The Burden of Debt for Canadian Dental Students: Part 3. Student Indebtedness, Sources of Funding and the Influence of Socioeconomic Status on Debt

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ABSTRACT

In recent years, tuition fees at most universities across Canada have increased substantially, particularly in professional programs such as dentistry. Anecdotal evidence suggests that these increases have a significant adverse impact on the educational experience of dental students. In January 2004, students at Canada's 10 dental schools were invited to participate in a survey on costs, debt and other factors related to attending dental school in Canada. This third article in a series of 4 examines the effects of funding sources and socioeconomic status (SES) on dental students' debt.

The survey provided key information about the costs of attending dental school and the levels of debt among dental students across Canada. Choice of school and year of study had a significant effect on the overall costs of attending dental school, and dental students' costs were largely financed by private loans or other forms of debt. Canadian dental students' average debt varied between $24,000 to $26,000 per annum, depending on their year of study.

Key determinants of borrowing included type of residence, SES, total costs, and number of dependents. Students who lived at home or with relatives borrowed significantly less than those who were renting. Parents' SES was related to students' access to forms of educational funding that result in no debt burden. SES also played a role in determining the likelihood of a student pursuing further professional education.

MeSH Key Words: education, dental/economics; students, dental; training support/trends

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The problem of dental students' debt in Canada was explored in part 1 of a series of 4 articles.[1] Empirical studies[2,3] support the notion that dental students use various resources to finance their education. However, up-to-date information about dental students' debt in Canada is lacking. Current primary sources of information (e.g., Statistics Canada) on the overall costs focus solely on tuition fees; therefore no measures of the total costs of attending dental schools in Canada exist. Because of limited historical data about access to professional programs, assessing the impact of costs on student access is difficult. More information about the cost of dental programs across Canada and the variation in cost by year of study within universities is needed. Is the system of financial aid (public and private) adequate to cover the gap in access? Anecdotal information suggests that dental students borrow heavily to fund their way through school. Information about how much dental students are borrowing and how close they are to their borrowing limits is

Table 1 Student responses to funding shortfall

Response	No. of responses (%)
I do not have a shortfall	217 (32.7)
I will increase my debt even further	331 (49.9)
I will withdraw from dental school	4 (0.6)
I will reduce my anticipated total expenses	39 (5.9)
I will get a new job/higher pay	10 (1.5)
I don't know what I will do yet	67 (10.0)

Table 2 Multiple regression analysis of factors (sex, marital status, place of residence, mode of transport to and from school, age, and no. of dependents) influencing overall total costs

Source	Type III sum of squares	df	Mean square	*F*	*p value*	Partial eta squared
Corrected model	50661756334.970[a]	51	993367771.274	9.807	0.000	0.483
Intercept	2943599823.679	1	2943599823.679	29.061	0.000	0.051
Q1: University currently attended	16994041136.130	8	2124255142.016	20.972	0.000	0.238
Q4: Year in dental program	3757324385.641	3	1252441461.880	12.365	0.000	0.065
Q1 * Q4	7052388570.928	24	293849523.789	2.901	0.000	0.115
Q6: Sex	13375154.464	1	13375154.464	0.132	0.716	0.000
Q7: Marital status	1556499080.041	4	389124770.010	3.842	0.004	0.028
Q10: Living arrangements	2467830745.506	5	493566149.101	4.873	0.000	0.043
Q12: Student's mode of transportation	366716583.468	4	91679145.867	0.905	0.461	0.007
Q2: Age	76519377.663	1	76519377.663	0.755	0.385	0.001
Q9: Number of dependents	391682714.892	1	391682714.892	3.867	0.050	0.007
Error	54291475422.786	536	101290066.087			
Total	834543153858.000	588				
Corrected total	104953231757.755	587				

[a] $R^2 = 0.483$ (Adjusted $R^2 = 0.433$).

needed. Such information would provide a baseline for further debt-policy analysis.

We know little about how educational costs and related student debt affect students' professional choices, particularly their choice of the type of dentistry they plan to pursue after graduation. These data would be of interest to a diverse audience. Prospective and current dental students would benefit from accurate and complete information about the financial requirements of pursuing a dentistry degree. Similarly, dental professionals, who have a long-standing tradition of providing support and assistance to dental students, will gain an understanding of the financial challenges facing a new generation of dental students. For universities — which bear some responsibility for their accessibility, provide students with financial aid and inform prospective students about these issues — the results of the survey should provide current information about dental students in Canada. Perhaps most importantly, dental care is an essential component of our health care system, and government policy must

Table 3 Mean amount of funding from sources by year of study and percentage of funding dental students obtained from the source

Year of study	Mean amount (Can$) of funding					
	Scholarships, bursaries and other non-repayable awards (%)	Government student loans (%)	Private loans, lines of credit, etc. (%)	Personal resources (e.g., employment income, savings, sale of assets) (%)	Total	Total accrued debt (Can$)
1	3,558.11 (10.0)	7,661.34 (21.0)	15,163.23 (42.0)	9,956.49 (27.0)	36,339.16	22,824.57
2	3,356.41 (9.0)	9,672.78 (26.0)	16,441.47 (44.0)	7,766.88 (21.0)	37,237.54	26,114.26
3	4,456.86 (12.0)	10,023.36 (26.0)	15,556.74 (41.0)	8,196.67 (21.0)	38,233.63	25,580.10
4	4,772.36 (13.0)	9,536.20 (26.0)	14,856.32 (41.0)	7,033.39 (19.0)	36,198.26	24,392.52
Overall average	3,981.37 (11.0)	9,130.62 (24.8)	15,520.92 (42.0)	8,386.70 (22.0)	37,019.60	24,651.53

ensure that we have dentists — if there is a failure in the system of financing dental training, federal and provincial governments must understand and deal with the issues.

In January 2004, students at Canada's 10 dental schools were invited to participate in a survey on costs, debt and other factors related to attending dental school in Canada. The study was supported by the deans of Canadian dental schools, conducted by one of the authors (JNW) and the office of Planning and Institutional Research (PAIR) at the University of British Columbia (UBC), and funded by PAIR.

This study was designed to measure the total costs of attending dental school in Canada; examine the magnitude of debt accumulation for Canadian dental students; and explore how educational costs and related debt are affecting students' professional choices within dentistry.

The first objective, along with background information about survey participants, was addressed in part 2 of this series.[4] This paper, part 3 of this series, focuses on the second objective; the third objective will be explored in part 4.[5]

Materials and Methods

The materials and methods for this survey were described in detail in part 2 of the series.[4] Statistical analysis of the data for this paper, primarily with simple descriptive statistics, regression analysis and analysis of variance (ANOVA), was undertaken with SPSS version 13 (SPSS Inc., Chicago, Ill.).

Results

In the survey, students were asked this question: "If your sources of funding do not equal your projected expenses, you will have a shortfall for the current year. How will you address this challenge?"[4] Almost half of respondents indicated that they would increase their level of debt further (**Table 1**).

While choice of university and year of study may have the greatest impact on overall costs and required funding,[4] dental students had many other financial obligations that influenced their overall expenses on a yearly basis. Regression analysis was used to examine various factors that could influence the overall annual expenses of dental students, including the variables "university attended," "year in program," "gender," "marital status," "living arrangements," "student's mode of transportation" and "age" (**Table 2**). The variables "university, year level, marital status, living arrangements and number of dependents" were significant predictors of student costs.

Table 3 lists the mean amounts of funding students obtained from various sources (and the percentage of funding from each source) according to year of study (years 1–4). Across all years of study, almost half (42%) of students' costs were financed by private loans. On average, dental students incurred debt of $24,651 per year, an amount that peaked in second year, falling slightly each year thereafter.

Table 4 shows the mean amount of funding dental students obtained from various sources, based on the university they attended and their year of study. To compare universities, we sum annual debt across all 4 year levels of the students surveyed. The least mean debt (summed over the 4 year levels) was $29,833 for students at Laval University, and the highest was $116,111 for students at Saskatchewan, followed closely by students at UBC ($115,283). Students from Alberta (across all 4 years) received the highest mean amount in government student loans ($73,189), compared with students from Laval, who received the least amount in government loans ($6,617).

Table 4 Mean amount of funding from sources (Can$) by university and year of study

University and year of study	Scholarships, bursaries and other nonrepayable awards	Government student loans	Private loans, lines of credit, etc.	Personal resources (e.g. employment income, savings, sale of assets)	Total accrued debt
Alberta					
1	3,326.47	23,643.71	9,864.13	8,231.25	33,507.84
2	4,020.63	21,296.50	3,666.88	2,560.00	24,963.38
3	3,555.00	17,331.88	5,800.00	5,187.50	23,131.88
4	6,076.92	10,916.67	13,916.67	3,153.85	24,833.34
British Columbia					
1	4,626.92	8,826.92	24,894.23	8,240.00	33,721.15
2	4,466.67	10,156.94	18,998.94	8,312.63	29,155.88
3	4,481.82	9,878.57	21,960.71	4,659.09	31,839.28
4	4,716.67	8,275.00	12,291.67	12,000.00	20,566.67
Dalhousie					
1	700.00	8,450.50	15,710.53	7,825.75	24,161.03
2	628.44	9,434.06	16,966.67	7,264.12	26,400.73
3	1,531.25	11,008.75	18,700.00	3,843.75	29,708.75
4	1,100.00	7,873.08	17,923.08	8,107.69	25,796.16
Laval					
1	1,500.00	1,200.00	2,500.00	8,000.00	3,700.00
2	1,800.00	520.00	11,400.00	3,000.00	11,920.00
3	800.00	2,416.67	9,250.00	1,500.00	11,666.67
4	7,287.50	2,480.00	66.67	2,750.00	2,546.67
Manitoba					
1	1,868.75	8,218.75	11,828.57	10,900.00	20,047.32
2	1,087.50	7,492.86	16,118.75	6,025.00	23,611.61
3	2,938.57	4,600.00	20,582.86	11,514.29	25,182.86
4	216.67	6,566.67	17,166.67	1,750.00	23,733.34
McGill					
1	3,142.11	2,750.56	5,906.25	4,852.63	8,656.81
2	2,740.00	6,695.75	15,379.35	7,122.76	22,075.10
3	2,100.00	8,313.33	9,800.00	9,961.54	18,113.33
4	4,508.33	5,546.67	11,500.00	5,000.00	17,046.67
Saskatchewan					
1	9,528.00	9,110.00	23,225.00	5,684.21	32,335.00
2	5,911.76	12,689.71	23,588.24	10,221.88	36,277.95
3	9,753.13	11,718.75	16,843.75	9,180.00	28,562.50
4	8,883.53	6,602.94	12,333.33	8,216.67	18,936.27
Toronto					
1	2,665.28	3,269.03	16,830.00	12,487.50	20,099.03
2	3,743.48	7,970.65	17,695.65	6,952.17	25,666.30
3	4,854.55	7,734.38	10,107.14	14,451.61	17,841.52
4	2,751.40	6,291.67	13,768.60	6,979.17	20,060.27
Western					
1	3,375.00	3,987.07	9,803.70	16,478.57	13,790.77
2	4,306.67	5,940.00	15,864.71	14,941.18	21,804.71
3	5,634.78	6,993.48	15,841.67	7,404.17	22,835.15
4	6,783.33	10,672.22	13,205.56	8,981.83	23,877.78

Table 5 Multiple regression analysis of additional debt (private loans, lines of credit, etc.) by university and year of study

Source	Type III sum of squares	df	Mean square	*F*	*p* value	Partial eta squared
Corrected model	16158045879.228[a]	35	461658453.692	3.425	0.000	0.180
Intercept	77431648537.396	1	77431648537.396	574.409	0.000	0.513
Q1: University currently attended	7972488081.493	8	996561010.187	7.393	0.000	0.098
Q4: Year of study in dental program	519519683.821	3	173173227.940	1.285	0.279	0.007
Q1 * Q4	6418783863.824	24	267449327.659	1.984	0.004	0.080
Error	73601999490.133	546	134802196.868			
Total	218285968724.000	582				
Corrected total	89760045369.361	581				

[a] $R^2 = 0.180$ (Adjusted $R^2 = 0.127$).

Table 5 summarizes the results of regression analysis of additional debt (private loans, lines of credit, etc.) by university and year of study. The variables "university" and "year of study" could predict 18% of the variation in private debt. This means that the differences in tuition costs imposed by universities resulted in differences in private debt.

The regression analysis in **Table 6** shows that there were 4 significant predictors of borrowing ($p < 0.05$): residence, socioeconomic status (SES) (as indicated by parental education), total costs and number of dependents. Sex, age and marital status were not statistically significant factors. Students who lived at home or with relatives borrowed $5,333 less than those who were renting. In **Table 7**, the results of parameter estimation are given to explain the actual effects of each of these significant determinants of borrowing. In the case of annual costs, the parameter estimate was statistically significant and also showed a relatively high effect size. The value of 0.516 indicates that for every dollar of increased cost, students will borrow approximately $0.52 at current levels of cost. Consequently, when costs increase because of higher tuition or other factors, students must have access to additional loans of approximately half the amount of the increase.

Discussion

Table 2 investigates the influence of other factors related to annual expenses. Living expenses can be high for university students (typically increasing as students progress in their academic programs) because students place less reliance on their parents for housing and financial support.[6] The most surprising feature of the results of the regression shown in **Table 2** is the relatively low impact of most factors, other than university and year of study, on student costs. When these other variables were included, this model explained 48% of the overall costs ($R^2 = 0.483$). Because this is the best possible model of dental school costs based on our existing data set, the median reported total costs ($Can) for the academic year 2003–2004 highlighted in **Table 4** of part 2 of the series[4] are fairly reliable representations; that is, although costs vary because of factors other than university and year of study, these other factors explain only another 8% of the variation in costs (adjusted R^2 difference is 0.433; see **Table 2** of this paper) – 0.353 (see **Table 5** of part 2 of this series[4]) = 0.08).

The one exceptional additional cost factor in **Table 2** is "living arrangements," which also shows a significant ($p = 0.000$) effect on student costs. Students who reported living with family or relatives had costs that were on average $6,100 less than those students who rented (little difference was found between types of rental arrangements, including on-campus housing). Students who lived in accommodation that they owned reported costs that were $7,300 more than students who lived with their parents. These findings provide reliable estimates of the costs of housing.

The reasonableness of the numbers themselves provides external validity for the model. For any university and year of study, it is possible to calculate the average or median cost of attending dental school, and to separate the costs into broad components. One way to consider costs is with the simple equation [*total cost – living cost = burden of cost to dental students*]. This equation can be used to compute realistic components of the cost of attending dental school: based on costs at UBC as an example, the approximated living costs for first-year dentistry are $14,000 (i.e., $50,000 [median total cost, from **Table 4** in part 2[4]] – $36,000 [burden of cost to UBC dental students, as calculated from internal information and university calendar]).

Table 6 Regression analysis of total borrowing

Source	Type III sum of squares	df	Mean square	*F*	*p* value	Partial eta squared
Corrected model	43901843154.700[a]	14	3135845939.621	10.014	0.000	0.206
Intercept	351675.087	1	351675.087	0.001	0.973	0.000
Q6: sex	31584005.880	1	31584005.880	0.101	0.751	0.000
Q10: living arrangements	6130307536.124	5	1226061507.225	3.915	0.002	0.035
Parental education	1527582322.614	1	1527582322.614	4.878	0.028	0.009
Q19: Total expenses	22200893504.416	1	22200893504.416	70.894	0.000	0.116
Q2: Age	474829106.470	1	474829106.470	1.516	0.219	0.003
Q9: Dependents	1390779447.789	1	1390779447.789	4.441	0.036	0.008
Q7: Marital status	701823691.433	4	175455922.858	0.560	0.692	0.004
Error	169104507223.462	540	313156494.858			
Total	555421280036.000	555				
Corrected total	213006350378.162	554				

[a] $R^2 = 0.206$ (Adjusted $R^2 = 0.186$).

Prospective students and policy makers can use information from this survey to determine total costs. Individual universities with inside information about actual total program costs can see the extent to which the students' total costs are influenced by the costs that the schools have been forced to levy. How are dental students paying for these costs? Unfortunately, reports of the cost of dental programs are complex and difficult to understand; some university calendars show fees exclusive of clinical and instrument costs; some include all costs within their overall fees.

Students finance their education by various means.[6,7] However, for simplification, student financing can be divided into 4 categories: 1) scholarships, bursaries and other nonrepayable awards; 2) government student loans; 3) private loans, lines of credit, and credit cards; and 4) personal resources: employment income, personal savings, sale of assets, financial assistance from family and friends, and gifts. Categorizing income sources under "personal resources" is intended to focus on the essential policy elements explored in this survey — university support, government support and the extent to which private loans make up for shortcomings in these 2 funding sources.

Perhaps one of the most notable results to emerge from this survey is the extent to which dental students use private-sector loans to finance their education. **Table 3** shows that across all years of study, 42% of student costs were financed by private loans and 63% to 70% by some form of debt. On average, dental students incurred debt of $24,652 per year, an amount that peaked for second-year students ($26,114), and diminished slightly each year thereafter. This probably reflects lower costs for students further along in their studies, based on incremental fee increases affecting study participants, and not a decrease in the cost of attending dental school from one year to the next for any given student. Despite the high incomes that dental graduates can earn once established, these debt levels are formidable, particularly since many students have incurred debt in their prior academic studies.

The complexities of student aid policies in the various provinces and within different universities underlie the patterns observed in **Table 4**. However, despite the immense variation, we can still investigate the key relationship of increased program costs to students' methods of financing, in particular, the relationship between private borrowing and the 2 primary determinants of dental program cost: university and year of study. The regression model in **Table 5** shows that the university and the year of study explain 18% of the variation in private debt, namely, the differences in costs imposed by universities can result in differences in private debt. Although 18% may not be a large fraction of the variation in debt, particularly because debt is a function of many other factors (**Table 6**), these results nevertheless show a clear and important relationship between costs imposed by universities and private debt. The policy question that emerges from discussions of tuition fees and financial aid is: How much does total student borrowing increase because of increased costs, all other factors being equal?

Another consideration in the development of this survey was the relationship between student debt and SES, and methods of analyzing this issue. Although many

Table 7 Parameter estimation for total borrowing with ANOVA

Parameter	Coefficient β [a]	Standard error	t	*p* value	95% CI	Partial eta squared
Intercept	–2204.690	15675.763	–0.141	0.888	–32997.638 to 28588.258	0.000
Q6; sex male	–488.783	1539.086	–0.318	0.751	–3512.113 to 2534.547	0.000
Q6; sex female	0[b]					
Living arrangement						
University residence	9353.039	3742.307	2.499	0.013	2001.775 to 16704.302	0.011
[Q10; own home]	–3611.003	3280.417	–1.101	0.271	–10054.945 to 2832.939	0.002
[Q10; rent off campus]	5333.006	2073.809	2.572	0.010	1259.283 to 9406.728	0.012
[Q10; rent on campus]	1033.807	2694.905	0.384	0.701	–4259.976 to 6327.589	0.000
[Q10; fraternity or sorority]	–27.766	9035.709	–0.003	0.998	–17777.213 to 17721.680	0.000
[Q10; with family or friends]	0[b]					
Marital status						
[Q7; single]	951.781	11135.448	0.085	0.932	–20922.322 to 22825.884	0.000
[Q7; married]	562.863	11076.998	0.051	0.959	–21196.425 to 22322.151	0.000
[Q7; cohabiting]	6096.535	11498.301	0.530	0.596	–16490.346 to 28683.415	0.001
[Q7; legally separated]	–3675.463	16512.520	–0.223	0.824	–36112.109 to 28761.184	0.000
[Q7; divorced]	0[b]					
Parental education	–1024.064	463.666	–2.209	0.028	–1934.874 to –113.253	0.009
Q2: age	390.449	317.086	1.231	0.219	–232.423 to 1013.322	0.003
Q9: dependents	3366.118	1597.280	2.107	0.036	228.475 to 6503.761	0.008
Q19: total expenses	0.516	0.061	8.420	0.000	0.396 to 0.637	0.116

[a] *Unstandardized.*
[b] *This parameter was set to zero because it is redundant.*

surveys attempt to measure SES with questions related to parental education and parental income, results based on parental income have repeatedly been shown to be unreliable.[3] Students, particularly those in professional or post-baccalaureate programs such as dentistry, who may have been away from home for a considerable length of time, provide unreliable answers to questions about parental income. However, in Canadian society the strong link between SES and education is well established, and parental education can be measured with surveys relatively easily and accurately. Therefore, parental education was used as the proxy for SES throughout this study. Parental education was derived as the simple average of the mother's and father's education,[8] based on the Statistics Canada 8-point scale (**Table 8**).

Also of interest was the relationship between borrowing and SES, as measured by parental education. The scale used was consistent with the methods of Statistics Canada,[8] increasing one level for every level of increase in the Statistics Canada classification. The difference between the bachelor's level on the scale and the high school level is 3 steps (**Table 8**). Therefore, students whose mother and father had bachelor's degrees could expect to borrow an average of $3,072 (3 × $1,024) less annually than a student whose parents had completed only high school. Parents' educational level, and therefore SES, was related to students' access to forms of educational funding that result in no debt burden.

The regression analysis in **Table 6** shows that SES (as indicated by parental education) was one of 4 significant predictors of borrowing ($p < 0.05$). A key feature of access to post-secondary education is the role played by SES. Much is known about the reduced participation of those from lower SES groups in post-secondary education,[8] but the research has been almost exclusively related to the attainment of a first degree. One hypothesis is that once students register at a university, and obtain sufficient university credits and success to be admitted to dental school, the filtering effects of SES are no longer present. If this hypothesis is true, the distribution of SES

Table 8 The classification of parental education, derived from the highest level of education attained, according to the Statistics Canada 8-point scale

Classification	Description
1	Elementary school
2	Some high school
3	Completed high school
4	Trade or vocational school
5	Post-secondary certificate or diploma
6	Bachelor's degree
7	Master's degree
8	Professional or doctorate

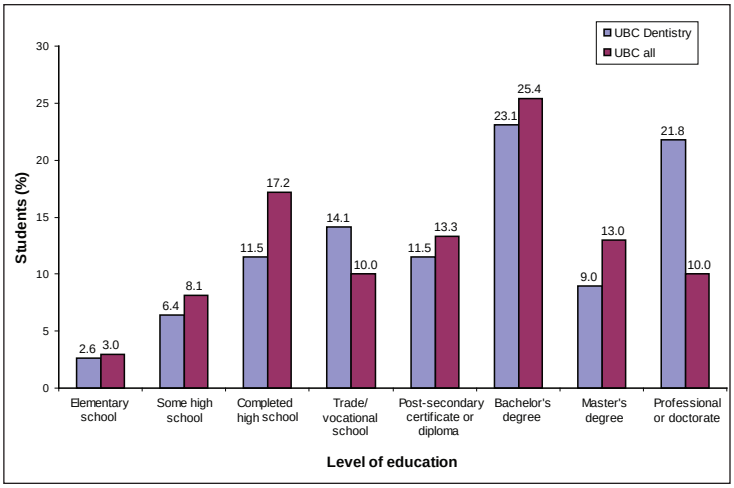

Figure 1 Comparison of highest level of education of fathers of University of British Columbia (UBC) dental students and all undergraduate UBC students (2003–2004), as proxy for socioeconomic status.

Source: Data from this survey and from Dumaresq and others.[3] Note: Only father's education was available for this comparison.

Figure 1 compares the highest educational attainment of fathers between UBC dental students, used as a case study, and all UBC undergraduate students. The authors (CD and WS) have extensive access to statistical information about the parental education of UBC students and therefore could expand upon this concept using the UBC data from the survey, along with additional information provided by PAIR at UBC. Overall, the percentage of dental students whose fathers had completed a university degree was 5.4% higher than that of the overall undergraduate group; the spread at the highest degree level (professional or doctorate) was 11.8%. Extrapolation of this comparison to the overall population of British Columbia suggests that 16% of people over 15 years of age have fathers with a university degree, compared with 48.4% of all UBC students and 53.9% of dental students in the 2003–2004 academic year.

The results of this survey show that parental education continues to play a role in students' continuance to dental school. This result is unexpected and extends the theoretical dimension of the research on educational attainment. To summarize, there is clear evidence of selectivity based on SES in continuance to dental school, but there is no evidence that this selectivity is influenced by increasing costs. This result is consistent with research into participation in U.S. professional schools[9,10] and a recent Statistics Canada report.[11] As supported by the current survey results, costs have little influence on participation by SES per se, because participation is already largely determined by SES. Because dental students come from high-income and high-education families already, increasing costs have little impact on the SES profile — students with low SES have never attended dental school in great numbers.

among dental students would be similar to that among other successful students at the same university. Another hypothesis predicts that the more expensive dental programs would be composed of students from relatively higher SES groups.

We found no significant correlation between costs and average parental education, suggesting that higher-cost universities did not have an exclusionary effect on students with low SES. This result is corroborated by the borrowing analysis, suggesting that students of lower SES are not deterred by higher costs, but are simply forced to borrow more. Despite the lack of a relationship between costs and SES, the SES attainment proxy for dental students is different from that of the general student population and, to an even greater extent, the general Canadian population.

Conclusions

Faced with a shortfall of funding, half of the survey's respondents indicated that they would increase their debt level further. Marital status and living arrangements were significant predictors of student costs. A large portion (42%) of students' costs were financed by private loans. The highest mean levels of debt (at Saskatchewan) were more than 3 times greater than mean levels of debt for students at Laval. Government loans for students at Alberta were 12 times higher than those for students at Laval. The SES of dental students' parents, as estimated by the highest reported level of parental education, was a significant predictor of borrowing by students, although higher-cost programs did not seem to dissuade students of lower SES from pursuing a career in dentistry.

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