Changes in doctors' working hours: A longitudinal analysis

ABSTRACT

The study examined changes in doctors' working hours and satisfaction with working hours over five-time points and explored the influences of personal characteristics on these outcomes. Latent growth curve modelling was applied to the MABEL (Medicine in Australia: Balancing Employment and Life) data, collected in 2008-2012. Findings showed that working hours significantly declined over time, with a greater decrease among males, older doctors, and doctors with fewer children. Satisfaction increased faster over time among specialists, doctors with poorer health, those whose partners did not work full-time, and those with older children. The more hours the doctors worked initially, the lower satisfaction reported, and the greater the increase in satisfaction. Findings are consistent with a culture change in the medical profession, whereby long working hours are no longer seen as synonymous with professionalism. This is important to take into account in projecting future workforce supply.

Key words: working hours, satisfaction, latent growth curve modeling, MABEL survey, Australian GPs and specialists

INTRODUCTION

The number of hours that doctors choose to work is a key determinant of the level of supply available to provide clinical services to meet the medical needs of the population. A medical workforce shortage, where supply is insufficient to meet demand, can be the result of reduced work effort rather than reduced numbers in the workforce. Medical workforce shortages can have a wide range of negative consequences. For policy-makers, they create challenges for governments in meeting their responsibility to ensure adequate access to health care for the population. For patients, they can result in barriers to accessing care, increasing the risk of insufficient care and preventable complications. For doctors, workforce shortages can contribute to a self-reinforcing cycle of increasing workload and pressure for those who remain in the workforce. If workforce planning is to be effective in ensuring adequate supply, there is a need to monitor, and also to understand the determinants of, doctors' working hours. Furthermore, available data indicates that doctors' working hours are declining over time. In Australia, doctors in 2012 worked 42.7 hours per week on average, compared with 45.2 a decade earlier, and 47.6 in 1997 (Australian Institute of Health and Welfare, 2011). This trend is observed across many high income nations (de Jong, Heiligers, Groenewegen, & Hingstman, 2006). This paper is focused on exploring changes over time in doctors' working hours using longitudinal data from a large cohort of Australian doctors.

New contribution

While existing literature provides some clues as to the key determinants and correlates of doctors' working hours, it also has limitations. Specifically, much of the available data is cross-sectional, and longitudinal data are needed to understand determinants of changes over time. Additionally, there is a paucity of studies employing multivariate explanatory models and/or conceptual frameworks to understand changes in doctors' working hours. Our study is

one of the few which analyses longitudinal data on individuals and uses a conceptual model to not only identify key determinants but to explicate the relationships between them and working hours. We combine a work-life balance model with a gender lens to provide a comprehensive understanding of relevant individual and structural factors.

Conceptual framework

We conceptualise working hours as an indicator of work-life balance. In line with Guest's (2002) formulation, we also include satisfaction with hours of work to capture subjective elements of work-life balance, in acknowledgement of individual differences in preferences about working hours. Guest's model proposes three key sets of factors which determine work-life balance: individual factors, work domain factors, and home domain factors. As depicted in Figure 1, our study includes measures of all three sets.

Figure 1 here

There is strong and consistent empirical evidence about the relationship between individual factors and working hours. On average, female doctors work fewer hours than males (Australian Institute of Health and Welfare, 2014; Boulis & Jacobs, 2008). Working hours also typically change across the life span, but with different patterns for men and women. Australian data indicate that, while male doctors work longer hours on average than females in all age categories, the magnitude of the difference varies (Australian Institute of Health and Welfare, 2014). For males, those aged under 35 work the longest hours (48.8 hours per week), although they are similar to the average hours worked by male doctors aged up to 64 years (46.4-48.0). Females aged under 35 also work the longest hours of all female doctors

(44.7), and the gender difference is smallest in this age group. Females aged 35-44 have lower working hours (35.1), which corresponds to the peak child-bearing and rearing years for university-educated women. From age 65, average working hours for both males and females are markedly lower (Australian Institute of Health and Welfare, 2014).

These observed age differences in cross-sectional data, combined with the observed declines in working hours over time, has led to the proposition that there is a cohort effect, in which younger doctors work fewer hours than their older colleagues did at the same age. This, in turn, is understood as a reflection of a greater focus among younger doctors on work-life balance (Markwell & Wainer, 2009; Shrestha & Joyce, 2011). This is consistent with general conceptualisations of Generation X, who are said to be me-oriented, independent, pragmatic, and sceptical (Lancaster & Stillman, 2003). If the primary explanation for the observed trends in working hours is a cohort effect, longitudinal data should indicate little change within individuals over time, and a marked effect of age.

There is also an established association between working hours and health. Long working hours have been associated with poor lifestyle habits such as heavy smoking, inadequate diet, and lack of exercise (Maruyama & Morimoto, 1996; Spurgeon, Harrington, & Cooper, 1997), which can lead to psychological (e.g., stress, sleepless, and low satisfaction) and physical (e.g., cardiovascular diseases) health problems.

Individual factors are generally thought of as having a direct relationship with working hours. Work-life-balance models, such as Guest's (2002), assume that working hours and work-life balance are matters of personal choice, influenced by individual differences. However, as noted by Lewis and colleagues (2007), such an approach does not account for gender (as

expressed in structural forms) as an influence on such choices. A personal choice model proposes that the gender differences in working hours arise from the different choices women and men make in regard to their work and their careers (Boulis & Jacobs, 2008). This, in turn, is seen to be related to women's tendency to be more caring and sensitive, and their choice to take greater responsibility for care of children, compared to men. The personal choices of women to be more involved in child care are proposed to create greater difficulties in achieving work-life balance, particularly given the demanding nature of medical careers (Boulis & Jacobs, 2008). Thus, women choose to spend fewer hours in paid work.

The personal choice explanation would suggest that there should be no changes observed over time in male doctors' working hours. However, Australian data indicate that decreases in working hours among male doctors are greater than those for females, so that the gender gap is decreasing over time. In the decade between 2001 and 2011, Australian male doctors' average hours decreased by 2.5 hours per week, while their female colleagues decreased by just 0.1 hours (Australian Institute of Health and Welfare, 2011, 2014). These data indicate the need to consider factors in addition to individual factors and personal choice.

Guest's (2002) model includes the work and home domains, and specifies that 'demands' and 'culture' are key elements of both. We propose the gender is a key aspect of the culture in both domains. In the work domain, structural factors act to prevent women from participating as fully as men in the medical workforce. These may include low availability or low effectiveness of policies or strategies to support mothers' participation in the workforce, and gender role expectations around caring responsibilities. Highly qualified women such as doctors are likely to be partnered to similar men, with demanding professional careers, but

despite this, women who work usually still have primary responsibility for care of children (Crompton & Lyonette, 2011).

Another key element of 'culture' within the medical work domain is the notion of 'professionalism'. The medical culture has traditionally valued long hours as a key signifier of professional dedication. The presence of women in the workforce, and particularly a critical mass of women, may change the norms so that a culture change occurs within the profession (Jones & Green, 2006), and long working hours are no longer regarded as standard. Women comprised 38% of the Australian medical workforce in 2011, up from 28% in 1997 (Australian Institute of Health and Welfare, 2011, 2014). Women's participation in medicine continues to be unevenly distributed, with 41% of GP workforce female compared to 26% of the specialist workforce (Australian Institute of Health and Welfare, 2014). Similar patterns are evident in comparable high income countries (Boulis & Jacobs, 2008). Medical specialty fields with higher proportions of women (for example, general practice, paediatrics, geriatrics, rehabilitation medicine (Health Workforce Australia, 2012)) are characterised by shorter and flexible hours, and more control/predictability over hours. In Australia, general practitioners (GPs) work fewer hours per week on average (39.1) than specialists (44.7; Australian Institute of Health and Welfare, 2014). Specialties such as surgery, which are regarded as high status and are the highest paid (Creed, Searle, & Rogers, 2010), have the lowest proportions of women. It is not possible to determine from the available cross-sectional data whether women are attracted to particular fields because of these characteristics, or whether a stronger presence of women impacts on them.

In the home domain, we include measures of the number of children, the age of the youngest child, and partner's employment, as indicators of demands and culture. Our model highlights

that individual factors may relate to working hours not only in a direct fashion, but also via their influence on the culture of the work and home domains. In other words, we propose that the changing composition of the medical workforce (increasing proportions of women; entry of new generations) is changing the professional culture within medicine, which in turn is influencing patterns of working hours.

The objective of this study was to examine the process of change in doctors working hours and their satisfaction with working hours over five time points; and to assess the factors that explain the change patterns. A number of specific hypotheses are suggested by our conceptual framework: (1) that all doctors are reducing their working hours over time; (2) that a cohort effect is also evident, with generation X doctors working fewer hours than baby boomers; and (3) that GPs hours are reducing at a faster rate than specialists.

METHODS

Participants and design

Data from the Medicine in Australia: Balancing Employment and Life (MABEL) longitudinal survey of doctors were used for this study. The methods for the study have previously been published (Joyce et al., 2010). In brief, doctors listed on the *Medical Directory of Australia* (Australian Medical Publishing Company, 2013) were invited to participate at baseline in 2008. In subsequent annual waves, previous respondents plus annual top-up samples were surveyed (Yan et al., 2011). Doctors could choose to complete a paper copy of the questionnaire or an online version through the secure study website. The MABEL study includes all four types of clinicians: general practitioners (GPs), specialists, specialists in training, and hospital non-specialists. In the present study, only the first two categories of doctor (GPs and specialists), representing fully qualified doctors, were included. Doctors in

these categories have more choice over their hours of work, in comparison to the latter two categories, which are largely comprised of doctors in training. A total of 8,183 GPs and specialists were enrolled into the MABEL study in Wave 1 (2008). Given that we are interested in analysing changes in working hours and job satisfaction over time, we limit the sample to doctors who completed all five waves of the survey (2008-2012). After excluding missing data arising from unit and item nonresponse, we arrive at a final analysis sample of 2,319 doctors, with a total of 11,595 person-observations. The study was approved by the Faculty of Economics and Commerce Human Ethics Advisory Group, University of Melbourne and the Monash University Standing Committee on Ethics in Research Involving Humans.

Measures

Total working hours was measured by a single question “Excluding on-call, how many HOURS in your MOST RECENT USUAL WEEK at work did you spend on the following activities? TOTAL HOURS WORKED PER WEEK”. This continuous variable was measured annually from wave 1 to wave 5.

Satisfaction with working hours was measured by one of the items in a revised version of the Warr-Cook-Wall Job Satisfaction Questionnaire (Warr, Cook, & Wall, 1979). The scale includes ten items to which participants are asked to respond as follows: “Please indicate how satisfied or dissatisfied you are with each of the various aspects of your work as a doctor”. The item for satisfaction with “Your hours of work” was included in the analyses for this study. This item was measured repeatedly over the five-time points and anchored on a five-point scale ranging from 0 (very dissatisfied) to 4 (very satisfied). Although the scale is not

strictly considered as a continuous variable, it was assumed that the underlying property is continuous in nature.

Covariates Seven covariates assessed at wave 1 were considered: age, gender, doctor type, general health status, partner's employment status, number of dependent children, and the age of the youngest child. Age was continuous variable used in the analysis. Gender was coded as 0 (male) and 1 (female), and doctor type as 1 (GP) and 2 (specialist). Doctors' general health status was measured by the item "In general, would you say your health is:" with responses on a 5-point Likert scale from 0 (excellent) to 4 (poor). Partner's employment status was categorised as *not in labour force*, *currently seeking work*, *full-time employment*, *part-time employment*, and *not applicable* that was recoded as 0 (others) and 1 (full-time employment). Number of dependent children was counted as 0, 1, 2, and 3+. The age of the youngest child was continuous between 0 and 22+ years.

Statistical analyses

Latent growth curve modelling (LGCM) allows investigation of differences in change over time and explores the predictors of individual differences (B. Muthén & Curran, 1997).

LGCM can be considered an extension of repeated measures analysis of variance. It models factor means, factor variances and covariances. LGCM factors include intercept and slope.

Intercept factor represents the constant level score of the time series and slope factor captures the changing portion of the time series. In the present study, LGCM was used with a

continuous observed outcome variable of total working hours and an ordered observed outcome variable of satisfaction with working hours measured at five time points (w1, w2, w3, w4, w5). Individual differences in growth were captured in the variances of the initial status factor (intercept) and the growth rate factor (slope). The latent intercept factors were

centred relative to scores at the first time-point. The linear slopes represent the functional form of the growth trajectories across the five time-points.

Seven covariates were included to account for variability in the growth factors (Duncan & Duncan, 1996): age, gender, doctor type, general health status, partner's employment status, number of dependent children, and the age of the youngest child. The latent growth factors were regressed on these individual background variables. A parallel processes model (a structural equation model composed of two latent growth models ie. total working hours and satisfaction with working hours) with paths among the growth factors and from covariates was hypothesized.

Figure 2 shows the proposed linear growth model with the unstandardized coefficients. The intercepts are identified by the constant loadings of 1 going to each repeated measure. The slopes are indicated by fixing the paths at 0, 1, 2, 3, and 4, with the first wave or baseline represented by zero, and the repeated observed variables measured each subsequent year scored 1 through 4.

The analysis was carried out by Mplus 7.1 (L. K. Muthén & Muthén, 1998-2013) and the **LGCM** model was estimated by robust maximum likelihood (MLR) procedures to account for non-normally distributed data. Model fit was evaluated with chi-square statistic, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean-square error of approximation (RMSEA), and standardised root mean-square residual (SRMR). The **proposed LGCM model** was considered to **provide a good description of the data** when the following criteria were met: chi-square or scaling correction probability $p > 0.05$, RMSEA < 0.05 , SRMR < 0.05 , CFI > 0.95 , and TLI > 0.95 .

RESULTS

For the purpose of generation comparisons, age was categorised as generation X – doctors born between 1965 and 1979 (29-43 years), baby boomers – doctors born between 1946 and 1964 (44-62 years), and the older generation – doctors born before 1945 (63 years and over). The final sample was mostly male, of the baby-boomer generation, and in good health (Table 1). Almost all doctors (98.2%) are parents, and over one-third have partners who work full time. Average working hours at baseline was 43.13 hours per week, while the average satisfaction with working hours was 2.58, representing relatively good satisfaction (Table 1).

Table 1 here

The fit statistics suggested that the proposed parallel process LGCM without covariates fitted the data well as indicated by non-significant chi-square statistics, $\chi^2(41) = 114.42, p = 0.00$ with a scaling correction for MLR $p = 1.31$. The other fit indices were all in the desired range: CFI = 0.99, TLI = 0.99, RMSEA = 0.03 (90% CI: 0.02, 0.03), and SRMR = 0.02. Moreover, the LGCM with covariates (Figure 2) also fitted the data well: $\chi^2(83) = 186.02, p = 0.00$ with a scaling correction for MLR $p = 1.17$, CFI = 0.99, TLI = 0.99, RMSEA = 0.02 (90% CI: 0.02, 0.03), and SRMR = 0.01.

Figure 2 here

Total working hours

As shown in Table 2, the model without covariates estimated an average total working hours at the baseline of 43.04 per week (the Intercept), with a small but significant decrease of 0.14 on average (the Slope) over the subsequent 4 years. Additionally, the variance of the intercept and slope factors of the total working hours were significant, indicating significant individual differences at the initial working hours and in change trajectories over time, respectively. There was a negative relationship between initial level and growth in total working hours over time ($r = -5.22, p < 0.01$), indicating that the more hours the doctors worked at the baseline, the steeper the decline in working hours over time.

Table 2 here

The personal and professional characteristics of doctors play an important role in explaining working hours at baseline and the change over time. Age negatively influenced the rate of change in total working hours ($\beta = -0.04, p < 0.01$). This suggests that as age increased, the steeper the decline in total working hours. A post hoc test of repeated measure ANOVA showed that on average, the older generation worked significantly less hours per week (38.47 hours) than baby boomers (44.70 hours). Older generation doctors worked around 43 hours per week at baseline and had a dramatic decrease of almost 10 hours per week over the 5 year period (see Figure 3).

Figure 3 here

Gender positively influenced the rate of change in total working hours ($\beta = 0.61, p < 0.01$) but negatively impacted on total working hours at baseline ($\beta = -13.95, p < 0.01$), which indicates that males doctors worked more hours at baseline and had a greater decline in total working hours over time compared to females.

Specialists worked more hours at the baseline than GPs ($\beta = 3.92, p < 0.01$), and doctors who reported poor health worked more hours at the baseline ($\beta = 0.95, p < 0.01$).

Doctors who reported that their partner was not in full time employment ($\beta = -2.18, p < 0.01$), those who had more dependent children ($\beta = 1.27, p < 0.01$), and those whose youngest child was older ($\beta = 0.49, p < 0.01$) worked more hours at the baseline ($\beta = -2.18, p < 0.01$). In addition, as the number of dependent children increased, the rate of decline in working hours slowed.

Satisfaction with working hours

The estimated satisfaction with working hours at baseline in the model was 2.61 ($p < 0.01$) and this score increased, on average by 0.05 over the following 4 years. This finding implies that over time, doctors' satisfaction levels were gradually, but significantly increased. In addition, the variance of the intercept and slope factors of satisfaction with working hours were significant, indicating significant individual differences at the initial level and in growth trajectories of satisfaction over time. A negative association was found between initial level and growth in satisfaction with working hours over time ($r = -0.06, p < 0.01$), showing that the more satisfied they were at the baseline, the slower the increase in satisfaction over time (see Table 2).

When the covariates were introduced into the model, gender positively influenced satisfaction at baseline ($\beta = 0.37, p < 0.01$). This indicates that female doctors reported higher levels of satisfaction at baseline, compared to males.

GPs had higher levels of satisfaction with working hours at the baseline ($\beta = -0.20, p < 0.01$), as did doctors reporting better health ($\beta = -0.28, p < 0.01$). However, GPs ($\beta = 0.02, p < 0.01$) and doctors reporting better health ($\beta = 0.01, p < 0.01$) had slower increases over time in satisfaction with working hours.

Lower satisfaction at baseline was observed for doctors with partners not in full time employment ($\beta = 0.19, p < 0.01$), those with more dependent children ($\beta = -0.12, p < 0.01$) and those whose youngest child was older ($\beta = -0.03, p < 0.01$). Satisfaction increased less over time among those with partners in full time employment ($\beta = -0.05, p < 0.01$), and more over time for those whose youngest child was older ($\beta = 0.00, p < 0.01$).

Associations between the growth factors of working hours and satisfaction

Findings show a negative relationship between initial total working hours and initial satisfaction with working hours was significant ($r = -5.50, p < 0.01$), indicating that the more hours the doctors worked initially, the lower levels of satisfaction at baseline they reported. Similarly, a negative association ($r = -0.14, p < 0.01$) was found between both slope factors (ie. satisfaction and total working hours), showing that a higher rate of rising satisfaction was related to a steeper decline in total working hours.

Furthermore, there was a positive association between the initial level of working hours and the rate of change in satisfaction ($r = 0.26, p < 0.01$), indicating that the more hours that doctors worked at baseline, the greater the increase in satisfaction over time. There was also a

positive association between satisfaction at baseline and the rate of change in working hours ($r = 0.26, p < 0.01$), indicating that a higher level of satisfaction at baseline was associated with a slower decline in working hours over time (see Table 3).

Table 3 here

DISCUSSION

This analysis of a large cohort of Australian doctors shows that individual doctors reduced their working hours over a five year period. **This supports our first hypothesis, that doctors across the board are reducing their working hours.** Longer working hours at baseline were observed among older doctors, male doctors, specialists, and those reporting poor health, those whose partners did not work full time, those with more children, and those with older children. Furthermore, longer hours at baseline were associated with larger decreases over time. Male doctors reduced their hours more than female doctors, older doctors reduced theirs more than younger doctors, and doctors with fewer children reduced theirs more than doctors with more children. These findings are consistent with previous literature, and shed further light on the observed trends.

Family circumstances were significant factors in working hours over time, which is consistent with **our conceptual model and with** the broader literature on the economics of the family and labour supply (Browning, Chiappori, & Weiss, 2014). Marital status have been shown to have a strong influence on the allocation of work time in which married men work more in the labour market, while married women work less. This stems in a large part from the division of labour between married partners whereby women play a larger role in

household production, and men in the labour market. Similar patterns have been observed within the medical profession on the role of marriage and parenthood on working hours (Sasser, 2005; Schurer, Kuehle, Scott, & Cheng, 2012; Wang & Sweetman, 2013).

In relation to our second hypothesis, our analysis indicated that both baby boomers and the older generation worked more than their generation X colleagues at baseline, and that both older cohorts' hours declined more than generation X doctors over time. This is consistent with our hypothesis of a cohort effect. The greater value placed on work-life balance among generation X doctors (Markwell & Wainer, 2009; Shrestha & Joyce, 2011) is reflected in the observed pattern of working fewer hours at the start, and continuing to do so over time. It seems plausible that generation X doctors will never reach the level of working hours that have been commonplace for their older colleagues, which those same colleagues are now reducing.

Our third hypothesis, that GPs' working hours are reducing at a faster rate than specialists, was not supported. We don't find an effect of doctor type and this may be because gender is also included in analysis. We did find, consistent with other studies, that GPs worked fewer hours than specialists at baseline. Our hypothesis was based on the assumption that the higher proportion of women in general practice would influence trends in working hours. Our results suggest that while gender may be one important feature of the professional culture, which in turn influences working hours, there are other factors at play. Some structural features in particular specialty fields constrain choices about working hours. Our study did not examine individual specialty fields, between which there is likely to be significant variation.

Notwithstanding the lack of support for our third hypothesis, there are nevertheless several findings which are at least consistent with the notion of a changing professional culture in the medical profession (and more specifically that long working hours are no longer inexorably associated with good professional practice). First, the overall decline in individual working hours is suggestive of a generalised trend rather than an issue affecting only some sections of the workforce. Second, the larger reductions in male compared to female working hours is consistent with the thesis of a changing professional culture. It is possible that there is some ceiling effect on male doctors' working hours, although the fact that they were historically higher than they were at baseline in our study gives some confidence that this is not the only explanation. Finally, the inverse relationship between working hours and satisfaction with working hours is also consistent with changing professional norms. The more hours the doctors worked initially, the lower levels of satisfaction they reported, and the more they decreased their working hours over time, the greater the increase in their satisfaction.

Implications

In summary, it appears that, in addition to the increasing proportions of women in the medical workforce, both a cohort effect of generation X attitudes and possibly changing professional norms are contributing to continued declines in doctors' working hours.

Identifying these as the explanatory factors highlights that such declines are likely to continue into the future, and that reductions in the gender gap are likely to take the form of male doctors reducing their hours rather than female doctors increasing theirs. This has important implications for workforce planning. The same number of doctors will translate into progressively fewer full-time-equivalent doctors.

Furthermore, reductions in working hours are also being influenced by industry standards and regulations, in part influenced by quality and safety concerns associated with long hours.

These concerns have focused on the experiences of junior doctors in particular. The European Working Time Directive restricts working hours to 48 hours per week in all industries including medicine, and was implemented in the National Health Service in the UK in a phased manner from 2004 (Maisonneuve, Lambert, & Goldacre, 2014). In the United States, limits on weekly working hours and shift length for junior doctors have been introduced (Axelrod, Shah, & Jena, 2013). In Australia, there has been an industry self-regulation approach, with the Australian Medical Association developing a voluntary National Code of Practice to guide safe working practices for hospital-employed doctors (Australian Medical Association, 2002). These factors add further impetus to the reductions in doctors working hours over time.

For governments, the clear implication is that a larger number of doctors will need to be trained to maintain a supply sufficient to meet the current and future demand for medical care. Alternatively, other innovative solutions such as substitution, demand management, or new models of care may be required.

At the organisational level, it is likely that a greater number of people will need to be employed to provide the same volume of services. This adds costs, as well as complexity in managing task sharing, roster allocations, continuity and coordination of care, and so forth. Such complexities have been observed as the European Working Time Directive has been implemented in the UK (General Medical Council, 2011).

For doctors, reduced working hours may have positive impacts on their own health and job satisfaction, and therefore on workforce retention. If the number of new entrants to the workforce is insufficient and no alternative strategies are put in place, there is also the potential to increase workload pressure on doctors to meet demand.

For patients, reductions in doctors' working hours have the potential to impact negatively on access to care, again underlining the importance of a coordinated policy response to avert such impacts. Patients may also find a different experience of care, if more individuals are involved, and their preferred providers are less accessible than previously.

Limitations

An important limitation with our study is the question of how representative our sample is compared to the population of qualified Australian doctors. There are some data from the national medical labour force survey for the population of Australian GPs and specialists in 2008 available for comparison. Our sample was 65% male, compared to 69% in the population; and 38% were GPs compared to 52% in the population (Australian Institute of Health and Welfare, 2010). In terms of age, 36% of Australian GPs and specialists in 2008 were aged less than 45 years; compared to 25% aged under 44 in our sample; 54% of the population were aged 45-64 compared to 63% aged 44-62 in our sample; and 10% of the population were aged 65 plus compared to 11% aged 63 plus in our sample (Australian Institute of Health and Welfare, 2010). These data suggest that our sample under-represents GPs and younger doctors to some extent. A related issue is the changing composition of the sample due to sample attrition over time. GPs and specialists who are male, have lower number of years of work experience, and are trained overseas are more likely to drop out of the survey. It has been shown however that sample attrition does not appear to have a

significant impact on the analysis of doctors' earnings (Cheng & Trivedi, 2014). While our study therefore provides a good explanation of the factors influencing changing work hours among middle-aged doctors, it may be less informative about the factors of importance for generation X doctors. Future research may usefully explore the experiences and expectations of generation X doctors in more detail.

We are also limited in being unable to draw conclusions about different specialist fields. There are likely to be important differences between fields within our "specialist" group (e.g., surgery compared to psychiatry), but we have not explored these in the current study. It would be of particular interest and value to investigate the professional cultures of different medical specialties and how these relate to working hours.

Finally, the outcome measures used were single items and, as such, may have limited content and construct validity. They do have good face validity and the job satisfaction measure comes from a well-known and widely-used job satisfaction scale.

Conclusion

The shift to shorter working hours in the medical profession is challenging. For some older doctors who worked through the times when long hours were the very essence of professional dedication, it can appear to denote a lack of commitment or professionalism. But the trend is here to stay. The health system, from planners to employing organisations, the profession of medicine and patients, will need to adapt their expectations and their systems to ensure that health care needs can continue to be met in these changing times.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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Table 1 Descriptive statistics for the sample

Background variable (wave 1)		%	
Age (years)	Generation X: 29-43 years	28.6	
	Baby boomers: 44-62 years	68.3	
	Older generation: 63 years & over	3.1	
Gender	Male (0)	62.6	
	Female (1)	37.4	
Doctor type	GP (0)	46.1	
	Specialist (1)	53.9	
Health status	Excellent (0)	36.4	
	very good (1)	38.4	
	Good (2)	18.5	
	Fair (3)	6.1	
	Poor (4)	0.7	
Partner's employment status	Else (0)	63.6	
	Full time (1)	36.4	
Number of dependent children	0	1.8	
	1	19.9	
	2	40.5	
	3+	37.8	
Age of youngest child^a	mean (sd)	10.18 (6.19)	
		<i>M</i>	<i>SD</i>
Total working hours			
w1		43.13	15.57
w2		42.81	14.48

w3	42.80	14.58
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w4	42.51	14.24
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w5	42.54	14.55
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Satisfaction with working hours

w1	2.58	1.23
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w2	2.69	1.16
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w3	2.74	1.14
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w4	2.79	1.11
----	------	------

w5	2.81	1.11
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^abetween 0 and 21 year old

Table 2 Parameter estimates using LGCM

	Total working hours		Satisfaction with working hours	
	Intercept	Slope	Intercept	Slope
-- Model without covariates --				
Mean	43.04 (0.30)**	-0.14 (0.05)**	2.61 (0.02)**	0.05 (0.01)**
Variance	184.80 (6.31)**	2.00 (0.32)**	0.93 (0.04)**	0.02 (0.00)**
Covariance	-5.22 (0.91)**		-0.06 (0.01)**	
-- Model with covariates --				
Mean	38.29 (2.46)**	1.45 (0.54)**	3.28 (0.20)**	-0.04 (0.05)
Variance	110.93 (4.66)**	1.71 (0.30)**	0.76 (0.03)**	0.02 (0.00)**
Covariance	-1.32 (0.76)		-0.04 (0.01)**	
Gender	-13.95 (0.61)**	0.61 (0.12)**	0.37 (0.05)**	-0.02 (0.01)
Age	-0.09 (0.06)	-0.04 (0.01)**	0.01 (0.00)	0.00 (0.00)
Doctor type: Specialist	3.92 (0.52)**	-0.14 (0.11)	-0.20 (0.05)**	0.02 (0.01)*
Health status	0.95 (0.29)**	0.03 (0.06)	-0.28 (0.03)**	0.01 (0.01)*
Partner's employment	-2.18 (0.60)**	0.11 (0.13)	0.19 (0.05)**	-0.05 (0.01)**

Number of	1.27 (0.33)**	0.13 (0.06)*	-0.12	0.01 (0.01)
dependent children			(0.03)**	
Age of youngest	0.49 (0.07)**	-0.03 (0.01)	-0.03	0.00 (0.00)*
child			(0.01)**	

Note. Values in parentheses are standard errors of the estimates.

* $p < .05$, ** $p < .01$

Table 3 Associations between the growth factors

	Initial working hours	Rate change of working hours
Initial level of job satisfaction	-5.50 (0.28)**	0.26 (0.05)**
Rate change of job satisfaction	0.26 (0.06)**	-0.14 (0.02)**

Note. Values in parentheses are standard errors of the estimates. ** $p < .01$

Figure 1 Conceptual model of influences on hours worked and satisfaction with hours worked

Figure 2 A hypothetical latent parallel growth model of total working hours and satisfaction with working hours among GPs and specialists.

Figure 3 Working hours by age cohort

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