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ORIGINAL RESEARCH

What does it take? The influence of rural upbringing and sense of rural background on medical students' intention to work in a rural environment

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ABSTRACT

Introduction: There is abundant evidence that rural origin is an influence on rural career choice. Rural origin is widely used to select students to be supported into programs designed to address the rural medical workforce shortage. What is not as clear is how many years of rural upbringing are required to have a maximal effect on rural career choice. Neither is the place of having a sense of rural background well understood.

Methods: A cross-sectional self-completed paper-based survey of all students in years one through four of the Monash University medical course was undertaken in 2003. The survey included a scale to measure stated rural career intention as well as questions about the number of years of rural upbringing and whether students had a sense of rural background. The Rural Intention score was divided into three categories: strong urban intent, strong rural intent, and an intermediate, less certain intent.



Results: There was an 88% ($n = 399$) response rate from students holding Commonwealth Supported Places. Approximately 30% of these claimed a sense of rural background, and 28% had more than 8 years of rural upbringing. Twenty-five percent stated a strong intention to choose a rural career and 34.5% had strong urban intent. The remaining 40.5% were in the intermediate group. Almost all students (97.5%) with over 5 years of rural upbringing had developed a sense of rural background, and almost all (97.5%) with less than 5 years' rural upbringing denied a sense of rural background. Rural intent was high for those with a sense of rural background and those with more than 8 years of rural upbringing, but the students who had had from 4 to 8 years of rural upbringing mainly fell into the 'uncertain' category.

Discussion: In this cohort of almost 400 Australian medical students, a sense of rural background developed at a clear point, around 5 years of rural upbringing. Students with a sense of rural background were likely to develop a strong rural intent several years before similar students who had failed to make this connection with a rural community. This latter group displayed uncertainty toward a rural career choice, possibly due to unfamiliarity. Unlike those with strong urban intent, these students have not excluded a rural career and should be supported. The inclusion of a measure of the intention of students to work in a rural environment is likely to increase the reliability and validity of selection procedures.

Key words: career choice, medical school, medical students, rural background, rural intention, selection, years of rural upbringing.

Introduction

There is an abundance of evidence that rural origin is associated with a rural medical career choice¹. Consequently, in order to address the rural medical workforce shortage, the Australian Government requires medical schools to ensure that at least 25% of their Commonwealth Supported Places (CSP) is offered to students with a rural background. A student of rural origin is defined by the Rural Undergraduate Support and Coordination (RUSC) program as having at least 5 years rural residence (Rural, Remote and Metropolitan Areas [RRMA] classification 3-7²) consecutive or cumulative, from the commencement of primary school³.

The RUSC guidelines are not applied consistently to selection processes across the Australian medical schools. For example, while the Monash University Dean's Rural List supports students who have lived for 5 of the previous 12 years in RRMA 3-7, the University of Melbourne focuses on the place of residence during the last 2 years of high school. The University of Sydney more closely follows the RUSC guidelines, requiring 5 years since the commencement of primary school. The Australian Medical

Workforce Advisory Committee (AMWAC), the peak advisory group to the Australian Health Ministers Advisory Council (AHMAC), defined rural background as 'having lived in a rural area (RRMA 3-7) for a minimum of five consecutive years or eight cumulative years⁴.'

The Jefferson Longitudinal Study in the USA found that apart from rural origin, rural intention (RI) at entry to medical school was the only independent predictor of rural career choice⁵. A study of first, second and final year students at Monash University, Australia, found that rural origin was the most important predictor of RI in the early years. The change in RI influenced by a successful rural attachment became more important, even than rural origin, in later years⁶.

The original 1994 RUSC definition was based on a literature review which focussed on rural origin, but not on years of rural upbringing^{7,8}. It is difficult to find research that identifies the number of years of rural upbringing that optimally influences rural career choice. Further, it is unclear whether the relationship between rural origin and RI is constant over the years of rural upbringing. There is some



evidence to suggest that a rural primary school education may be more important than a rural secondary education⁹.

Cutchin has highlighted the importance of congruence between self and community for the retention of rural physicians¹⁰. He developed a theory of experiential place integration, identifying security, freedom, identity and meaning in place as essentials for developing a sense of belonging to a rural place¹¹. It is possible that these components, developed during a rural upbringing, will enable a sense of rural background, and will have an effect on recruitment.

So, another possible influence on rural career choice is the 'sense' of rural background (RB). Is the development of RB an important intermediary between years of rural origin and the intention to choose a rural career? Does it exert its influence on RI through the number of years of rural background (YR) or does it have an independent effect?

This article investigates the relationship between the stated RI, that is the strength of intention to work in a rural environment, as declared by the respondent and YR. We also investigate the place of having RB in rural career decision-making. This was part of a much wider study of factors influencing rural career choice and the measurement of attitudinal change¹².

Methods

During 2003, a cross-sectional self-completed paper-based survey was conducted of all medical students in years one through four of the undergraduate-entry medical course at Monash University, Victoria, Australia. Due to a curriculum restructure at the time, respondents came from the first two years of the new five-year course and the fourth year of the previous six-year course. There was no third year cohort. Students were approached several times throughout the year while they attended lectures. Data from the most recent response from each student were used for this article.

The three variables reported in this article were:

1. *Rural intent (RI)*: a score resulting from the simple combination of responses to two visual analogue scales. The first measured strength of intention to work only in a capital city (scored 0 to -9), and the second measured strength of intention to take up a rural career (all areas outside a capital city and its metropolitan suburbs) (scored 0 to +9). The possible range was -9 (strongly urban) to +9 (strongly rural). Measures of the strength of intention must be directed at a single target. This approach allows for a clear and dichotomous choice, and is supported in the literature¹³.

This continuous variable was subsequently reduced to three categories, set arbitrarily at thirds of the range (-9 to +9):

- a. strong rural intention: $RI > 3$
 - b. intermediate (uncertain): $-3 \leq RI \leq +3$
 - c. strong urban intention: $RI < -3$
2. *Years of rural upbringing (YR)*: 'How many years of your life have you lived in rural areas (outside a capital city)?' Rural was defined as anywhere outside metropolitan areas of capital cities. No attempt was made in this study to determine which years were spent in a rural/non-capital city environment.
 3. *Sense of rural background (RB)*: 'Do you feel you have a rural background?' (Yes/No)

Ethics approval had been gained from the Standing Committee for Ethics in Research involving Humans (SCERIH), Monash University. Data were analysed using the Statistical Package for the Social Sciences (SPSS for Windows: release 14.0.0; SPSS Inc; Chicago IL, USA).



Results

Of the 604 students, 530 (88%) replied. Of these respondents, 399 held CSP and 131 were international medical students. This article reports on data from the 399 responses from local (CSP) students. More than 30% of the CSP students had an RB, and a similar proportion had more than 5 YR. Two-thirds (262) were female.

The distribution of the responses for the dependent variable, stated RI was normal. Approximately 25% (100) of respondents fell into the strong RI category consistent with expectations, and the remainder fell reasonably equally into the other two categories: strong urban (136), and intermediate (158).

Stated rural intent and years of rural upbringing

Figure 1 represents the relationship between RI and YR as a scatterplot graph. The line of best fit (included as a dotted line), reveals the relationship between RI and YR to have been of moderate magnitude and highly statistically significant¹⁴.

- $R = .49$, adjusted $R^2 = 0.24$, $p < .001$
- Unstandardised beta = 0.26, std error = 0.02, $p < .001$

The slope of the line reveals that RI (Beta) was likely to increase by one RI unit for every 4 additional YR upbringing.

The point where the numbers in the strong rural category began to outweigh those in the strong urban category was approximately $YR = 8$. This is represented graphically in Figure 2, where YR is represented in categories along the X-axis. Data within each YR category were divided according to the RI category.

There are two clusters in the data in Figure 1. These are located near the line of best fit at zero YR and at 16-20 YR. The latter cluster represents students who had spent virtually

their whole lives in the country. It is apparent that students in the $YR = \text{zero}$ cluster had a lower RI than those in the $YR = 16-20$ cluster.

Visually, the relatively small numbers between these clusters do not appear to have a clear trend on the scatterplot, although most seem to be above $RI = 0$ and the line of best fit. It is possible that the line of best fit is overly influenced by these two clusters and that it may not accurately reflect the trend for students between $YR = 0$ and $YR = 16$.

Figure 2 looks more closely at the intervening data. The vast majority of students from both the zero and the up-to-four YR groups were evenly distributed in the strong urban and uncertain RI groups, suggesting a similarity in these cohorts. It also suggests that approximately 40% from each group are uncertain and have not excluded a rural career. A greater proportion of students in the up-to-four group (25%) declared a strong interest in a rural career.

While the numbers are low, over 70% of the 4-8 YR group fell in the uncertain RI category. This represents a group with attitudes between the strong urban and the strong rural groups. While they are not strongly rural, they are not committed to an urban career. The $YR = 4-8$ may represent the turning point for the influence of YR on RI.

Both groups with $YR > 8$, had a similar pattern and more than 60% were in the strong rural group. It would appear that $YR > 14$ was not a more powerful influence over RI than $YR = 8-14$. This confirms the impression that $YR = 8$ is critical for developing a strong rural RI.

Figure 3 reduces these data to three categories of YR. The $YR = 0$ group is largely split between urban and uncertain; the $YR > 8$ is strongly rural; and the intervening up-to-8 YR group is more uncertain with an RI distribution between these more extreme patterns.

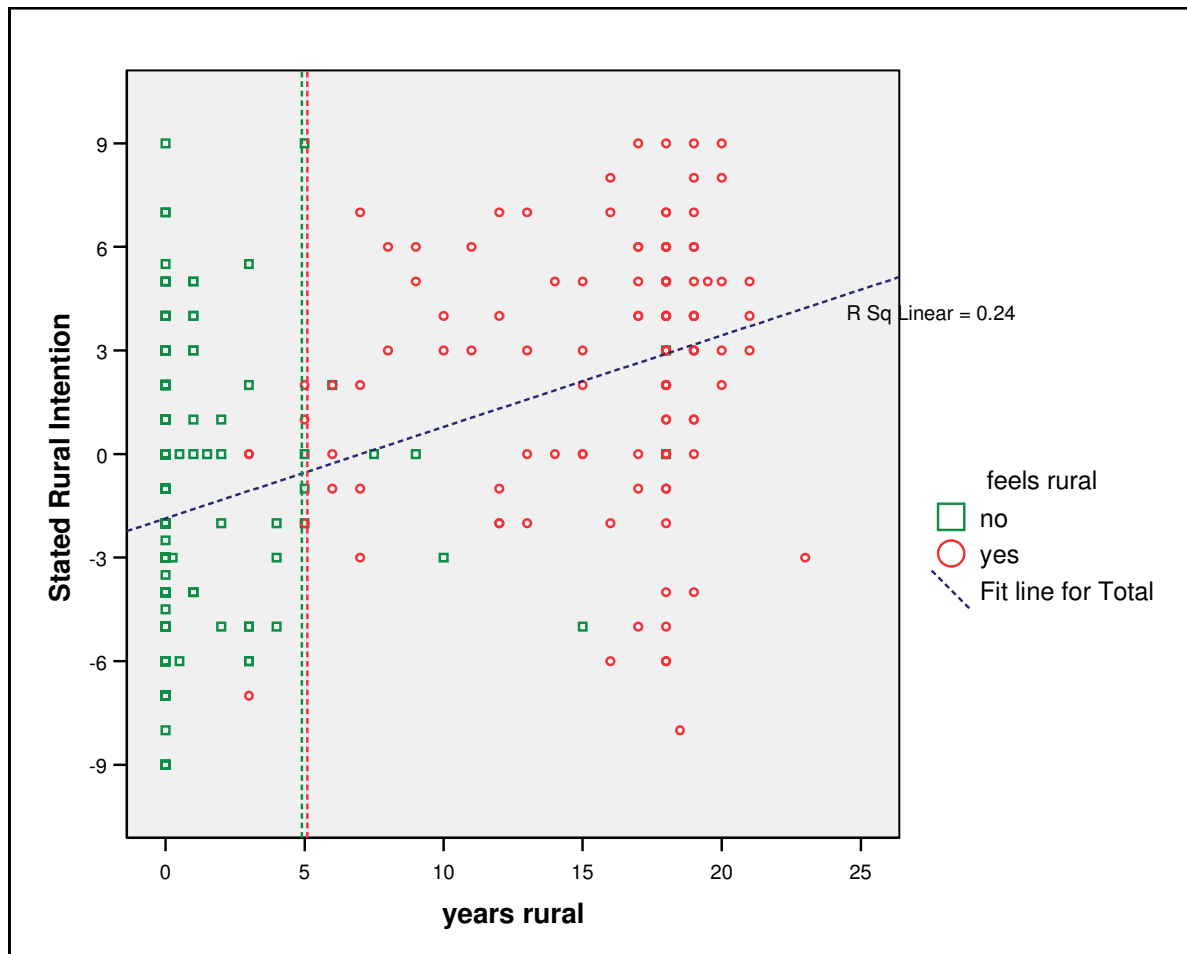


Figure 1: The relationship between stated rural intention (RI) and years of rural upbringing (YR). Each marker may represent more than one result. The markers are identified according to sense of rural background (RB). The diagonal line is the line of best fit. The vertical lines at YR = 5 are a visual aid to highlight the cut-off point where RB is seen to develop.

Years of rural upbringing (YR) and a sense of rural background (RB)

The markers in Figure 1 are identified for RB. There were 396 valid responses. Only three (2.5%) of the 119 students who claimed RB had less than 5 years rural upbringing, and only seven (2.5%) of the 277 who did not claim RB, had YR >5. An additional seven students had 5 YR. Therefore, there is a 95% likelihood that an RB develops at 5 YR. A vertical line is shown at YR = 5 to highlight this.

- RB can be said to develop at YR = 5.

Stated Rural Intent (RI) and a sense of rural background (RB)

When a regression model was fitted with RI as the dependent variable (DV) and RB as the independent variable (IV), RB had a similar predictive validity to YR.

- $R = 0.48$, $\text{adj. } R^2 = 0.23$, $p < .001$
- Unstandardised beta = 2.16, std error = 0.20, $p < .001$

This suggests that a student with a positive RB should have an RI some 2.2 RI units (12% of the range) greater than if RB was negative.

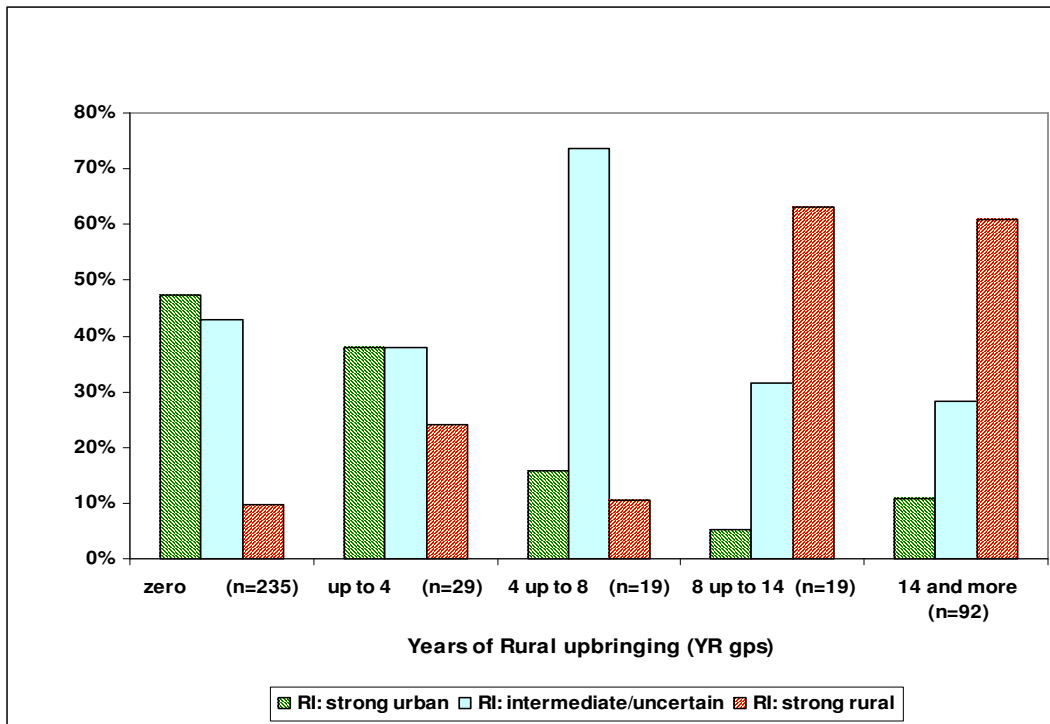


Figure 2: Percentages of years of rural upbringing (YR) sub-groups that fall in the rural intent (RI) categories.

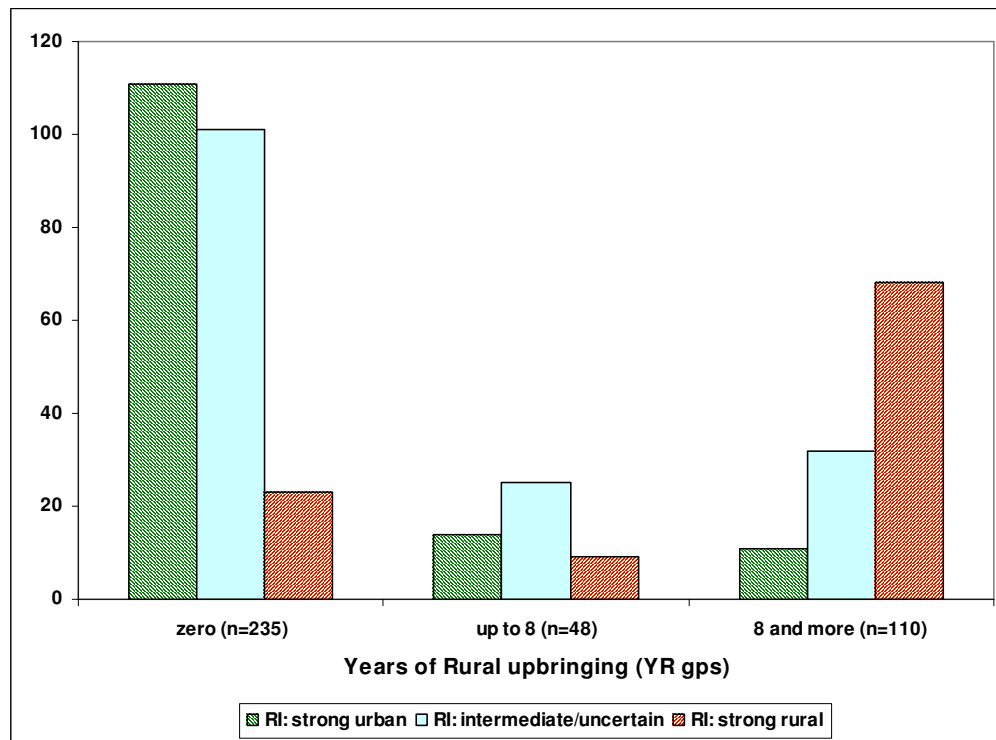


Figure 3: The bar graph represents the three patterns of rural intent (RI) category seen in the major YR sub-groups.



Stated rural intent (RI), years rural (YR) and a sense of rural background (RB)

In order to test whether YR and RB had independent effects on RI, an attempt was made to fit a regression model with RI as DV, and both YR and RB as IVs. As these IVs overlap (RB = 5YR) it was not surprising that there was an unacceptably high degree of multicollinearity (bivariate correlation = 0.91), rendering the analysis inappropriate.

Figure 1 shows that RB is strongly associated with over 5 years of YR. As discussed (Figure 2), RI is influenced by YR, and this is maximal if $YR > 8$. Further, if we can assume a linear relationship, RI increases 0.26 for every additional year of YR. It was found that a positive RB added about 2.2 RI units to the RI score. Eight YR are required to have the same impact ($8 \times 0.26 = 2.1$).

Figure 4 represents the distribution of RI categories for those with and without RB. This graph is very similar to Figure 3 without the middle $YR = \text{up-to-8}$ group. The predictive patterns of RB both on the cross-tabulations (Figs 3, 4) and regression modelling are similar to YR.

Discussion

Definition of rural

There is no universally accepted definition of rural, and the efforts of the Australian Government to devise complex systems such as the RRMA² and ARIA¹⁵ systems have failed to gain universal acceptance. Muula¹⁶ concluded recently that 'a universal definition of a rural area is not possible'. Therefore, a minimalist definition of 'rural' as meaning 'non-capital city' was adopted in this work.

While Couper states that 'rural cannot be defined as non-urban', he goes on to define rural health care as the 'provision of health services to areas outside of metropolitan centres where there is not ready access to specialist,

intensive and/or high technology care...'¹⁷. Within the limitations outlined above, we have accepted that much of Couper's definition can be accommodated by using the capital city - non capital city model. This is the most likely model to be understood internationally. It is also clearly understood by the students being surveyed. Indeed, a survey using other, less readily understood definitions is unlikely to be valid, because the level of understanding of the students of what we are seeking to measure will not be consistent. Further, our research demanded a dichotomous model of rural/non-rural, disallowing the use of more complex models.

This approach was supported by Dempsey et al. who wrote¹³:

Which system of classifying rurality can be recommended? The capital city versus the rest of the state system is simple, intuitive and seems to provide robust results, in this setting. This approach may therefore have some value in states such as South Australia where the capital city dominates and the regional centres are much smaller.

Perhaps this approach is more appropriate in Australia, and especially for states like South Australia where large states are centred on a single large city.

While it might be argued that large regional centres such as Geelong, Victoria, and Wollongong, New South Wales, are not the same as smaller rural centres, these larger centres do not have ready access to all tertiary and quaternary services; conditions there are still different to those in capital cities. The definition accepted here is simple, understandable and unambiguous. It enables the researcher to investigate the earliest variation in attitude away from capital city intention. While this may not always translate to a positive attitude toward remote practice, it is an early indicator of a positive attitude toward rural practice.

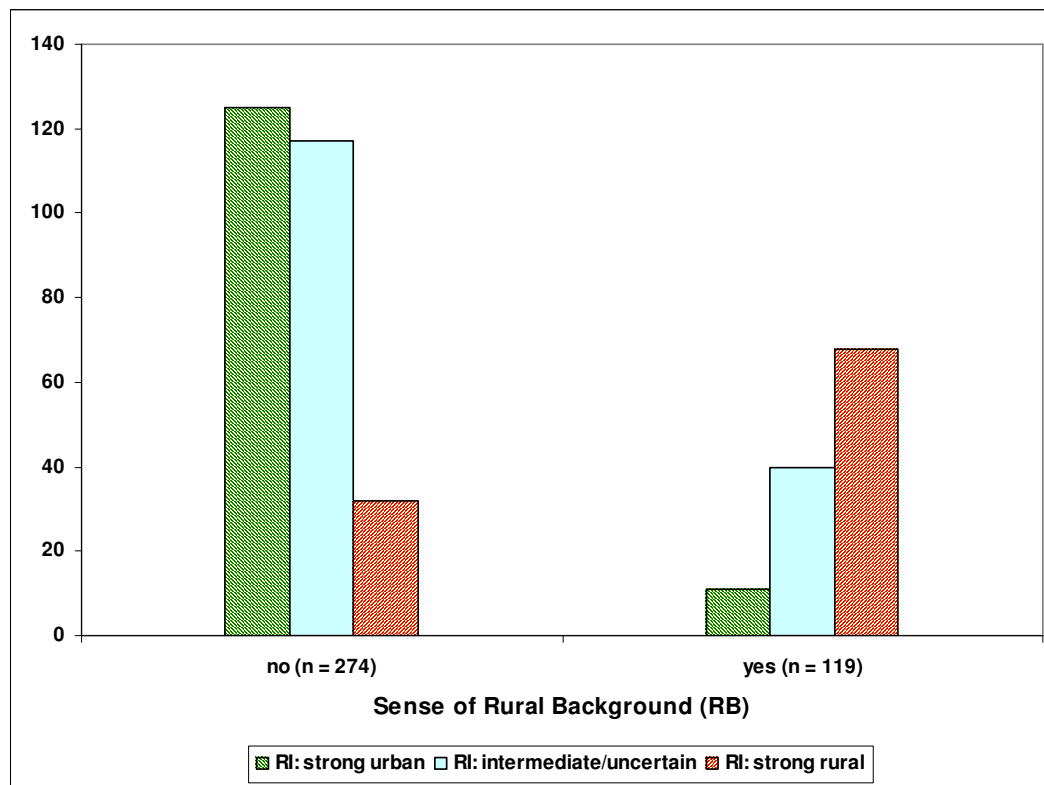


Figure 4: Bar graph representing the two patterns of Rural Intent (RI) category according to sense of rural background (RB).

Sample characteristics

It is possible that a disproportionate number of the 51 non-responders may have had a negative attitude toward rural careers. It is unlikely that this will affect the generalisability of these results afforded by the high response rate (88%). Monash University attracts a large proportion of rural origin students to its medical course. While 28% of local respondents had over 8 YR, 30% claimed RB. These proportions may be lower if the non-responders were predominantly of urban origin.

A limitation of this research is the relatively small number of students in the 1-13 YR group. This suggests that Monash University, while requiring rural origin students to have spent a minimum of 5 of the previous 12 years in the country, actually selects rural origin students who have spent the major part of their lives in a rural environment. This

limits the ability of this study to clearly identify trends for YR by each year group. Further research involving larger numbers in this cohort is required to find the definitive answer. Such research may require a national sample, such as that used in the Medical Schools Outcomes Database and Longitudinal Tracking Project of the Committee of Deans of Medical Schools (CDAMS)¹⁸.

Another limitation of this study was that the timing of YB was not identified. Neither was the influence of boarding school. It is possible that say, 5 years in a rural environment later in one's upbringing, might have a greater effect on RI than 5 years in infancy, although there is some evidence to the contrary⁹. Alternatively, it may have the same or indeed a different effect on developing YB. Some studies, such as the CDAMS study¹⁸ do ask for more detail. Perhaps subsequent analysis of these data collected on the larger national cohort will offer further insights.



Categories of rural intent

Stated RI scale was arbitrarily split into three categories as defined by thirds of its range. These were deemed to represent a strong urban, a strong rural and an intermediate group in order to perform comparative analyses. While the meaning of the high scoring group and the low scoring group is reasonable clear, that of the intermediate group warrants further consideration.

One interpretation of the meaning of the intermediate group is that these students form an uncertain or undecided group as they are neither strongly urban, nor strongly rural. If this is the case, these students, with appropriate support, might consider a rural career. It is these students who should be the target of undergraduate programs designed to increase rural career uptake. It is important to remember that almost as many of those with zero YR fall into this category, as into the strong urban category. Further, there were 20 students with no rural background who declared a strong intention to pursue a rural career.

The students who have strong urban or strong rural tendencies are less likely to change their attitudes. Rabinowitz et al. did find, however, that offering support and positive rural experiences to the strong rural cohort was worthwhile, because it increased their retention rate once they did enter a rural career⁵.

Rural origin and rural intent

While it was clear that the YR = 0 ($n = 235$) was largely a mix of strong urban and undecided RI, and that the YR >14 ($n = 92$) was largely of strong rural RI, the number of respondents between these extremes was relatively small ($n = 67$). This made it difficult to determine significant trends in the intervening levels of YR.

Despite this limitation, the YR = 8 to 14 group had a similar RI pattern to that of YR >14 (Fig 2), and this appeared different to that of the YR = 4 to 8 group. This suggested

that YR = 8 was the critical point where RI became maximal.

Having RB had a similar effect on (RI to that of YR >8 (Figs 3, 4). There was a very strong correlation between RB and YR >5 (Fig 1). If indeed a difference between the onset of maximal influence of these variables can be identified from the limited data of this study, it would be that having RB exerts its maximal influence on RI (at YR = 5) before YR itself does (at YR = 8). This suggests that students with RB were likely to develop a strong RI several years earlier than similar students who had failed to make this connection with a rural community.

Conclusions

It may not be possible to accurately determine the optimal number of YR required to influence RI. These data suggest that 8 years may be the minimum number of YR required to produce the highest likelihood of RI. It is also likely that a having RB is a good predictor of rural career intention. This influence of RB on RI develops at 5 YR, earlier than the 8 years required by YR.

A number of students with an RB do not intend to practice in the country, and a larger number of those without an RB do intend to practice in the country. Further, those with uncertain intention, that is, those with neither strong urban or strong RI, form a significant proportion of all RB and YR groups. As discussed, these last students are likely to benefit most from undergraduate rural programs. Recently introduced programs at Monash University are likely to limit access to rural undergraduate programs by non-rural students.

Students likely to subsequently choose a rural career, then, are not only identifiable by measuring YR or RB. A useful adjunct is the measurement of RI. This is not straightforward, and has been considered elsewhere¹². In order to maximise and to better understand the effects of rural undergraduate experience on medical students, it would



be useful if large national studies such as the CDAMS longitudinal database¹⁸ included measures of rural career intention. Such a measure would also be an improvement on rural origin alone in the selection of students for medical school places designed to increase rural career uptake.

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