

# WHAT HAPPENS WHEN GIRLS, GIFTED IN SCIENCE, GROW UP?

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## ABSTRACT

A major problem with the research concerning female achievement in post-secondary education and career attainment, is the undue emphasis on deficit or comparison models, serving to instill the notion of female deficit or underachievement in comparison to male peers. This work, though informative, needs to be balanced with information about how females who are gifted and/or successful in a given field or discipline have been able to accomplish this. The purpose of the present research was to investigate the sources that contribute to the dynamic interaction of achievement-related decisions, career and adult life-role choices of females and males talented in the sciences using the Eccles model. Specifically, the overall study entails an examination of the key personal and educational factors that contribute to high achievement in the sciences, the factors favorable to the pursuit of programs and careers in science and related disciplines, the impact of the Shad Valley program on the advancement of interest and expertise for females and males gifted in the sciences, and, in particular, factors influencing female life-role choices in adulthood. The total sample consisted of 117 males and females from an initial subject pool of Shad Valley Program applicants. Two groups of subjects (males [n=51] and females [n=65]) were drawn for the years 1981 to 1985 (Time band 1); 1986 to 1990 (Time band 2); and 1991 to 1995 (Time band 3), with equal representation from across Canada. In stage 1, three questionnaires (University of Michigan, Study of Adolescent Life Transitions [adapted]; Values Inventory; and The Salience Inventory) were mailed out and completed by all subjects. In stage 2, telephone interviews were later carried out with approximately one half of these subjects. The present paper reports on several aspects of the latter telephone interview component. Specifically, stage 2a consists of general telephone interview data for the total sample of interviewed males and females (n=64), and for stage 2b, a more detailed overview of the responses of younger (n=5) and older (n=5) female interview responses on selected questions will be provided. The results and discussion sections for stage 2a and 2b are organized by the five broad categories of achievements, individual perceptions of how their math/science abilities impact several areas of their lives, social influences, life satisfaction, and exciting/regretful experiences. The analysis for stage 2a is focused on gender differences, and stage 2b is focused on differences in the responses of younger versus older female subjects. The paper concludes with a discussion of the major findings from this aspect of the overall research project

## INTRODUCTION

The past three decades have witnessed unprecedented changes and opportunities in the lives of women and girls. Traditional role expectations for women to spend the bulk of their adult lives maintaining the home and raising children, have been dramatically dismantled as growing numbers of women enter the paid work force and pursue higher education. In contrast to earlier times when a very small percentage of women were part of the paid work force, today, most women do - 58% in 1991, and by the year 2005, experts say 70% of women will be in the work-force (Lero & Johnson, 1994). With respect to enrolment in Canadian universities (Colombo, 1999), females

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dominate at the full-time undergraduate level (M=45%; F=55%), and for part-time enrolment, females dominate at both the undergraduate (M= 39%; F=61%) and the graduate level (M=46%; F=54%). There are now more women than ever in various careers such as law, medicine, politics and business. However, despite this seemingly positive trend toward equitable gender-based participation in the labour force and in educational attainment, current statistics on the numbers of women in highly esteemed professional and business positions indicates that females, even gifted females, are not achieving preeminence in the proportion expected given the prevalence in the population (Reis & Callahan, 1989).

Essentially this means that despite the significant increase in participation of females in post-secondary education and the work force, females are still highly underrepresented in high-profile, high status fields and career - particularly those associated with physical science, engineering, and applied mathematics - and over-represented in many low-status, low-paying occupational fields such as secretarial work, nursing, and teaching. Specifically, there is a critical imbalance of participation of females in the math/sciences academic programs and careers (Colombo, 1999). For example, in the engineering and applied sciences area undergraduate and graduate enrolment figures from 1996 indicate M=80% and F=20%. In the mathematics and physical sciences these percentages are M=67% and F=33%; and at the graduate level this discrepancy increases to M=73% and F=27%. Moreover, a recent publication (CAUT, 2000 Status of Women Supplement) reported that the number of women granted doctoral degrees in 1999 equaled 36.4% overall, however, females remain seriously under represented in Engineering and Applied Sciences (10.95), and in Mathematics and Physical Sciences (21.7%). This trend toward significant under representation of females in university faculty appoints across all Canadian universities is most evident in the ranks of associate professors (tenured female/leading to tenure = 29.6%), and full professor (tenured female/Leading to tenure = 13.8%). Although these kinds of imbalances have been recognized as a fundamental threat to Canada's continuing economic competitiveness in a global economy, some areas of imbalance have remained particularly salient (Sherriff & Svenne, 1993). Why is this an issue? It means that males dominate in disciplines that filter into careers and professions that rely on this kind of expertise, and the female perspective on issues within the discipline are not addressed.

Although there is increasing interest in attracting women to positions of social, political, educational, and scientific leadership, many obstacles inhibit women from realizing their potential in these areas. Women face more constraints (or barriers) when compared with men which are detrimental to their career advancement and achievement. Almost all of these barriers are attributable to how our society perceives the role of women, how (or if) we foster and encourage female achievement, and how we socialize girls and women to perceive themselves and their expected and valued roles in society. In the professional world, discrimination is encountered in obtaining positions, promotions, and salaries comparable to those of men (Statistics Canada, 1995). In a review of the research on occupational stereotyping, Thomas Ruble and associates (1984) concluded that "sex stereotypes . . . operate in various ways to limit equal employment opportunities for women" (p. 343). These authors point out that women's performance tends to be evaluated differentially, such that high levels of performance may be attributed to transitory causes (luck, effort, easy job) rather than to stable causes (ability and skill). Moreover traditional studies of career development, have been predominantly male focused, and career success was indicated by the following factors: earned income; self-rated success and satisfaction; vertical and horizontal job mobility (up-the-career-ladder); number of individuals supervised; and length of time on the job.

Traditional career models simply do not adequately reflect the multi-track roles that females most often assume in their adult lives; wife, mother, homemaker, and career (Baruch & Barnett, 1987). More recent studies such as Northcutt (1991) have found that successful career women did not define nor value the amount of money they earned as a major component of their success. Instead, these women were more likely to perceive themselves as successful if they were achieving their own goals, enjoying their work, receiving recognition from others, and contributing to the community, or to others' well-being.

Despite this growing recognition of the limitations of traditional career development models, the goals and achievements of professional males and their lifestyles are the yardsticks by which gifted women are measured and measure themselves (Silverman, 1986). When measured against these standards, women often come out on the short end. Unfortunately, marked gender differences from previous studies have been inappropriately interpreted as female deficits or under achievements, which casts a negative hue on female achievement and development possibilities. We are all aware of examples of eminence in females in a wide variety of disciplines, and yet this aspect is significantly under represented in the literature in the area. Hence, new forms of inquiry need to be sought.

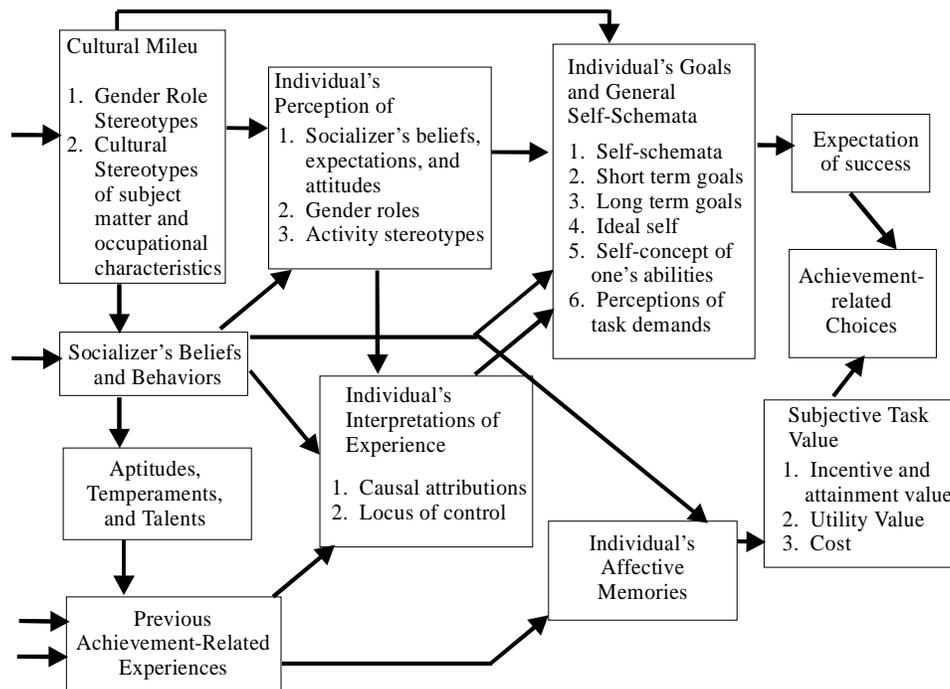
The trend toward studying women's experience is fairly recent, and we are beginning to see that women's attitudes, values, expectations, and desires relating to work, family, and achievement often deviate from those of

men (Hashizume & Crozier, 1994). For example Belenky, Clinchy, Goldberger, and Tarule (1986), Gilligan (1982) and Josselson (1987) have recently suggested that women have a different value system from men, a system which influences academic, career, and all other life choices, and ultimately plays a primary role in their educational and occupational achievements. Collectively these theorists suggest that in order to understand women's lives, one must recognize that in comparison to men, women simply have a completely different world view, one that is relational in nature. According to these theorists, women are different from men in their sense of connection and in their need to be related to others. Men, on the other hand, are more concerned with separation and autonomy. These perspectives influence what each gender will generally consider an appropriate career choice, one that will lead to personal satisfaction and fulfillment. Gilligan (1982) focuses on the *different voice* associated with women and describes standard psychological theories of human development as having been based on observation of men. She believes women were compared to this standard and judged deficient. Gilligan suggests a new look at that voice, one which considers it not deficient, but simply different.

With respect to this broader orientation of women's career development, few researchers have attempted to develop a theoretical framework to guide current and future research endeavors which aim to identify the sources of unrealized potential in gifted women. One notable exception, however, is a model developed by Eccles (1985) and her colleagues.

### **Eccles Achievement-Choice Model**

The Achievement-Choice model (shown in Figure 1) is a social-cultural framework for understanding how women make occupationally related choices and decisions. Eccles' model is based on concepts used in decision-making in achievement and in attribution research (Meece, Parsons, Kaczala, Goff, & Futterman, 1983). It links occupational aspirations and achievement-related choices to expectations for success and subjective value within a particular field of work/study. Expectations for success and the subjective value of the task are the central constructs within this model. These constructs are central because they are hypothesized to most directly influence achievement behaviors and to serve as mediators on the influence of other constructs. In particular, expectancies and value are posited to be influenced directly by the individual's goals, perceptions of his or her abilities, and perceptions of the task demands. These constructs are in turn influenced by perceptions of socializers' beliefs and behaviors and perceptions of cultural roles and values.



**FIGURE 1. ECCLES (1985) ACHIEVEMENT CHOICE MODEL**

Within Eccles' model, gender-role socialization, anticipated task demands, expectations for success, and subjective task value influence career choice. Choices are characterized as conscious or unconscious decisions that people make in their daily lives such as what courses to take or how hard to work. These choices are, in turn, directly or indirectly influenced by sex-role stereotyping, attitudes, interests, and self-concept, all of which are the culmination of socializing experiences. The individual's personal values, related to goals and expectations, both immediate and long-range, form the basis for career development and success.

According to Eccles, compared to men, women have different but equally important goals that change over the lifespan. Therefore, Eccles' theoretical viewpoint provides for an exploration of the additive effects of the interrelated contributing variables on achievement-related behavior in gifted females. While structural impediments are acknowledged, the Achievement-Choice model provides a more positive explanation of achievement patterns than do attributions to women's lack of confidence or low expectations. More importantly, this framework provides for a move away from traditional, sex/ gender differences research, to a focus instead on within-gender differences, in order to understand the diversity of life choices that women make (Eccles, 1994). Thus, the theoretical model developed by Eccles (1985) reflects the current trend to studying women's career development by being much broader in scope, more psychosocial in orientation and phenomenological in nature, than more traditional career development theories. However, despite this effort, the reality is that many women continue to also face, in addition to the "biased criteria," a variety of barriers which prevent them from achieving their full potential.

As previously noted, some researchers have recently suggested that women's development is different from men's and that women's valuing of relationships is a central feature of their development and achievement in our society (Gilligan, 1982; Miller, 1986; Surrey, 1985). Further, the different personal value structure of women is likely to affect their educational and occupational choices. In an effort to understand the characteristics and behaviors valued by women, this research study was conducted which explored the relationship between personal values, achievement-related choices, and life satisfaction in a population of two groups of high achieving women. The purpose of the present research is to avoid the limitations of previous research by using the Eccles framework to examine the adult life role choices and decision making between males and females. The importance of subjective task value from Eccles' model was stressed as was the need to study achievement from a perspective that gives equal weight to variables affecting the choices of both males and females.

## **DATA COLLECTION AND METHODOLOGY**

The present study was pursued within the larger framework of a three year, retrospective study of applicants and participants from the Shad Valley Program. Shad Valley is a university-based summer program for high school students gifted in mathematics and/or the sciences. Shad Valley students are selected from across Canada to participate in one of eight university-based programs, with emphasized experiences in science, technology, and entrepreneurship. Related sponsorships and work experiences are provided by participating business companies. The major components of the general research project are (1) a content analysis of Shad Valley program application forms, (2) questionnaire of former Shad participants and their cohorts, (An adapted version of the Eccles questionnaire was used to probe factors relevant to the promotion of science interest and expertise), and (3) in-depth interviews of former Shad participants and their cohorts. This paper is based on the latter component.

The individual, in-depth, open-ended telephone interviews, based on the examination of personal, educational and occupational factors emerging from the previous phases of data analysis, were carried out to explore experiences, life satisfaction, and social influences on interest and involvement in science-related courses, programs, and careers. Using open-ended interviews provides more consistent information about attempts to understand the world from the participant's point of view, to unfold the meaning of the participant's experience, and to uncover their lived world prior to scientific explanations (Kvale, 1996). The in-depth interview data provided two critical bases for comparison. First, telephone interview data was examined for gender differences. This data source allowed an extensive examination of male and female perceptions on achievements, the degree to which their math/science abilities influence several dimensions of their lives, social influences, and life satisfaction. For selected areas of this data gender comparisons were carried out for the variables of interest using a t-test of significance. A statistically significant t-test indicates that there is a significant difference between the average score of the responses between males and females in the sample.

Second a sub-sample of 5 older Shad females and 5 younger Shad females was examined for life stage differences. By carrying out an analysis of younger and older female Shad subjects, the possibility that factors that seem relevant to women's achievement might vary at different age level was explored. The intent was to move beyond a static profile of factors related to women's achievement (or underachievement), by exploring relevant dimensions attributed to high-achieving women during different phases of their life. The cross-sectional aspect of this study provided an opportunity to explore age-related patterns of values and life-role choices across a broad spectrum from the end of high school to beginning mid-life. Previous studies in the area of women's achievement have tended to concentrate on a more restricted age range.

### **Subjects/Sample**

Part 1: All subjects had been identified for their high math/science ability during their high school years, and had submitted an application to the Shad Valley Program. Participants were drawn from Western provinces, Ontario, Quebec, and the Atlantic Provinces. Participant and non-participant cohorts were chosen for the present study because all were, by nature, defined as high achieving in this study as congruent with their participation and/or application to the Shad Valley program. The requirements for application to Shad Valley are based on traditional (i.e., high school grades) and non-traditional (i.e., letters of reference, involvement in extracurricular activities) measures of achievement. Several data bases were used to track subjects, starting with the original application information, and relying on well established Shad communication networks to locate study participants. All participants in the interview component of the study had completed the questionnaires package prior to the interview. A total of 31 males and 34 females participated in the tape-recorded in-depth telephone interviews. Subjects ranged in age from 19 to 32 years of age. Approximately 68% of the sample were Caucasian, and the remainder were of American Indian, East Indian, or Asian ethnic background.

Part 2: A total of 10 women were selected for the phase of life comparison. The following criteria were set for selection: (1) The subjects were females. (2) The subjects were participant or non-participant cohorts of the Shad Valley program during 1981-1985, or during 1991-1995.

### **Procedure**

This sample provided a fairly homogeneous group in terms of ability level, in that they had each been identified in grade 11 or 12 for their exceptional achievement in math/sciences. The in-depth telephone interview was structured by a set of seven open-ended questions presented in sequence. Information sought pertained to the subject's three greatest achievements, the perceived influence of math/science ability in relation to selected aspects of their lives, the type of social support experienced by each individual in life-role choice, personal and general satisfaction in a variety of life-role situations. Interviews were conducted between September - December, 1997, and ranged from 30 to 45 minutes in length. Responses to the interview questions added descriptive documentation about possible influences on work/non-work values and salience of various life-roles in high-achieving women's academic/occupational-related choices and decision making.

All interviews were carried out by the second author. To quantify responses, a standardized format outlined by Tesch (1990), was implemented consistently throughout this stage of the study. Using this procedure, all the responses for each interview question were first read through. A summary list of the descriptors or terms that were used in the responses were then compiled. From this list the responses were placed into a number of categories (usually 4). For each category created, a list of associated descriptors/terminology was kept. The data were summarized again, using the categories created, for both groups of women and males. The list of descriptors and terms subsumed by a particular classification helped ensure that categorization of the responses was consistent. When a novel response was encountered, an attempt was made to include it in one of the existing categories - if not, a new category was created. This process was repeated for all categories of questions.

## **RESULTS AND ANALYSIS**

### **Achievements**

The first category to emerge was the area of 'achievements', that is, accomplishments described by the men and women in their adult life roles. Males reported their work most often, then university degrees or accomplishments, next children and then travel. For their second and third choices, the predominant themes were work, marriage and relationships, and financial or work related recognition. The top four responses for females were parenting, work, volunteer work, and independence. For second and third level choices of females, emergent themes

included success or recognition at work, marriage and relationships, and general and or financial independence. It is of interest to note that males and females appear to rank parenting and work most highly.

Both males and females reported a wide range of unusual responses. For example, some of the top achievements reported by males included becoming a moral person, and ability to deal with pressure. For females some of the more unusual responses included being patient, discovering one's heritage, and being able to balance different areas of her life.

Response comparisons between younger and older female Shads indicated that this question became a very difficult one to answer. Many (younger and older Shads) had trouble coming up with a response or being able to perceive areas of their life where they felt they had achieved. One older Shad (Business major) put it like this when she said, *I don't know that I've had any great accomplishments . . . I mean some of my greatest achievements right now are my children and my relationship with my husband . . . but . . . I don't know if that really counts.*

Achievements as a student for younger Shads was easier to answer than achievements as an adult. These women listed their participation in the Shad Valley program, being self-sufficient or financially independent, maintaining balance in various life roles, and staying diversified or exposed to as many different areas as possible, as their student achievements. Older Shads listed the completion of educational degrees, and maintaining involvement in student organizations as their greatest achievements. There were similarities between the two groups in that doing well academically (i.e., maintaining high grades), and winning awards/scholarships for academic excellence, were areas of great achievement for them.

Achievements listed as an adult for the older Shads included their relationship(s) with their husband and/or children, recognition at work for hard efforts, feeling success in a career in that they were doing what they enjoyed, involvement with another in writing a book, giving a workshop, travelling overseas, and doing well athletically. The younger Shads listed achievements such as being able to maintain balance in their life, involvement in volunteer work, independence away from home, going to a support group for women and obtaining their first job. The two groups of women were similar in that both found great achievement in their relationships with family, friends, and/or people in general, and were proud of their continued involvement in other interests such as athletics or music.

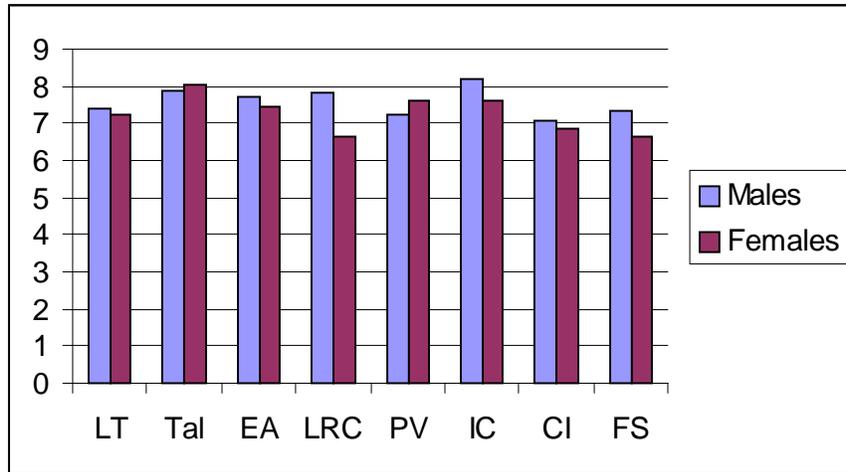
The responses by both groups are typical with what has been found in the literature on women's achievement (Hollinger & Fleming, 1992; Noble, 1994; Reis, 1995). Similar to previous research, the majority of women in this study defined their accomplishments in both traditional and relational terms. For example, one older Shad had achieved being President of the Medical Genetics Students' Union. Two older Shads had written outstanding papers in their field that were published. One younger Shad had received the Governor General's Award for distinction in her field of study. One younger Shad had graduated the top of her class in Engineering. In addition to their professional achievements, all younger and older Shads similarly found great achievement in their relationships at home and work, and in their hobbies/interests.

Thus, in addition to educational degrees attained and career advancement achieved, many of these high achieving women also included personal and/or interpersonal growth or accomplishments in their list of three greatest achievements. Very few women limited their self-defined achievements to traditional areas alone. When measured by male or societal standards, presenting a workshop at a local conference or volunteering at a local charity may seem to be a modest accomplishment, but when measured by female views of the dual importance of family and work, these are indeed accomplishments (Reis, 1995).

### **Math/Science Ability**

Subjects were asked to respond to the question "On a scale of 1-10 how does your math/science ability rate in terms of a specified area?" Figure 2 below indicates that males ranked most of the categories higher than females. However, females showed higher rankings in the two categories of specific abilities and talents and perceived value; possibly reflecting their awareness of significant under representation of females in math and science, as well as perhaps, their perceived value in being recognized for their science/math abilities. A series of T-test were carried out for each of the categories, and several significant differences were noted in the mean scores comparisons, however, the two areas where the females scored higher were not found to be significant. The first variable showing significant gender differences was for perceived value of math/science ability for "long term goals, with males showing a higher mean value of 7.40 in comparison to females with a mean value of 7.24. Next "ease of application" means for males were 7.70 and for females 7.47. Significantly higher means for males were also found for "adult life-role choices" (males = 7.84 and females = 6.62), and for "future success" (males = 7.33 and females = 6.63). These statistically significant results appear to cluster in predictable areas of adult life role choices and the important connection to using these abilities to ensure future career success. Thus, unlike females, males seem to be

very comfortable with their high math/science abilities, and they have a level of confidence that translates into their long range career planning. These results are consistent with previous research in this area (Eccles, 1985; Yewchuk, 1992), and in fact, males who fall into the lower half of the achievement distribution are more likely than their female counterparts to continue to study math (Pedro, Wolleat, Fennema, & Becker, 1981).

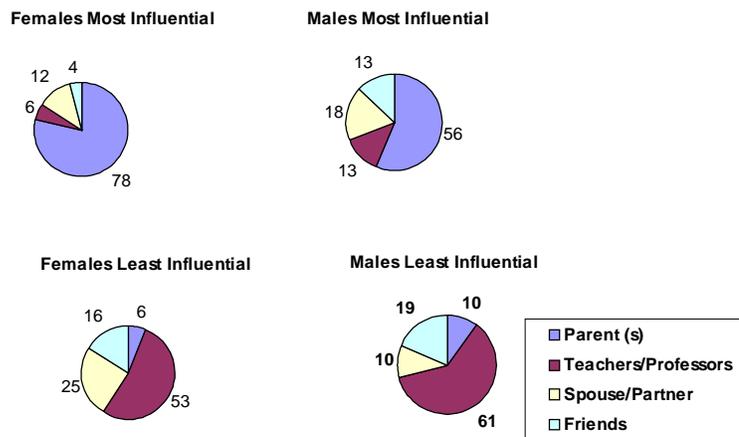


LT=Long-term Goals; Tal=Specific Abilities/Talents; EA=Ease of Application; LRC=Adult Life Role Choices; PV=Perceived Value; IC=Interest as a Child; CI=Cultural Interest; FS=Future Success

**FIGURE 2. GENDER DIFFERENCES IN MATH/SCIENCE ABILITY RATINGS**

**Social Influences**

The third category to emerge was 'influences', that is, individuals who have been prominent in the participant's life-role choices, and the ways they have been influential. As indicated in Figure 3, the most significant influence to emerge for both males and females was parents. This influence was much greater though for females, was 78% reported that their parents were the most influential in their life-role decision making. The “most” pattern of influence for males indicated a fairly equal distribution of influence from teachers, spouse and friends, whereas for females this two major areas of influence were parents and spouse or partner.



**FIGURE 3. MOST AND LEAST SOCIAL INFLUENCES**

Looking at the indicators for least influential social support in adult life-role decision making, it is of interest to note that teachers and professors were considered to be the least influential by both males and females. Despite the similarity for males and females, 61% of the males in comparison to 53% of the females reported teachers and professors as being least influential. This difference may be due to the possible mentoring of a particular teacher who may have been sensitive to the need to provide strong encouragement for females to pursue academic work in the math and science areas.

Although the majority of women did not make a distinction between their mother or father, there were two cases in the younger shad group who mentioned their father as being a specific influence in their life-role choices. These two younger Shads mentioned taking an interest in their father's career at an early age and being supported by their father in their interests. In general, both groups of women mentioned parents as being very instrumental in allowing freedom of choice, offering support and encouragement in choices made, building self-confidence, and instilling a work ethic and a sense of social responsibility in the community. One younger Shad (Psychology major) summed it up like this, *I think I'm much more independent than my parents but I think a lot of it has to do with the way I was raised, because my mom stayed home with us a lot and you know, she started her career after we were all out of the house and free. . . but I was never brought up that way . . . I was always told, you can go to university and you can be whatever you want . . . it wasn't just my mother saying that but my father too . . . telling me if I want to be an engineer, then go ahead be an engineer.*

The second influence to emerge ranged from teachers for the older shads to teachers, friend and/or partner for the younger shads. Teachers were mentioned by both groups for various reasons that included providing support and encouragement of interests, presenting material in interesting and challenging ways, displaying enthusiasm for learning which was contagious, setting high standards and expectations of work, and treating student as an equal. Most of the women felt their teachers were a positive influence in their life, however, not all (mostly older Shads) reported a positive influence by teachers; some expressed anger about the lack of support by teachers for their mathematics/science-related interests. For example, an older Shad (Speech Pathologist) remarked, *Feeling ignored in science classes and boys getting all the attention turned me off from science . . . all the examples were geared towards males, I guess I just got bored.* Another older Shad (Social Worker) stated, *I came back 'on a high' after participating in the Shad program, but I came back knowing more than my science teacher, than any of my teachers really . . . there were no teachers to model after and none of my teachers encouraged my math or science interests . . . it was a real letdown.*

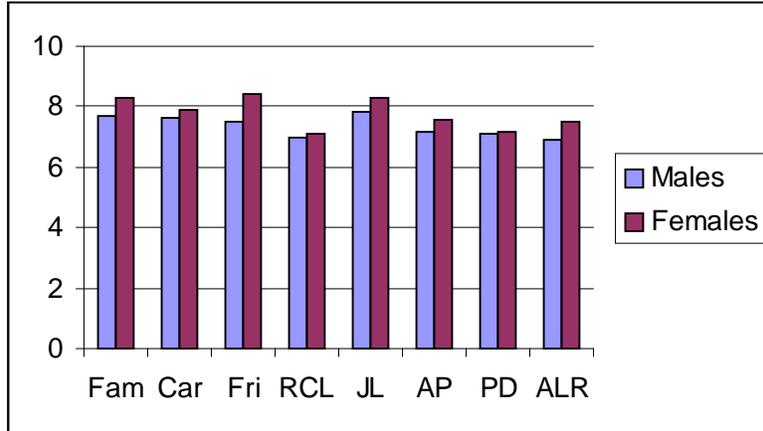
Although many of the older Shads were not as positively influenced by educators in high school, many of them reported a positive influence by mentors down the road who had helped in the formation of their careers. For example, one woman who was working in the area of humanities, spoke of previous university professors, and other graduate students, who had accepted her abilities and allowed her to risk voicing her ideas.

In addition to mentor relationships, younger and older Shads also mentioned other significant influences, particularly from husbands, boyfriends, and other individual men in the workplace who helped them forge new paths in their careers. For those women who were either married or involved in a relationship, a spouse and/or partner was mentioned as instrumental in providing support and encouragement in a career or pursuit of career, and being open-minded with respect to female roles in society. An older Shad (Engineer) spoke about the support of her husband like this, *My husband has been my biggest fan . . . I make more money than he does but that doesn't bother him a bit. . . his total encouragement of my professional goals has been the secret of my success.* Finally, friends were mentioned by both groups of women as being good role examples for choices to make or avoid, and for providing encouragement and support. A similar strong influence of supports on female decision making has been noted by Blair and Lupart (1996). Moreover, as previous studies have shown, the need for committed individuals who take a sincere and strengthening interest in the aspirations of gifted females was clearly portrayed in the responses of these older and younger high achieving women. Mentors provide role models, encouragement, and socialization into the profession (Kaufmann, Harrel, Milam, Woolverton, & Miller, 1986).

### **Life Satisfaction**

'Satisfaction' was the fourth and last category to be discussed in this paper. An examination of Figure 3 indicates that for every single category of life satisfaction presented, females were consistently higher in their ratings than were males. Indeed, a t-test of the average of all means indicated that females were significantly higher than males (females = 7.77 and males = 7.06). Interestingly though when each variable was tested on it's own, none of the categories of "life satisfaction" were found to be significantly different. This implies that there is a general

difference in life satisfaction levels positively favoring females, though no one category stands out as the critical element to create this difference.



Fam=Family; Car=Career; Fri=Friendships; RCL=Richness of Cultural Life; JL=Joy in Living; AP=Actualization of Potential; PD=Physical Development/Well-being; ALR=Adult Life Role Balance

**FIGURE4. LIFE SATISFACTION**

A common characteristic of the majority of women in this study is that most, in general, were satisfied with the different aspects of their lives, however, the younger Shads were more highly satisfied as a group than the older Shads. The younger Shads felt high satisfaction in all areas except for family, and actualization of potential, which were rated relatively lower. In family, some of the younger women were still living at home and were frustrated by the fact that they could not really establish their independence because of this. Others were living on their own and they were frustrated by the lack of contact (on the family members part) or the estrangement they felt by their family. With respect to actualization of potential, many of these women felt they were fulfilling their aspirations and goals but weren't quite sure if they were "realizing their potential" to the best of their abilities. It was interesting to note that some of these women stated it was "more important to be doing something they enjoyed" rather than trying to reach one's potential. Their responses might indicate an awareness of the importance of their values and a non-conforming attitude to societal expectations. On the other hand, these women are all fairly young (average age was 21 years old) and as previous research indicates, dissatisfaction with realization of potential might not come until later in life when there is a reflecting back on what could have been done.

The older Shads were satisfied in all areas except for adult life-role balance, actualization of potential, and physical development/well-being. All of these women expressed the difficulty of trying to balance family, career, and other life roles, and the lack of time for pursuing other interests. Because of this, the majority of these women did not feel they were fulfilling their potential. This finding supports that of other research suggesting that the greatest conflict for gifted women is centered around the interaction of career and personal life, which in turn, influences their satisfaction in life (Reis, 1995). In some cases, where a spouse and/or children were involved, there was neither the time nor the energy to pursue their own talents after working and taking care of their families. This issue left two of the older Shads quite frustrated about their lives. The younger Shads experienced no dissatisfaction in adult life-role balance. Many of them expected to have-it-all someday and did not foresee a conflict between their future work and family roles.

The majority of the older Shads in this study were satisfied with their career although two of this group listed alternate careers they would retrospectively select. These women were unsure about their career choice, did not feel their talents were being utilized, and were contemplating a different choice of career. These women attributed this dissatisfaction with career choice to the lack of role models in nontraditional careers, and to the lack of guidance or encouragement by counselors. Given the increasing numbers of women in the workforce, it would appear that the limited career choices available to the older Shads in this study when they entered college, or pursued a career, have certainly changed in the last decade or two. However, recent longitudinal research with gifted women, Arnold (1993) suggests that the majority of gifted women who seek to display exceptional talent continue to face formidable, sometimes insurmountable challenges, within their educational and occupational environments. Yet

to be carried out data analysis from the overall study, may corroborate with these initial findings and reveal further areas of gender difference.

## CONCLUSION

An attempt has been made in this investigation to explore the relationship between personal values, achievement-related choices, and life satisfaction in a distinct population of two groups of high achieving women, in order to enhance our understanding of female career choices and decision making, and their influence on career development. The importance of subjective task value from Eccles' model was stressed as was the need to study achievement congruent with both male and female perspectives.

One of the major outcomes of this study is the support that it gives to Eccles (1994) focus on the importance of subjective task value in making achievement-related choices, i.e., the importance of values, intrinsic interests, self-image and long term goals. Eccles maintains that men and women place different values on the same tasks, leading to gender differences in achievement-related tasks and in the allocation of time and energy. Interestingly, males and females believed their parents to be the most influential supports in their career and adult life role choices. Male participants were generally higher in recognizing the strong connection between math/science talent and ability and their choices in professional careers as well as their likely future success. Female participants in this study emphasized personal values and interests as important influences in their occupational choice. Younger and older Shad females discussed the importance of "doing what one enjoyed" as opposed to "doing what was expected". All of the women in this study made occupational decisions based upon their personal values and interests. Recognizing the role that values and interests have in career achievement is vital if women are to advance equally with men.

Another important finding is related to the area of life satisfaction. First, and possibly most surprising, was the finding that on average, females were significantly more satisfied than their male peers, though no one area was singled out as a root factor. This suggests that even though females experienced more indecision and doubt with respect to their careers, that the rich blend of home making and parenting, for which females typically assume greater responsibility (Ghalam, 1993) may contribute to this difference. As was discussed previously, older Shads felt less satisfied with their lives than younger Shads. Previous research suggests that satisfaction in life can be influenced by the interaction of career and personal life (Reis, 1995). This characterized the lesser feeling of satisfaction for the older Shad group. Many of these women spoke of the personal struggle between wanting to develop their own talents, and providing nurturance to their families. Most had little free time and did the majority of the housework. Most also indicated that they took the primary responsibility for raising their children. Thus, little time existed for creative pursuits. The younger Shads had not, as yet, experienced this conflict between career and family, nor did they foresee experiencing this conflict in the future. With the expressed optimism of youth, these younger Shads expected to have-it-all someday. Learning to juggle a marriage, interrupting a career to raise a child or moving to accommodate a partner's job, all carry consequences that demand careful consideration and planning on the part of females. Can we surmise that the younger Shad's expressed optimism is a sign that societal beliefs and attitudes towards females are indeed changing? This is an exciting prospect, however, it would be interesting to see how this latter group's career expectations unfold over the next few years, and whether they are able to combine it all or if there is a shift towards less demanding careers as a result of involvement in future marriage and child raising roles.

Finally, all of the women in the present study felt a measure of success that was not just restricted to the work role. Women redefined their achievements in a way that allowed for their own value systems, and their multiple life roles. Their achievements included educational degrees and career status as well as providing service to and maintaining good relationships with others. Although many of these women were still in the process of realizing their potential and achieving their aspirations and goals, much of the career development literature would state that these women were underachieving (Hashizume & Crozier, 1994). Their responses indeed validated the need for an expanded definition of achievement that includes not only educational, career, and financial accomplishments but also accomplishments that fall within other personal and interpersonal life spheres. If society starts to acknowledge the connectedness and ambition that females seek, then there may be less need for women to fight the conformity and the traditional stereotyping that plagues them (Leroux, 1994). Recognizing the variety of ways that life fulfillment can occur is how we should measure a female model of success.

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## REFERENCES

- Arnold, K. (1993). Academically talented women in the 1980s: The Illinois Valedictorian Project. In K. D. Hulbert & D. T. Schuster (Eds.), Women's lives through time: Educated women in the twentieth century. (pp. 393-414). San Francisco: Jossey-Bass.
- Baruch, G. K., & Barnett, R. C. (1987). Role quality, multiple role involvement, and psychological well-being in midlife women. Journal of Personality and Social Psychology, *51*, 578-585.
- Belenky, M. F., Clinchy, B. V., Goldberger, N.R., & Tarule, J. M. (1986). Women's ways of knowing: The development of self, voice and mind. New York: Basic Books.
- Blair, V., & Lupart, J.L. (1991). *Differentiating factors of university females persisting and withdrawing from mathematics*. Paper presented at the Canadian Psychological Association Annual Convention, SWAP Institute: Women, Girls and Achievement, June, Calgary, Alberta.
- Colombo, J. R. (Ed.) (1999). *The 1999 Canadian global almanac*. Toronto, ON: Macmillan.
- Eccles, J. (1985). Why doesn't Jane run? Sex differences in educational and occupational patterns. In F. D. Horowitz & M. O'Brien (Eds.) *The gifted and talented: Developmental perspectives*, (pp. 251-295). Washington, DC: American Psychological Association.
- Eccles, J. (1987). Gender roles and women's achievement-related decisions. Psychology of Women Quarterly, *11*, 135-172.
- Eccles, J. S. (1994). Understanding women's educational and occupational choices: Applying the Eccles et al. model of achievement-related choices. Psychology of Women Quarterly, *18*, 585-609.
- Eccles, J. S. (1987). Gender roles and women's achievement-related decisions. Psychology of Women Quarterly, *11*, 135-171.
- Gilligan, C. (1982). In a different voice. Cambridge: Harvard University.
- Government of Canada (1991). *Learning well...Living well*. Ottawa, ON: Minister of Supply and Services.
- Hashizume, L., & Crozier, S. D. (1994). A female definition of career achievement. In J. Gallivan, S. D. Crozier & V. M. Lalande (Eds.), Women, girls & achievement (pp. 106-120). North York: Captus University Publications.
- Hollinger, C. L., & Fleming, E. S. (1992). A longitudinal examination of life choices of gifted and talented young women. Gifted Child Quarterly, *36*, 207-212.
- Josselson, R. (1987). Finding herself: Pathways to identity development in women. San Francisco: Jossey-Bass.
- Kaufmann, F. A., Harrel, G., Milam, C. P., Woolverton, N., & Miller, J. (1986). The nature, role and influence of mentors in the lives of gifted adults. Journal of Counselling and Development, *64*, 576-
- Kvale, S. (1996). InterViews: An introduction to qualitative research interviewing. Thousand Oaks: Sage Publications.
- Lero, D., & Johnson, K. L. (1994). 110 Canadian statistics on work & family. The Canadian Advisory Council on the Status of Women, No. 94-E-204.
- Leroux, J. (1994). A tapestry of values: Gifted women speak out. Gifted Education International, *9*, 167-171.
- Meece, J., Parsons, J., Kaczala, C., Goff, S., & Futterman, R. (1983). Sex differences in math achievement: Toward a model of academic choice. Psychological Bulletin, *91*, 324-348.
- Miller, J. B. (1986). Toward a new psychology of women (2nd edition). Boston: Beacon Press.

- Noble, K. D. (1994). The sound of a silver horn: Reclaiming the heroism in contemporary women's lives. New York: Fawcett Columbine.
- Northcutt, C. A. (1991). Successful career women: Their professional and personal characteristics.
- Perdro, J., Wolleat, P., Fennema, E., & Becker, A. (1981). Election of high school mathematics by females and males: Attributions and attitudes. *American Educational Research Journal*, 18, 207-218.
- Reis, S. M. (1995). Talent ignored, talent diverted: The cultural context underlying giftedness in females. *Gifted Child Quarterly*, 39, 162-170.
- Reis, S. M., & Callahan, C. M. (1989). Gifted females: They've come a long way - - or have they? *Journal for the Education of the Gifted*, 12, 99-117.
- Ruble, T. L., Cohen, R., & Ruble, D. N. (1984). Sex stereotypes: Occupational barriers for women. *American Behavioral Scientist*, 27, 339-356.
- Silverman, L. K. (1986). What happens to the gifted girl? In C. June Maker (Ed.), Critical issues in gifted education: Defensible programs for the gifted (pp. 43-89). Rockville, MD: Aspen.
- Statistics Canada. (1995). Distribution of employment, by occupation, 1982 and 1994. Labour Force Survey. (Catalogue No. 89-503E).
- Surrey, J. L. (1985). Self-in-relation: A theory of women's development. Work in progress. Wellesley, MA: Stone Center for Developmental Services and Studies.
- Tesch, R. (1990). Qualitative research: Analysis types and software tools. New York: Falmer Press.
- Yewchuk, C. (1992). *Gender issues in education. Paper presented at the 6<sup>th</sup> Annual Canadian Symposium (SAGE)*. Edmonton, Alberta,