A cross-disciplinary assessment of student loans debt, financial support for study and career preferences upon graduation

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ABSTRACT

AIM: To explore relationships between student loans debt, financial support and career preferences upon graduation for all healthcare disciplines offered at the Faculty of Medical and Health Sciences, University of Auckland.

METHODS: The Faculty Tracking Project is a longitudinal study which invites students to complete a questionnaire at the beginning and end of their educational programmes, including questions on debt, financial support and career preference. Our analysis comprised three phases: (1) a descriptive analysis of data related to debt and financial support; (2) a principal component analysis in order to find related categories of career choice; and (3) logistic regression models to determine how career preference categories could be explained by either levels of student loans debt or financial support.

RESULTS: Data from 2,405 participating students were included. Students in health sciences, nursing and pharmacy typically accrue levels of student loans debt of around $15,000 to $29,999, while optometry students accrue debt around $15,000 higher. Medical students show debt distributed around modes of $0 and $90,000 or more. All students typically access three sources of financial support during study. Career preferences at graduation reduced to four categories for all health disciplines. We found five significant effects, involving students in health sciences, medicine and pharmacy, relating the number of sources of financial support to the four categories of career preference. No significant effects were found related to level of student loans debt.

CONCLUSIONS: Our results suggest that financial support is a more strongly determining factor in career choices than the level of student loans debt. The four-category framework for student career preferences appears to be a useful model for further research.

A student's career choices may be influenced by many factors, including personal interest, financial compensation, the cost and perceived level of difficulty of the training programme and lifestyle preferences.[1–3] A number of these factors appear to be particularly relevant in the case of students studying towards a career in healthcare. This is due to the typically higher fees and often greater number of years of study required in healthcare compared to other undergraduate programmes. This can place a financial burden on healthcare students, which may also negatively impact on their wellbeing.[4–6] Some evidence suggests that the rising cost of healthcare education is causing some medical students to seek specialties perceived to be more highly paid. These specialties are often in cities, thus their selection potentially undersupplies primary healthcare and rural locations.[7–8]

In New Zealand, primary healthcare workers from a range of professional backgrounds are responsible for the provision of comprehensive and continuous patient care, thus forming the foundation of an effective health system.[9–10] New Zealand's aging population places further demands on primary healthcare providers and there is a growing need to encourage a significant proportion of graduates to specialise in primary healthcare. This is especially the case in rural areas where healthcare workers are already in short supply.[11]

To date, the relationship between student debt at graduation and future career choices has almost exclusively been studied in medical students.[1,6,12,13] The results of such studies have been mixed, however, with some finding no significant relationship between debt levels, career choices and specialisation—even in relation to students with higher levels of debt.[6,8,12,14–17] Furthermore, two studies found that students with lower debt levels were less likely to select a career in primary care.[8,12] Other analyses suggest that debt levels of medical students are manageable even if they select a career in the primary healthcare sector.[15] These conflicting findings may in part be due to the confounding influence of socioeconomic status, and age upon entry into educational programmes.[8,12,16]

There are very few reports of the influences of debt or income on career choice in other health professions. In one national study of dentists in Canada, almost half reported incurring substantially more debt during their education than they had anticipated, but in two-thirds this did not affect their career choice.[18] A study of psychologists in New Zealand found that participants borrowed more when they anticipated greater earnings in their intended career, but overall took longer to repay their student loan than they had anticipated.[19] However, we know of no research which has considered the wider context of healthcare education by taking a cross-disciplinary approach when considering the relationship between student debt levels and career choice. Such a cross-disciplinary approach is important in terms of gaining insight into how best to provide the range of healthcare workers needed in New Zealand, and the Faculty Tracking Project (as described below) allows such comparisons to be made, across disciplines, using comparable data. Therefore, our present aim was to conduct an exploratory study analysing relationships between student debt, sources of financial support and career preferences upon graduation for all healthcare disciplines offered in the Faculty of Medical and Health Sciences at the University of Auckland.

Methods

Data for the present study were drawn from the existing database of the Faculty Tracking Project at the University of Auckland for all participating disciplines. The Faculty Tracking Project is a longitudinal study that began in 2006, and invites students to complete a questionnaire upon entry to, and exit from, their health education programmes. In the present study only exit questionnaire data were used, and all identifying student information was removed upon extraction of data from the database. The New Zealand Government student loans (GSLs) scheme is available for domestic students, and such loans may be used to cover compulsory student fees, course-related costs up to the value of $1,000 and living costs up to $177 per week. In questionnaires, participants were asked to disclose their total student loans debt, the sources of financial support accessed during their study and their career preferences upon graduation. Specific questions are apparent from our reported results, and copies of the discipline-specific questionnaires are available from the corresponding author.

In 2012, the Faculty Tracking Project became part of the Australian Medical Schools Outcomes Database and Longitudinal Tracking Project (MSOD). This change involved the substantial redesign of the questionnaire form for medicine, particularly involving the way career preferences are coded.[20] This presented difficulties with the planned inferential data analysis regarding career preference in terms of data continuity. Therefore we have included data for medicine related to income and debt for the seven years from 2006 to 2012, but have excluded the career preference data collected using the new form in 2012. Optometry was recruited to the Tracking

Project in 2013, and these data have been included in the initial descriptive analysis of the study for comparison purposes. For the disciplines of health sciences, nursing and pharmacy we have included data from the eight-year period from 2006 to 2013 (see Discipline column, Table 1). This study was conducted under the ethics approval of the Faculty Tracking Project granted by the University of Auckland Human Participants Ethics Committee.

Data analysis

Our planned data analysis comprised three distinct phases. First we conducted a descriptive and exploratory analysis of all data related to student loans debt and financial support. Second, we conducted a principal component analysis within each of the four disciplines of health sciences, medicine, nursing and pharmacy in order to identify factors of similar career preferences. This was necessary because the career choices listed in the questionnaire for each discipline were different in type and number (between eight and 19 choices)—thus significantly complicating subsequent analysis and comparisons between disciplines without some reduction in factors. Third, we conducted two separate logistic regressions to explore how career preference factors could be explained by either levels of student loans debt or numbers of sources of financial support (SPSS, IBM Corporation, New York). We also considered how career preference factors could be explained by levels of financial support with debt as a covariate. We designated $p<0.05$ as statistically significant, and given the exploratory nature of our study we did not correct for multiple comparisons.[21,22]

Results

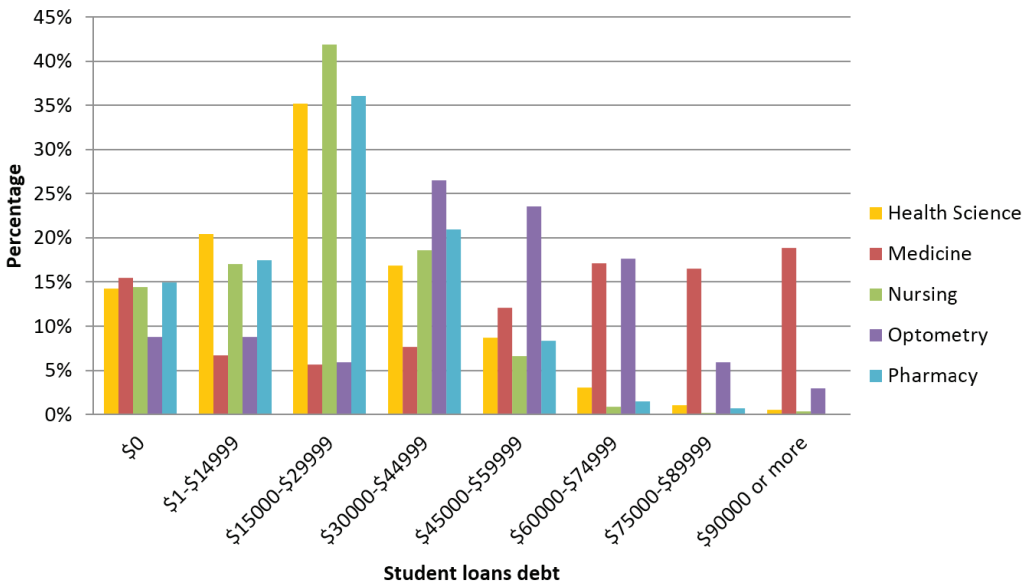
Data from a total of 2,405 students were included in our study—this comprised 199 health sciences students, 890 medical students, 572 nursing students, 710 pharmacy students and 34 optometry students. There was a high questionnaire response rate for medical, nursing, optometry and pharmacy students (81–95%), but this was considerably lower for health sciences students (47%).

Phase one

Student debt levels

Levels of student loans debt were reported using eight categories in increments of $15,000 each, spanning the range from $0 to $90,000 or more. Figure 1 shows the distributions of debt for all disciplines included in our study. The most common level of debt was the same for health sciences, nursing and pharmacy students, peaking in the $15,000 to $29,999 range. Optometry students reported modal debt in the next highest debt category, at $30,000 to $44,999. By contrast, levels of student loans debt reported by medical students showed a much flatter distribution with a nadir in the range in which other disciplines showed their peaks, and peaks at both extreme ends of the scale, namely $0 and $90,000 or more.

Figure 1: Histogram of the distribution of student loans debt at completion of the educational programme for each participating discipline.



Owing to the different distributions of student loans debt and the fact that some categories contained only a small number of respondents, we elected to use two categories for the analysis of debt levels—namely low and high debt, defined as debt less than $30,000 and greater than $30,000 respectively. Using two categories in this way allowed us to use binary logistic regression in phase three of our study in order to explore the relationships with career preferences. We chose $30,000 as the threshold between categories because approximately half the overall respondents fell into each category. However, compared with student loans debt overall (Figure 1), the proportions of low to high debt between disciplines varied significantly ($p<0.001$, chi square—Table 1). This effect was due to the fact that proportionally more students in medicine and optometry had high debt, while proportionally more students in health sciences, nursing and pharmacy had low debt (post hoc testing, Table 1).

Sources of financial support

Sources of financial support reported on the Tracking Project questionnaire comprised support from parents, student loans, student allowance, part-time employment, partner's income, savings, scholarships and other. Students were asked to indicate the total number of sources of financial support that they had accessed during their studies. Despite different debt levels, the most common number of sources of financial support was the same for all disciplines, with a mode of three sources (range 0–8 for medicine, 0–7 for health sciences and nursing, 0–6 for pharmacy and 1–6 for optometry). For the purposes of further analysis we elected to create two categories for the number of sources of financial support—namely low (three or less sources) and high (four or more sources). Despite similar modal numbers of sources of financial support, the proportions of low to high numbers varied significantly between disciplines ($p<0.005$, chi square—Table 1). This effect was due to the fact that

Table 1: Proportions of student loans debt and sources of financial support falling into low and high categories.

Discipline (sample period)		**Debt**** ($p<0.001$, chi square)		**Sources of financial support** ($p<0.005$, chi square)	
		Low (<$30,000)	High (>$30,000)	Low (3 or less)	High (4 or more)
Health science (2006–2013)	Participant n=199 Within discipline %	**138*** 70%	**59** 30%	120 60%	79 40%
Medicine (2006–2012)	Participant n=890 Within discipline %	**242** 28%	**625*** 72%	**488** 55%	**402*** 45%
Nursing (2006–2013)	Participant n=572 Within discipline %	**400*** 73%	**147** 27%	346 60%	226 40%
Pharmacy (2006–2013)	Participant n=710 Within discipline %	**463*** 69%	**212** 31%	**451*** 64%	**259** 36%
Optometry (2013)	Participant n=34 Within discipline %	**8** 24%	**26*** 76%	16 47%	18 53%
Total	Participant n=2,405	1,251	1,069	1,421	984

*Significant post hoc effect (z-score >1.96).
**Missing values indicate participants who declined to disclose their level of student loans debt.

proportionally more students in medicine had a high number of sources of financial support, while proportionally more students in pharmacy had a low number of sources of financial support—with other disciplines showing no significant effects (post hoc testing, Table 1). Given the small number of optometry respondents, this discipline was not included in further analysis.

Phase two

Principal component analysis of career preferences

In order to use regression analysis to investigate possible relationships between debt levels, financial support and career preferences upon graduation, we first attempted to find whether career preferences factored into similar types in order to reduce the number of factors for analysis. Students indicated their career preferences in the questionnaire by recording strong interest, some interest or no interest in each potential career choice. For our analysis we coded this level of interest numerically, using a value of 2 for strong interest, 1 for some interest and 0 for no interest. Of the 890 medical students included in the study, 145 from the year 2012 were excluded due to differently coded data.

The principal components method was used to perform factor analysis extraction in order to identify career choice factors using the level-of-interest score as the clustering factor. Initial analysis demonstrated that between three and five categories of career preference were evident across the different disciplines. In order to consolidate categories further we used Varimax rotation, suppression of loadings below 0.3, and the rule that category membership of possible career options was determined by the loading with the highest absolute value. This approach lead to the emergence of four distinct career preference categories for each discipline, with acceptable levels of total variance explained (between 46% and 68%—Table 2).[23–25]

Phase three

Relationships between career categories, student loans debt and financial support

We used a binary logistic regression model to explore relationships between levels of student loans debt, financial support used during study and categories of career preference (outputs for regression models are shown in Table 3).[23,24] The first model explored student loans debt and its relationship to the four career preference categories across all disciplines, but demonstrated no significant results (Table 3). Conducting the same exploratory regression model in relation to sources of financial support used during study and categories of career preference demonstrated six significant effects. Having a low number of sources of financial support meant that health sciences students favoured a career in Category 4, and medical students favoured a career in Category 1 (Table 3). Alternatively, having a high number of sources of financial support meant that medical and nursing students favoured a career in Category 4, and pharmacy students favoured a career in Categories 1 and 2 (Table 3). Although student loans debt appeared not to be a determining factor in these effects, it could nevertheless be a moderating factor. We therefore also conducted the second regression model with student loans debt included as a covariate. This approach increased the percentage of total variance explained in the model—for example, in medicine, the variance explained doubled from 4% to 8% (Table 3). Only one effect failed to reach significance with the addition of debt as a covariate (the effect for nursing), suggesting that we may have additional confidence in the five remaining effects for health sciences, medicine and pharmacy.

Table 2: Principal component analysis of career preferences based on level of interest reported by students.*

Career options on questionnaire	Career preference categories			
	1	2	3	4
Health science (total VE 64%)**				
Health promotion	.862			
Community outreach	.809			
Academic research		.816		
Postgraduate study		.748		
Medicine		.448		
Health policy			.771	
Health management			.771	
Pharmacy				.740
Nursing				.726
Medicine (total VE 46%)				
Medicine (general)	.810			
Medicine (subspecialty)	.702			
Geriatrics	.569			
Postgraduate study		.761		
Academic research		.748		
Medical sciences		.585		
Public health		.584		
Pathology		.383		
Surgery (subspecialty)			.626	
Surgery (general)			.616	
Radiology			.609	
Anaesthesia			.591	
Emergency medicine			.372	
Paediatrics (general)				.792
Paediatrics (neonatology)				.743
General practice				.418
Psychiatry				.404
Obstetrics and gynaecology				.351
Nursing (total VE 57%)				
Public health	.745			
Primary healthcare	.693			
Mental health	.636			
Older persons' health	.595			
Academic research	.469			
Surgery (general)		.820		
Surgery (subspecialty)		.811		
Theatre		.645		
Medicine (general)			.843	
Medicine (subspecialty)			.819	
Paediatrics				.834
Obstetrics and gynaecology				.517
Emergency care				.425
Pharmacy (total VE 68%)				
Postgraduate study	.886			
Academic research	.881			
Management		.758		
Regulatory affairs		.691		
Industry		.651		
Community			-.844	
Hospital			.628	
Veterinary				.989

*Career choices were clustered into categories using Varimax rotation with Kaiser normalisation, and the rule that category allocation was determined by the loading with the highest absolute value.
**VE—variance explained.

Table 3: Outputs of logistic regression models relating career category to student loans debt and financial support.

Discipline	*Career category number*	*Careers included in category*	*Debt, p value*	*Financial support, p value*	*Financial support with debt covariate, p value*	*Implications from significant effects*
Health science	1	Health promotion, community outreach	0.634	0.332	0.299	
	2	Academic research, postgraduate study, medicine	0.444	0.323	0.307	
	3	Health policy, health management	0.970	0.584	0.665	
	4	Pharmacy, nursing	0.977	**0.039**	**0.046**	Favoured by those with a low number of financial supports
	VE*		1%	5%	5%	
Medicine	1	Medicine (general), medicine (subspecialty), geriatrics	0.069	**<0.001**	**0.001**	Favoured by those with a low number of financial supports
	2	Postgraduate study, academic research, medical sciences, public health, pathology	0.146	0.074	0.069	
	3	Surgery (general), surgery (subspecialty), radiology, anaesthesia, emergency medicine	0.317	0.149	0.304	
	4	Paediatrics (general), paediatrics (neonatology), general practice, psychiatry, obstetrics and gynaecology	0.158	**0.002**	**0.004**	Favoured by those with a high number of financial supports
	VE		2%	4%	8%	
Nursing	1	Public health, primary healthcare, mental health, older person's health, academic research	0.918	0.621	0.911	
	2	Surgery (general), surgery (subspecialty), theatre	0.567	0.416	0.559	
	3	Medicine (general), medicine (subspecialty)	0.823	0.550	0.669	
	4	Paediatrics, obstetrics and gynaecology, emergency care	0.500	**0.045**	0.076	Favoured by those with a high number of financial supports
	VE		<1%	1%	2%	
Pharmacy	1	Postgraduate study, academic research	0.863	**0.013**	**0.029**	Favoured by those with a high number of financial supports
	2	Management, regulatory affairs, industry	0.729	**0.044**	**0.035**	Favoured by those with a high number of financial supports
	3	Community, hospital	0.176	0.918	0.759	
	4	Veterinary	0.589	0.961	0.821	
	VE		1%	3%	4%	

*Variance explained

Discussion

Our exploratory study found a number of findings of interest, including some significant relationships between sources of financial support and career preferences upon graduation. Student loans debt in all disciplines showed a distribution with a single mode, except in medicine. Principal component analysis of career preferences upon graduation demonstrated that despite different kinds and number of career options in each discipline, choices were able to be clustered into four categories of related choices within each discipline. The career preferences included in each category resulting from our principal component analysis largely make intuitive sense in terms of the vocational similarities of the careers within each category and the dissimilarities between categories—thus making it plausible that a student with an interest in one career choice in a given category may also have more interest in others in the same category than those in different categories (Table 2). Career categories across disciplines also appeared to contain similar combinations of career options—for example, in the three disciplines where postgraduate study and academic research were career options, these always clustered together—suggesting emergent natural types of career choice. We had no *a priori* expectation that the disparate career choices included on the questionnaire for each discipline could be meaningfully reduced to a manageable number of categories, let alone the same number of categories for all disciplines. The fact that we were able to do this made subsequent analysis considerably less complicated, and also allowed for more comparable relationships to be explored across disciplines. Thus, the framework of career preference categories generated by this study is, in itself, a substantial outcome—it is evidence based, shows acceptable levels of variance explained, and would potentially form a useful basis for further analysis using other methods of understanding student choice and career pathways. It is conceivable it could also guide aspects of curriculum design or the placement options offered to students.

The peak in the debt distribution for health Sciences, nursing and pharmacy students at $15,000–$29,999 could be explained by the fact that the total tuition costs of these degrees are around $18,000–$24,000 (Figure 1).[26] The higher peak for optometry is likely to be the result of the degree being of a greater length (five years) and the fees being around $1,500 more (from year two onward). In addition to this, there is a requirement for students to purchase equipment during their degree costing around $10,000.[26,27] In medicine, the 15% of students showing no debt could potentially be explained by this group containing international students who do not have access to the New Zealand Government student loans scheme and those students who have more substantial parental support. The large number of medical students with debt in the higher range, on the other hand, is likely to indicate graduate students entering the medical programme, who may already have some student loans debt, and the six-year length of the degree programme with higher course fees (approximately $14,000 per year as opposed to $6,200 for health sciences, nursing and pharmacy).[26]

Our results suggest that the number of sources of financial support more strongly determines career choice than the level of student loans debt *per se.* However, it is important to note that the level of student loans debt incurred under the Government student loans (GSLs) scheme is only a proxy for the total debt a student may incur during their studies. Learning more about the nature of the sources of financial support available to students may shed light on such effects. For example, students who have access to sources of income that they are not required to pay back (eg, scholarships or parental support) may be expected to be less encumbered by debt and make different career choices than those students who do have to pay back sources of financial support (eg, GSLs). Although students were asked to indicate all the sources of financial support used during their study, this did not allow us to ascertain the student's main source of financial support or give an indication of the degree of support received from each source.

General practice is included in medicine's career Category 4 in our results, which is a category favoured by medical students with a high number of sources of financial

support (three or more)—but this result, in itself, tells us little about possible career pathways to primary healthcare (Table 3). Category 4 in both nursing and medicine contains paediatrics, and obstetrics and gynaecology, and is favoured by students in both disciplines who have a high number of sources of financial support. It is also worth noting that Category 4 in health sciences likely represents an alternative route into professionally registered careers in pharmacy and nursing, and is favoured by students with a low number of sources of financial support (Table 3). Some further targeted data collection using additional questionnaires or interviews in students who indicate a preference for particular categories, could allow us to better understand such career choices. It is also unclear whether preference for certain career categories over others is related to the perceived remuneration associated with those careers. The significant effect in pharmacy involving a preference for Category 2 may suggest that this category, relative to the others in the discipline, offers higher paid opportunities. However, further research is needed to properly estimate the earning potential of each career category in our results (Table 3).

Although some of the results relating category of career preference with financial support were highly significant (Table 3), and the inclusion of debt as a covariate in these models increased the rates of variance explained, the final rates of variance explained remained relatively small. However, we chose the variables of student loans debt and financial support *a priori*, and there is no single acceptable level of variance explained in regression studies. Furthermore, smaller rates of variance explained remain useful when attempting to detect relatively weak signals in noisy systems—a type of system to which student career choice clearly belongs. Future work may allow more precise targeting of cohorts of student who are making specific choices and so increase the explanatory power of our models.

A strength of our study lies in the large number of participants included and the high questionnaire response rates, which were higher than that typically reported in questionnaire studies.[28,29] To our knowledge, this kind of cross-disciplinary comparison study has not been conducted previously. Potential limitations of our research include the fact that we did not exclude international students from our analysis, and the somewhat limiting nature of some of the questions included in the questionnaire. International students do not have access to the New Zealand Government loans scheme—however, even students who do have access to the scheme may not take up GSLs. In the questionnaire, students were asked to select a range to indicate their level of student loans debt upon exit from their educational programme, rather than asking them to record a total value for their debt. Although this made the question easier for students to answer, it effectively transformed a continuous measure into a categorical one, thus likely reducing the discriminability of the variable in relation to other factors, and increasing the complexity of the data for analysis. In future work, categories of debt could be converted to a pseudo-continuous measure by taking the numeric mid-point of each category rather than using a binary approach as in the present study. The changes to the questionnaire for medicine in 2012, when the Faculty Tracking Project became part of the MSOD research project, presented difficulties with data continuity and analysis. This led us to exclude the data after these changes were made from our analysis. However, it is possible that in future work, a method of equating data across the two periods could be devised, therefore allowing all data in the database to be including in a larger-scale analysis. It is also worth noting that career preferences indicated upon exit from an educational programme may have little bearing on the jobs that students ultimately end up working in. However, including variables such as gender and ethnicity into career preference models in future work may further inform such models.

Conclusion

Students in health sciences, nursing and pharmacy typically accrue similar levels of student loans debt of around $15,000 to $29,999, while optometry students accrue debt around $15,000 higher. Medical students demonstrate a flatter distribution of student loans debt, with debt distributed around both ends of the scale—that is, no

debt and $90,000 or more. Students typically access three sources of financial support during study. We have developed and demonstrated the efficacy of a four-category career preference framework to explore the relationship between student loans debt, financial support and career preferences upon graduation. Overall, we found five significant effects relating the number of sources of financial support to career preference categories involving students in health sciences, medicine and pharmacy. Our results suggest that the number of sources of financial support is a more strongly determining factor in career preference than the level of student loans debt *per se,* but this requires further study.

Competing interests:
Nil.

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