly obvious and well-documented, a review of the literature reveals that almost without exception, physician workforce analyses have failed to explore the importance of period effects. The vast majority of workforce analyses are cross-sectional or longitudinal with few observation periods. Those studies that are longitudinal analyses have not used birth cohorts to investigate generational differences in physicians' workforce participation.<sup>17</sup>

### ***Age and Cohort Effects***

Another limitation of past workforce research is that it has not incorporated the life course perspective of age differentiation which is described by Elder (1975) as an awareness that "age locates individuals in historical time by defining their cohort membership and in the social structure by indicating their life or career stage."<sup>18</sup> Age differentiation is important because physicians in different birth cohorts "share a distinctive culture and/or a self-conscious identity by virtue of their having experienced the same social events *at roughly the same time in their lives*" (italics added for emphasis)<sup>19</sup> Depending on the historical period during which physicians practiced and their age when major shifts occurred in both medical practice and in societal expectations, physicians in different birth cohorts are likely to have very different expectations and assumptions about their careers

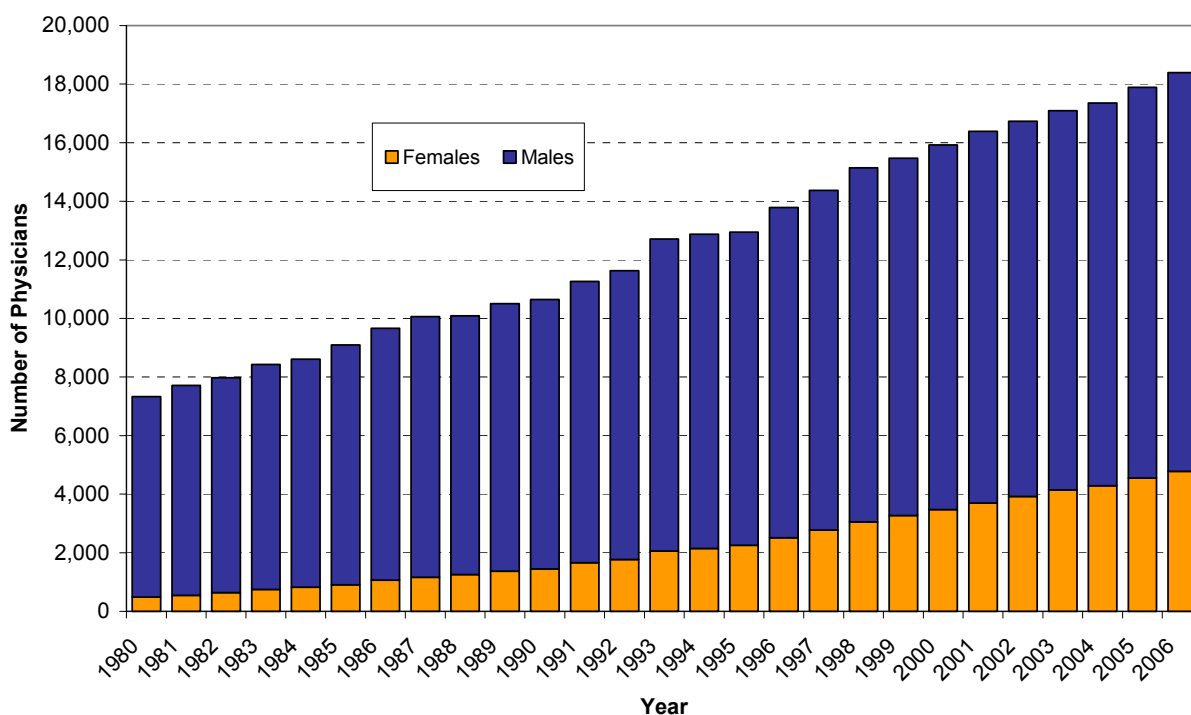
For example, the issue of work-life balance is one that has been given much attention in physician supply discussions and has generally centered on whether new generations of physicians share the same commitment to medicine as their predecessors.<sup>20</sup> There is a commonly held perception that physicians in the Boomer generation (born 1946-1964) work longer hours, hold their physician identity more central to their self-identity and are generally more committed to their medical careers. By contrast, Generation X colleagues (born 1965-1979) are perceived to be more concerned with achieving a balance between home and work, are more likely to see their physician role as only part of their self-identity.<sup>21,22,23,24</sup>

### ***Gender Effects***

Arguably one of the most dramatic changes in medical practice has been the increasing number of women entering medicine. In 1972, Congress passed the *Educational Amendment Act* which prohibited educational institutions receiving federal funds from discriminating against female applicants to colleges

and universities. This and other federal legislation, in concert with the accomplishments of the feminist movement, removed many discriminatory barriers women had previously faced in pursuing medicine as a career.<sup>25</sup> The increasing number of female physicians in North Carolina mirrors national trends. In 1980 women represented just 7% of all physicians licensed to practice in North Carolina, but their numbers steadily increased so that by 2006, more than one in every four (26%) physicians in the state was a woman (**Figure 1**).

**Figure 1. Number of Male and Female Physicians  
North Carolina, 1980-2006**



Understanding the effect of gender on the dynamics of physician productivity is important given the rapidly changing demographics of the physician workforce. Research has shown that female physicians are more likely than their male counterparts to work fewer hours per week<sup>26,27</sup> and that important gender differences exist between male and female physicians regarding their choice of specialties that allow for more flexible career arrangements.<sup>28,29,30,31</sup>

While women represent an increasingly important component of the physician workforce, research has not focused on the combined influence of gender and birth cohort effects on physicians' hours worked per week in patient care. Examining female physicians by successive birth cohorts will likely

reveal important differences in productivity between male and female physicians in younger and older birth cohorts. As more women have entered the workforce, they have likely changed the way that medical work is organized, making it more acceptable for both male and female physicians to work part-time, to reduce call hours and to have interrupted careers.<sup>32,33</sup>

## **Data and Methods**

Annual physician licensure files from the North Carolina (NC) Medical Board were linked from 1980-2006. Active, instate, non-federal, non-resident-in-training physicians were included in the analysis. Doctors of medicine (MDs) and doctors of osteopathy (DOs), both of whom register with the NC Medical Board, are included in the data. The final sample included 340,048 observations on 37,040 physicians. Physicians were assigned to one of 7 cohorts based on birth year. **Table 1** depicts the number of physicians, number of observations, age range, years in practice and percent of the workforce that is female by birth cohort.

Years in practice was calculated by the subtracting the year the physician graduated from medical school from the year the physician was observed in the file. **Table 1** shows that the first two cohorts (Pre-Depression and Depression) are observed in the latter years of their medical career, the middle two cohorts (Pre-WWII and WWII) in the midpoint of their medical careers and the latter three cohorts (Boomer 1, Boomer 2 and Generation X) from the beginning until about the middle of their careers.

**Table 1: Descriptive Statistics by Birth Cohort**

<b>Cohort (birth year)</b>	<b>Number of Physicians</b>	<b>Number of Observations</b>	<b>Age of Observations (avg, min-max)</b>	<b>Years in Practice (avg, min-max)</b>	<b>Percent Female</b>
Pre-Depression (before 1912)	472	2,644	77.9 (69-100)	51.2 (18-75)	5.8%
Depression (1912-1921)	1,200	11,018	69.3 (59-92)	42.7 (14-69)	5.1%
Pre-WWII (1922-1927)	1,173	14,919	64.3 (53-84)	38.0 (13-62)	5.1%
WWII (1928-1945)	5,528	88,412	54.0 (35-78)	27.2 (1-62)	6.3%
Boomer 1 (1946-1954)	8,184	99,082	44.2 (26-60)	16.8 (0-49)	16.5%
Boomer 2 (1955-1964)	11,465	90,109	39.5 (24-51)	12.3 (0-30)	26.8%
Generation X (1965-1979)	9,008	33,851	34.3 (24-41)	7.6 (0-21)	39.2%
<b>Total</b>	<b>37,030</b>	<b>340,035</b>			

*Note: birth year was missing for 13 observations on 10 physicians*

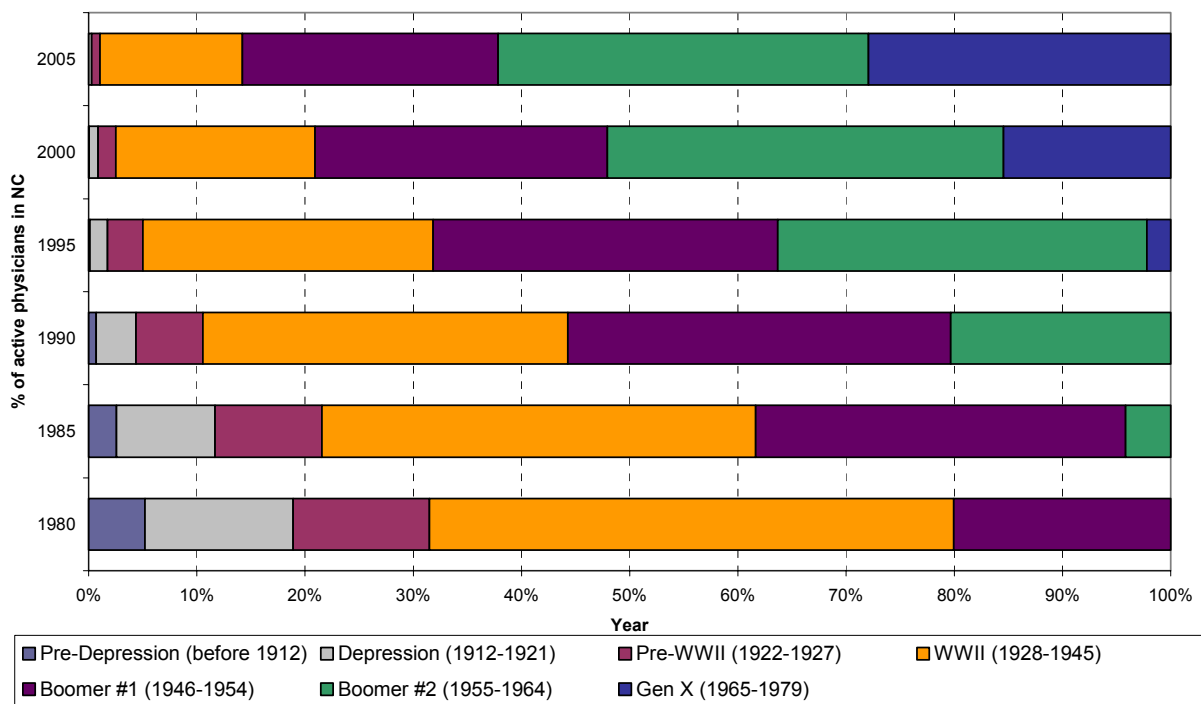
The key outcome variable of interest in the analysis is hours worked per week in patient care. The NC Medical Board has included a question about hours in patient care since 1980, although the question has changed slightly over time. On average between 1980 and 2006, 74.6% of physicians reported hours with a low of 53.2% of physicians reporting in 1983 to a high of 95.6% of physicians reporting hours in 2004. Physicians who did not report hours were slightly more likely to be male, over the age of 60 and in the pre-Depression, Depression, pre-WWII and WWII cohorts but reporting differences were not large.

## Results

### Aggregate Trends

Figure 2 shows that from a generational perspective, the stock of physicians in the North Carolina workforce has changed dramatically over time. In the early 1980's the Pre-WWII, WWII and Boomer 1 cohorts comprised the majority of the workforce. The Boomer 2 cohort began to enter practice in the mid- to late-1980s and together the Boomer 1 and Boomer 2 cohorts still comprise nearly 60% of

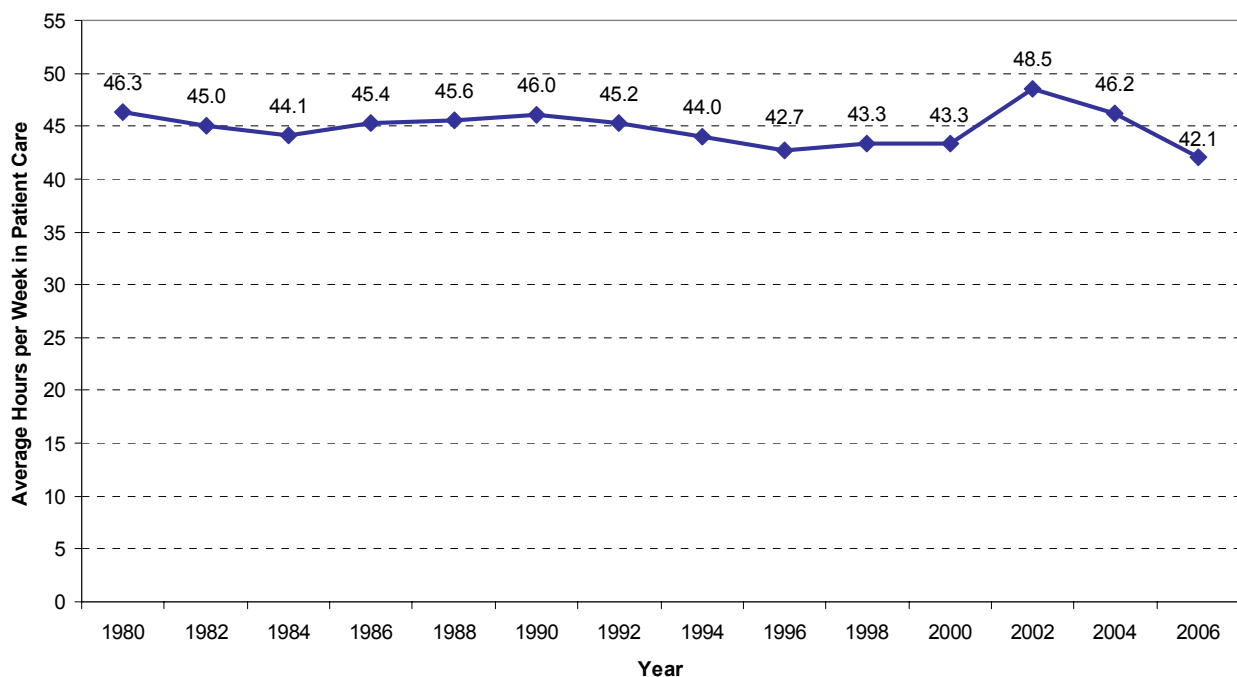
**Figure 2. Composition of Physician Workforce by Cohort  
North Carolina, 1980-2005**



the workforce today. Generation Xers began to enter practice in mid-1990s and now comprise about 28% of the active, in-state workforce in North Carolina. While there has been much discussion among physician workforce researchers about cohort differences in productivity, these discussions have generally centered on differences between the Boomer and Generation X physicians. However, it is interesting to note in **Figure 1** that during the period from 1980-2006, the WWII cohort made up as large a share of the workforce as the Boomer generations and thus provides another comparison group for testing cohort differences in hours worked across different ages and between male and female physicians.

Viewed across physicians of all ages and birth cohorts, hours per week worked in patient care generally trended downward from 46.3 hours in 1980 to 42.1 hours in 2006, however some year-to-year volatility is evident in the data (**Figure 3**).

**Figure 3. Average Hours per Week in Patient Care, North Carolina Physicians, 1980-2006**

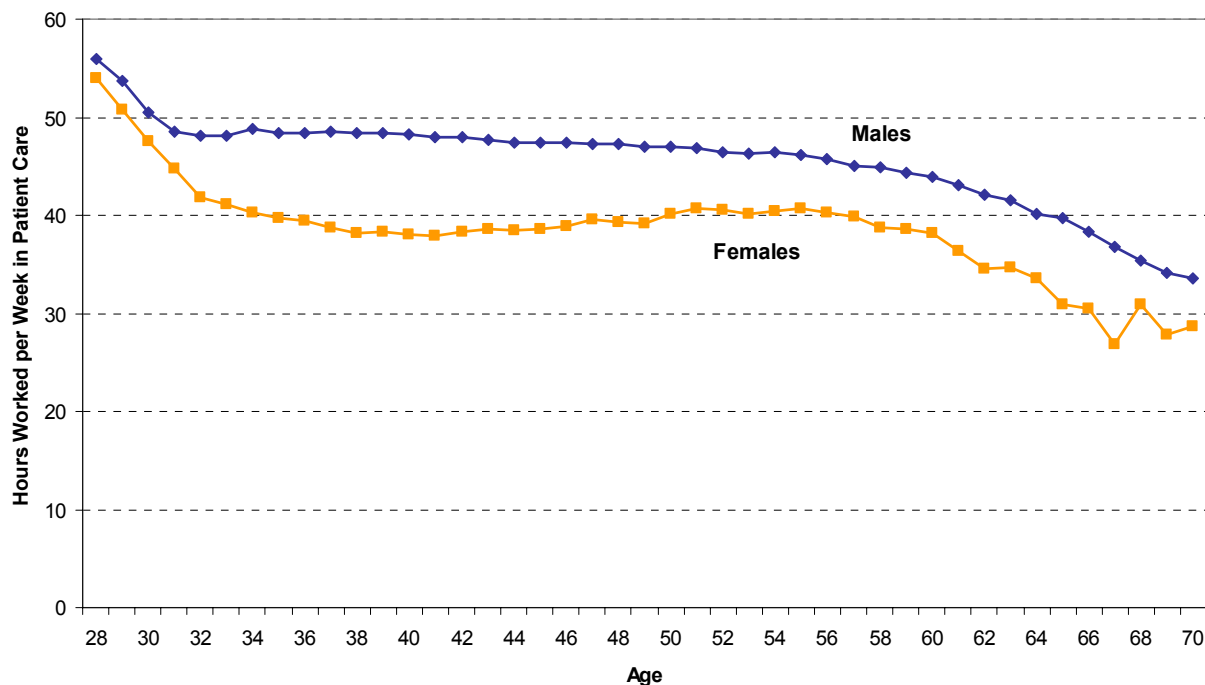


**Figure 4** shows the expected pattern of hours worked per week in patient care for male and female physicians by age. Women work fewer hours per week in patient care at all ages. The effect of age on hours worked for females is noticeable and forms a slightly u-shaped curve. Female physicians work only slightly fewer hours than males before age 32 but after age 32, female physicians work progressively fewer hours compared to males until age 41 at which age they work an average of 10 fewer



hours per week. At age 42 and beyond, women increase their hours until age 56 when they start to decline again. Like female physicians, male physicians work the most hours before age 32 but after age 32, their hours begin a slow and steady decline until age 62 at which age their hours start to decrease at an even more rapid rate.

**Figure 4: Hours Worked per Week in Patient Care by Age  
Male and Female Physicians, North Carolina**

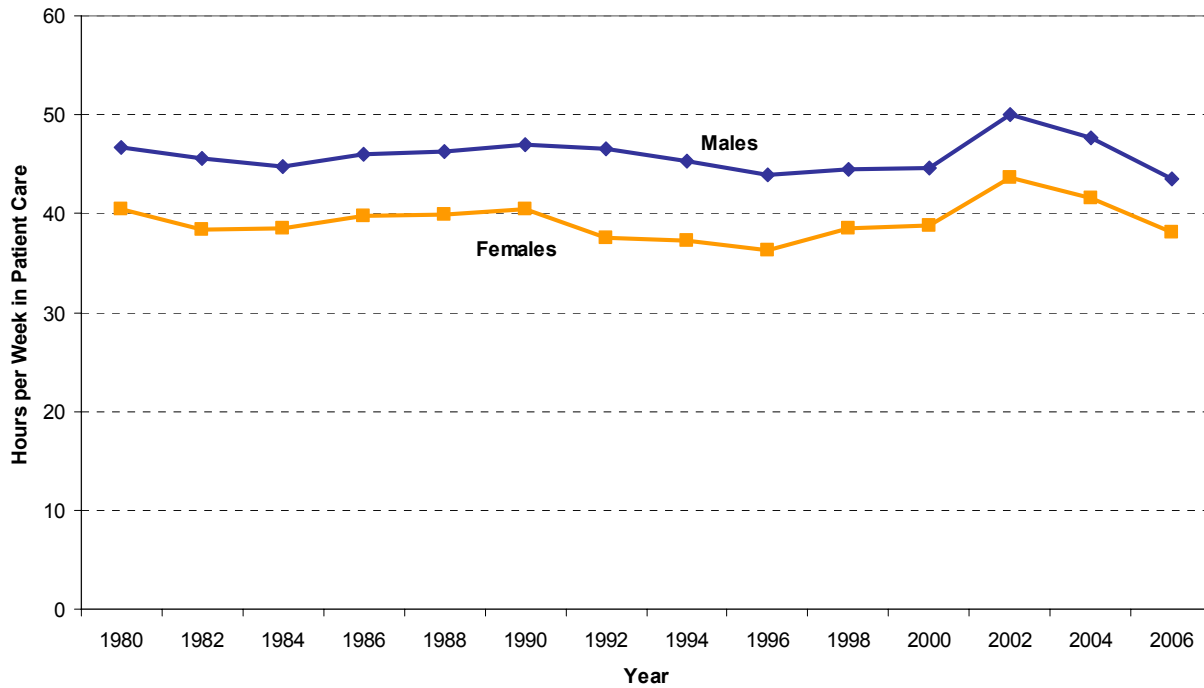


**Period Effects**

One unexpected finding from the analysis is that female physicians have consistently worked fewer hours per week than their male colleagues between 1980-2006 (**Figure 5**). This finding is surprising because as women have increased their representation in the workforce, one would have expected that there would have been a proportional reduction in their hours. More specifically, it would have seemed plausible that those female physicians who practiced in the early years when solo-practitioner offices were more of the norm and female physicians were fewer in number would have worked about the same number of hours as their male colleagues. However, as more female physicians entered practice and there was both a greater acceptance of women attempting to balance careers and families as well as more opportunities for practice in group settings one would have expected women to reduce their hours.

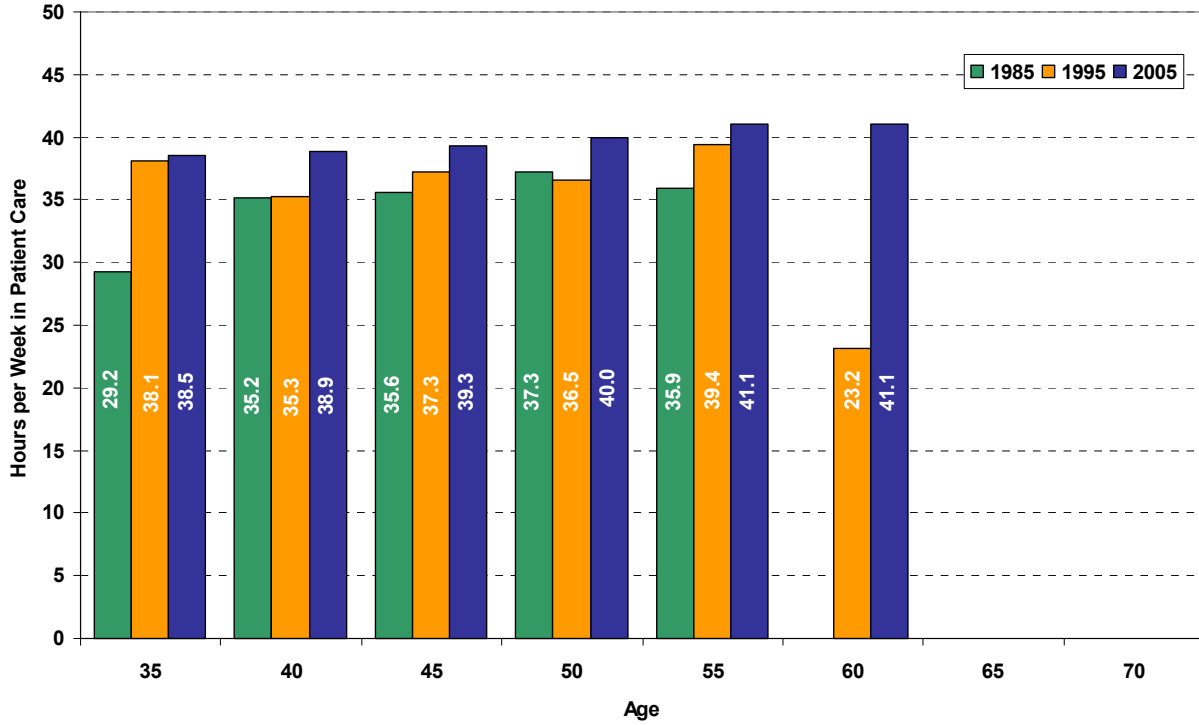
The data in **Figure 5** do not show this type of period effect. Women have consistently worked about six fewer hours per week than their male colleagues.

**Figure 5. Hours Worked per Week in Patient Care, Male and Female Physicians, North Carolina, 1980-2006**

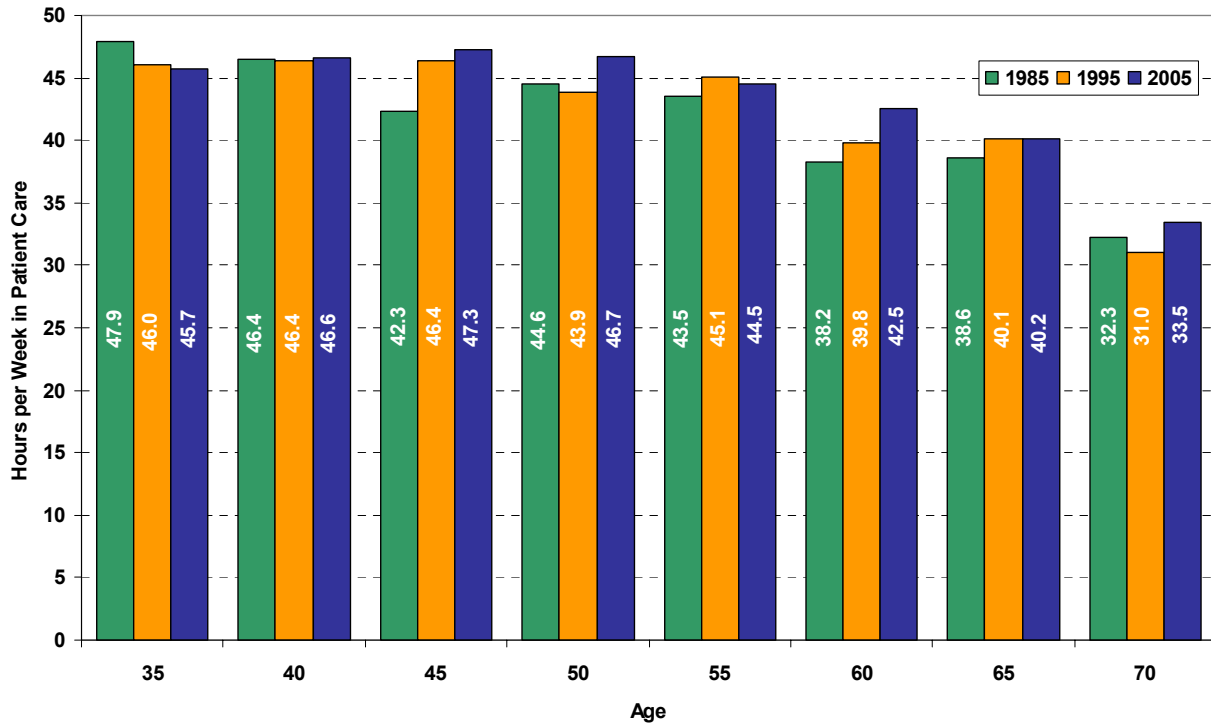


**Figures 6 and 7** show trends in hours worked per week by age for male and female physicians in 1985, 1995 and 2005. The data for female physicians in **Figure 6** are truncated at age 60 due to small sample sizes but they show that women in all age groups worked more hours in 2005 than they did in 1985 or 1985. **Figure 7** shows that there has been a steady decline in hours worked at age 35 for male physicians from 47.9 in 1985 to 45.7 in 2005. At age 40 male physicians in 1985, 1995 and 2005 worked about the same number of hours but after age 40, male physicians worked more hours in 2005 than in 1985. The data in **Figures 5, 6 and 7** suggest that the decline in hours worked over time is not due to a period effect, but may be attributable to the declining number of hours physicians work as they age, younger cohorts working fewer hours or the larger proportion of female physicians in the workforce.

**Figure 6. Hours Worked per Week in Patient Care by Age and Year  
Female Physicians, North Carolina**



**Figure 7. Hours Worked per Week in Patient Care by Age and Year  
Male Physicians, North Carolina**



## Cohort Effects

To investigate whether there were cohort effects, hours worked per week were examined for physicians at the same age in different birth cohorts. **Table 2** shows the number of observations for which physicians reported hours between different birth cohorts.

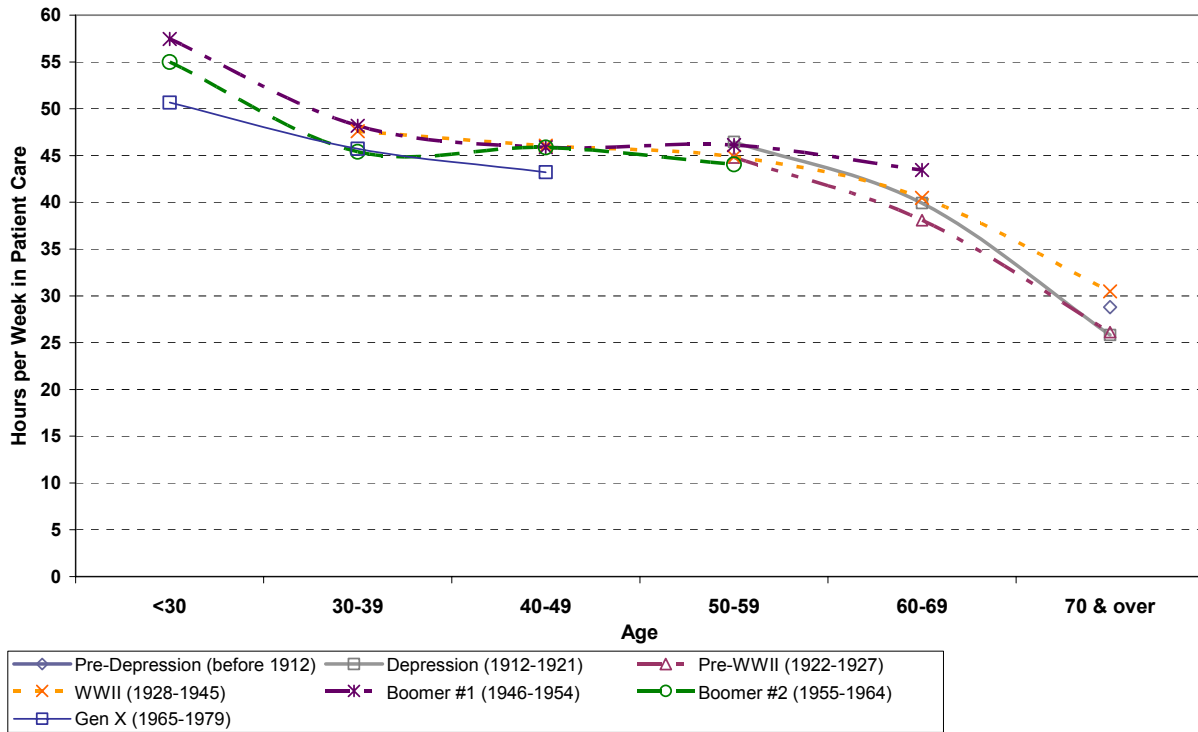
**Table 2. Number of Observations Reporting Hours Worked in Patient Care by Age Group and Cohort**

Age	Pre-Depression (before 1912)	Depression (1912-1921)	Pre-WWII (1922-1927)	WWII (1928-1945)	Boomer #1 (1946-1954)	Boomer #2 (1955-1964)	Gen X (1965-1979)	Total by Age Group
<30	0	0	0	0	365	710	963	2,038
30-39	0	0	0	2,356	17,842	30,115	25,504	75,817
40-49	0	0	0	14,984	32,517	38,544	1,637	87,682
50-59	0	99	2,492	26,177	23,993	1,652	0	54,413
60-69	30	3,488	4,552	17,493	313	0	0	25,876
70 & over	1,101	2,519	2,225	1,968	0	0	0	7,813
<b>Total</b>	<b>1,131</b>	<b>6,106</b>	<b>9,269</b>	<b>62,978</b>	<b>75,030</b>	<b>71,021</b>	<b>28,104</b>	<b>253,639</b>

The fact that there are multiple cohorts in the data affords the opportunity to test hypotheses related to variation in hours due to cohort effects. Do physicians in more recent birth cohorts work fewer hours at the same age than their earlier counterparts? Is there a different gender effect across cohorts?

**Figure 8** shows that below age 30, hours have steadily declined from 57.5 for the Boomer 1 cohort, to 55.0 for the Boomer 2 cohort to 50.7 in the Generation X cohort. Between the ages of 30 and 39 hours have also decreased in the more recent cohorts with the WWII and Boomer 1 cohorts working approximately 48 hours per week and the Boomer 2 and GenX cohorts working about 45.5 hours per week. Between ages 40-49, the WWII, Boomer1 and Boomer 2 cohorts all worked 46 hours per week while the Generation X cohort worked 43.2 hours per week. Cohort differences are less visible between the ages of 50-69. Over the age of 70, the WWII cohort worked the more hours than previous cohorts but this trend likely reflects the fact that hours decrease rapidly with age and the WWII cohort is the youngest cohort in this age group.

**Figure 8. Hours Worked per Week in Patient Care by Cohort and Age Group, North Carolina Physicians**

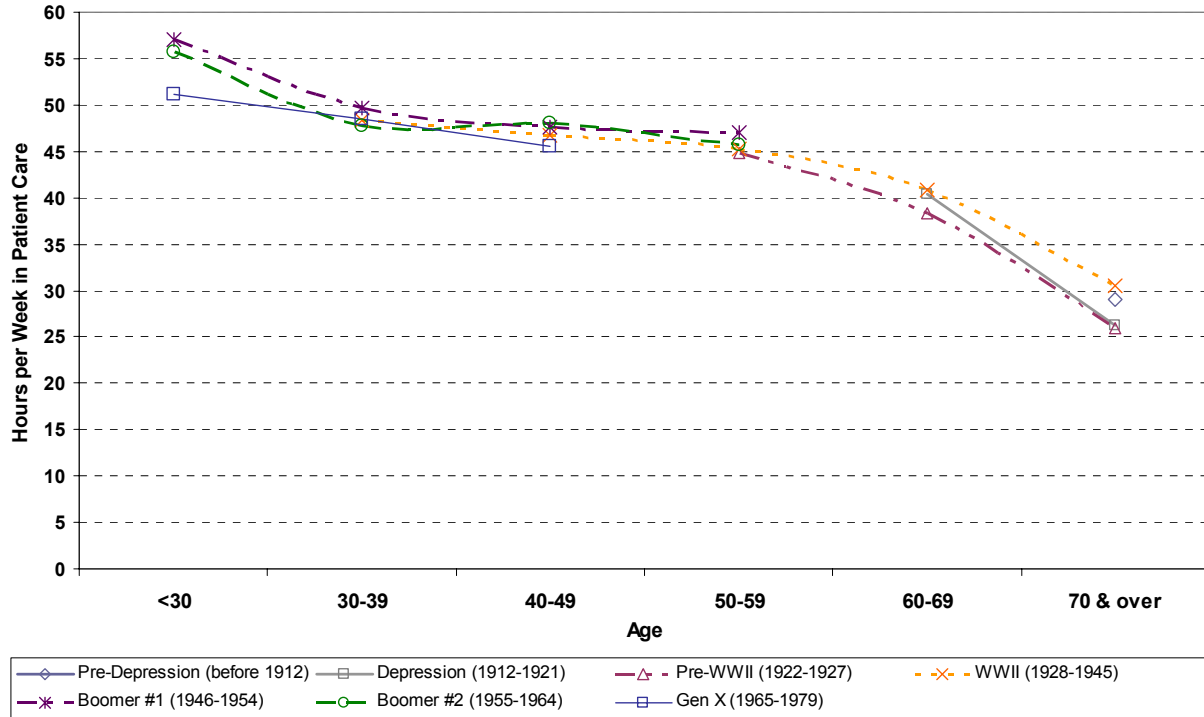


To explore the effects of gender on hours worked, female physicians in different birth cohorts were compared at equivalent ages. **Table 3**, shows the number of observations on female physicians who reported hours by age group and birth cohort.

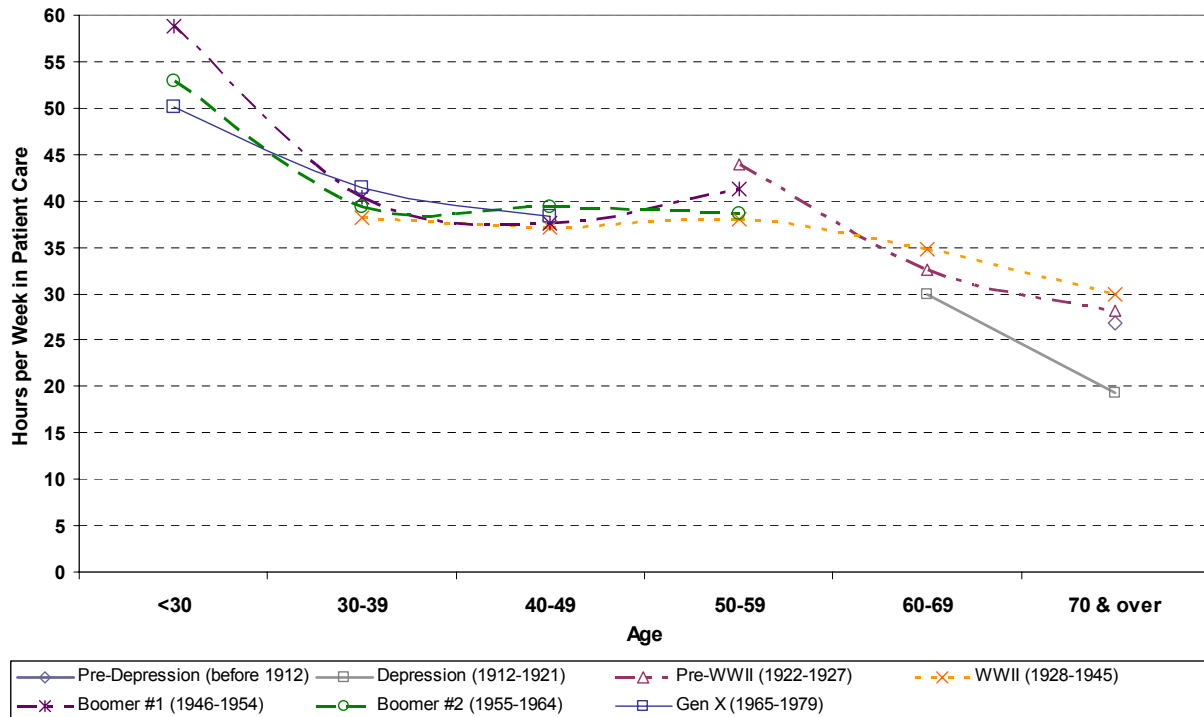
**Table 3. Number of Female Physicians Reporting Hours Worked in Patient Care by Age Group and Cohort**

	Pre-Depression (before 1912)	Depression (1912-1921)	Pre-WWII (1922-1927)	WWII (1928-1945)	Boomer #1 (1946-1954)	Boomer #2 (1955-1964)	Gen X (1965-1979)	Total by Age Group
<30	0	0	0	0	74	188	483	745
30-39	0	0	0	163	2,891	8,328	9,974	21,356
40-49	0	0	0	1,068	5,549	9,801	524	16,942
50-59	0	6	132	1,741	390	3,704	0	5,973
60-69	1	177	249	1,009	31	0	0	1,467
70 & over	89	125	110	67	0	0	0	391
<b>Total</b>	<b>90</b>	<b>308</b>	<b>491</b>	<b>4,048</b>	<b>8,935</b>	<b>22,021</b>	<b>10,981</b>	<b>46,874</b>

**Figure 9. Hours Worked per Week in Patient Care by Cohort and Age Group, Male Physicians**



**Figure 10. Hours Worked per Week in Patient Care by Cohort and Age Group, Female Physicians**

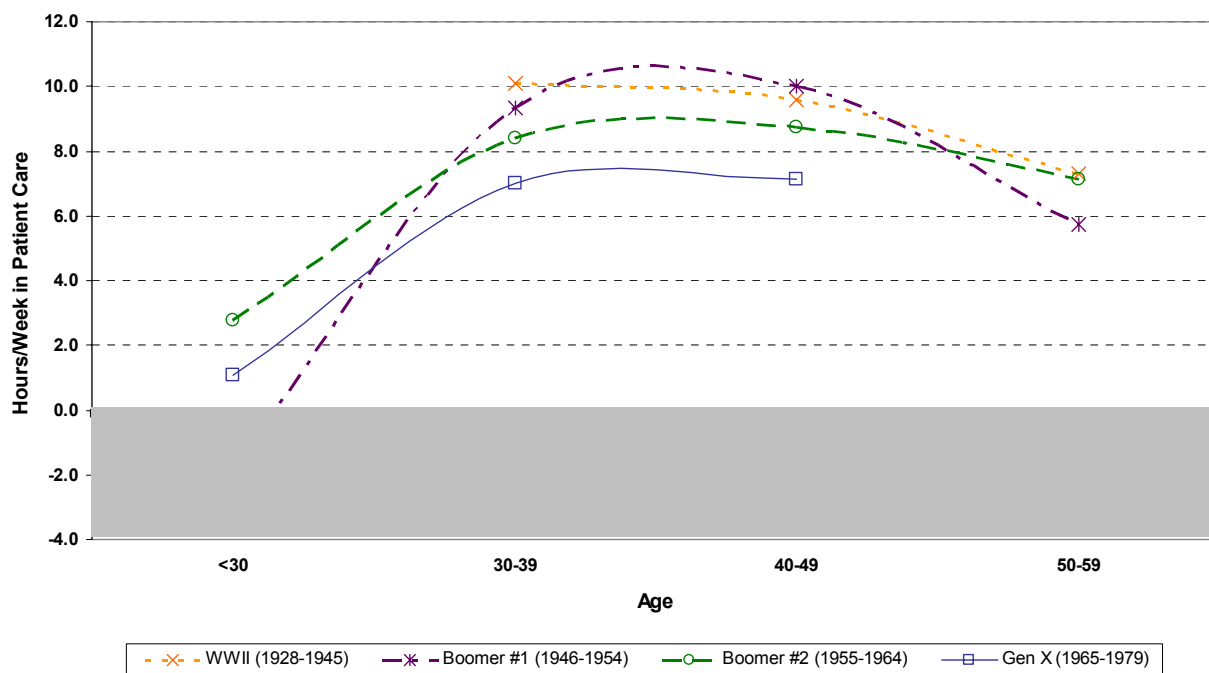


**Figures 9 and 10** show hours per week in patient care for male and female physicians in different cohorts at the same age. In general, differences in hours worked per week are small and there are few discernible patterns except under age 30. Male and female physicians under age 30 in the Generation X cohort worked fewer hours than physicians in the Boomer 1 and Boomer 2 cohorts. Male Gen Xers worked the same hours per week as the WWII cohort and slightly more hours than the Boomer 2 cohort at ages 30-39 (**Figure 9**). The Boomer 1 cohort worked more hours than other cohorts at every age except at age 50-59 when they worked approximately the same number of hours as the Boomer 2 cohort.

**Figure 10** shows that the familiar u-shaped effect of age on hours worked for female physicians is consistent across cohorts but most noticeable for the Boomer 1 cohort. Female physicians' hours decrease rapidly after age 30 and then increase slightly after 40 before decreasing again after age 59.

**Figure 11** illustrates that the difference in hours worked per week between male and female physician is getting smaller in more recent cohorts. At ages 30-39 and 40-49, the difference in hours worked per week is smallest for Generation X and Boomer 2 physicians and largest for the Boomer 1 and WWII cohorts.

**Figure 11. Difference in Hours Worked/Week in Patient Care  
Male & Female Physicians, North Carolina**



## Discussion

This analysis has shown that average hours worked per week in patient care declined for North Carolina physician workforce between 1980 and 2006 and this decline is attributable to age, gender and cohort effects. The data do not seem to reflect period effects since both male and female physicians across most ages worked more hours per week in 2005 than physicians in the same age groups in 1985. As well, female physicians have consistently worked about 6 fewer hours per week in patient care than their male colleagues between 1980-2006.

Age effects appear to have the most influence on hours worked. Female physicians work only slightly fewer hours than males before age 32 but after age 32, female physicians work progressively fewer hours compared to males until age 41 at which age they work an average of 10 fewer hours per week. At age 42 and beyond, women increase their hours until age 56 when they start to decline again. Like female physicians, male physicians work the most hours before age 32 but after age 32, their hours begin a slow and steady decline until age 62 at which age their hours start to decrease at an even more rapid rate. These age effects for male and female physicians are consistent across cohorts.

Cohort effects are also evident in the data, particularly for the Generation X cohort. Below age 30, hours have steadily declined from 57.5 for the Boomer 1 cohort, to 55.0 for the Boomer 2 cohort to 50.7 in the Generation X cohort. Between the ages of 30 and 39, hours have also decreased in the more recent cohorts with the WWII and Boomer 1 cohorts working more hours than the Boomer 2 and GenX cohorts. Between ages 40-49, the WWII, Boomer1 and Boomer 2 cohorts worked about 3 hours more per week than the Generation X cohort. Cohort differences are less visible between the ages of 50-69.

The analysis of hours worked by cohort and gender showed that the difference in hours worked per week between male and female physician is decreasing in more recent cohorts. The implication of these data is that there are gender, age and cohort effects on hours worked but that the effect of gender may be lessening in more recent cohorts.

Reflecting on the limitations of previous research on aging, Riley (1998) identifies two important fallacies (life course and cohort-centrism) that are directly relevant to the findings of this research and to future physician workforce studies.<sup>34</sup> The “**life course fallacy**” involves “erroneously interpreting cross-sectional age differences as if they referred to the process of aging.”<sup>35</sup> Many workforce analyses have



fallen into a life course fallacy by interpreting cross-sectional differences in work patterns between age groups as if they revealed insight into how younger physicians' careers will evolve.<sup>36</sup> The limitation is that one is looking at the physician population at a given point in time and assuming that a static process governs how the physician's productivity will change as s/he ages. The results of this analysis show that the error introduced into productivity estimates from the life course fallacy are not significant in the NC physician workforce because the effect of age on productivity for both male and female physicians over time is consistent across cohorts. However, the analyses presented in this paper have been purely descriptive. Multivariate regression techniques may show that there are statistically different age effects for male and female physicians over time and between cohorts.

The second limitation is the **"fallacy of cohort-centrism"** or "assuming that members of all cohorts will grow older in the same fashion as members of our own cohort."<sup>37</sup> Workforce research that examines the practice patterns of a single cohort over time and then abstracts these findings to all cohorts ignores the influence of period and gender effects on different cohorts of physicians.<sup>38</sup> The fallacy of cohort-centrism appears to introduce more bias into physician productivity estimates because the analysis has shown that there are cohort effects and that gender has a different effect on hours worked in different cohorts.

While the use of birth cohorts is essential to investigate how large-scale changes over time in the context of medical practice and social structures in the United States have rippled through the physician population, affecting career decisions regarding hours worked, it is not possible to completely disentangle the three sources of variation—age, period, and cohort effects—on hours worked.<sup>39</sup> As Bynner (2003) explains, "[d]ata collected at a particular time point in a cohort study may be a product of the age of the individual concerned (age effect), the time when the individual was born (cohort effect) and the period at which data were collected (period or secular effect). These effects are logically related through the formula:  $\text{Period} = \text{Age} + \text{Cohort}$  and are therefore confounded."<sup>40</sup> To the extent possible, this study has used descriptive analyses to explore these effects but future analyses may incorporate more rigorous methods such as those developed by Mason, Mason, Winsborough and Poole (1973)<sup>41</sup> and Robin and Jackson (2001).<sup>42</sup>

## **Conclusions and Implications of Findings**

The effect of sex and generational differences on physician productivity is often cited but not empirically well-documented. Existing models of physician supply are generally ahistorical and fail to recognize that because the medical practice context continuously changes and social structures continuously evolve, physicians in different birth cohorts will not follow the same career trajectory patterns. New models need to be more dynamic and incorporate more complex physician modeling techniques that incorporate age, gender, cohort and period effects.<sup>43</sup>

For simplicity in this analysis, cohorts were chosen based on generational differences that exist due to the divergent experiences of cohorts born during important periods that have shaped history and social structures. It would be informative in future analyses to identify cohorts based on specific events that have dramatically changed the way that medicine is structured such as the implementation of the 80 hour work week.

This analysis has not examined how age, gender, cohort and period effects may differ across medical specialties. It is likely that the magnitude and significance of these effects is moderated by specialty. For example, future analyses may reveal that age-gender-period-cohort effects in specialties such as surgery that have traditionally had fewer women and less flexible practice arrangements are different than in specialties such as family medicine or dermatology.

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<sup>2</sup> American Medical Association. "AMA Announces Physician Shortage." June 21, 2005. Press release available at: <http://www.ama-assn.org/ama/pub/category/15241.html>. Accessed November 20, 2006.

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<sup>4</sup> Goodman DC, Fisher ES. (2008). Physician Workforce Crisis? Wrong Diagnosis, Wrong Prescription. *New England Journal of Medicine*, 358(16): 1658-1661.

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<sup>6</sup> Ibid.

<sup>7</sup> Salsberg E. Medical School Expansion: On Track for a 30% Increase But Only One Part of the Solution. Association of American Medical Colleges Annual Meeting. May 1, 2008; Washington DC.

<sup>8</sup> Kirch DG, Vernon DJ. (2008). Confronting the Complexity of the Physician Workforce Equation. *The Journal of the American Medical Association*, 299(22): 2680-2682.

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