4.17 Job experience and multiple related factors: regression analyses

The two-way tables show that the measures of job experience appear to have a complex association with a number of factors or variables. It is not sufficient to examine only the relationship of job experience and each factor separately, as this may be misleading. In particular, an apparent association between job experience and any one factor may be due to both variables being associated with a third variable, an effect known as confounding.

Regression analysis is a statistical method for analysing the relationship between a particular variable of interest, in this case a measure of job experience such as income per week, and a set of other variables or factors. The regression models the relationship of the job experience measure with all the factors simultaneously, and 'adjusts for' or 'controls for' any confounding effects.

The regression model is expressed as an equation that estimates or 'predicts' the value of the job experience measure from a function of the factors. Prediction in this sense means estimating income per week (or whatever the measure may be) from the values of the factors, for an observation taken under the same circumstances as the sample from which the regression equation was derived. This does not imply that any of the factors actually *cause* changes in income. The regression only models relationships or associations between income and other factors; any inferences that such relationships are due to direct cause and effect can only be made on the basis of other knowledge.

Two job experience measures have been modelled. These are whether a client had a job or not during 1995 (i.e. whether the client was a worker) and income from work per week of support.

Worker/non-worker

Whether a client had a job or not in 1995 can be considered as a binary variable, that is it can have two values only—a person can only have had a job or not have had a job. Logistic regression is a commonly used statistical model in such cases. It models the likelihood that a client had a job, given the client's characteristics.

Likelihood is expressed in terms of odds ratios, and the logistic regression models the natural logarithm of the odds ratio. (Odds, as in horseracing, are equal to p/1-p, where p is the probability of having had a job, and 1-p is the probability of not having had a job. Thus if p = 0.5, then the odds are equal to 1; if p = 0.75, then the odds are equal to 3, i.e. 3 to 1.) As the odds are already a ratio, then the odds ratio is a ratio of a ratio, and so it is not easily interpretable. It is possible to estimate particular probabilities from odds ratios, but the main purpose here is to determine the relative importance of the various factors while controlling for confounding. (See Appendix 2 for further details of the regression analyses.)

The logistic regression analysis shows that with some important exceptions the associations between the probability of having had a job and the various factors discussed previously in this chapter are, in fact, similar to the simple two-way tables (Table 4.47).

In the regression model, all client characteristics except two were statistically significantly associated with the likelihood of getting a job. The two factors which were not statistically significant are not included in the model in Table 4.47. One was non-English-speaking background for which the difference in employment rate was small ($F_{1,18476} = 0.1$, $p > 0.05$; see also Table 4.12). The other was episodic nature of primary disability which, as previously discussed, is highly correlated with the type of disability, specifically with having a psychiatric disability. Thus, after controlling for type of disability, the episodic nature of disability is no longer a statistically significant factor ($F_{1,18476} = 1.2$, $p > 0.05$).

Agency site characteristics were also associated with the likelihood of having had a job. In particular, the number of staff and the number of clients supported at a site were both

highly statistically significant. Considering these two factors together showed that the likelihood of employment was inversely associated with the magnitude of the client-to-staff ratio, that is, clients were more likely to have had a job if supported by an site with a low client-to-staff ratio. A ratio of less than 5 to 1 in particular increased the likelihood of employment, such that a additional term for this could be entered into the model. Client-to-staff ratio appeared to interact with certain client characteristics, as discussed below.

The patterns of employment likelihood with sex, age, Indigenous status and presence of other disabilities remain similar to those in Tables 4.6, 4.8, 4.10 and 4.18. However, the regression shows that contrary to the results of the simple analysis in Table 4.14, after controlling for other factors, clients with a psychiatric disability were about as likely to get a job as those with a physical or a neurological disability, or with an acquired brain injury. The main difference that remained was that people with an intellectual/learning disability were more likely to have had a job than people with one of the other common disabilities.

The main reason for this result appears to be the effect of controlling for the site client-to-staff ratio. Clients with a psychiatric disability were more likely to be supported by a site with a high client-to-staff ratio. For example, 58% of clients with a psychiatric disability were supported by a site with a client-to-staff ratio of 10 or greater, compared with 45% of all other clients, and 41% of clients with an intellectual/learning disability. Thus, one possible explanation is that clients with a psychiatric disability appeared to be less likely to get a job than clients with a physical disability, for example (see Table 4.14), simply because of this association with high site client-to-staff ratios, rather than because of differences between these disability types. However, other explanations are possible.

The two-way cross tabulations in Table 4.20 showed no consistent association between job participation and the frequency of assistance needed by clients for activities of daily living. However, the regression analysis suggests that clients who required a continual frequency of assistance were less likely to have had a job than others. Again, this appeared to be due to controlling for the client-to-staff ratio. In this case, clients who needed a continual frequency of assistance were more likely to be supported by a site with a low ratio, where they would receive more support (see Chapter 5). About 25% of these clients were supported by sites with a ratio less than 7.5, compared with 6% of all other clients. Thus, it appears that given the same amount of agency support, clients who needed continual ADL assistance were less likely to have had a job than other clients. However, because they were more likely to have received more support from an agency site with a low client-to-staff ratio, they look to be just as likely to have had employment as other clients. There were no statistically significant differences between the other levels of support ($F_{3,18476} = 7.6$, $p > 0.05$).

Clients who were either living alone or with family members were more likely to have had a job than clients with other living arrangements, whereas clients whose living arrangements were not known were less likely to have had a job. This latter group constituted over 6% of clients and appears to be not a random sample.

Clients who had been endorsed by a disability panel were more likely to have had a job than other clients. This may not necessarily be because of the effects of endorsement itself. Endorsement may be related to one or more other factors, for example severity of disability, which affect the chances of employment.

Not surprisingly, clients reported to be under the Supported Wage System as at the end of the year were more likely to have a job than others. There were no statistically significant differences between CETP and ISJ clients ($F_{1,18476} = 0.1$, $p > 0.05$). Clients who were referred from a source other than self, family, DEET or HFS were less likely to have had a job than those referred from any of these sources, but there was no statistically significant variation among them ($F_{3,18476} = 3.8$, $p > 0.05$).

The State/Territory of the agency site remained a statistically significant factor which suggests that there was variation between States in unmeasured external factors which may have affected employment success. Consistent with Table 4.38, clients of agency sites in remote locations were more likely to have had jobs than clients of urban or rural agency sites.

Table 4.47: Logistic regression model for clients having had a job during 1995 (18,527 clients)

Variable	Category[a]	Chi-square statistic[b]	Log odds ratio		Odds ratio	
			Estimate	Standard error	Estimate with 95% confidence interval	
Intercept			-0.93	0.13	0.39	(0.31, 0.51)
Sex	*Male*	57.5***				
	Female		-0.24	0.03	0.78	(0.74, 0.83)
Age	*15–19*	144.3***				
	20–24		0.52	0.05	1.68	(1.53, 1.84)
	25–29		0.52	0.05	1.68	(1.51, 1.86)
	30–44		0.40	0.05	1.50	(1.36, 1.65)
	45–59		0.35	0.07	1.41	(1.24, 1.61)
	60–64		0.60	0.35	1.81	(0.92, 3.60)
	65–69		2.32	1.14	10.21	1(.09, 95.90)
	Not known		-0.03	0.33	0.97	(0.51, 1.85)
Indigenous status[c]	*No*	56.7***				
	Yes		-0.44	0.11	0.65	(0.52, 0.81)
	Not known		0.38	0.06	1.46	(1.30, 1.65)
Primary disability type	*Intellectual/learning*	135.3***				
	Physical		-0.34	0.05	0.71	(0.64, 0.79)
	Acquired brain injury		-0.33	0.09	0.72	(0.61, 0.86)
	Deaf and blind		-0.62	0.49	0.54	(0.21, 1.40
	Vision		-0.46	0.10	0.63	(0.52, 0.78)
	Hearing		0.22	0.08	1.25	(1.06, 1.48)
	Speech		0.57	0.27	1.77	(1.04, 2.99)
	Psychiatric		-0.37	0.05	0.69	(0.63, 0.76)
	Neurological		-0.35	0.09	0.71	(0.59, 0.84)
	Not specified		-1.21	0.81	0.30	(0.06, 1.47)
Other disability	*No*	30.4**				
	Yes		-0.21	0.04	0.81	(0.75, 0.87)
Frequency of ADL assistance required	*Other*	22.5***				
	Continually		-0.25	0.05	0.78	(0.70, 0.86)
Type of living arrangements	*Other*	130.0***				
	Lives alone or with family		0.32	0.06	1.38	(1.24, 1.54)
	Not known		-0.41	0.09	0.66	(0.56, 0.79)
Disability panel	*Referred*	108.7***				
	Endorsed		0.25	0.05	1.28	(1.15, 1.42)
	Rejected		0.03	0.21	1.03	(0.68, 1.57)
	None of the above		-0.10	0.06	0.90	(0.81, 1.01)
	Not known		0.51	0.98	1.67	(0.25, 11.36)
Funding type	*CETP, ISJ or 'Other'*	26.5***				
	Supported Wage System		0.62	0.14	1.85	(1.40, 2.46)
	Not known		0.61	0.22	1.84	(1.20, 2.82)

(continued)

Table 4.47 (continued): Logistic regression model for clients having had a job during 1995

			Log odds ratio		Odds ratio	
	Category[a]	Chi-square statistic[b]	Estimate	Standard error	Estimate with 95% confidence interval	
Referral source	*Not 'other'*[d]	61.8***				
	Other		-0.27	0.04	0.76	(0.71, 0.81)
State	*New South Wales*	124.1***				
	Victoria		-0.03	0.05	0.97	(0.89, 1.07)
	Queensland		0.16	0.05	1.18	(1.07, 1.29)
	Western Australia		0.42	0.06	1.51	(1.35, 1.70)
	South Australia		-0.16	0.09	0.86	(0.72, 1.02)
	Tasmania		0.00	0.14	1.00	(0.76, 1.30)
	ACT		0.56	0.12	1.76	(1.40, 2.21)
	Northern Territory		1.48	0.29	4.39	(2.50, 7.72)
Agency site location	*Urban or rural*	15.3***				
	Remote		0.48	0.13	1.61	(1.27, 2.05)
Number of staff	*<3*	307.3***				
	3–5		0.51	0.07	1.67	(1.46, 1.92)
	5.1–10		0.77	0.07	2.15	(1.89, 2.45)
	10.1–15		0.89	0.08	2.43	(2.10, 2.82)
	>15		1.02	0.08	2.78	(2.37, 3.25)
	Not known		-1.62	0.24	0.20	(0.12, 0.32)
Number of clients	*1 to 25*	81.5***				
	26 to 100		-0.37	0.10	0.69	(0.56, 0.84)
	More than 100		-0.69	0.11	0.50	(0.41, 0.62)
Client-to-staff ratio	*5 to 1 or more*	55.7***				
	Less than 5 to 1		0.86	0.12	2.35	(1.86, 2.98)
Type of site	*Other*	39.9***				
	Vision 75%+		2.47	0.23	11.80	(7.50, 18.57)
	Psychiatric 25–74%		-0.12	0.05	0.88	(0.80, 0.98)
	Neurological 25–74%		0.41	0.18	1.50	(1.05, 2.16)
	Intellectual/learning <50%		0.16	0.06	1.18	(1.04, 1.34)

(a) An italic entry indicates the reference category.
(b) Likelihood ratio chi-square with n-1 degrees of freedom, where n is the number of categories for the variable. Statistical significance of chi-square is indicated as *** $p < 0.001$, ** $0.001 < p < 0.01$, * $0.01 < p < 0.05$.
(c) Aboriginal, Torres Strait Islander or South Sea Islander.
(d) Other than self, family member, DEET programs or Human Services and Health.

There was also some statistically significant variation of employment likelihood with the type of site after controlling for other factors. In particular, the regression suggests that the probability of a client having had a job was somewhat higher than might otherwise be expected for two types of sites (sites for which 25–74% of clients had a neurological disability, and sites with a mixed clientele of whom less than 50% had an intellectual disability) and lower than expected for one other (sites for which 25–74% of clients had a psychological disability). The very high odds ratio for sites for which 75% or more of clients had primary disability type 'vision' was due to only one site which had an unusually high proportion of clients in work.

The results of the regression do not simplify the analysis of job likelihood very much, and nearly all the factors discussed had an association with having had a job. This suggests that the likelihood of being in work depended on a complex range of factors and cannot be simply explained.

Income earned from jobs

A linear regression model was carried out for income earned from jobs per week of the support period, after first transforming it to natural logarithms. This variable was chosen because it is an overall summary measure of job experience, and because after transformation it has an approximately normal distribution (see Appendix 2 for further details of the regression procedure). Only workers were included in this analysis. As with the likelihood of having had a job, the model showed that most factors examined remained associated with income even after controlling for all other factors (Table 4.48).

As for the previous regression analysis, there were no statistically significant differences in income earned from jobs by non-English-speaking background ($F_{1,8667} = 0.0$, $p > 0.05$) or the episodic nature of the primary disability ($F_{1,8667} = 1.3$, $p > 0.05$). Indigenous status was also not statistically significant ($F_{1,8667} = 0.9$, $p > 0.05$) but because of its general importance has been retained in the model for information. Lastly, there was no statistically significant association between income and referral source ($F_{5,8667} = 0.4$, $p > 0.05$).

Sex and age were both highly statistically significant and showed the same patterns as in Tables 4.7 and 4.9. Female workers are estimated to have earned about 80% of the income of males. For workers aged under 65, the 25 to 29 age group had the highest income and the 15 to 19 age group the lowest income from work.

The remaining client characteristics (primary disability type, presence of other disability, type of living arrangements, frequency of assistance required for daily activities, disability panel endorsement and funding type) also had statistically significant associations with income earned from jobs, and the patterns for these variables were similar to those in the two-way tables (see Tables 4.15, 4.19, 4.21, 4.23, 4.25 and 4.27). To summarise, workers with a psychiatric disability had the lowest mean income from jobs, followed by those with an intellectual/learning disability. Workers with a hearing disability had the highest income (besides disability type 'deaf and blind' which had too few workers to show any statistically significant differences). Workers with more than one disability tended to earn less income from jobs than workers with only one disability.

Workers who lived alone or with family had a greater income from work than people with other living arrangements. Workers who needed continual assistance with activities of daily living were earning less than other clients. There was also evidence that workers who needed occasional ADL assistance earned more than those who needed no ADL assistance.

There was no statistically significant difference in income between workers who had been referred and those who had been endorsed by a disability panel. However, workers who had been rejected by a panel had the highest mean income from work, followed by those who had not been considered by a panel. CETP workers had a statistically significantly higher work income than ISJ or other workers.

Workers for whom paid employment was recorded as the primary source of income not surprisingly had the highest income from work on average. Workers whose primary income was recorded as the Disability Support Pension had the lowest income.

Variation in income between States and Territories was statistically significant and was little affected by controlling for other factors. The Northern Territory, South Australia and the Australian Capital Territory had the highest average income for workers and Western Australia, Queensland and Tasmania had the lowest. Workers supported by sites in urban areas earned more income from jobs over the year. There was also some statistically significant variation with agency site type after controlling for other factors. The most substantial difference appears to be that workers supported by sites with 25–74% of clients with a psychological disability had a lower income than might otherwise be expected. This reflects the differences apparent in Table 4.46 between these sites and those with 75% or more of clients with a psychiatric disability.

Table 4.48: Linear regression model for income earned per support week from jobs during 1995 (8,718 workers[a])

			Regression coefficients			
			Log scale		Linear scale	
Variable	Category[b]	F-statistic[c]	Estimate	Standard error	Estimate with 95% confidence interval	
Intercept			4.24	0.07	69.36	(60.28, 79.82)
Sex	*Male*	96.3***				
	Female		-0.23	0.02	0.79	(0.75, 0.83)
Age	*15–19*	28.6***				
	20–24		0.40	0.04	1.49	(1.39, 1.60)
	25–29		0.49	0.04	1.64	(1.51, 1.77)
	30–44		0.47	0.04	1.60	(1.49, 1.73)
	45–59		0.38	0.05	1.47	(1.32, 1.63)
	60–64		0.28	0.25	1.33	(0.81, 2.16)
	65–69		-0.28	0.52	0.76	(0.27, 2.12)
	Not known		0.62	0.28	1.86	(1.08, 3.21)
Indigenous status[d]	*No*	0.9[ns]				
	Yes		0.04	0.09	1.04	(0.87, 1.23)
	Not known		-0.05	0.04	0.95	(0.88, 1.03)
Primary disability type	*Intellectual/learning*	9.2***				
	Physical		0.12	0.04	1.12	(1.04, 1.21)
	Acquired brain injury		0.07	0.07	1.08	(0.95, 1.22)
	Deaf and blind		0.64	0.40	1.90	(0.87, 4.13)
	Vision		0.11	0.08	1.11	(0.95, 1.30)
	Hearing		0.37	0.06	1.45	(1.29, 1.63)
	Speech		0.16	0.17	1.17	(0.83, 1.65)
	Psychiatric		-0.15	0.04	0.86	(0.80, 0.92)
	Neurological		0.06	0.07	1.06	(0.93, 1.21)
	Not specified		0.76	0.82	2.14	(0.43, 10.64)
Other disability	*No*	28.7***				
	Yes		-0.15	0.03	0.86	(0.81, 0.90)
Frequency of ADL assistance required	*Not at all*	21.3***				
	Occasionally		0.08	0.03	1.08	(1.02, 1.15)
	Frequently		-0.01	0.03	0.99	(0.93, 1.06)
	Continually		-0.31	0.04	0.73	(0.67, 0.80)
	Not known		0.94	1.05	2.56	(0.33, 19.96)
Disability panel	*Referred*	12.3***				
	Endorsed		-0.05	0.04	0.95	(0.88, 1.03)
	Rejected		0.24	0.16	1.27	(0.93, 1.74)
	None of the above		0.13	0.04	1.13	(1.04, 1.23)
	Not known		-1.80	1.25	0.17	(0.01, 1.91)

(continued)

Table 4.48 (continued): Linear regression model for income from jobs per support week during 1995

			Regression coefficients			
			Log scale		Linear scale	
Variable	Category[b]	F-statistic[c]	Estimate	Standard error	Estimate with 95% confidence interval	
Type of living arrangements	*Other*	23.1***				
	Lives alone or with family		0.21	0.04	1.24	(1.15, 1.33)
Funding type	*CETP*	291.1***				
	ISJ		-0.24	0.03	0.79	(0.75, 0.83)
	Supported Wage System		-0.27	0.05	0.77	(0.69, 0.85)
	Other		-0.36	0.10	0.70	(0.58, 0.85)
	Not known		0.05	0.15	1.05	(0.78, 1.42)
Primary source of income	*Other*[e]	27.9***				
	Disability Support Pension		-0.24	0.03	0.79	(0.74, 0.84)
	Paid employment		0.55	0.03	1.73	(1.62, 1.85)
	Nil		0.16	0.06	1.17	(1.04, 1.33)
State	*New South Wales*	22.2**				
	Victoria		-0.13	0.04	0.88	(0.82, 0.94)
	Queensland		-0.18	0.03	0.84	(0.78, 0.89)
	Western Australia		-0.32	0.04	0.73	(0.68, 0.79)
	South Australia		0.25	0.06	1.28	(1.13, 1.46)
	Tasmania		-0.38	0.10	0.69	(0.56, 0.84)
	ACT		0.17	0.08	1.19	(1.03, 1.38)
	Northern Territory		0.42	0.12	1.52	(1.20, 1.94)
Agency site location	*Urban*	57.1***				
	Rural		-0.29	0.03	0.75	(0.71, 0.79)
	Remote		-0.11	0.08	0.89	(0.76, 1.05)
Number of staff	*Other*	14.0***				
	10.1–15		0.12	0.03	1.12	(1.06, 1.20)
Type of site	*Other*	8.7***				
	Vision 75%+		0.36	0.13	1.43	(1.11, 1.86)
	Hearing 75%+		-0.51	0.27	0.60	(0.35, 1.02)
	Physical 25–74%		0.07	0.06	1.07	(0.96, 1.19)
	Psychiatric 25–74%		-0.19	0.04	0.83	(0.76, 0.90)

(a) Income from jobs could not be calculated for 206 workers due to missing data.
(b) An italic entry indicates the reference category.
(c) F statistic is $F_{n-1,8667}$ where n is the number of categories for the variable.
Statistical significance of F-test is indicated as *** $p < 0.001$, ** $0.001 < p < 0.01$, * $0.01 < p < 0.05$.
(d) Aboriginal, Torres Strait Islander or South Sea Islander.
(e) Includes other pensions or benefits, Jobsearch or Newstart allowance, compensation payments or other income

The number of clients per agency site was not a statistically significant factor at the 1% level ($F_{7,8667} = 2.3$, $p = 0.03$). The number of paid staff was statistically significant but only in that clients of sites with 10–15 staff earned more income from jobs than other clients ($F_{3,8667} = 0.3$, $p > 0.05$, for variation with number of staff among other sites). The reasons for this are not clear, but it is possible that sites of this staff size are associated with one or more other characteristics which influence client income. In any case, unlike the probability of having had a job, there is no evidence that income from jobs is associated with client-to-staff ratio.

Occupation and industry type can be added to this model and are statistically significant ($F_{8,8667} = 14.4$, $p < 0.001$, and $F_{20,8659} = 11.3$, $p < 0.001$ respectively). However, the addition of these terms did not substantially alter the estimates for other variables. This suggests that the type of job undertaken by a client was not solely determined by the client and agency site characteristics considered above, and thus that some variation in income was due to job type independently of these factors.

As with job likelihood, the regression model of income from jobs shows that most client characteristics and some agency site factors remain statistically significant, and the variation in income cannot be simply explained.