Social Science & Medicine 339 (2023) 116381

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

The stability of physicians' risk attitudes across time and domains

Xuemin Zhu [a,d,*], Marjon van der Pol [a], Anthony Scott [b], Julia Allan [c]

[a] Health Economics Research Unit, University of Aberdeen, Polwarth Building Foresterhill, Aberdeen, AB25 2ZD, UK
[b] Melbourne Institute of Applied Economic and Social Research, University of Melbourne, Grattan Street, Parkville, Victoria, 3010, Australia
[c] Health Psychology, University of Aberdeen, Health Sciences Building, Foresterhill, Aberdeen, AB25 2ZD, UK
[d] Health Economics Research Centre, Nuffield Department of Population Health, University of Oxford, OX7 7LF, UK

ARTICLE INFO

Handling Editor: Joanna Coast

Keywords:
Risk attitudes
Physicians
Negative life events
Stability
Domain-specificity

ABSTRACT

Risk attitude is known to influence physicians' decision-making under uncertainty. Research on the risk attitudes of physicians is therefore important in facilitating a better understanding of physicians' decisions. However, little is known about the stability of physicians' risk attitudes across domains. Using five waves of data from a prospective panel study of Australian physicians from 2013 to 2017, we explored the stability of risk attitudes over a four-year period and examined the association between negative life events and risk attitudes among 4417 physicians. Further, we tested the stability of risk attitude across three domains most relevant to a physician's career and clinical decision-making (financial, career and clinical). The results showed that risk attitude was stable over time at both the mean and individual levels but the correlation between domains was modest. There were no significant associations between negative life events and risk attitude changes in all three domains. These findings suggest that risk attitude can be assumed to be constant but domain-specificity needs to be considered in analyses of physician decision-making.

1. Introduction

Risk attitude, how sensitive an individual is to risk, is a key determinant of decision-making under uncertainty. Individual risk attitudes are associated with a range of decision-making and life outcomes (Barsky et al., 1997; Yamano and Tanaka, 2015). The risk attitudes of physicians are of particular interest as nearly all clinical decisions involve uncertainty. Due to information asymmetry physicians often make decisions on behalf of patients. As the risk attitudes of patients are not easily observed physicians are likely to apply their own risk attitudes when making treatment recommendations. Further, many career decisions for physicians involve uncertainty. For example, physicians in training need to choose amongst several specialities that vary in risk. Empirical evidence suggests that risk-averse physicians/medical students prefer surgical specialities (Borracci et al., 2021), the private sector (Scott et al., 2020), order more laboratory tests (Cheng et al., 2018; Holtgrave et al., 1991; Pedersen et al., 2015; Pines et al., 2009), admit more patients (Franks et al., 2000; Pearson et al., 1995; Pines et al., 2010) and use more resources (Allison et al., 1998; Fiscella et al., 2000). Research on the risk attitudes of physicians is therefore important and can facilitate a better understanding of physicians' clinical and career decisions. This is of particular interest given the current pressures on healthcare systems and the healthcare workforce across many countries.

Standard economics assumes that an individual's risk attitude is constant over time and domains. This assumption has been challenged in recent years. Empirical studies suggest that risk aversion in adults increases with age (Dohmen et al., 2011; Liu et al., 2022; Schurer, 2015), financial crises (Guiso et al., 2013) and economic downturns (Malmendier and Nagel, 2011). However, empirical studies about the direction in which risk attitudes were affected by shocks such as natural disasters, violent conflicts and health events are unclear (Chuang and Schechter, 2015). Several studies found that risk aversion increased after a natural disaster, violent conflict and health events (Callen et al., 2014; Cameron and Shah, 2015; Cassar et al., 2017; Chantarat et al., 2015; Decker and Schmitz, 2016; Kim and Lee, 2014; Moya, 2018), whilst others found that risk aversion decreased (Bchir et al., 2015; Hanaoka et al., 2014; Ingwersen, 2014; Page et al., 2014; Said et al., 2015; Voors et al., 2012) as well as no clear evidence (Chuang and Schechter, 2015; Kettlewell, 2019; Marsaudon, 2019; Sahm, 2012). Most previous studies focus on the stability of risk attitudes among the general population and to our knowledge no research has been

* Corresponding author. Health Economics Research Centre, Nuffield Department of Population Health, University of Oxford, Richard Doll Building, Old Road Campus, Oxford, OX7 7LF, UK.

E-mail address: xuemin.zhu@ndph.ox.ac.uk (X. Zhu).

https://doi.org/10.1016/j.socscimed.2023.116381
Received 2 June 2023; Received in revised form 18 October 2023; Accepted 27 October 2023
Available online 8 November 2023

conducted among physicians. Physicians may have different risk attitudes due to self-selecting into a profession which involves risky decision-making. Risk attitudes of physicians may also be shaped by medical training and repeated clinical decision-making. The temporal stability of risk attitudes may therefore vary compared to the general population. If physicians' risk attitudes are not constant over time, any analysis examining the associations between risk attitude and physician decision-making needs to take into account the dynamic nature of preferences over time. Furthermore, the stability of physicians' risk attitudes is important when designing policies and interventions to attract and retain physicians to certain roles, for instance, when trying to improve the job match quality by matching the characteristics of the physician (their risk attitude) to the characteristics of the role (level of risk). If risk attitudes are not stable but change as a result of clinical experience then policies aimed at career transitions should take into account changes. For example, if physicians become more risk-averse over time then policies need to be developed to reduce the uncertainty associated with more senior roles.

In addition to the temporal instability, psychology and economics literature has increasingly suggested that risk attitudes are domain-specific (Einav et al., 2012; Hanoch et al., 2006; MacCrimmon and Wehrung, 1990; van der Pol and Ruggeri, 2008; Weber et al., 2002). Empirical evidence shows that the correlation between within-subject decision-making in different risky domains, such as gambling, investment, social and career, is small (Anderson and Mellor, 2009; Galizzi et al., 2016). Self-reported risk-taking propensity in different domains is not always the same (Ding et al., 2010; Dohmen et al., 2011; Hanoch et al., 2006; Weber et al., 2002) and risk attitude measured in one domain has little predictive power for risk-taking behaviour in other domains (Barsky et al., 1997; Dohmen et al., 2011; Guiso and Paiella, 2005; Picone et al., 2004; Weber and Johnson, 2009). Little is known to what extent physicians' risk attitudes are domain-specific. This is important when trying to understand how a physician's risk attitude influences decisions across domains such as the clinical and career domains.

This paper aims to explore the stability of risk attitudes in physicians over time and across domains. We use data from a longitudinal survey of physicians: Medicine in Australia: Balancing Employment and Life (MABEL). It is broadly representative of the Australian medical workforce and contains detailed information on personal, family and practice characteristics (Szawlowski et al., 2020). This paper exploits the longitudinal nature of the data and tests whether physicians' risk attitudes are stable at the mean and individual levels over time. The temporal stability of risk attitude is further tested by examining the association between negative life events and risk attitude changes. This paper also examines whether risk attitude is stable across three domains most relevant to physician's decision-making: financial, career and clinical.

2. Methods

2.1. Data

This paper uses data from the MABEL survey, a prospective panel study of workforce participation, labour supply and its determinants among Australian physicians. MABEL is a self-completed survey collecting comprehensive information on the Australian medical workforce including current working status, job satisfaction, workplace, workload, finances, geographic location, family circumstances, and personal characteristics. In 2008 (wave 1), MABEL invited all contactable medical practitioners in the Medical Directory of Australia (54,750) and received responses from 10,498 physicians. These are followed up annually, in addition to new physician cohorts being added to each wave. Each annual wave has around 10,000 respondents. Broadly, MABEL is representative of the Australian physician population in terms of age, gender, location, hours worked and physician type (Szawlowski et al., 2020). In total, MABEL collected information on physicians' risk attitudes across five waves (waves 6 to 10; 2013–2017) and negative life events across eight waves (waves 4 to 11; 2011–2018). The main analyses are restricted to physicians who answered wave 6 and 10 risk attitude questions and who provided complete information about life events in waves 7, 8, 9 and 10 and physician characteristics in wave 6. This results in a panel of 4417 physicians. The study is approved by The University of Melbourne Faculty of Business and Economics Human Ethics Advisory Group (Ref. 0709559) and the Monash University Standing Committee on Ethics in Research Involving Humans (Ref: 195535 CF07/1102–2007000291).

2.1.1. Risk attitudes

In the economics literature, risk attitudes are usually measured using lotteries in laboratory experiments. However, these experiments can be cognitively complex, time-consuming and costly. Consequently, self-reported risk propensity measures have become popular. These are considered proxies for risk attitudes and have been shown to be correlated with risk attitudes elicited in lottery experiments (Dohmen et al., 2011). The risk attitude measures included in MABEL are self-reports (Fig. 1). The domain-specific MABEL Risk Attitudes Scale was developed using the Risk Propensity Scale proposed by Nicholson et al. (2005) and applying it to the context of physician behaviours. The measure asks physicians about their everyday risk-taking on a scale from zero (very unlikely) to five (very likely), in three different domains: financial (e.g., investment with an uncertain outcome), career and professional (e.g., publicly challenging your professional colleagues), and clinical domains (e.g., recommending a treatment that is new to your usual practice or is controversial). The MABEL Risk Attitudes Scale has been shown to be associated with prescribing decisions and General Practitioners (GPs) migration (Mendez et al., 2021; van der Pol et al., 2019; Zhang et al., 2019).

2.1.2. Negative life events

MABEL collects information on negative personal life events that happened in the past 12 months (Fig. 2). The life events questions are based on the Household, Income, and Labour Dynamics in Australia (HILDA) survey and incorporate additional events that are likely to be unique and influential to physicians' work and life balance. These include serious personal injury or illness to self, serious personal injury or illness to a close relative or family member (e.g., parent or sibling), death of spouse or child, death of other close relative or family member, death of a close friend, being a victim of physical violence (e.g., assault), being a victim of property crime (e.g., theft, housebreaking), and being named as a defendant in a medical negligence claim.

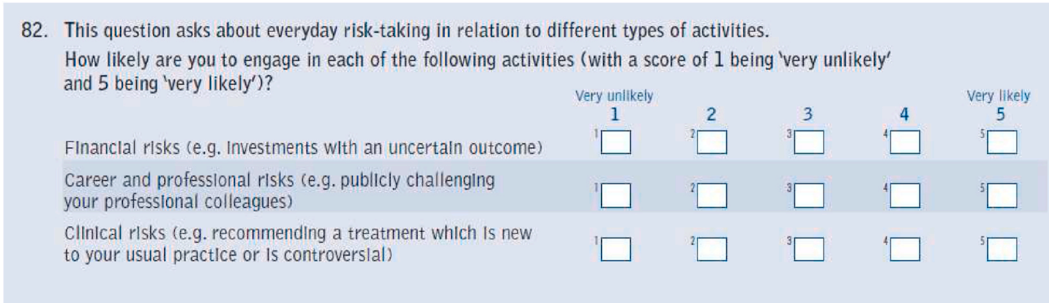
2.2. Empirical strategy

We examine the mean-level stability over time and across domains, individual-level stability over time and the associations between life events and risk attitude changes.

2.2.1. Mean-level stability

The correlation of risk attitudes across domains is investigated through Pearson's correlation (Bonett and Wright, 2000). Usually the correlation coefficient is considered to be small if Pearson's correlation coefficient is between 0.1 and 0.3, modest if between 0.3 and 0.5, and large if it is more than 0.5 (Cohen, 1988a). It is tested whether the mean difference in risk attitude between domains is statistically significant using Hotelling's T-squared statistic (Hotelling, 1931).

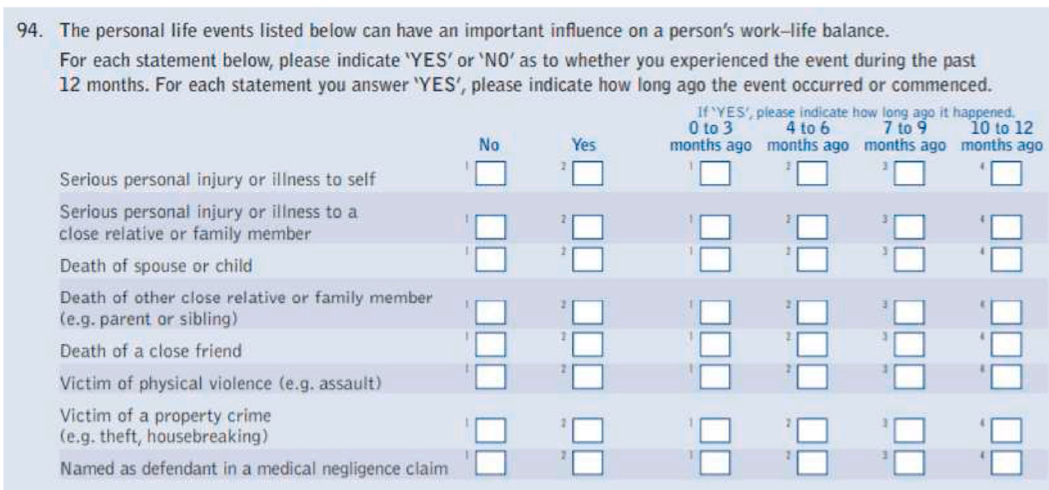
Changes in risk attitude over a four-year period (the longest time available with these data) are calculated for each physician, i, by comparing the responses in risk attitudes (RA) between wave 6 and wave 10: $\Delta RA_i^j = RA_{i,10}^j - RA_{i,6}^j$, where j defines the domain of the MABEL risk attitudes scale: financial, career and professional, and clinical. The stability in risk attitudes is assessed by comparing



82. This question asks about everyday risk-taking in relation to different types of activities.
How likely are you to engage in each of the following activities (with a score of 1 being 'very unlikely' and 5 being 'very likely')?

	Very unlikely 1	2	3	4	Very likely 5
Financial risks (e.g. investments with an uncertain outcome)	☐	☐	☐	☐	☐
Career and professional risks (e.g. publicly challenging your professional colleagues)	☐	☐	☐	☐	☐
Clinical risks (e.g. recommending a treatment which is new to your usual practice or is controversial)	☐	☐	☐	☐	☐

Fig. 1. Risk attitude measure used in the MABEL survey.



94. The personal life events listed below can have an important influence on a person's work–life balance.
For each statement below, please indicate 'YES' or 'NO' as to whether you experienced the event during the past 12 months. For each statement you answer 'YES', please indicate how long ago the event occurred or commenced.

	No	Yes	If 'YES', please indicate how long ago it happened. 0 to 3 months ago	4 to 6 months ago	7 to 9 months ago	10 to 12 months ago
Serious personal injury or illness to self	☐	☐	☐	☐	☐	☐
Serious personal injury or illness to a close relative or family member	☐	☐	☐	☐	☐	☐
Death of spouse or child	☐	☐	☐	☐	☐	☐
Death of other close relative or family member (e.g. parent or sibling)	☐	☐	☐	☐	☐	☐
Death of a close friend	☐	☐	☐	☐	☐	☐
Victim of physical violence (e.g. assault)	☐	☐	☐	☐	☐	☐
Victim of a property crime (e.g. theft, housebreaking)	☐	☐	☐	☐	☐	☐
Named as defendant in a medical negligence claim	☐	☐	☐	☐	☐	☐

Fig. 2. Life events measure used in the MABEL survey.

standardised differences in means using Cohen's d effect size (Sullivan and Feinn, 2012). This is the difference between two risk attitudes means (μ) divided by the standard deviation of the pooled data, $(\mu_{10}^{j} - \mu_{6}^{j})/SD_{pooled}$. Usually the effect size is considered to be small if the Cohen's d is between 0.2 and 0.5, medium if between 0.5 and 0.8, and large if it is more than 0.8 (Cohen, 1988b). We also pool observations from all waves and examine risk attitude changes between observed wave t and wave p (t, p = 6,7,8,9,10 and $t \neq p$) to see whether there is a difference between short-term and long-term changes.

To explore the risk attitude changes across subgroups, Cohen's d effect sizes are plotted against age categories (under 35, 35–39, 40–44, 45–49, 50–54, 55–59, 60+), gender and physician types (GPs and GP registrars, specialists, hospital non-specialists and specialist registrars in vocational training programs). To ensure a sufficient sample size, specialists and specialists-in-training are grouped and compared with GPs, leaving out hospital non-specialists as the sample size is too small to conduct valid analyses. This combination is only used for the graph analyses here.

2.2.2. Individual-level stability

Some physicians may have become less likely to engage in risky activities between waves whilst others may have become more likely to engage in risky activities and this may result in limited changes at the mean level. The Reliable Change Index (RCI), used extensively in psychometrics (Guhn et al., 2014), is applied to assess whether changes over time are larger than could be reasonably expected due to measurement error. In short, the extent to which the change over time can be regarded as "reliable" (Jacobson and Truax, 1991). The noise in the data is usually approximated by the spread of the scores in the full population. If the risk attitude measures contain a great amount of noise, then changes over time have to be relatively large to be considered reliable changes. RCI is defined as, $\frac{RA_t^{i,j} - RA_p^{i,j}}{\sqrt{\sqrt{2(\sigma \Delta RA_j)}(1-\alpha_j)^2}}$, where α is Cronbach's alpha, a reliability measure illustrating the internal consistency between two wave measures. An RCI greater than 1.96 denotes a reliable change. The difference in risk attitude between waves 10 and 6 is therefore categorised as no reliable change, a reliable positive change, or a reliable negative change. We test whether the reliable changes vary across domains using Pearson's chi-squared test.

2.2.3. Negative life events and risk attitudes

Risk attitude changes are hypothesised to be a function of negative life events and a set of physician characteristics. The model to be estimated is:

$$\Delta RA_i^j = \rho^{j,k} L_i^k + \delta^{j,k} X_{i,baseline} + \varepsilon_i^{j,k}$$

where ΔRA_i^j is the risk attitude change for physician i between waves 10 and 6 in domain j, which is standardised to have a normal distribution for comparability. $\rho^{j,k}$ are the coefficients of interest to be estimated, interpreted as the association between negative life event k and risk attitude changes in domain j. $L_i^k = 1$ if life event k is reported in waves 7, 8, 9 and/or 10 of the survey, and 0 otherwise. $X_{i,baseline}$ is a range of baseline individual characteristics that are related to the occurrence of negative life events and exert their effect on risk attitude changes, including age, physician type, and self-rated health (ranging from one, excellent, to five, poor). Other variables are coded as binary: with a value of one if the physician is a female, living with a partner or spouse, has dependent children, and is a temporary resident. $\varepsilon_i^{j,k}$ denotes idiosyncratic errors.

There is attrition in the sample (34.9% of physicians who answered the questions on risk attitude and individual characteristics in wave 6 did not answer the risk attitude questions in wave 10). We use probability weighting to control for systematic attrition. Whether the physician was missing from wave 10 is modelled as a function of life events and baseline characteristics including domain-specific risk attitudes, gender, age, having dependent children, living with a spouse, health condition, residential status, doctor type, workload and overall job satisfaction (Yan et al., 2011). The model is estimated using logistic regression. The inverse of the probability of being missing is used as a weight in the analysis of life events and risk attitude.

The above specification is estimated separately for each domain-specific risk attitude and each life event. The model is therefore estimated nine times (eight life events and any life event) for each domain. Multiple testing increases the chance that the life events coefficient will be incorrectly identified as statistically significant (type I error) and we therefore use the Bonferroni correction. This approach has been criticised as too conservative but provides a lower bound on the statistical significance of the associations.

One of the possible reasons for not observing risk attitude changes after negative life events is that risk attitudes are more unstable early in their career (and at a younger age) and gradually stabilise after a period of repeated decision-making. Negative life events may therefore only influence risk attitude early in their career (and at a younger age). To explore this we estimate the regression models for each age group (as a proxy for career stage), separately.

The shock after negative life events may quickly dissipate. To explore whether time since the event matters, any life events, L_i^k, are replaced with four dummies $\{L_i^{k,4}, L_i^{k,3}, L_i^{k,2}, L_i^{k,1}\}$ which respectively takes a value of one if any life event is experienced before 3–4, 2–3,1-2, and 0–1 years ago and 0 otherwise. We repeat this analysis excluding physicians who had life events in more than one time period.

3. Results

The descriptive statistics of the sample are reported in Table 1. The mean risk attitudes are around two suggesting physicians in this sample are on average less likely to engage in risky activities. Fig. A1 in the appendix shows that the difference in the distribution of risk attitudes between waves 6 and 10 is small. The correlation of baseline risk attitudes is 0.31 between financial and career domains, 0.31 between financial and clinical domains and 0.48 between career and clinical domains, which indicates a modest-strength positive correlation across domains (Cohen, 1988a). There is a statistically significant difference in mean baseline risk attitude across domains as determined by Hotelling F (2,4415) = 168.78, p = 0.000.

Injury or illness to a family member is the most prevalent life event whilst the least prevalent is the death of a spouse or child. It is relatively common to experience negative life events: 73.5 % of the sample included experienced at least one life event. The physician sample is mainly composed of GPs (33.8%) and specialists (43.1%).

3.1. Mean-level stability

Table 2 reports the mean-level changes in risk attitudes between wave six and wave nine. A positive change indicates physicians becoming on average more likely to engage in risky activities over time whilst a negative change indicates physicians becoming on average less likely to engage in risky activities over time. The mean-level changes are negative and generally small (given that risk attitudes are measured on a five-point scale) and this is confirmed by the very small Cohen's d effect sizes, ranging from 0.002 to 0.065 for a four-year time frame. The results indicate that mean risk attitude is very stable in all three domains for time frames of four years or less.

The Reliability Change Index results in Table 3 show that in all three

Table 1
Descriptive statistics (N = 4417).

	Mean	SD
Risk attitudes in wave 6		
Financial	1.884	0.97
Career and professional	2.197	1.02
Clinical	2.013	0.92
Risk attitudes in wave 10		
Financial	1.950	1.02
Career and professional	2.237	1.04
Clinical	2.037	0.96
	N	**Percent**
Gender: Female	2119	48.0
Age: under 35	1043	23.6
Age: 35–39	542	12.3
Age: 40–44	541	12.3
Age: 45–49	525	11.9
Age: 50–54	576	13.0
Age: 55–59	559	12.7
Age: 60+	631	14.3
Living with a partner or spouse: yes	3561	80.6
Having dependent children: yes	2393	54.2
Being a temporary resident: yes	66	1.5
Self-rated health: [1] Excellent	1731	39.2
Self-rated health: [2] Very good	1717	38.9
Self-rated health: [3] Good	747	16.9
Self-rated health: [4] Fair	200	4.5
Self-rated health: [5] Poor	22	0.5
Type of doctor: GP	1492	33.8
Type of doctor: Specialist	1904	43.1
Type of doctor: Hospital non-specialist	549	12.4
Type of doctor: Specialist-in-training	472	10.7
Reported life events in waves 7, 8, 9 and/or 10		
Injury or illness to self	1214	27.5
Injury or illness to a family member	2056	46.5
Death of spouse or child	176	4.0
Death of other family members	1269	28.7
Death of a close friend	928	21.0
Physical violence	235	5.3
Property crime	668	15.1
Medical negligence claim	371	8.4
Any life event	3248	73.5
Reported life events more than twice across waves 7, 8, 9 and/or 10		
Injury or illness to self	421	9.5
Injury or illness to a family member	912	20.6
Death of spouse or child	9	0.2
Death of other family members	321	7.3
Death of a close friend	238	5.4
Physical violence	30	0.7
Property crime	134	3.0
Medical negligence claim	66	1.5
Any life events	2296	52.0

Table 2
Mean-level changes in risk attitude.

Risk attitudes	N	Mean changes (SD)	min	max	Cohen's d (SD)
Financial					
1*	11,788	0.028 (1.16)	−4	4	0.022 (0.98)
2	11,677	0.032 (1.16)	−4	4	0.026 (0.97)
3	8052	0.053 (1.15)	−4	4	0.047 (1.00)
4	4417	0.066 (1.03)	−4	4	0.065 (1.03)
Career and professional					
1	11,788	0.012 (1.22)	−4	4	0.009 (0.99)
2	11,677	0.019 (1.22)	−4	4	0.015 (0.98)
3	8052	0.031 (1.21)	−4	4	0.027 (1.01)
4	4417	0.041 (1.07)	−4	4	0.040(1.04)
Clinical					
1	11,788	0.022 (1.14)	−4	4	0.018 (1.00)
2	11,677	0.002 (1.15)	−4	4	0.002 (1.01)
3	8052	0.004 (1.14)	−4	4	0.006 (1.03)
4	4417	0.025 (0.97)	−4	4	0.026(1.03)

Note: * The time difference (years) between two measures. F statistics for the differences among four period changes is 1.77, 0.79 and 0.93 for financial, career and clinical risk attitudes, given three degrees of freedom and a 5% significance level, the critical value is 2.605.

Table 3
Reliability Change Index for changes in risk attitude over a four-year period.

Risk attitude domains	Decrease (%)	No reliable change (%)	Increase (%)
Financial	5.0	87.6	7.4
Career and professional	6.4	86.4	7.2
Clinical	4.8	89.9	5.3

Note: Pearson chi2 (4) = 33.911; Pr = 0.000.

domains, the majority of physicians display no reliable change. In total, 87.6%, 86.4% and 89.9% of physicians do not display reliable changes in risk attitudes in the financial, career and clinical domains respectively. The chi-squared test is statistically significant suggesting that the distribution of reliable risk attitude changes varies across domains.

Fig. 3 shows Cohen's effect sizes of risk attitude changes over a four-year period by age group, gender and physician type. Graph 1 plots Cohen's effect by age group and shows that risk attitudes are stable in all age groups (all Cohen's effect sizes are below 0.2). Graphs 2, 3 and 4 plot Cohen's effect size by age and gender for the financial, clinical and career domains respectively. Risk attitude is stable for male physicians across all age groups. Risk attitudes in financial and clinical domains are also stable in female physicians. There are larger changes in the career domain within the 40–44 year age group with females becoming more risk-seeking (Graph 3). Graphs 5, 6 and 7 plot Cohen's effect size by age and physician type for the financial, clinical and career domains respectively. Overall, risk attitudes are stable across all physician types and age groups.

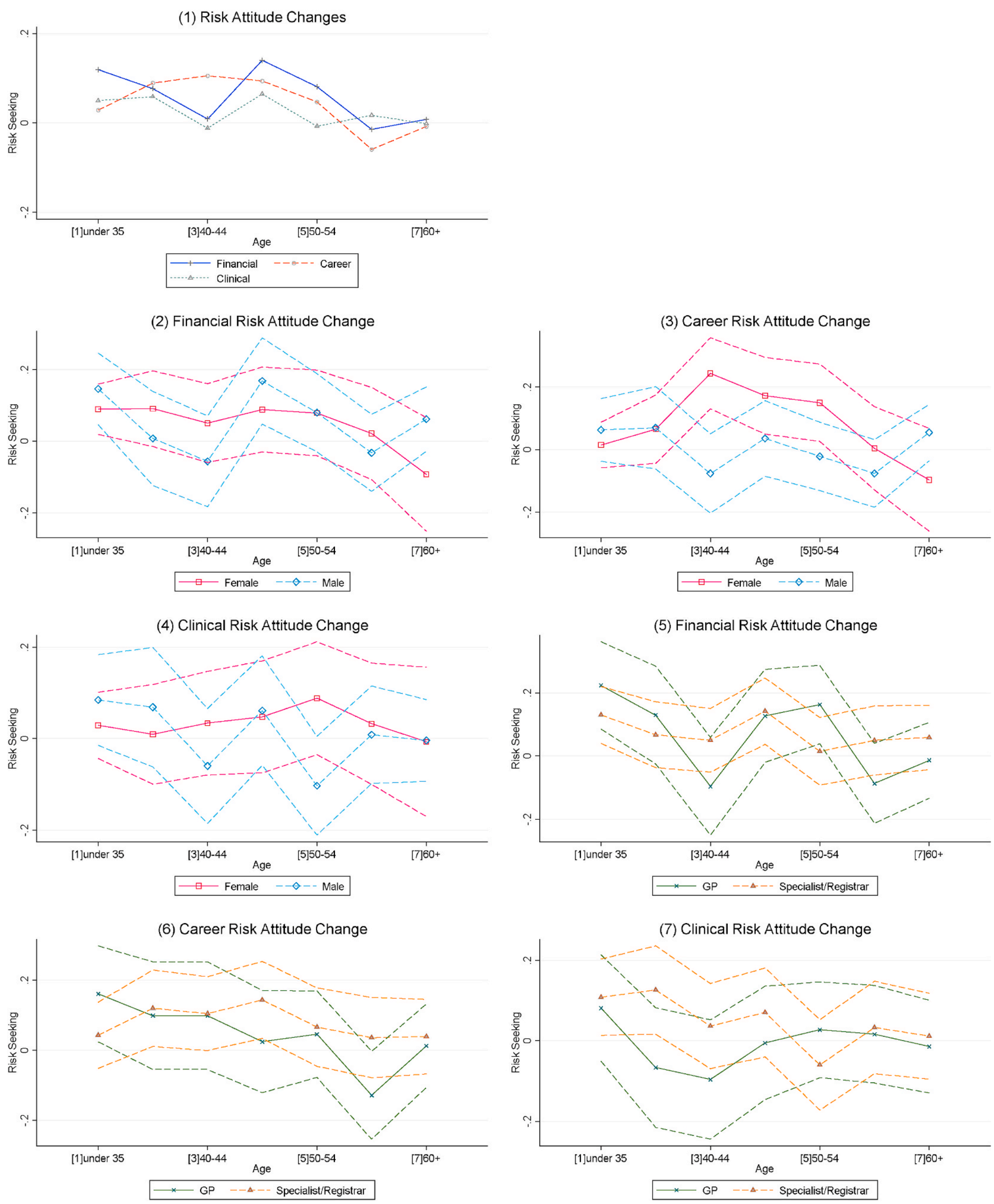


Fig. 3. Changes in risk attitudes (Cohen's d effect size) over four years by age, gender and speciality
Note: Figures present the relationship between four-year risk attitude changes and age groups, where the magnitudes of changes are Cohen's effect sizes, i.e., mean-level changes divided by pooled standard deviation. The dashed lines represent a 95% confidence interval of the mean-level changes.

3.2. Negative life events and risk attitudes

Appendix Table A1 shows that the probability of dropping out of the sample by wave 10 is associated with risk attitude in the career domain, having dependent children, having poorer health, being aged over 60, being a specialist, hospital non-specialist or specialist-in-training, and being a temporary or permanent resident. All types of life event experiences significantly decrease the probability of dropping out in the wave 10 surveys.

Table 4 reports the association between different negative life events and risk attitude changes estimated in separate regression models after adjusting for sample attrition. Only one type of life event is associated with risk attitude change: after experiencing the death of other family members, a physician becomes 0.074 standard deviations more likely to engage in risky activities in the career domain. However, this association is only statistically significant at a 10% level and is no longer significant after adjusting for multiple testing. Generally, we did not find a significant association between negative life events, ranging from family, health to career, and physicians' financial, career or clinical risk attitude changes after adjusting for multiple testing. Appendix Table A2 presents the estimation without adjusting for sample attrition and the coefficients are only slightly larger compared with the results in Table 4, whilst the direction and significance remain unchanged.

Table 5 presents the results of any life event by age group. The results are similar in that there is no association between any life event and risk attitude change except in the financial domain for physicians aged between 50 and 54. Physicians in that age group become less likely to engage in risky activities after experiencing a life event. Appendix Table A3 presents the estimation without adjusting for sample attrition and the coefficients are generally slightly larger.

Fig. 4 shows a lack of significant associations between changes in domain-specific risk attitudes and any life events that occurred across the various time intervals. There is no evidence that life events within the past year have a stronger or temporary effect on physicians' risk attitudes across financial, career, and clinical domains compared to more distant events. Excluding physicians who had life events in more than one time period (N = 1393), Appendix Fig. A2 shows similar results.

4. Discussion

The aim of this paper was to test the stability of physicians' risk attitudes over time and across domains. Our results showed, across the financial, career and clinical domains, physicians' risk attitudes were stable over a four-year period at both the mean and individual levels. We also examined the association between negative life events and risk attitude changes. The results showed that risk attitudes were generally not influenced by negative life events. The relative stability means that risk attitudes can be assumed to be constant when analysing physician decision-making over time, at least in the Australian context and within a time frame of around four years.

Table 5
The association between any life event and risk attitudes by age.

	Financial risk attitude		Career risk attitude		Clinical risk attitude	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Under 35	−0.023	(0.07)	−0.028	(0.07)	0.023	(0.07)
35-39	0.033	(0.12)	0.028	(0.18)	0.048	(0.15)
40-44	0.119	(0.10)	0.070	(0.12)	0.174	(0.12)
45-49	−0.048	(0.10)	−0.145	(0.10)	−0.062	(0.10)
50-54	0.252**	(0.10)	0.142	(0.11)	−0.022	(0.08)
55-59	0.015	(0.12)	0.003	(0.14)	0.061	(0.14)
60+	0.185	(0.13)	0.028	(0.13)	0.054	(0.12)

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors are in parentheses. Inversed probability weights are used to control for systematic attrition.

The paper also compared risk attitude across three domains: financial, clinical and career. There was a statistically significant difference in mean risk attitude across the domains and there was only a modest correlation between risk attitudes across domains. The modest correlation of risk attitudes across domains among physicians is in line with previous studies in other populations (Ding et al., 2010; Dohmen et al., 2011; Hanoch et al., 2006; Weber et al., 2002). We also tested whether the stability of risk attitude varies across domains. The mean level change in risk attitude was the smallest in the clinical domain and the largest in the financial domain although all changes were regarded as small.

It could be argued that risk attitude appears more stable in physicians compared to the general population although we acknowledge that the evidence in the general population is mixed. Schurer (2015) found a higher level of stability in risk attitudes among individuals with high income and high levels of education. It may also be the case that risk attitudes are more stable in physicians as having to make repeated clinical decisions with risk may make them more 'immune' to negative life events. The relative stability of risk attitudes implies that risk attitude can be considered constant when analysing its relationship with physician decision-making. This means that risk attitude measured at one time period can legitimately be used to predict behaviour at another time period. The stability of risk attitude also has implications for policies and interventions aimed at attracting and retaining physicians to certain roles. Policies that aim to improve job match quality on the basis of risk attitude can assume risk attitude to be relatively constant and do not have to take into account more complex dynamic changes in risk attitude. Similarly, it becomes more straightforward to develop policies aimed at attracting physicians to specific job roles, such as mitigating clinical or financial risks in the work environment, although identifying optimal domain-specific risk attitudes for these roles remains a topic for future research.

There are several limitations to this study. First, the risk attitude measure used in this paper relates to likelihood rather than a willingness to engage in risky activities and may therefore capture broader effects relating to risky decision-making. This measure of risk-taking is different

Table 4
Regression results of risk attitude changes and life events (N = 4417).

	Financial risk attitude		Career risk attitude		Clinical risk attitude	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Injury or illness to self	0.016	(0.04)	−0.015	(0.04)	0.018	(0.04)
Injury or illness to a family member	−0.001	(0.03)	−0.005	(0.04)	0.000	(0.04)
Death of spouse or child	−0.101	(0.09)	−0.030	(0.09)	−0.031	(0.09)
Death of other family members	0.028	(0.04)	0.074*	(0.04)	0.034	(0.04)
Death of a close friend	0.001	(0.04)	0.012	(0.05)	0.031	(0.05)
Physical violence	−0.045	(0.07)	−0.035	(0.08)	−0.025	(0.08)
Property crime	−0.053	(0.05)	−0.022	(0.05)	0.020	(0.05)
Medical negligence claim	−0.081	(0.06)	−0.034	(0.07)	−0.039	(0.07)
Any life event	0.046	(0.04)	0.002	(0.04)	0.039	(0.04)

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors are in parentheses. Inversed probability weights are used to control for systematic attrition.

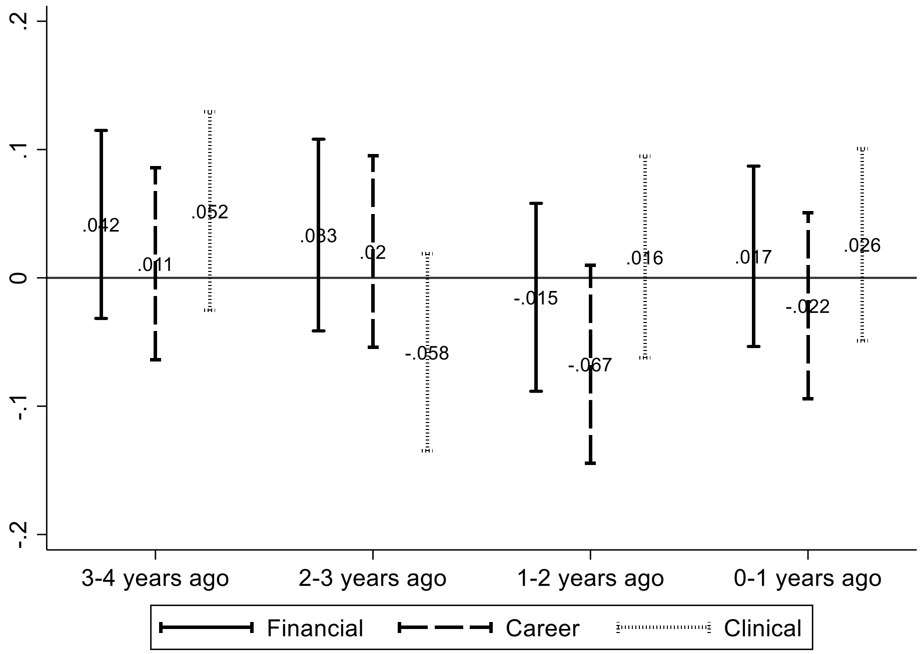


Fig. 4. The association between risk attitude changes and any life event occurring 3–4, 2–3, 1–2, and 0–1 years ago
Note: N = 4417. The estimates represent the association between risk attitude changes (standardised) and any life events occurring 3–4, 2–3, 1–2, and 0–1 years ago, along with their corresponding 95% confidence intervals. These estimates are derived from OLS regressions controlled for time dummy and a range of physician characteristics: gender, physician type, self-rated health, living with a partner or spouse, having dependent children, and temporary residence. Inversed probability weights are used to control for systematic attrition.

from incentivised behavioural experiments elicited revealed risk preference. Empirical evidence suggests that self-reports and behavioural measures are correlated but the strength of the correlation is small (Anderson and Mellor, 2009; Deck et al., 2013; Frey et al., 2017; Josef et al., 2016; Lönnqvist et al., 2015; Guenther et al., 2021). While the test-retest reliability of choice between monetary gambles is quite low, risk attitudes captured by self-reports show a moderate to a strong degree of correlation across different measurement methods (Dohmen et al., 2011; Frey et al., 2021; Hertwig et al., 2019). Second, the measurement of negative life events is based on self-report and may have been measured with errors. Third, the time frame is relatively short (four years) and to fully explore the stability of risk attitude a longer time period may be required. Fourth, compared with the occurrence of exogenous shocks such as natural disasters, the occurrence of life events is likely to be more endogenous.

Overall, we find that risk attitudes in physicians are generally stable over a four-year period. There was a modest correlation between domains of physicians' risk attitudes. This suggests that risk attitudes can be assumed to be constant but domain-specificity needs to be considered when analysing physicians' decision-making.

Funding

This research used data from the MABEL longitudinal survey operated by the University of Melbourne and Monash University. Funding for MABEL was provided by the National Health and Medical Research Council (2007–2016: 454799 and 1019605); the Australian Department of Health and Ageing (2008); Health Workforce Australia (2013); The University of Melbourne, Medibank Better Health Foundation, the NSW Department of Health, and the Victorian Department of Health and Human Services (2017); and the Australian Government Department of Health, the Australian Digital Health Agency, and the Victorian Department of Health and Human Services (2018). The funders were not involved in the study design, collection, analysis, and interpretation of data, the writing of this article or the decision to submit it for publication. The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the funders that provide institutional support for the authors. No specific funding was received for this work. Xuemin Zhu's PhD studentship was funded by the Elphinstone Scholarship Scheme. University of Aberdeen. The Health Economics Research Unit is funded by the Chief Scientist Office of the Scottish Government Health and Social Care Directorates.

Declaration of Competing interest

None.

Data availability

The authors do not have permission to share data.

Acknowledgement

The authors acknowledge the physicians who spent their valuable time participating in the MABEL longitudinal survey and the research team that designed and administered the survey. The authors would like to acknowledge valuable comments and suggestions at the PhD Student Conference in Behavioural Science 2018, European Health Economics Association Student-Supervisor Conference 2019, and the Health Economists' Study Group Summer Meeting 2019.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2023.116381.

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