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# Factors Influencing the Pursuit of Health and Science Careers for Canadian Adolescents in Transition from School to Work

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ABSTRACT *Previous research separately acknowledges two emerging trends in adolescence but neglects to integrate them. These are that many changes have occurred in the school to work transitional processes, and that there is substantial need for adolescents, especially young women, to pursue science career pathways. In this study, we link these trends and develop predictive, interactive models of science pursuit for 836 Canadian secondary school graduates living through a period of massive change in school to work transitional processes. Separate logit analyses were conducted for males and females. Results suggest that young women are not under-represented in the pursuit of science careers in high school. Young women aspire more frequently to medical and health sciences, and young men to natural sciences, engineering and mathematics. For young women, father's occupation in science, curriculum track and level of occupational expectation were significant in the model, correctly predicting 72% of membership in science. For males, socioeconomic status, family support, level of occupational expectation, regional unemployment levels and items measuring work environment were significant in the model that predicted 81% of membership in science. The findings suggest the salience of gender-differentiated school to work transition models in determining pursuit of health and science career pathways.*

## Introduction

Successfully negotiating the transition from school to work is a central concern of contemporary adolescents. Historically this transition took place easily and was predictable, but negotiating the transition today is less simple and orderly. Krahn (1996) summarizes the process as long term, bi-directional and multidimensional. Investigations have demonstrated that labour market trends such as unemployment, underemployment and increased educational demands have resulted in considerable changes in the nature of the school to work transition (Wallace, 1989; Krahn & Lowe, 1991; Looker, 1993; Krahn, 1996). For example, the increasing demand for education and retraining in science and technology occupations has become a consistent reality. The Economic Council of Canada (1992) reported that, between 1980 and 1985, over three-quarters of 1000 employers had introduced new technologies into the work place and, of these, a further 75% reported the need for upgrading skills. We suggest that these social trends

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be addressed as two related key issues: that social policy is demanding increases in the numbers of young people who pursue science career pathways (Natural Sciences and Engineering Research Council of Canada, 1989; Lee, 1997; APEC, 2000); and that changes in school to work transitional patterns may influence pursuit of science career pathways in ways that have yet to be defined.

Both issues have been further delineated by gender considerations. On the demand side, it is has been widely acknowledged that women are under-represented in science, both in school and in the workplace (Grandy, 1987; Lee, 1997; APEC, 2000). Young women opt for science fields such as medicine and health over natural sciences, engineering and mathematics, which are dominated by males (Nevitte *et al.*, 1990; Wilson & Bodzier, 1990). Research also consistently reports gender differences in formation of science career decisions for both 'elite' science students and high school students in general. Ware & Lee (1988) reported that personal characteristics, family background, school, and achievement characteristics explained 50% of the variance in science career choice for men but only 30% for women. Women who placed a high priority on family and personal life were less likely to choose a science major than their female peers who did not. Lewko *et al*. (1993) report further gender differences for elite science students. Males held more positive views of scientists and science/technology, and were more likely to engage in science-related activities than females, even though both groups were selected for their prior excellence in science achievement. Family support and positive image of scientists were significant for females, while strength of interest and motivation in science were found to be significant for males. Lewko *et al*. (1993) concluded that external factors such as encouragement and support from family were more predictive of science membership for females, while internal factors such as motivation and attitude were more important for males. These results have been suggested by others who have found that father's employment in the sciences is highly influential in choice of career for daughters (Nevitte *et al.*, 1990). This suggests that external factors may serve to either demystify or create barriers to science for young females. Gender differentiation in undergraduate science has been shown to depend on lifestyle and career pathways (Donaldson & Dixon, 1995; Lee & Ware, 1986). It has been suggested that a complex web of competing and contradictory realities are presented for women in science that must be understood and addressed before, during and after their undergraduate science education (Erwin & Maurutto, 1998; Tilleczek, 1993; Tilleczek & Lewko, 1997).

In part, this web is well-defined in the status attainment literature, which concludes that socioeconomic status and, particularly, parental occupation and education indirectly affect career choice and occupational aspirations through attitudes, parental support, and school achievement (Blau & Duncan, 1967; Haller & Portes, 1973; Cuneo & Curtis, 1975; Willis, 1977; Hurrelmann, 1989). The effect of socioeconomic status on career choice is mediated by attitudes, occupational aspirations and achievement in school (Haller & Portes, 1973; Cuneo & Curtis, 1975; Gottfredson, 1981; Poole, 1983, 1989). Students of higher social class backgrounds are more likely to be members of the academic track regardless of their academic ability and, conversely, students from lower social class backgrounds of high ability are under-represented in the academic levels of study (Porter *et al*., 1982). Many of the 3- and 4-year university programmes, particularly those in health sciences and technology, which require advanced level courses for admission, are not accessible by general level students (Gallagher, 1994).

Tracking has been similarly shown to represent a structural barrier to personal progress in science careers (Lee, 1987; Congress of United States Office of Technology Assessment, 1988). Over one-quarter of the students who indicated an interest in a possible major and/or career in science in their sophomore year of high school, and who were above the national average in school achievement, were impeded in their pursuits of science by the tracking process. The tracking system is a formally structured sorting process that places secondary school students in one of three tracks or streams: Basic, General or Advanced. Within each track, the curriculum is geared to academic or non-academic outcomes. In general, students placed in lower (basic and general) tracks have much less chance of moving into an academic career or even of graduating from secondary school at all (Curtis *et al.*, 1992). The placement of students in non-academic tracks caused them to take fewer academic mathematics and science courses in the last 2 years of high school (Lee, 1987).

Gender also clearly structures the school to work transitional process. Different destinations are assumed by gender, which in turn structures entrances into pathways, experiences encountered within each, and the manner in which one exits (Looker, 1993; Mandell & Crysdale, 1993). While the family of origin is seen as important to the success of young women in school and work plans, families entered into through marriage are seen as added 'career contingencies' (Looker, 1993, p. 51) that may detract from plans. In a longitudinal study of 1200 Canadian youths in transition from school to work, young women had anticipated such contingencies before the age of 17, but had not resolved the anticipated conflicts. The majority of young women concluded that, to make permanent transitions to work, they would have to sacrifice their plans to have children or make major adjustments to their notions that full-time work is incompatible with raising pre-schoolers. This contingency was not reported by the young men, who conversely reported that marriage and parenthood would more firmly link them to a permanent transitional pathway to work (Looker, 1993).

Many explanations for women's under-representation in science careers have been postulated (for thorough reviews, see Ware & Lee, 1988; Nevitte *et al.*, 1990; Acker & Oatley, 1993). In this study, we employ an interactional transition to work model that draws on both Krahn's (1996) and Gottfredson's (1981) frameworks of career transition for adolescents to isolate predictive, gender-differentiated models of pursuit of science careers for young Canadians in transition from school to work. This model conceptualizes career aspirations as representing a match between one's individual career aspiration and the social realities of the day. Occupations perceived to be inappropriate to an individual's gender membership are eliminated as valid choices between the ages of 6 and 8 years. Further elimination occurs on the basis of social class, interests and achievement during adolescence when compromises are made in relation to the realities of the labour market. This framework addresses the impasse in debates on women in science that arise from dualistic interpretations based on either individual or structural factors (Henwood, 1998). The ability to track adolescents through a time of changing school to work transitions allows for the testing of this interactional model of science career pursuit and provide input to the continuing efforts (see, for example, APEC, 2000) to encourage young people (especially women) to pursue science and technology careers both in Canada and internationally.

## Method

Data for this investigation were obtained from the data base of a 5-year panel study that followed Canadian young people as they graduated from secondary school (see Krahn, 1988; Krahn *et al*., 1993). In this investigation, Year 1 (1985) and Year 4 (1989) data were analyzed. Baseline data (Year 1) and subsequent follow-ups were collected from students in Edmonton, Sudbury and Toronto. While the three cities are not representative of the country, it was believed that they reflect basic similarities as well as variation in the experiences of young people in major urban centres, including regional disparities in unemployment rates, city size and economic base (Krahn, 1988).

### *Participants*

While the sample was obtained to study adolescent career patterns generally, a subsample was chosen of those who remained in the study for all 4 years to examine both pursuit and persistence in science career pathways. A random sample of high school students was not obtained because access to all schools, and all classrooms was not provided. In Edmonton, for instance, only the public board participated and designated a set of high schools to contact. Principals could also refuse access to schools or to classes within them. An attempt was made, however, to build as much variation as possible into the sample by contacting schools in middle-class and working-class neighbourhoods. Thus, a strategic sampling design using the school as the primary sampling unit provided a range of school settings, programme types and student backgrounds. In each school, an attempt was made to obtain a cross-section of academic and vocational classes. The final sample contained students from six Edmonton high schools, 12 schools in Toronto and seven in Sudbury.

A total of 2229 high school students in three Canadian cities was initially contacted in 1985. These young people were again surveyed in 1986, 1987 and 1989 by mail follow-up surveys in which repeated mailings and telephone calls were used to ensure high response rates. The first major follow-up took place on May 1986 (Year 2), a second took place in May 1987 (Year 3) and a third was conducted in June of 1989 (Year 4). Of the 2229 respondents in Year 1, 1906 (86 per cent) gave their names and addresses to be contacted in Years 2 and 3. There was relatively little attrition between Years 3 and 4, with 81 per cent of Year 3 respondents returning Year 4 surveys. By Year 4, attrition reduced the sample to 836 (37.5 per cent).

A comparison of Year 1 respondents who subsequently dropped out of the study in Year 2 or 3 with those who participated in all 3 years identified several sources of bias including gender, academic orientation, city and socioeconomic status (see Krahn, 1988, 1991). Most critical for this study is the high attrition rates for males, non-academic high school graduates and students from Sudbury. Therefore, the sample used in this study consisted of an over-representation of academically inclined young women than might otherwise have occurred.

### *Procedure*

The Year 1 survey was pretested on 48 students in Edmonton. Questionnaires were administered in class after completion of consent forms. Baseline data were

then collected from high school graduates in their classrooms in May and June of 1985. Respondents in this baseline survey were asked to provide their names, home addresses and telephone numbers. Several months before the follow-up survey was sent, respondents were contacted via a newsletter including general findings and details about the next wave of data collection. The newsletter also included a request for respondents to telephone (collect) if they had moved to a new address. Newsletters returned by the post office indicated sample members who needed to be located before the next follow-up.

*Measures*

The variables under investigation were selected from two of the four surveys of the Three-Cities Study (all four questionnaires can be obtained from the Centre for Research in Human Development, Sudbury, Ontario). They were selected from the Time 1 (T1) survey (1985) and the follow-up Time 4 (T4) survey (1989). Information was elicited using both open-ended and forced choice items. Independent variables included: family socioeconomic status (SES), parental education, parental occupation in science, city of survey and unemployment rates, perceived family support, family structure, academic track, academic achievement at T1 and T4, educational and occupational expectations at T1, enjoyment of high school, student attitudes to work at T1, student attitudes to gender issues, membership in transitional group over 5 years indicating the student's transition and participation in full-time education over time, T4 measures of student attitudes to family and work after high school, and student's own family circumstances after high school.

*Dependent variables: defining science career pathways*. Student occupational aspirations were used to define pursuit of science career pathways. The stated aspirations were recoded using the Standard Occupational Classification (SOC) (Statistics Canada, 1980, 1989) and ultimately re-coded into non-science (1), science (2) and undecided (3), and to further subdivide science occupations into different fields of science. The SOC is the standard for both Canadian industry and education. Moreover, this classification approximates that used by others defining science and non-science aspirations in that physical science, mathematics, engineering and computing comprise one science category, and medical and health sciences another (See Grandy, 1987; Lee, 1987; Hilton & Lee, 1988; Smith, 1991).

The use of the SOC provided an overall structure for classifying occupational aspirations according to the kind of work performed. In the SOC, occupations are primarily grouped in accordance with the tasks, duties and responsibilities that they entail. Factors such as 'the materials processed or used, the industrial processes used, the degree of responsibility and complexity of work, the products made and the services provided' are taken into account when combining occupations into major groups (Statistics Canada, 1980, p. 11).

*Science*. The 'science' category was made up of two major groups (21 and 31) of the SOC. Major group 21 is occupations in natural sciences, engineering and

mathematics, and major group 31 is occupations in health sciences. These groups are defined and further subdivided as follows.

(1) Natural sciences, engineering and mathematics. Occupations categorized into this group included those concerned with research and practical application of scientific knowledge in the fields of physical science, life sciences, architecture, engineering, mathematics, statistics, and systems analysis.
(2) Medicine and health sciences. Occupations categorized into this group included those dedicated to 'preventing and diagnosing human and animal ailments, and prescribing and giving surgical and medical treatment for diseases and illnesses; giving professional and non-professional nursing care and providing special therapeutic services; and providing pharmaceutical, dietary, optical and medical support services' (Statistics Canada, 1980, p. 91). In the SOC, occupations in medicine and health sciences are further divided into three subcategories: health diagnosing and treating, nursing and related occupations, and other occupations in medicine and health.

*Non-science*. Occupations categorized into non-science comprised all of those occupations that were not included in major groups 31 and 21 of the SOC. The major groups of occupations that comprised this non-science category included managerial and business, teaching, artistic and literary, sales, service, construction, farming, and social sciences. While there is some debate in the literature on the placement of social sciences within the science/non-science categories, Hilton & Lee (1988) have suggested that social sciences be placed in the non-science category even though the National Science Foundation in the USA considers it to be a science. Analysis by Hilton & Lee (1988) indicated that the reasons students select social science majors and their persistence in these majors are so different from the motivations and persistence of other science majors as to contribute to confounding results if the social sciences are combined with the sciences.

*Undecided*. This category included the respondents who stated that they 'did not know' or were unspecified as to their aspirations.

## Results

### *Background description at Time 1*

*The Students*. Of the 836 participants who continued in the panel study between 1985 and 1989, there were 440 (53 per cent) females and 396 (47 per cent) males. The average age of the students at Year 1 was 18 years. The majority of the respondents who continued in the study were from Edmonton (60 per cent), while Toronto represented 25 per cent and Sudbury represented 15 per cent.

Most of the students who continued in this study were from academic curriculum tracks at secondary school (68 per cent) and reported a wide range of secondary school marks ranging from A grades to F grades. Fourteen per cent reported grades of 80 per cent or above; 31 per cent reported grades in the 70–79 per cent range, 42 per cent reported grades in the 60–69 per cent range, and 13 per cent reported grades in the 50–59 per cent range. A majority of the students reported high educational expectations, with 53 per cent expecting to continue on to university and 39 per cent expecting to go to college.

**Table 1.** Frequencies and percentages of parental employment in scientific fields

| | Mother | | Father | |
|---|---|---|---|---|
| Field | *n* | % | *n* | % |
| Physical sciences | 0 | 0 | 3 | 4 |
| Life sciences | 0 | 0 | 2 | 3 |
| Engineering | 0 | 0 | 45 | 67 |
| Mathematics and computing | 0 | 0 | 4 | 6 |
| Medicine | 2 | 3 | 11 | 16 |
| Nursing | 59 | 83 | 1 | 2 |
| Other medicine | 10 | 14 | 1 | 2 |
| Totals | 71 | 100 | 67 | 100 |

*The Family*. A large percentage of the sample (84 per cent) at Year 1 were from families that were considered to be 'intact' such that both a mother and father were present in the home, while 11 per cent were from single female-headed households. Reflecting this high percentage of intact families was the finding that participants reported that they were from homes in which there was moderate to high amounts of family support (70 per cent). However, the support systems were reported to be uneven, with mothers providing more support than fathers. Sixty-nine per cent of the students was able to rely either 'somewhat' or 'very much' on their mothers when they had problems. The picture appeared similar with respect to reliance on fathers, with more students reporting support than non-support. However, only 52 per cent reported that they were able to rely on their fathers either 'somewhat' or 'very much', and nearly one-half (45 per cent) of the participants stated that their fathers provided no such support.

The parents were reported to be from a range of socioeconomic strata but the lower SES was under-represented. The majority (44 per cent) reportedly held high socioeconomic status occupations, 33 per cent holding middle-class occupations and 23 per cent holding occupations classed in the lower socioeconomic strata. The majority of parents were also reported to have relatively moderate educational achievements such that most had attained high school or less (mothers, 67 per cent; fathers, 55 per cent). However, 33 per cent of the mothers and 45 per cent of the fathers had attained college or university levels of education. This can be compared with the 35 per cent of the adult Canadian labour force who had attained college or university education in 1988 (Statistics Canada, 1988). Of the parents who were employed in 1985, 9 per cent of fathers and 11.6 per cent of mothers were reported to be employed in the sciences, with diversity among fields as shown in Table 1.

*Pursuing science*. Of the 836 participants who continued in the panel study between 1985 and 1989, 28 per cent ($n = 233$) stated that they were aspiring to a career in the sciences. This number is high in relation to the 9 per cent annual employment rate within the sciences in Canada during that same year (Statistics Canada, 1985). Fully 492 (59 per cent) of the sample were aspiring to non-science careers and 29 (4 per cent) were undecided at Time 1 (1985). There was less variation in reported academic grades for the science students in comparison

**Table 2.** Aspirations for employment in the science categories by gender compared with annual national averages. 1985

| Gender | Student aspirations (%) | Annual employment national averages* (%) |
|---|---|---|
| Total science ($n = 233$) | | |
| Female | 0 | 52 |
| Male | 0 | 48 |
| Total | 100 | 100 |
| Medicine and health ($n = 128$) | | |
| Female | 83 | 78 |
| Male | 17 | 22 |
| Total | 100 | 100 |
| Natural science engineering and mathematics ($n = 105$) | | |
| Female | 28 | 16 |
| Male | 72 | 84 |
| Total | 100 | 100 |

* *Source*: Statistics Canada, Labour Force Survey 1985.

with those of the total sample, with more science students reporting higher marks. Nearly 60 per cent reported marks over 70 per cent, 30 per cent reported marks between 60 and 69 per cent, and only 10 per cent reported marks below 50 per cent. There was a significant relationship between science versus non-science aspiration and marks ($\chi^2 = 18.9$; degrees of freedom = 1; $P < 0.00001$). In the non-science group, 61 per cent had marks below 70 per cent and 39 per cent reported marks above 70 per cent. For the science aspirers this trend was reversed, with 59 per cent reporting marks above 70 per cent and only 41 per cent with marks below 70 per cent.

Of the 233 participants who declared aspirations for science careers in 1985, one-half were male and one-half were female. There was no significant relationship between gender and choice of science or non-science career pathways. However, there was a significant relationship between gender and choice of scientific field for those entering into science career pathways ($\chi^2 = 70.24$, degrees of freedom = 1; $P < 0.0001$). In total, of the 233 students aspiring to follow science career pathways in 1985, 128 (55 per cent) were aspiring to a career in the areas of 'Medicine and health' (M&H), and the remaining 105 (45 per cent) stated an aspiration for a science career in 'Natural sciences, engineering and mathematics' (NSEM). For the 115 females who chose science career pathways at Time 1, 83 per cent chose fields within M&H, while for the 118 males in this subsample, nearly three-quarters (74 per cent) chose fields within NSEM. Table 2 summarizes this breakdown into fields of NSEM and M&H, and provides comparisons with Canadian annual averages of employment within each field. Table 3 further illustrates the breakdown of aspirations for these high school 'science students' into subfields of science.

Separate logit analyses for females and males were carried out to predict pursuit of science/non-science careers. This technique allowed for the analysis of the effects of a set of independent variables on a dichotomous dependent variable with minimal statistical bias and loss of information as compared with

**Table 3.** Aspirations for science careers by field and gender, 1985

| Scientific field | Gender (%) | |
|---|---|---|
| | Female ($n = 115$) | Male ($n = 118$) |
| Physical science | 3 | 3 |
| Life science | 6 | 7 |
| Engineering | 3 | 45 |
| Mathematics and computing | 5 | 16 |
| Medicine | 24 | 18 |
| Nursing | 30 | 5 |
| Other medicine | 29 | 6 |
| Total | 100 | 100 |

ordinary least-squares regression or weighted least-squares regression, which may mathematically force the data to conform to a linear specification when an S-shaped curve would be more realistic (Hosmer & Lemeshow, 1989).

For the females, the most significant variables ($P < 0.05$) included father's occupation in science, curriculum track, and level of occupational expectations. Variables approaching significance ($P < 0.10$) included two Year 1 measures of the type of full-time work that students were looking for, including the importance of work that pays well, and work with a good chance for promotion. Variables that failed to reach significance included mother's career in science, socioeconomic status, feelings about school experiences, family support, level of discriminatory attitudes toward women, regional unemployment rate, and academic achievement in high school. A total of 171 cases were observed, with 111 in non-science and 60 in science. The joint association of variables in the model correctly predicted 72 per cent of female science and non-science aspirers, although it was more effective at predicting non-science membership (84 per cent) than science membership (50 per cent).

Females who pursue science careers on graduating from high school were more likely to have fathers employed in the sciences, to have completed their diploma at the advanced level curriculum track and to have expectations for a high status occupation. Probability predictors were calculated for this group of females and show that these young women are 3.5 times more likely (3.54: 1) to pursue science versus non-science careers. While the variables tapping job security were only approaching significance, it is interesting to note that these young women were also more likely to enter science if they saw the need for good paying occupations with a chance for promotion. When unemployment levels reached over 12 per cent, these women were less likely (although not significantly so) to pursue science versus non-science careers. Table 4 summarizes this analysis, including $P$ values for the model $\chi^2$, $L^2$ (likelihood ratio chi-square), $G^2$ (goodness of fit chi-square), and the calculated pseudo-$R^2$, which approaches 1 as the quality of the fit improves.

For males, the independent variables reaching significance ($P < 0.05$) are reported in Table 5. They include socioeconomic status, occupational expectations, family support, importance of work that gives a feeling of accomplishment, the importance of work where one makes their own decisions, the

**Table 4.** Logit regression model of female pursuit of science/non-science careers

| Independent variable | $\beta$ | Exp $\beta$ |
|---|---|---|
| Dad in science | 1.34* | 3.91 |
| Track | 1.00 | 2.73 |
| Occupational expectations | 1.16** | 3.18 |
| Work that pays well—moderately important | −1.60 | 0.20 |
| Work with chance for promotion—not important | −2.12 | 0.12 |
| Regional unemployment—over 12% | −0.85 | 0.43 |
| Intercept | −2.27** | |
| $L^2$ | | |
| $G^2$ | | |
| Model $\lambda^2$ | *** | |
| Pseudo-$R^2$ | | |

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

importance of work that is interesting, and the level of regional unemployment in 1985. Variables that failed to reach significance included the importance of work that pays well, academic achievement in high school, educational expectations, feelings about school experiences, level of discriminatory attitudes towards women, father's career in science, and mother's career in science. The joint association of the logit model for the males correctly predicted 81 per cent of all science and non-science aspirers. A total of 125 cases were observed, with 82 in non-science and 43 in science. The model successfully predicted 90 per cent of non-science aspirers and 63 per cent of science aspirers.

Probability predictions were calculated for males from areas of regional unemployment over 12 per cent. They had high levels of parental support and high occupational expectations and reported that they were seeking work where they might make their own decisions but that did not necessarily have to be interesting. These males were three times more likely (3.05: 1) to pursue science versus non-science careers. Those males from lower SES backgrounds were less

**Table 5.** Logit regression model of male pursuit of science/non-science careers

| Independent variable | $\beta$ | Exp $\beta$ |
|---|---|---|
| SES—low status | −2.81** | 0.06 |
| Family support | 1.65* | 5.18 |
| Occupational expectations | 1.74** | 5.67 |
| Work giving feeling of accomplishment—unimportant | −3.34 | 0.04 |
| Work where make own decisions—somewhat important | 2.32* | 10.19 |
| Work that is interesting—not important | 2.15* | 8.59 |
| Regional unemployment—over 12% | 1.48* | 4.39 |
| Intercept | −8.23 | |
| $L^2$ | | |
| $G^2$ | | |
| Model $\lambda^2$ | *** | |
| Pseudo-$R^2$ | | |

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

likely to pursue science than those who felt that work with a feeling of accomplishment was unimportant.

## Discussion

This study involved two related investigations: to examine the trends in pursuit of science career pathways for Canadian adolescents in transition from school to work, and to identify predictive, interactional, gender-differentiated models of pursuit of science careers. Analyses of the Three Cities Study of Canadian Youth have assisted in both confirming past research and illustrating future steps.

The findings that equal numbers of males and females entered into science-related occupations runs counter to those reported by Grandy (1987) and Lee (1987), who report that young females are under-represented in the sciences. For this sample, science careers were not generally considered inappropriate on the basis of gender and had not been eliminated from the zone of acceptable career aspiration alternatives by adolescence, as described by Gottfredson (1981). It is more accurate to suggest that specific science field became an important area of gender differentiation, placing young women in the more traditional occupations within science. When compared with their mothers, these young women are entering 'non-traditional' occupations in greater numbers, with 17 per cent more of the daughters entering into NSEM and 21 per cent more into medicine than did their mothers. Thus, lack of maternal background in science has not detracted from daughter's career choice in the sciences, and perhaps influences not measured in the Three Cities Study (such as maternal encouragement in the science careers) specifically are influential. Caution, however, is recommended as the attrition bias in this study may indicate results weighted toward females with higher academic and socioeconomic backgrounds, and therefore a more 'elite' sample of academic young women may be over-represented. In fact, in both NSEM and M&H, the percentage of 1985 female aspirants was higher than the actual national annual averages. Future research could extend beyond explanations of under-representation of women in the sciences generally, but rather explore in more detail the gender differentiation within NSEM and M&H.

As in previous studies (Strouse, 1992; Lewko *et al.*, 1993; Tilleczek, 1993; Tilleczek & Lewko, 1997), a different array of factors influenced female and male pursuit of science. Moreover, the joint association of variables was more predictive of science/non-science pursuit for males than females, and especially so in predicting science membership. Future research could seek to describe influential factors not yet identified for young women. The results of this study suggest that researchers pay close attention to attitudes toward career and family, interruptions in educational pathways, the importance of job security issues, and specific fields of science chosen. The ability to track youth over time and assess patterns of persistence in science is a necessary next step.

For females in this sample, father's career in science, curriculum track, level of occupational expectations and job security issues were predictive. For males, SES, family support, level of occupational expectations, job environment and unemployment rates were significant predictors. While gender was not significant in predicting pursuit of science generally, the fields of scientific endeavour were quite differentiated, with young women more likely to enter into medical and health sciences, and young males into the natural science, engineering and mathematics. These findings are in concert with those reported

in earlier studies (see Grandy, 1987; Lee, 1987; Bateman, 1990; Nevitte *et al.*, 1990; Wilson & Bodzier, 1990; Smith, 1991). Future research might extend beyond explanations of under-representation of women in the sciences generally, but rather explore in more detail the gender differentiation within NSEM and M&H (Erwin & Maurutto, 1998).

While maternal employment in science was not significant in predicting science membership, the young women in the sample were more likely to pursue science careers if their fathers were employed in science (see Fitzpatrick & Silverman, 1989; Nevitte *et al.*, 1990). For the males, this variable failed to reach significance and thus father's career in science may be perceived as 'demystifying' science for female children only (Nevitte *et al.*, 1990). However, future research might endeavour to uncover the nature of these links between father–daughter science career pathways in terms of early socialization practices and possible modelling effects. Moreover, the link between daughter–father science career has been shown to be non-significant for persistence in science (Tilleczek, 1993; Tilleczek & Lewko, 1997), and thus implies that perhaps the initial effect is more short term and not necessarily strong enough on its own to influence daughter's long-range pathways.

While others have reported the importance of the link between family support and daughter's entrance into science (Lewko *et al.*, 1993), this study found family support significant for male pursuit only. However, the nature of the variable in this case was quite unspecific to science-related support and was measured by general reliance for help, while previous studies have focused on support for non-traditional or science-based undertakings (Houser & Garvey, 1985; Desantis & Youniss, 1991). The specificity of the support therefore seems to be of importance. In pursuing science career pathways, general parental help is obviously not significant enough to encourage children (and especially females) if parents do not specifically offer support for science-related career endeavours. Even still, we are yet to find out the long-term nature of such specific support on persistence in science.

Curriculum track was related to pursuit of science for females such that placement in the high school academic stream significantly increased the probability of pursuit of science. As Lee (1987) and the Congress of United States Office of Technology Assessment (1988) have reported, the tracking process has been found to impede science career aspirations for over one-quarter of students who were above national averages in school achievement but placed in non-academic tracks. The findings of the current investigation suggest that this impediment may be more restrictive for female students than for males, who were not significantly influenced by tracking in their pursuit of science career pathways.

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