DOCUMENT RESUME

ED 263 517 CG 018 674

AUTHOR	Lips, Hilary M.; And Others
TITLE	Self-Schema Theory and Gender-Related Behaviors: Research on Some Correlates of University Women's Participation in Mathematics, Science and Athletic Activities.
SPONS AGENCY	Social Sciences and Humanities Research Council of Canada, Ottawa (Ontario).
PUB DATE	[85]
GRANT	410-83-0283-R1
NOTE	122p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	College Students; *Females; Higher Education; *Mathematics Anxiety; Perception; *Physical Education; *Science Curriculum; Self Concept
IDENTIFIERS	*Course Selection; *Self Schemas

ABSTRACT

The usefulness of the self-schema construct for understanding and predicting human behavior and the reason for the gender-relatedness of certain behaviors and experiences were investigated in three studies. The studies examined cognitive correlates of two gender-related behaviors that are more characteristic of and problematic for women than for men: the avoidance of math and science, and non-participation in athletics. Subjects for Study 1 were female undergraduates at the University of Winnipeg: 184 who had taken more than the required one course in basic science; 213 who had not taken math or science courses; and 49 who were taking physical education courses but no math or science courses. Subjects completed questionnaires measuring their self-schemas for math/science ability, physical ability, and general competence; their perceived physical ability and physical self-presentation confidence; a modified Bem Sex Role Inventory; and several open-ended questions about their performance in courses and athletics. Subjects (N=113) who had been identified from Study 1 data as positive, negative, or aschematic with respect to math/science self-schema or physical/athletic self-schema participated in Study 2. These subjects completed a questionnaire measuring endorsement of self-descriptive items, a generation of behavioral examples task, a recall task, and a math performance test. Male (N=8) and female (N=31) undergraduates in a statistical methods course participated in Study 3 which gathered data on the relationship among self-efficacy, self-schema, and mastery training by using the same self-schema and self-efficacy measures used in Study 1. (Results are presented in detail; a 5-page reference list, 33 data tables, and 2 figures are included.) (NRB)

S-f-schema Theory and Gender-Related Behaviours: Research on some correlates of university women's participation in mathematics, science and athletic activities

Hilary M. Lips

University of Winnipeg

515 Portage Avenue

Winnipeg, Manitoba R3B 2E9

With the research assistance of:

Anne Morrison

Susan Brenner

Patricia Fergusson

Carol Guest

This is the final report of work done under research grant #410-83-0283-R1 from the Social Sciences and Humanities Research Council of Canada. The support of the Council is gratefully acknowledged.

FINAL REPORT

Self-schema Theory and Gender Related Behaviours: Research on some correlates of university women's participation in mathematics, science, and athletic activities

The research reported here was concerned simultaneously with two sets of theoretical and practical issues. The first is the usefulness of the self-schema construct for understanding and predicting human behaviour. The second concerns the reason for the gender-relatedness of certain behaviours and experiences. The two sets of issues were addressed together by framing the research as an investigation of some cognitive correlates of two gender-related behaviours that are more characteristic of and problematic for women than men: the avoidance of math and science, and non-participation in athletics.

Schemas

The schema construct, postulating the existence of networks of associations used by the individual to organize and process information about the social world, is not a new one. However, in recent years the expanding research area of social cognition has focused increasing attention on these cognitive structures (e.g. Higgins, Herman & Zanna, 1981; Nisbett & Ross, 1980). Schema theorists describe perception as a constructive process in which incoming information interacts with the perceiver's pre-existing schema to produce a particular perception (Bobrow & Norman, 1975; Neisser, 1976; Taylor & Crocker, 1981). An individual who has a general readiness to process information in terms of a particular schema should manifest this by being able to encode schema-consistent information quickly, organize information in schema-relevant categories, recall schema-relevant material better than schema-irrelevant material, etc. In general, schemas can be said to "lend structure to experience" (Taylor & ocker, 1981).

Recently, attention has turned to the impact of schemas on the processing of information about the self (Bem, 1981; Keenan & Bailett, 1979; Markus, 1977; Markus, Crane, Berstein & Siladi, 1982; Markus & Smith, 1980; Mischel, Ebbesen & Zeiss, 1976; Rogers, Kuiper & Kirker, 1977). This attention is part of a broader interest within social psychology in the role of self-referent thought in behaviour and psychological functioning (Bandura, 1978, 1981, 1982; Perlmuter & Monty, 1979; Scheier, 1976; Snyder, 1974, 1979; Swann & Hill, 1982; Zajonc, 1980). Self-schemas are thought to be generalizations constructed from past behaviour that guide individuals in understanding their social experience and organizing information about themselves. Research has shown that differential processing of information about the self in a particular behavioural domain can be linked to differences in the self-schema for that domain. Markus (1977) demonstrated that individuals who were schematic on the self-concept of "independence" endorsed significantly more adjectives associated with the concept of independence than did persons who did not characterize themselves this way, required shorter processing times for self-description judgments to words concerned with independence than to other types of words, were able to supply relatively more specific examples of independent behaviour, thought they were likely to engage in future independent behaviour, and were resistant to the acceptance of information that implied they were not independent. Parallel results were found with dependent stimuli for people who thought of themselves as "dependent". In contrast, people who were aschematic on the dependent-independent dimension did not differ in processing times for dependent and independent words, had more difficulty in providing behavioural evidence of independence and dependence, thought they were as likely to engage in independent as dependent behaviour, and were relatively accepting of information about themselves on this dimension. Similar kinds of systematic differences in information processing were found to discriminate among feminine schematics, masculine schematics and aschematics in a later investigation of self-schemas and gender (Markus et al., 1982).

Some Unanswered Questions About Self-Schemas

To date, self-schemas have been investigated in only a few behavioural domains. It is of considerable theoretical importance to expand the research beyond the realm of self-perceived personality traits to encompass different types of self-schemas. One area that remains largely unexplored in this respect is that of self-perceived abilities and interests. The results of an examination of the information-processing consequences of various ability-interest self-schemas would be of more than simply theoretical interest, moreover. It is quite likely that such schemas mediate the learning of important concepts and skills and the processing of information relevant to the preparation for choice of career. An examination of this area is of considerable importance for theory and practice in education and counselling, and for avoiding anticipated shortages in certain critical skills. If self-schemas are the powerful mediators that theory suggests, they must be taken into account in education and career counselling for women going into traditionally masculine fields, for instance. The research reported here focussed on the relationship of self-schemas to information-processing and behaviour in two areas of ability-interest: mathematics and science, and athletics.

Within the realm of information-processing, some interesting questions arise about the relationship of self-schemas to other aspects of social cognition currently under study. Markus (1977), for instance, suggested a relationship between self-schemas and an individual's attributions of causality for his/her own behaviour. Supposedly, an individual behaving in a way congruent with his/her self-schema finds it easier to make internal attributions to explain that behaviour, while one behaving in a schema-incongruent way would resist this schema-discrepant information by attributing the behaviour to external forces. An aschematic individual could be led to make an internal or external attribution, depending on the situation and the form of the feedback. This relationship between self-schemas and causal attribution was examined in the current research.

The relationship between self-schemas and self-efficacy is a second area of interest. Perceived self-efficacy is a judgment of how well one can execute behaviours required to deal with particular situations (Bandura, 1982). Research shows that self-efficacy judgments influence choice of activities and environmental settings and help to determine the amount of effort and persistence on tasks in the face of obstacles (Bandura, 1977; Bandura & Schunk; 1981). While it is well-established that experiences of mastery can and frequently do enhance an individual's perceived self-efficacy for a particular activity, people vary in their responsiveness to such self-efficacy training (Bandura, 1982). It appears likely that responsiveness or resistance to self-efficacy training is mediated by the presence of a self-schema for the activity in question. A person who is aschematic on a particular dimension (e.g. math/science) should be more easily persuaded to alter her/his perceived self-efficacy than should someone for whom an experience of mastery runs counter to a prevailing generalization about the self.

A preliminary attempt to address this question was made in the current project.

Theoretically, self-schemas should relate to behaviours beyond the realm of information-processing. One would expect, for example, that an individual's choices with respect to academic pursuits, leisure time activities, career, and so on would reflect biases based on her/his self-schemas. This relationship was examined in the research reported here.

Self-schemas, Gender, and Behaviour

In recent years, many researchers have demonstrated that an individual's "sex-typing", or the degree to which s/he conforms to and identifies with a particular gender role is frequently an equivalent and sometimes a better predictor of gender-related behaviour than is biological sex (e.g. Bem, 1975, 1979; LaFrance, 1981; Myers & Lips, 1978). However, a continuing controversy has raged about the definition of sex-typing and the appropriate way to assess it (Bem, 1977; Colwill & Lips, 1978; Locksley & Colten, 1979; Myers & Gonda, 1982; Myers & Stark-Adamec, in press; Myers & Sugar, 1979; Orlofsky, Aslin & Ginsburg, 1977; Pedhazur & Tetenbaum, 1979; Spence & Helmreich, 1978, 1979). Most recently, the emphasis has begun to shift to an investigation of the cognitive structures and processes underlying sex-typing (Bem, 1981; Markus, 1982; Myers & Finn, in press). While this new emphasis has not stemmed the tide of controversy about measurement (e.g. Spence & Helmreich, 1981; Bem, 1981b), it provides a new theoretical framework. This approach may increase our ability to predict gender-related behaviours from paper and pencil measures of sex typing. As Markus (1977) has suggested, those individuals who have schemas about themselves on a particular dimension are those most likely to display a correspondence between self-description and behaviour and to be behaviourally consistent on that dimension across situations.

The basic difficulty with the concepts and the major source of controversy over the measurement of masculinity and femininity has not, however, changed since Constantinople's (1973) critique of traditional attempts to measure them. While many people may have well-articulated, salient concepts about femininity and masculinity, the precise content of the concepts differs cross-culturally, regionally, and even interpersonally. Thus, any attempt to demonstrate the operation of gender self-schemas must demonstrate not only that, for instance, masculine schematics endorse stereotypically masculine qualities as self-descriptive and that they rate this set of qualities as important to their self-concept, but also that they label this set of qualities as masculinity. The two studies of gender schemas currently available in the literature (Bem, 1981; Markus et al, 1982) are both somewhat disappointing in this regard. Both relied on the Bem Sex Role Inventory (Bem, 1974) or a subset of the adjectives on that inventory to categorize subjects as schematic. No ratings of importance of trait adjectives were used, nor was an attempt made to ascertain whether subjects scoring as masculine, feminine or androgynous actually labelled the set of traits they endorsed in these ways. Since it has been argued that for some individuals the BSRI may measure self-images of instrumentality and expressiveness rather than of masculinity and femininity (e.g. Spence & Helmreich, 1981) and since it has been illustrated that, when asked to define masculinity and femininity, many people do not choose responses that reflect the item content of the BSRI (Myers & Gonda, 1982), a conservative approach to inferring the presence of gender schemas from BSRI scores alone seems indicated. The schema construct allows for the idea that people can vary in both the content or structure of their gender schemas as well as in the salience or availability of these schemas. Thus, an individual who is highly schematic with respect to femininity (i.e. thinks of the self as feminine and places a high importance on this quality) may actually not score as Feminine on the BSRI if the content of her/his femininity schema differs markedly from the notion of femininity tapped by that scale. (This should be a rare occurrence if the BSRI accurately taps an accepted cultural definition of femininity. However, given the historical, cultural and individual variability in definitions of masculinity and femininity, it is a possibility that must be taken into account.)

One question addressed in this research was whether women who engage in non-traditional (for women) activities differ from more traditional women in the content or the salience, or both, of their gender schemas. For example, do college women who emphasize and enjoy math and science courses view themselves as "less feminine" than other women? Are they more likely than other women to include mathematical competence or interest in science in their definiion of acceptable "feminine" qualities? Or is the femininity schema simply irrelevant to this activity? In order to address these questions, measures of both the content and salience of gender self-schemas were included.

"Competence/Effectiveness" Self-schemas

It has become almost a truism in the writing about gender-related behaviour that many so-called gender differences actually reflect power differences: differences that stem from one group's having less power, or seeing itself as having less power, than another (e.g. Colwill, 1982; Henley, 1977; Kanter, 1976; Lips, 1981). Power is commonly defined as the ability to have an impact on or to affect one's environment (Winter, 1973), and a certain amount of converging research suggests that women feel less powerful than men do (Lips, in press). Thus, it seems at least possible that self-schemas having to do with power or effectiveness may be as useful as gender self-schemas when it comes to predicting certain gender-related behaviours.

Research indicates that people differ widely in their precise understanding and definition of the term power, but the majority of college student respondents describe it as either the ability to influence other people or the capacity to achieve a goal (Lips, in press). Both descriptions are congruent with the psychological notion of power as the ability to have an impact or effect on one's environment. Further pilot research with college students suggests that about half of them have a self-schema that might be characterized as "Competence/Effectiveness", made up of trait adjectives such as competent, effective, capable and in control (Lips, Note 1). The research project tested the usefulness of this self-schema in predicting gender-related behaviours.

Behavioural Domains Under Investigation

Avoidance of math and science. Female avoidance of math and science courses and careers is a well-documented phenomenon which has aroused considerable concern in North America (Ernst, 1974; Fennema & Sherman, 1976; Science Council of Canada, 1981; Scott, 1981; Tobias, 1976). The concern has been especially heightened by the emerging importance of computers in virtually all areas of the labour force (Menzies, 1981). The decision to engage in or to avoid endeavours that involve mathematics and science is clearly a gender-related behaviour that urgently requires study. The findings of research will have implications for the development of an educational policy directed to helping women both acquire the critical skills needed in future labour markets and gain admittance in greater numbers to scientific circles.

Non-participation in athletic activities. In recent years, concern has emerged over the fact that girls and women are not encouraged to be physically active or fit (Myers & Lips, 1978; Oglesby, 1978; Rorbaugh, 1979; Westkott & Coakley, 1981). The sense of physical mastery that comes with fitness and strength has potential psychological implications for a person's feeling of power and competence (Lips, 1981) as well as for the important issues of health and stamina. Studies indicate that women report more physical illness symptoms than men do (Rubenstein, 1982) and that these differences may well reflect both more difficult lifestyles for women than men and a lack of participation by women in regular strenuous exercise. Thus, participation in athletic activities is another gender-related activity that may be problematic for women, and results of the study may have implications for educational and social policy in this area.

STUDY 1

Method

Subjects

A computer listing of all currently registered female undergraduate students who had completed at least five courses was obtained from the University of Winnipeg. The list was divided into those who had taken or were taking at least one course in the mathematics, chemistry, physics or biology departments and those who had not. Each group yielded approximately 800 names. The math/science group was further narrowed down to include only those women who had taken more than the required one course in basic science. The resulting list contained about 400 names. An additional list of 169 women taking physical education courses and not taking math or science was also used. Two hundred names from the math/science list and 300 from the no-math/science list were randomly chosen to be contacted for the study, as well as all names from the physical education list. These people were contacted first by letter and then by telephone. One hundred and eighty-four women from the math/science list, 213 from the no-math/science list, and 49 from the physical education list agreed to participate in the study.

Procedure

Subjects were run in groups of 2 to 10 over a four-week period during the fall semester. In the lab, they completed a series of questionnaires. These included a measure of their self-schemas for math/science ability, physical ability, and general competence (developed for this study using Markus' 1977 approach), a measure of their confidence in learning mathematics (Fennema & Sherman, 1976), a measure of perceived physical ability and physical self-presentation confidence (Ryckman, Robbins, Thornton & Cantrell, 1982), a modified version of the Bem Sex Role Inventory (BSRI), open-ended questions about their reasons for taking or not taking courses in science and mathematics, and reasons for regularly participating or not participating in physical activity. In addition, subjects were asked to rate their performance level in courses with a large math or science content, and their performance level in athletic or sports activities. Further, subjects gave reasons for the level of their performance in these two areas. The questionnaire also included a list of athletic activities on which subjects were asked to check [illegible] they participated in twice a week or more. Subjects were also asked to indicate which of a series of items listed would make them feel less feminine. Finally, an open-ended question was included asking respondents to describe what femininity means to them.

Measures

Self-schemas. Items for the self-schema measures were obtained through pilot-testing in a large social psychology class and with visitors to the university's annual "Open House". Students were asked to supply adjectives that they would use to describe someone who was good at and interested in mathematics and science, someone good at and interested in athletics and sports, and someone who was generally competent. Visitors to the open house (n = 76) were asked to describe themselves, using 11-point scales, on a list of 14 adjectives made up of those most frequently listed by the social psychology students. The responses were factor-analyzed, using principal components with varimax rotation. It was found that the following items had salient loadings (.40 or greater) on one factor: mathematically-inclined (.74), enjoy learning about science (.75), good at abstract reasoning (.67) and good with numbers (.50). These items were used as the math/science self-schema items in the subsequent research. Another factor was made up of the following items with salient loadings: sportsminded (.88), physically active (.76) and physically fit (.59). These items were used as the physical self-schema items in the subsequent research. Items reflecting general competence were divided between two factors, one of which contained high loadings for competent (.81) and capable (.47) as well as for graceful, strong, physically fit and good with numbers; while the other contained high loadings on effective (.73), in control (.76) and capable (.56) as well as on analytical. The following three items were selected for use as the competence self-schema items in the subsequent research: competent, effective, in control.

Self-efficacy. Self-efficacy in mathematics and science was measured using Fennema and Sherman's Confidence in Learning Mathematics Scale (CLM).

The scale consists of 12 items on which respondents indicate a level of agreement on a 5-point scale. The instrument was modified slightly to use a 6-point scale, in order that items could be mixed in with items from the Physical Self-Efficacy Scale.

Fennema and Sherman (1976) developed the scale to measure confidence in one's ability to learn and perform well on mathematical tasks. They report a split-half realiability for the scale of .93.

Self-efficacy in physical, athletic activities was measured using the Physical Self-Efficacy Scale (PSE) developed by Ryckman, Robbins, Thornton, and Cantrell (1982). The scale measures two underlying dimensions of physical self-efficacy: Perceived Physical Ability (PPA) and Physical Self-Presentation Confidence (PSPC). The authors report test-retest reliabilities of .85 for the PPA subscale, .69 for the PSPC subscale, and .80 for the composite PSE scale. Internal consistencies, assessed via coefficient alpha, were .84 for the PPA, .74 for the PSPC, and .81 for the PSE. They also report that the PSE, and particularly the PPA subscale predicted a significant amount of the variance in sports involvement for a college population.

Gender self-schema. A modified version of the Bem Sex Role Inventory (BSRI; Bem, 1974) was used to determine the presence of gender self-schemas. The questionnaire requires subjects to indicate on a 7-point scale the extent to which each of 60 trait adjectives describes them. In the modified version used here, subjects were also asked to indicate on a second 7-point scale the extent to which their self-appraised level on each of the trait adjectives reflected an important part of "how you see yourself".

Self-appraised Performance. To indicate self-appraised performance level in math/science, subjects responded on a 5-point scale on the following question: "On the scale below, please rate how well or poorly you generally do in math and science courses, or in courses with a large math and science content". The scale was anchored with 1 (Extremely poorly) and 5 (Extremely well).

To indicate self-appraisal performance level in athletics, subjects responded on a 5-point scale to the following question: "On the scale below, please rate how well or poorly you generally do in athletic or sports activities". The scale was anchored with 1 (Extremely poorly) and 5 (Extremely well).

Attribution of Cause for Performance. After indicating their self-appraisal performance level in each of the two areas (math/science and athletics) subjects responded to the following open-ended question: "What do you think are the reasons for your level of performance in this area?"

Attribution of Cause for Level of Participation. Subjects were asked to indicate whether or not they had taken or were taking university courses in the departments of mathematics, chemistry, physics or biology. They then responded to one of the following open-ended questions: "If YES, why did you decide to take these courses?" or "If NO, why did you decide not to take courses in these departments?" They were next asked to indicate whether or not they were taking courses with large math/science contents in other departments (such as psychology, geography, economics), and again asked to provide reasons for their decision.

Subjects were asked to indicate whether or not they engaged in any form of regular athletic activity. They then answered either "please explain why you choose not to participate in any type of athletic activity" or "please explain why you participate in these activities".

Results

Description of sample

A total of 446 women took part in the study. Of these 49 women were drawn from the athletic list, 162 from those registered for math/science courses, 213 not registered for math/science courses, and 22 were on both the athletic list and the math/science list. These women ranged in age from 18 to 69, the mean age was 27.86 years. Approximately two-thirds of the sample (65.9%) were in the 18 to 27 year age range. The women had completed an average of 10 courses, with the mode being 5 courses.

Self-schemas

Competence. It was found that 276 (61.8%) of the sample of 446 women scored high on all three of the competency items as well as rating all three items as high on importance. An additional 61 (13.7%) scored high on two of the three items and medium on the other while scoring high on all three items on importance. Thus the majority of the sample would be classified as positive schematic for competence. Only two subjects scored low on all three of the ability items while considering al' three as high on importance, while one additional subject scored medium on one ability item, low on the other two ability items and scored high on importance on all three. Thus only three negative schematics were identified. Only nine subjects could be classified as aschematics where they rated at least two or three of the items as unimportant to their self-view. A further 61 subjects remained unclassified. In view of this unbalanced distribution, the competence self-schema was not employed in any further analyses.

Math/science. Following Markus (1977), subjects were classified as positive schematic if they rated themselves high (8-11) on at least 3 of the

4 items _and_ rated at least the same 3 of 4 items as important (8-11) to their self-view. Conversely, subjects were classified as negative schematic if they rated themselves low (1-4) on at least 3 of the 4 items _and_ rated at least the same 3 of 4 items as important to their self-view. Subjects were classed as aschematic if, regardless of their self-description on the 4 items, they rated at least 3 of the 4 items as unimportant (1-4) to their self-view.

Using the above stringent criteria, 78 or 17.5% of the sample of 446 women could be classified as clearly positive schematic for math/science/science ability, 74 or 16.6% could be classified as aschematic, and only 3, or 0.7%, could be classified as negative schematic. When the criteria were loosened to include respondents who rated themselves high in ability and importance on at least 2 of the 4 items and no lower than neutral on the other two, the number of positive schematics rose to 96 or 21.5%. A parallel easing of the criteria for negative schematics brought their number only up to 5, or 1.1%. Thus, the number of women in the sample demonstrating negative self-schemas for math/science ability was surprisingly small, especially given the fact that a large proportion of the sample was made up of people not taking math and science. Eventually, the criteria for inclusion in the three schema levels was loosened still further, in order to make use of as much of the sample as possible in further analyses. The positive schematic group was defined as all subjects rating themselves higher than one-half of a standard deviation above the mean on at least 2 of the 4 self-description items, while also rating the importance of at least 2 items higher than the mean. The negative schematic group was defined as all subjects rating themselves lower than one-half of a standard deviation below the mean on at least 2 of the 4 self-description items, while also rating the importance of at least 2 items higher than the mean. The aschematic group was defined as all subjects who, regardless of their self-ratings on the self-description items, rated at least 3 of the 4 items lower than one-half of a standard deviation below the mean in terms of importance to their view of themselves. Using these criteria, 157 respondents (35.2%) were categorized as positive schematic, 65 respondents (14.6%) were categorized as negative schematic, and 57 (12.8%) were categorized as aschematic for math/science ability. The other 167 subjects (37.4%) could not be classified.

There was a stronger tendency for subjects to rate themselves as high on ability for math and science than to rate that ability as an important part of their self-concept. While 103 of the 446 women rated themselves high on the self-description part of all 4 math/science items, only 56 women rated all 4 as important to their self-view.

Physical. Subjects were classed as positive schematic if they rated themselves higher than one-half of a standard deviation above the mean on at least two of the three self-description items, while also rating the importance of at least two items higher than the mean. The negative schematic group was defined as all subjects rating themselves as lower than one-half of a standard deviation below the mean on at least two of the three self-description items, while also rating above average on at least two of the three items in terms of importance to the self-view. The aschematic group was defined as all subjects who, regardless of their self-description items, rated at least two of three items lower than one-half of a standard deviation below the mean in terms of importance to their view of themselves. Using these criteria, 157 respondents (35.2%) were categorized as positive schematic, 18 respondents (4.0%) were categorized as negative schematic, and 129 respondents (28.9%) were categorized as aschematic for physical ability. The other 142 subjects

(31.8%) could not be classified.

Femininity/Masculinity. The criteria for identifying gender self-schemas were set as follows. To be categorized as masculine schematic, a subject had to endorse masculinity but not femininity on the BSRI and rate it as important (5-7) on a 7-point scale, as well as scoring as Masculine on the scale. Feminine schematics had to show a similar pattern with respect to femininity. "Androgynous" schematics must endorse both masculinity and femininity and rate them as important and score as Androgynous on the scale. Aschematics should endorse neither masculinity nor femininity strongly and score as Undifferentiated on the scale.

Use of the above procedure was found unsatisfactory, as it resulted in the classification of only 17% of the sample into schema groups (11.4% as feminine, 0.4% as masculine, 0.2% as androgynous, and [illegible].7% as undifferentiated). Thus, these gender schema categories were not used in further analyses. Some analyses were done using the simple median split technique to categorize subjects as Feminine, Masculine, Androgynous or Undifferentiated. This technique resulted in the classification of 106 subjects as Feminine, 117 as Masculine, 106 as Androgynous and 89 as Undifferentiated.

Self-efficacy

Math/science. A frequency distribution of the scores on the Fennema-Sherman Confidence in Learning Mathematics Scale (CLM) is shown in Table 1. The distribution is negatively skewed, with almost one-third of the subjects falling in the highest confidence range and less than one-tenth falling in the lowest.

Physical. Frequency distributions of the two scores on the Physical Self-Efficacy scale (PSE) are shown in Tables 2 and 3. The distributions for both the perceived Physical Ability (PPA) scores and the Physical Self-

Presentation Confidence scores (PSPC) are approximately normal.

Self-ratings of performance

Math/science. When asked to rate their usual level of performance in mathematics and science courses according to a five-point scale, 2.5% of the sample rated their performance as extremely poor, 9.9% as moderately poor, 29.1% as fair, 43.9% as moderately good, and 12.1% as extremely good. Eleven subjects (2.5%) did not answer this question.

Physical. When asked to rate their usual level of performance in physical athletic activities, 4.0% of the sample rated their performance as extremely poor, 11.4% as moderately poor, 34.8% as fair, 41.0% as moderately good, and 5.2% as extremely good. Sixteen subjects (3.6%) did not answer this question.

Attribution of Cause for Performance Level

Mathematics/Science. Responses to the open-ended question about reasons for level of math/science performance were coded by two raters for the presence of 22 different attribution categories (actually the positive and negative version of 11 categories: interest and enjoyment, ability, background and experience, work and effort, attitude toward mathematics and science, perceived relevance of mathematics and science to subjects' own goals, encouragement, time available, teacher influence, peer and sibling influence, and parental influence). Categories were chosen by the investigator, with a view to the attributional literature and the existing literature on math/science avoidance, by a preliminary reading of subjects' responses. The response categories were quite easy to judge, and after some preliminary training, the two coders were in almost complete agreement on each subject's responses.

The responses of subjects to the causal attribution question, broken down by self-rated performance level and by whether or not they were currently enrolled in a mathematics or science course, are summarized in Tables 4, 5 and 6.

The tables show that the most heavily-used causal attributions for performance level are interest, ability, background, effort, and attitude, with parental, peer and teacher influence falling at the bottom of the list.

A stepwise multiple regression was performed between self-rated performance level in math and science as the dependent variable and dummy coded attributions for level of performance in math and science as the predictor variables. Nine of the predictor variables contributed significantly to the prediction of self-rated performance level. The predictor variables entered at each step, respectively, were attribution of math/science performance to positive interest in or liking for math and science, ability in math/science, hard work or effort put into it, no ability in math/science, no background, experience or past performance in math/science, no interest in or liking for math/science, negative attitude toward math/science, positive teacher influence, and positive background, experience or past performance in math/science. Table 6A shows the intercept, unstandardized regression coefficients, standard errors, type II sum of squares, F value and probability of F. The R^2 for regression was .410, and was significantly different from zero, $F(9,436) = 33.62$, $p < .0001$.

A series of chi-square analyses comparing subjects who rated their performance in the extremely poor to moderately poor range with those who rated it in the extremely good to moderately good range shows that the self-rated good performers were more likely to use ability $x^2(1) = 12.67$, $p<.001$, and effort attributions, $x^2_{(1)} = 15.59$, $p<.001$, while the self-rated poor performers were more likely to use background preparation $x^2_{(1)} = 14.25$, $p<.001$, and attitudes toward mathematics and science $x^2_{(1)} = 4.6$, $p<.05$, as attributions of cause for performance.

Few differences were evident between groups of subjects taking and not taking mathematics and science courses. Those subjects who were not taking mathematics and science courses were somewhat more likely than other subjects to attribute their performance level to level of background preparation $x^2_{(1)} = 4.13$, $p<.05$. No other differences in patterns of causal attribution were found between the two groups.

Athletics. Responses to the open-ended question about reasons for level of performance in athletic activities were coded by two raters for the presence of 25 different attribution categories (the positive and negative version of interest and enjoyment, ability, background and experience, effort, attitude, relevance, degree of encouragement by others, time available, fitness level, teacher influence, peer and sibling influence, parental influence, as well as disability/health problems). As in the previous case, the response categories were found easy to judge, and the two coders were in virtually complete agreement.

The responses of subjects to the causal attribution for performance question, broken down by self-rated performance level and by whether or not they participated regularly in athletic activities, are summarized in Tables 7, 8 and 9. The tables show that the most frequently used attributions of cause for performance were interest and enjoyment, ability, effort, attitude, background experience, and fitness level.

A stepwise multiple regression was performed between self-rated performance level in athletic activities as the dependent variable and dummy coded attributions for level of performance in athletic activities as the independent variables. Nine of the independent variables contributed significantly to the prediction of self-rated performance level. The IVs entered at each step, respectively, were, attribution of athletic performance level to positive interest in or liking for athletics, no background, experience or poor past performance in athletics, no interest or liking for athletics, no work or effort put into it, being unfit or overweight, no ability in athletics, negative teacher influence, and disability or health problem. No other variables met the .05 significance level for entry into the model. Table 10 shows the intercept, unstandardized regression coefficients, standard errors, type II sum of squares, F value and probability of F. The R^2 for regression was .328 and was significantly different from zero, $F(9,436) = 23.60$, $\underline{p}=.0001$.

A series of chi-square analyses comparing subjects who rated their performance in the poor to moderately poor range with those who rated their performance good to moderately good found only one difference between the two groups: self-rated good performers were the more likely to attribute their performance to interest and enjoyment level, $\chi^2_{(1)} = 17.31$, $p<.001$. Similar comparisons between subjects who did and subjects who did not participate in regular athletic activities showed no differences in attributions for performance between these two groups.

Participation

Two hundred and seventy-nine (62.6%) of the subjects indicated that they were taking or had taken courses in one or more of the four math/science departments, while 222 (49.8%) said they were taking courses in other departments that had substantial math/science content. Two hundred and ninety-seven (66.6%) of the women indicated that they participated regularly in athletic activities.

Attribution of Cause for Participation

Math/science. Tables 11 and 12 show the frequency with which various reasons were given in the open-ended responses for taking or avoiding math and science courses. It can be seen that the most frequently indicated reasons for taking mathematics and science courses were program requirements (57.3%) and interest/liking (50.5%), while by far the most frequently-cited reason for avoiding such courses was a lack of interest (56.9%).

Athletics. Tables 13 and 14 show the frequency with which various reasons were given for participating or not participating in regular athletic activities. The most frequently cited reasons for participation were to get into or stay in shape (58.9%) and enjoyment or liking (50.5%), while the most frequently mentioned reason for a lack of participation was being too busy (61%).

Relationships between Self-Schema and Other Variables

CLM. A clear relationship was found between math/science self-schema classification and self-efficacy for learning mathematics, as measured by the CLM. A one-way analysis of variance was carried out contrasting the CLM scores of the positive schematic, negative schematic, and aschematic (for math/science) groups. The effect of shema category was found to be significant, $F(2,272) = 133.85$, $p<.001$, with group differences accounting for 50% of the variance in CLM scores. The mean scores on the CLM were 61.74 for the positive schematic group, 38.25 for the aschematic group, and 33.76 for the negative schematic group.

Physical Self-Efficacy. A one-way analysis of variance was carried out contrasting the PPA scores of the positive schematic (for physical/athletics), negative schematic, aschematic and unclassified groups. The effect of schema category was found to be significant, $F(3,432) = 50.49$, $p<.0001$, with group differences accounting for 30% of the variance in PPA scores. The mean PPA scores were 45.64 for the positive schematic group, 34.52 for the aschematic group, 31.57 for the negative schematic group, and 37.83 for the unclassified group. Tukey's studentized range test showed that the negative and aschematic groups did not differ significantly, but all other group comparison showed significant differences.

A one-way analysis of variance was carried out contrasting the PSPC scores of the positive schematic, negative schematic, aschematic and unclassified groups. The effect of schema category was found to be significant, $F(3,432) = 2.63$, $p<.05$, but with group differences accounting for only 1.8% of the variance. The mean PSPC scores were 51.03 for the positive group, 52.16 for the aschematic group, 48.71 for the negative schematic group, and 49.84 for the unclassified group. Tukey's test showed that none of the indiv ·l group contrasts were significant, however.

Reasons for participation in Math/science courses. Math/science self-schemas were clearly related to course selection. A large majority (82.8%) of the women who were classified as positive math/science schematic were among those women who were taking or had taken math and science courses, while only 27.7% of the negative math/science schematics were from this group.

Among the women who were taking math or science courses, the positive schematic and aschematic groups more frequently than the negative schematics stated they were taking these course because they were interested in or liked this area (60.7% and 57.1%, respectively), compared with 26.3% of the negative schematics who gave this reason. Although all schema groups frequently stated they took these course because they were a basic requirement, the negative schematic and aschematic groups were more likely to give this reason (73.7% and 67.9%, respectively) than the positive schematic and undifferentiated groups (51.9% and 58.8%, respectively). The negative schematics were less likely to state they took math/science courses because they have the ability or have done well in the past (0%) than both the positive schematics (20.7%) and the aschematics (17.9%).

Among the women not taking courses in math or science, the positive schematic group most frequently stated they did not take these courses because they were not relevant or required (36.4%), compared with 15.6% of the negative schematics and 21.4% of the aschematics who gave this reason. The negative and aschematic groups most frequently stated they did not take math/science courses because of no interest in this area (66.7% and 67.9%, respectively), while only 22.7% of the positive schematics gave this reason. The negative schematics were more likely than any of the other groups to state having no background as a reason for not taking courses (24.4%).

These women were also asked to give reasons for taking or not taking other courses with math or science content.

Among those taking math or science courses, the positive schematics most frequently stated they took other math/science-related courses because of interest or enjoyment (53.3%), while 33.3% of the negative schematics and 42.3% of the aschematics gave this reason. The positive and aschematic groups were more likely to say they took other courses because they are useful or relevant (23.3% and 23.1%, respectively), than the negative schematic group (9.5%). The negative and aschematic groups most frequently stated they took other courses with math/science content because they were a basic requirement (61.9% and 69.2%, respectively), compared with 34.4% of the positive schematics who gave this reason.

Among those not taking math or science courses, the positive schematic group most frequently stated they did not take other courses with math/science content because they were not relevant or required (43.3%) compared with 9.3% of the negative schematics and 17.2% of the aschematics who gave this reason. The positive group was more likely than the other groups to avoid these other courses because they do not have the time or because the courses do not fit their schedule (14.9%). The negative and aschematic groups most frequently stated they did not take other courses because they were not interested (39.4% and 58.6%, respectively), while 23.9% of the positive group gave this reason. The negative and aschematic groups were also more likely to state they have had previous problems in the area of math or science (23.3% and 13.8%, respectively), than the positive schematic group (2.9%). The negative schematics more frequently than the other schema groups stated as a reason, having no background (16.3%) and fearing these courses are too difficult (11.6%).

Reasons for Participation in Athletics. Among the positive physical schematics, 90.5% participated regularly in athletic activities, and 9.48% did not. Forty-seven point six percent of the negative schematics, 43.6% of the schematics, and 70.5% of the unclassified group participated regularly. Thirty-eight point one percent of the negative schematics, 53.4% of the aschematics, and 26.1% of the unclassified group do not participate regularly in athletic activities.

Among those who did participate regularly, all groups (positive, negative, aschematic and unclassified) frequently stated that they participate in order to get into or stay in shape (65.7%, 60.0%, 39.7%, 22.0%, respectively), although, the positive and negative physical schematics stated this reason more frequently than the other two groups. Similarly, all groups frequently stated they participate regularly because they enjoy or like athletics, and for psychological benefits. Negative schematics were more likely than any of the other schema groups to state they participate in order to loose weight or prevent weight gain (20.0%).

Among those who did not participate regularly, all schema groups most frequently stated they did not participate regularly because they are too busy, although the positive schematics stated this as a reason more frequently than all other groups (81.8%). Negaitve schematics more frequently than the other schema groups stated they do not participate because they are unathletic or uncoordinated (25%) and were least likely to state they don't participate because they do not like or enjoy athletics (0%). Aschematics more frequently than any of the other groups stated they do not participate because they do not like or enjoy athletic activities (35.2%), and because they are lazy (18.2%).

Those women who were positive schematic most frequently attributed athletic performance level to interest in or liking for athletics (47.8%), work or effort put into it (31.9%), ability (27.6%), attitude (17.2) and being fit or in shape (16.4%). Negative schematics most frequently attributed their performance level to ability (23.8%). This group was less likely than the positive schematics to attribute performance level to interest in or liking for athletics (19.1%) and amount of work or effort put in (9.5%), but more likely than the other group to attribute performance to lack of background or past experience in athletics (19.1%). Both the aschematic and unclassified groups most frequently attributed performance to interest in or liking for athletics (34.6% and 41.5% respectively) and work or effort put in (33.1% and 28.4% respectively). All groups were about equally likely to attribute performance level to attitude and ability.

Among the 297 women who participated regularly in athletic activities, 35.4% were positive physical schematic, 3.4% negative, 19.5% aschematic and 41.8% unclassified. Among the 136 women who did not participate regularly, 8.1% were positive physical schematic, 5.9% negative, 52.2% aschematic, and 33.8% unclassified.

Among the positive schematics those who participated regularly most frequently attributed performance level to interest in or liking for athletics (49.5%; ability (26.7%), work or effort put into it (26.7%), fitness level (16.2%) attitude (15.2%) background or past experience (14.3%) and relevance (13.3%). Those not participating regularly more frequently than those who did participate attributed performance to ability (36.4%) relevance (27.3%) and attitude (36.4%) and were less likely than the other group to attribute performance to interest in or liking for athletics (27.3%) and work or effort put in (18.2%) and about as likely to attribute performance to fitness level (18.2%) and background or past experience (18.2%).

Negative schematics who participated most frequently attributed performance to ability (40.0%) attitude (30%) interest in or liking for athletics, background or past experience, and time (20%). Negative schematics who did not participate frequently although less often than those who do participate attributed performance level to ability (25.0%) and more frequently attributed performance to being discouraged (25% vs. 0%) and being unfit (25% vs. 0%). This group was less likely to attribute performance to interest or liking for athletics (12.5%) and time (0%) and about as likely to attribute performance to background (25%).

Both aschematics who do and do not participate most often attributed performance level to interest in or liking for athletics (34.5 & 36.6%), work or effort put in (31.0 & 36.6%), ability (18.9 & 25.4%) and attitude (15.5 & 19.7%).

Among the unclassified group, those who participate most frequently attributed performance level to interest (42.7%), attitude (29.8%), ability (25.8%) and work or effort put in (25.0%). Similarly those not participating frequently attributed performance to interest (41.3%) and ability (21.7%), but were more likely than the other group to attribute performance to work or effort put in (36.96%).

Factor Analysis of the Self-Schema Measures

Because of the large proportion of subjects who could not be classified into self-schema categories (37.4% for math/science self-schemas and 31.8% for physical/athletic self-schemas), a decision was made to create continuous scores on each of the two dimensions of the self-schemas (level of attribution of the trait to the self (A) and level of importance attached to the trait in the self-concept (B)). Each of the two sections of the self-schema measure was subjected to principle components analysis with varimax rotation.

Each analysis yielded separate factor scores for math/science and physical/athletics. The analysis of the first half of the measure (self-attribution of characteristics) yielded one factor on which all the math/science items loaded strongly (mathematically-inclined, .90; good at abstract reasoning, .56; good with numbers, .86; enjoys learning about science, .62) and one factor on which all the physical/athletic items loaded strongly (sportsminded, .74; physically active, .89; physically fit, .81). Factor scores for these two factors, called Math/science-A and Physical/athletic-A respectively, were used as indicators of self-schema content in further analyses.

The analysis of the second half of the self-schema measure (importance of characteristics to self-view) yielded one factor on which all the math/science items loaded strongly (mathematically-inclined, .86; good at abstract reasoning, .62; good with numbers, .86; enjoys learning about science, .69) and one factor on which all the physical/athletic items loaded strongly (sportsminded, .66; physically active, .89; physically fit, .85). Factor scores for these two factors, called Math/science-B and Physical/athletic-B respectively, were used as indicators of self-schema strength in further analyses.

Table 15 shows the intercorrelations among the four self-schema factor scores and other variables measured in this study: BSRI Femininity and Masculinity scores, age, the three self-efficacy measures, and self-rated performance levels in math/science courses and athletics.

Prediction of Participation

Math/science. A stepwise multiple regression was performed between total number of math and science course credits actually received by one year after the original measures were taken as the dependent variable and age, math efficacy (CLM), self-rated performance level in math/science, math/science-A and math/science-B factor scores, and four factor scores from the BSRI as independent variables.

Only two IVs contributed significantly to the total number of math or science course credits, age and math/science-A factor score. Table 16 shows the intercept, unstandardized regression coefficients, standard errors, type II sum of squares, F value and probability of F. R^2 for regression was .304 and was significantly different from zero: $F(2,383) = 83.55$, $p<.0001$.

The math/science schema-A factor score entered at the first step and age and the second step. No other variables met the .05 significance level for entry into the model.

To further investigate the relationship between math/science course participation and the variables measured in this study, a causal analysis was performed, using the LISREL VI computer program (Jöreskog & Sörbom, 1984). Figure 1 shows a diagram of the model that was tested, with path coefficients indicated. The y-variables were total number of math/science course credits accumulated by one year after the original measures were taken, and whether or not other courses with math/science content were being taken. The x-variables were the math/science-A and math/science-B factor scores, CLM score, self-rated level of performance in math/science courses, BSRI Masculinity scores, age, the attribution of performance to interest, time, and ability, and attribution of course participation to interest, program requirement, or relevance to goals. The model was found to fit the data perfectly, $x^2_{(0)}$, $p = 1.00$, Goodness of fit = 1.00, with 45% of the variance accounted for. Table 16A shows the t-values for the relationships between the x and y variables. It can be seen that the math/science-A factor score, the attribution of performance level to interest, the attribution of course participation to interest, the attribution of course participation to goal relevance, and age were significant predictors of the total number of math/science courses taken, and that CLM score, attribution of performance level to interest, attribution of performance level to ability, attribution of course participation to goal relevance, and age were significant predictors of whether or not other courses with math/science content were also being taken.

Physical/athletic activities. A two-group stepwise discriminant analysis was carried out, using subjects who said they did and subjects who said they did not participate in regular athletic activities as the two groups. Variables included in the analysis were BSRI Masculinity and Femininity scores, physical/athletic-A and physical/athletic-B factor scores, age, PPA, and PSPC scores. The canonical discriminant function was found to be significant, $F(6,383) = 21.32$, $p<.0000$, with the following variables correlating .30 or better with the function: BSRI Masculinity, Physical/athletic-A Factor score, and PPA score. Using this function, 71.4% of the subjects who did not participate in regular athletic activities were correctly classified, as were 73.9% of the subjects who did participate.

To further investigate the relationship between participation in athletic activities and the variables measured in this study, a causal analysis was performed using LISREL VI. Figure 2 shows a diagram of the model that was tested, with path coefficients indicated. The y-variable was stated participation in regular athletic activities. The x-variables were the physical/athletic-A and physical/athletic-B factor scores, PPA score, PSPC score, age, BSRI Masculinity score, self-rated level of performance in athletics, the attribution of performance level to ability, interest, and time spent, and the attribution of participation to liking. The model was found to fit the data perfectly, $x^2_{(0)} = 0.00$, $p = 1.000$, Goodness of fit = 1.00, with 50% of the variance accounted for. Table 17 shows the t-values for the relationships between the x and y variables. It can be seen that perceived physical ability, self-rated performance level, and attribution of performance to ability, interest and time were significant predictors of athletic participation.

The Meaning of Masculinity and Femininity

Because the two behaviours under investigation in the present study are apparently gender-related in that they generally attract more males than females, an effort was made to examine the relationship between subjects' perception of and self-concept of femininity and masculinity, on the one hand, and their participation in math/science courses and athletic activities on the other. The question was approached in one way by trying to determine whether participation in these activities was seen as relevant to these college women's self-concept of femininity, and in another by looking for correlations between actual participation in these activities and scores on the BSRI Femininity and Masculinity scales.

"What makes you feel less feminine?". Subjects indicated among 15 listed activities, those which made them feel "less feminine". The list included items relevant to math/science and to athletic activities. Among the activities, "being overweight" was the most frequently endorsed item (47.3%), followed by "not liking children" (19.1%). Other, less frequently endorsed items, included "being physically strong" (9.6%), "putting your own needs ahead of family needs" (7.6%), "expressing anger towards other people" (6.5%), "choosing a career instead of traditional family life" (6.3%), "playing competitive sports" (4.0%), "pursuing a demanding career" (3.6%), "doing strenuous/physical exercise" (2.9%), "doing well in a physics course (1.1%), "chairing a meeting" (.7%), "spending a lot of time studying" (.5%), "getting the best marks in class" (.5%), "enjoying math or science" (.2%), and "taking a computer course" (.2%).

Among the 446 women, 106 (23.8%) were classified on the BSRI as "feminine", 117 (26.2%) "masculine", 106 (23.8%) "androgynous" and 89 (19.96%) "undifferentiated". Table 18 shows the percentage of subjects in each of these categories who endorsed each item on the above list. Being overweight was the most frequently endorsed item for all gender groups; (feminine - 49.06%, masculine - 45.3%, androgynous - 46.2%, and undifferentiated - 51.7%). The feminine, androgynous and undifferentiated groups frequently endorsed the item "not liking children" (22.6%, 22.6%, 22.5%, respectively), whereas the masculine group was less likely to endorse this item (11.1%). The feminine group more frequently than the other groups endorsed the items "being physically strong" (14.5%) and "playing competitive sports" (7.6%).

"What Does Femininity Mean to You?". Responses to this question were coded by two raters for the presence of nine response categories and also for specific mentions of whether or not femininity was important. The nine categories were developed by the principal investigator and her chief research assistant through reading of the responses and consultation with the literature on femininity and masculinity. Table 19 lists the response categories along with examples of each. No specific categories were created for responses relevant to math/science or physical activities specifically, because no specific mention of these areas was made by any subject. Inter-rater agreement during this coding process was high, with disagreement occurring less than 10 % of the time on all categories.

Overall, the responses to the open-ended femininiity question, "What does femininity mean to you?" most frequently included descriptions involving self-acceptance (29.6%), followed by stereotyped descriptions (26.5%), emotional/expressive adjectives (18.4%) and autonomy (16.1%). Less frequent responses to this question included, being a person/individual (8.1%), describing femininity as something different from masculinity (7.6%), maintaining a balance in terms of traditional and non-traditional gender roles (7.2%), rejection of the stereotype (5.8%), and being attractive to the opposite sex or pleasing males (3.1%). Most subjects (89.2%) made no mention of the importance of femininity, while 7.9% stated it was not important and only 1.6% stated it was important.

Table 20 shows the percentage of subjects in each of the four BSRI categories who gave responses that could be classified in each of the nine categories.

The use of emotional adjectives to define femininity was associated with feeling less feminine if "playing competitive sports" (r = .109, p = .02), "not liking children" (r = .300, p = .0001), "putting your own needs ahead of your family's needs" (r = .147, p = .001), and "pursuing a demanding career" (r = .095, p = .044).

Defining femininity in terms of the stereotype was related to feeling less feminine if "playing competitive sports" (r = .10[illegible], p = .02), "being physically strong" (r = .131, p = .0055), and "putting your own needs ahead of your family's needs" (r = .134, p = .0045).

Describing femininity as a need to maintain a balance between autonomy and relationship (traditional and nontraditional) was associated with feeling less feminine if "not liking children" (r = .175, p = .0002).

Defining femininity as being a person was negatively correlated with feeling less feminine if "overweight" (r = -.116, p = .014), whereas defining femininity as being attractive to the opposite sex was positively correlated to feeling less feminine if "overweight" (r = .138, p = .003).

Women scoring higher on the Bem masculinity scale were less likely to describe femininity using emotional, expressive adjectives (r = .102, p = .035).

As well, scores on the BSRI masculinity scale were negatively correlated with endorsement of playing competitive sports (r = .128, p = .008), not liking children (r - .145, p = .003), and expressing anger toward others (r = .104, p = .032) as making one feel less feminine.

Women scoring higher on the Bem femininity scale were more likely to state on the open femininity question that femininity was important to them (r = .114, p = .018).

Comparisons of the content and salience of "femininity" and "masculinity" schemas for participants and non-participants.

Math/science. Math/science "avoiders" and "participants" were compared on their self-appraisal and importance-to-self ratings for the items "feminine" and "masculine" on the BSRI. No differences between the two groups were found for any of the four scores. Table 21 shows the group means.

Avoiders and participants were also compared on their endorsement of activities as ones that would make them feel less feminine, and on their responses to the open-ended question about the meaning of femininity. Only one of these comparisons reached conventional levels of statistical significance: 13.3% of math/science avoiders, as compared to 7.5% of math/science course participants agreed that being physically strong would make them feel less feminine, $X^2_{(1)} = 3.997$, $p < .046$.

Finally, stepwise discriminant analyses were used to compare BSRI Feminine avoiders with Feminine participants and BSRI Masculine avoiders with Masculine participants, using the individual BSRI self-appraisal and importance items as discriminating variables. Neutral items were omitted. These analyses must be treated as suggestive rather than conclusive, because the numbers of subjects in each group are smaller than the number of variables (80). However, the results suggest that Feminine math/science avoiders can be significantly discriminated from Feminine math/science participants, $F(3,99) = 6.61$, $p < .01$, with a correct classification rate of 63.1%. The discriminant function is made up of loadings on only 3 variables: the importance to self of level of independence, self-appraisal as athletic, and self-appraisal as childlike. Feminine math/science participants score lower on the first of these and higher on the other two than do Feminine math/science avoiders.

Masculine math/science avoiders and Masculine math/science participants can also be significantly discriminated, $F(3,112) = 7.68$, $p < .01$, with a correct classification rate of 66.4%. The discriminant function is made up of 3 variables: self-appraised self-sufficiency, self-appraised individualism, and the importance to the self-view of one's level of leadership ability. Masculine math/science participants score higher on the first and lower on the second two variables than do Masculine math/science avoiders.

Physical/athletics. Physical activities "avoiders" and "participants" were compared on their self-appraisal and importance-to-self ratings for the items "feminine" and "masculine" on the BSRI. No differences between the two groups were found for any of the four scores. Table 22 shows the group means.

Avoiders and participants were also compared on their endorsement of activities as ones that would make them feel less feminine, and on their responses to the open-ended question about the meaning of femininity. No significant differences were found between the two groups on any of these items.

Finally, stepwise discriminant analyses were used to compare BSRI

Feminine avoiders with Feminine participants and BSRI Masculine avoiders with Masculine participants, using the individual BSRI items as discriminating variables. As in the previous case, the results must be taken as suggestive. However, Feminine physical/athletic avoiders can be significantly discriminated from Feminine physical/athletic participants, $\underline{F}(4,97) = 12.60$, $\underline{p} < .001$, with a correct classification rate of 75%. The discriminant function is made up of loadings on 4 variables: self-appraisal as athletic, and the importance to self-view of level of sympathetic, sensitive to the needs of others and loves children. Feminine participants in physical/athletic activities score higher on the first two and lower on the second two variables than do Feminine avoiders of these activities. The largest difference by far is for self-appraisal as athletic ($\overline{X}$ for avoiders is 2.49; for participants is 4.02).

Masculine physical/athletic participants can also be significantly discriminated from Masculine physical/athletic avoiders, $\underline{F}(4,108) = 14.47$, $\underline{p} < .001$, with a correct classification rate of 80.5%. The discriminant function is made up of loadings on 4 variables: self-appraisal as athletic, and importance to self-view of level of understanding, sensitive to needs of others, and self-sufficient. Masculine participants in physical/athletic activities scored higher on the first two and lower on the second two variables than did Masculine avoiders of such activities. As in the previous case, the largest difference by far is for self-appraisal as athletic ($\overline{X}$ for avoiders is 1.66; for participants is 4.56).

Factor Analysis of the BSRI

Because of the unexpectedly weak relationship between BSRI scores and participation in the two gender-related behaviours under study (the Femininity score showed practically no significant relationship to any other variable, while the Masculinity score was only moderately predictive of athletic participation and not at all predictive of math/science participation), a decision was made to examine the BSRI responses in greater detail. Accordingly, response to the conventional BSRI items were subjected to principle components analysis with varimax rotation and factors limited to three. Table 23 shows the rotated factor pattern. Factor 1, explaining 14.47% of the variance, contains loadings higher than .60 on the items sensitive to the needs of others, sympathetic, understanding, compassionate, warm, gentle, tender, helpful, sincere, likable, and friendly. This factor includes most but not all of the items comprising the BSRI Femininity scale (it omits gullible, childlike, yielding, flatterable) and contains as well some of the socially desirable neutral items (e.g. helpful, likable, friendly). It was called the Femininity factor score and was used to replace the conventional BSRI Femininity score in a number of analyses. The second factor, explaining 12.08% of the variance, contains loadings higher than .60 on the items assertive, strong personality, forceful, has leadership ability, dominant, willing to take a stand, aggressive, and acts as a leader, as well as loadings higher than .45 on defends own beliefs, willing to take risks, individualistic and ambitious. Negative loadings for shy and soft-spoken were also included. This factor was called the Masculinity factor score and was used to replace the conventional BSRI Masculinity score in a number of analyses.

Two sets of responses to the BSRI were included in a second factor analysis: the conventional responses, measuring how true each of the characteristics was of the self; and a second set of responses indicating how important each characteristic is to the way the person sees herself.

Only the items from the Masculinity and Femininity scales were included. Thus a total of 80 variables were used in the analysis.

Principal components with varimax rotation was employed. Table 24 shows the factor loading and communalities of all items with loadings of .45 or greater.

Variables with high loadings on the first factor included many self-description and importance items from among the traditional feminine items. These were gentle, tender, compassionate, warm, sensitive to the needs of others, sympathetic, loves children, understanding, affectionate and eager to soothe hurt feelings. The "feminine" item loaded only weakly on this factor, while the importance aspect of femininity failed to load on any factor. This first factor was named Emotional/Empathetic.

The second factor, comprised of many characteristics from the Masculinity Scale was named Assertiveness/Dominance. The variables loading on this factor included "acts as leader", "has leadership abilities", "aggressive", "dominant", "assertive", "forceful", "strong personality", "willing to take a stand", "athletic", "competitive", and "ambitious". The variables "shy" and "soft-spoken" had moderate negative loadings.

The importance items for certain "masculine" characteristics defined the third factor. These included "assertive", "aggressive", "acts as leader", "forceful", "has leadership abilities", "willing to take risks", makes decisions easily", "dominant", "strong personality", "ambitious". This factor was name Importance of Assertiveness.

A fourth factor named Independence included the variables "independent", "self-sufficient", "self-reliant", "individualistic", and "makes decisions easily" as well as the importance of "self-reliant" and "independent".

These factors accounted for 11.94, 8.51, 7.89 and 6.46 percent of the variance respectively. (34.79% of total variance was accounted for.)

A total 29 of the 80 variables did not load on any factor at the .45 cut point. These included both the characteristic and the importance of a few of the least socially desirable items, ("gullible", "childlike", "yielding", "flatterable"), as well as items such as "cheerful", "loyal", "does not use harsh language", "analytical", "defends own beliefs", and "masculine". Further, the characteristic of "willing to take risks" was not included.

In addition, the importance of "feminine", "athletic", "competitive", "willing to take a stand", "shy", "individualistic", "soft-spoken" and "self-sufficient" did not load high enough to be included in the interpretation of the factors.

Correlation of Factor Scores With Other Variables

Factor 1, Emotional/Empathetic, was related to several other items such that higher scores on this factor were associated with the use of emotional adjectives to define femininity (r=.128, p=.0089), defining femininity as self-acceptance (r=.134, p=.0064), and specifically mentioning that femininity was important (r=.105, p=.0322). Lower scores on this factor were associated with mentioning that femininity was not important (r=-.097, p=.0486).

Factor 2, the Assertiveness Factor, was related to the "expression of anger" making one feel less feminine, such that endorsing that the "expression of anger" would make one feel less feminine was associated with lower scores on this factor (r=.119, p=.015).

Lower scores on Factor 3, the Importance of Assertiveness factor, were associated with endorsing "choosing a career instead of a traditional family life" (r= -.1336, p=.0065), as well as mentioning that femininity was not important to the person (r= -.1306, p=.007).

Higher scores on Factor 4, Independence, were associated with defining femininity as "being a person" (r=.1137, p=.02). Lower scores on this factor were related to endorsing feeling less feminine by "playing competitive sports" (r= -.098, p=.046), "not liking children" (r= -.2815, p=.0001), "choosing a career instead of a traditional family life" (r= -.1046, p=.033), "being physically strong" (r= -.110, p=.025), "being overweight" (r= -.1657, p=.0007), "putting your own needs ahead of your family's needs" (r= -.133, p=.006), and "pursuing a demanding career" (r= -.167, p=.0006).

Discussion of Study 1 Results

Math/Science Participation and Self-Schemas

The research just completed on math/science participation and self-schemas identified a number of issues that point the direction for future investigations. First of all, the number of women in the sample demonstrating negative self-schemas for math/science was surprisingly small (14.1%, using the least stringent criteria possible), especially given the large proprotion (41%) of the sample not taking math or science courses. An examination of the data suggests two possible reasons for this finding, each of which is probably partially responsible: 1) women who avoid math and science do not necessarily do so because of a sense of inadequacy in these areas; and 2) the method used to measure self-schema may be less sensitive to the presence of negative than positive self-schemas.

An argument for the first reason may be found in the finding that there was stronger tendency for the women in the study to rate themselves as high on ability for math and science than to rate that ability as an important part of their self-concept. Furthermore, the women's responses to open-ended questions about their reasons for taking or not taking mathematics and science courses indicated that the most frequent reason given for avoiding such courses was lack of interest (mentioned by 57% of the math/science-avoiders), while only 9.1% said they avoided such courses because of a fear that they would be too difficult.

An argument for the second reason (measurement insensitivity to negative self-schemas) comes from the observation of strong positive correlations between self-ratings and importance-to-self ratings on the math-science items. It can be argued that people tend to protect high self-evaluations by rating positive qualities that they possess as more important than those they do not see themselves as possessing. There is, in fact, some evidence that this protection of high self-evaluation does occur (Lewicki, 1983; 1984). It has even been shown in one study that positive trait ratings and importance ratings can correlate so strongly that there is little or no discriminant validity between the two measures (Burke, Kraut, & Dworkin, 1984). The latter authors argue, in fact, that self-schema theorists have confounded measures of schema and measures of trait level, and that different levels of trait ratings can account for differences in speed, confidence and richness of self-description between schematic and aschematic individuals, without postulating that the two groups differ qualitatively in their information-processing strategies. While it would be premature to abandon the self-schema construct, it is certainly apparent that the combination of trait and importance ratings typically used to measure it is inadequate, and should be replaced by a measure less sensitive to self-image portection strategies. At the present time, a response latency measure may be the best available choice. The distinction between aschematic and negative schematic individuals is potentially an interesting and important one to be able to make, since the practical implications for helping math/science avoiders differ considerably for the two groups. Intervention with aschematics would require strategies for increasing the perceived relevance and importance of science and mathematics ability, whereas intervention with negative schematics would require strategies aimed at changing negative self-appraisal and probably at reducing anxiety.

Whether or not the self-schema measure was entirely adequate in the math/science study, the women's scores on the self-ratings alone indicate that a significant proportion of college female math-avoiders do not rate themselves low on math/science orientation or ability. This finding suggests both that factors other than or in addition to self-perception are at work in producing math/science avoidance among women at university (a finding congruent with some of the research that has been done on high school students) and that some type of intervention at the university level might not be too late to encourage more women into mathematics and science courses. The latter possibility is underlined by the informal observations of the investigator and her colleagues that mature women returning to university after a considerable absence, and with a large burden of performance anxiety in the areas of mathematics, are quite frequently able to come to grips with mathematics and statistics, and sometimes become fascinated with these areas.

Athletic Participation and Self-Schemas

As with math/science, the number of women in the sample demonstrating negative self-schemas for athletic participation was small (4.0%). There were strong positive correlations between self-ratings and importance-to-self ratings for all three items, with the lowest (.34) occuring for the item "physically fit". In the latter case subjects showed a somewhat stronger tendency to rate the importance-to-self of the item high (71.3% did so) than to rate themselves high on the item itself (59.2% did so).

As in the previous case, the self-schema categories were not found to be particularly useful. However the highest number of non-participants in athletics comes from the aschematic group. It is also instructive to compare the importance-to-self ratings for the two behavioural domains in this study. While 71.3% of the subjects in this study rated their level of physical fitness as a highly important (8-11) aspect of their self-view, the highest percentage of high importance-to-self rating achieved by <u>any</u> of the math/science-related items was 44%--for "good at abstract reasoning".

<u>Gender Role, Gender Self-schemas, and Math/Science and Athletic Participation</u>

Research on the current project found little evidence for a link between masculinity, femininity or androgyny, as measured by the Bem Sex Role Inventory (BSRI: Bem, 1974), and participation in math and science courses; however, a positive correlation between BSRI masculinity and math/science self-efficacy was found. This finding is similar to that of Eccles-Parsons, Adler, Futterman, Goff, Kaczala, Meece, and Midgley (1983). We found, however, that the women in our sample did not define femininity or masculinity in ways that matched the BSRI traits. For instance, a factor analysis of the BSRI responses showed that the item "masculine" did not load on the factor that contained most of the so-called masculine items, while the "feminine" item loaded only weakly on the factor containing most items from the femininity scale. Furthermore, a few of the least socially desirable items of the femininity scale (gullible, childlike, yielding) also failed to load on this factor. These findings lend some support to the Myers and Gonda (1982) critique of the adequacy of the BSRI's definition of masculinity and femininity, and suggest that the BSRI masculinity score should be thought of, at least in this case, as reflecting instrumentality or self-confidence rather than gender-role identity. Examination of self ratings and importance-to-self ratings on the two single items "masculine" and "feminine" failed to reveal any differences between math/science avoiders and non-avoiders. Furthermore, attempts to classify subjects as Feminine schematic, Masculine schematic, Androgynous schematic, or Undifferentiated (aschematic) according to past research criteria resulted in only a small percentage of subjects being successfully categorized. Further analyses using these categories is simply not supported by this research.

It has been suggested (Chipman & Wilson, 1985) that while women's sex role stereotyping of mathematics itself has not been shown to be important in their decision to enroll or not enroll in mathematics courses, women's sex role stereotyping of future careers might be important in this process. This suggestion is similar to one made by Hollinger (1983) and by Sherman (1983). The idea that the impact of sex role stereotyping on math/science participation is mediated through career plans has received little research attention.

Work by Fennema (cited in Tobias & Weissbrod, 1980) suggests that adolescent males are more likely than teachers, parents or others to cite mathematics as an inappropriate activity for girls. Similarly, Fox, Brody and Tobin (1985) found that seventh-grade boys in accelerated mathematics classes in the U.S. were significantly more likely than their female counterparts to stereotype mathematics as a male domain. While a number of investigators have tried and failed to show a correlation between women's mathematics participation and their stereotyping of mathematics as a male domain, no one appears to have investigated the possibility of a link between females' participation and such stereotyping by significant male peers.

The BSRI Femininity score was not related to participation in athletic activities, but there was a moderate relationship between participation and BSRI Masculinity. Since the definition of athletic activities in the current study included everything from aerobics to volleyball, there is little reason to suppose that athletic participation could automatically be classed as "unfeminine". While "Feminine" subjects seemed somewhat more likely than others to say that "playing competitive sports" and "being physically strong" would make them feel less feminine, these differences were not statistically significant.

The salience of being masculine or feminine did not seem to differ between avoiders and participants in math/science courses or between avoiders and participants in physical/athletic activities. However, there is some suggestive evidence that the content of the masculinity and femininity schemas may differ for avoiders and participants for both activities, as they were characterized by slightly different scoring patterns on the BSRI. Some further investigation of this issue is warranted.

Self-schemas and Attribution Patterns for Participation and Performance

Markus (1977) suggested a relationship between self-schemas and an individual's attribution of causality for his/her own behaviour. An individual behaving in a way congruent with his/her self-schema should find it easier to make internal attributions to explain that behaviour, while one behaving in a schema-incongruent way would resist this schema-discrepant information by attributing the behaviour to external forces. Support for the hypothesized relationship was found in attributions for participation, but not in attributions for performance. The pattern of attributions for math/science participation and athletic participation were related to their respective self-schemas in the expected ways. However, patterns of attribution for performance levels in math/science and in athletics tended to be largely internal for all groups.

Study 2

This study was an attempt to ascertain whether the self-schema measures used in Study 1 classified subjects into groups that behaved (processed information) according to the predictions of self-schema theory. It also represented an opportunity for further investigation of the relationship between actual performance in mathematics and math/science self-schema, and between self-schemas and career plans.

Following Markus (1977), it was expected that subjects who were schematic for a given dimension would endorse more schema-related adjectives as self-descriptive, be able to supply more behavioral evidence for endorsed traits, and demonstrate better recall of schema-related information than subjects who were aschematic for that dimension. It was also hypothesized that math/science self-schemas would be positively related to performance on a mathematics test and predictive of career goals.

Method

Subjects. One hundred and sixteen subjects who had taken part in Study 1 were contacted by telephone and asked to return to the lab at a later date. The subjects, who had been identified on the basis of Study 1 data as positive, negative or aschematic with respect to math/science self-schema or physical/athletic self-schema, were contacted by a research assistant blind to their schema status to set up an appointment. Persons who missed or cancelled an appointment were contacted again as soon as possible to reschedule. Only after three "no-shows" or cancellations was a subject dropped from the list.

Only three subjects were dropped for this reason.

Criteria used to select subjects for the math/science self-schema groups for this study were as follows: subjects scoring high (8-11) on at least 2 of the 4 self-appraisal items and on at least 2 of the 4 important items were designated positive self-schematic. These subjects were divided into 2 further groups: those who had enrolled in university-level math or science courses and those who had avoided such courses. Thus there were two groups of math/science positive self-schematics: those with a history of math/science course participation and those with no history of math/science course participation. Subjects scoring low (1-4) on at least 2 of the 4 self-appraisal items or no higher than medium (5-7) on at least 3 of the 4 self-appraisal items and at least medium on 3 of the 4 importance items were designated aschematic.

Criteria used to select subjects for the physical/athletic self-schema groups for this study were as follows: subjects scoring high (8-11) on at least 2 of the 3 self-appraisal items and high on at least 2 of the 3 importance items were designated positive schematic. Subjects scoring low (1-4) or medium (5-7) on at least 2 of the 3 self-appraisal items and high on at least 2 of the 3 importance items were designated negative schematic. Subjects scoring low on all 3 or low on 2 and medium on the third importance items were designated aschematic.

Selection procedures resulted in the inclusion of a minimum of 16 subjects in each of the 7 groups.

Procedure. Subjects were tested singly or in pairs by a researcher blind to their schema classification. They were asked first to complete a questionnaire consisting of 30 items. Each item consisted of a trait adjective for which they were to indicate whether or not the word described them by circling "Me" or "Not me" and then to indicate their confidence in their answer on a 6-point scale anchored by 1 (Not at all confident) and 6 (Very confident). Next, they were given a set of 18 pages, each with a trait adjective printed at the top, and asked to provide as many examples of that trait as they could think of in their own behavior. The pages were presented in random order to each subject. Next subjects donned earphones and listened to an audio tape presenting information about careers in each of the following fields. biology, journalism, library science, mathematics and computing, and physical education. The time devoted to each of the 5 careers on the tape was approximately 2 minutes, and subjects were randomly given tapes with different orders of presentation of the 5 careers. The two "control" careers, journalism and library science, were always placed at the beginning and end of the presentation. After listening to the tape, each subject was asked to recall as much information as possible about each of the 5 careers. Their responses were later scored, by raters blind to subject schema status, for amount of information correctly recalled for each of the 5 fields. At the end of the recall test, subjects were also asked to write in their own career goals. Finally, subjects were given a performance test in mathematics.

Measures. The questionnaire measuring endorsement of self-descriptive items and confidence in self-description comprises 30 adjectives identified through pilot-testing as relevant to math/science or physical/athletic self-schemas. The pilot testing was done in two stages. First, students in two undergraduate social psychology classes were asked to generate adjectives they would use to describe someone who was good at mathematics and science or someone who was good at sports and athletics. The most commonly listed adjectives were then presented in adjective checklist form to students in the other undergraduate course, who were either asked to check those traits they would use to describe a student who was good at mathematics and science or to check the traits they would use to describe a student who was good at athletics. The most commonly checked adjectives were selected for use in the study.

Eighteen adjectives (or their opposites) were also selected from the same lists for the task requiring subjects to generate behavioral examples. For the latter task, each adjective was presented on a separate page, and subjects were asked to work their way through the pages, writing either "describes me" or "doesn't describe me" beside each adjective, and providing behavioral examples of each adjective indicated as self-descriptive.

The tapes for the recall task were created by the principal investigator, who prepared and read a brief script for each of the 5 careers. In each case, the script contained information about the type of college preparation required to enter the career, the types of opportunities available in the field, salary levels, etc. Recall was scored, by raters blind to subject schema status, as the number of items of information recalled relative to the number presented and was converted to a percentage.

The math performance test was taken from a basic statistics textbook (Witte, 1980). It contains 35 items, and tests skills in the following specific areas: fractions, positive and negative numbers, common symbols, rounding, and order of operations.

Results

Endorsement of schema-related adjectives. Table 25 shows the number of subjects in the entire sample and in each of the schema groups who endorsed each of the 30 adjectives in the first questionnaire. It can be seen that the two adjectives that most effectively split the entire sample into halves are "mathematical" and "athletic". As expected, physical/athletic self-schema was not predictive of endorsement of "mathematical", but math/science self-schema was. Fourteen of the 17 math/science positive schematics with no math/science university courses and 15 of the 16 positive schematics with such courses circled "me" for this item. Conversely, 14 of the 16 math/science negative schematics circled "not me". The aschematic group was almost evenly divided between the two responses.

Also as expected, math/science self-schema was not predictive of endorsement of "athletic", but physical/athletic self-schema was. Sixteen of the 18 physical/athletic positive schematics circled "me" for this item, while 14 of the 17 negative schematics circled "not me". The aschematics tended to circle "not me" (11) rather than "me" (4).

Confidence ratings for trait endorsement. Table 26 shows the mean confidence ratings for trait endorsements given by all subjects and by subjects in each schema group. No significant differences were found among the groups in their confidence ratings. In particular, it should be noted that the means show no tendency for aschematics to respond with less confidence than schematics on schema-related traits.

Provision of behavioral examples of schema-related traits. Table 27 shows the mean number of behavioral examples provided by each of the 4 math/science self-schema groups for each of 9 schema-related trait adjectives. A four-group, one-way multivariate analysis of variance showed an overall significant difference among the 4 groups in the numbers of examples provided for this set of traits, Wilks' $F(24, 157) = 3.43$, $p < .0001$. Table 28 shows the univariate F, R^2 and p values for each of the individual adjectives. Post hoc Sheffe tests indicated that the means for "mathematical" were significantly greater for both positive schema groups than for the negative group, the mean for "poor with numbers" was significantly greater for the negative schematics than for either positive schematic group, and that the positive schematics with a history of university math and science courses were significantly higher on the adjectives "analytical", "bright", and "capable" than the other 3 groups, and higher on "systematic" than the negative and aschematic groups. For the trait "unscientific", negative schematics were significantly higher than positive schematics with math/science history.

Table 29 shows the mean number of behavioral examples provided by each of the 3 physical/athletic self-schema groups for each of 6 schema-related trait adjectives. A 3-group, one way multivariate analysis of variance showed an overall significant difference among the 3 groups in the numbers of examples provided for this set of traits, Wilks' $\underline{F}(12,86) = 4.50$, $\underline{p} < .0001$. Table 30 shows the univariate $\underline{F}$, R^2 and $\underline{p}$ values for each of the individual adjectives. Post hoc Sheffe tests indicated that positive schematics gave significantly more examples than either of the other two groups for athletic, energetic and strong; while negative schematics gave significantly more examples than the other groups for poorly coordinated.

Recall of schema-related information. Table 31 shows the mean number of items recalled from each of the 5 career information tapes by each of the 7 self-schema groups. A 7-group one-way multivariate analysis of variance indicated an overall difference among the groups in their pattern of recall of information from the tapes, Wilks' $\underline{F}(30,422) = 2.06$, $\underline{p} < .0011$. Table 32 shows the univariate $\underline{F}$ and $\underline{p}$ values for each of the individual adjectives. Post hoc Sheffe tests indicated that the negative math/science schematics recalled significantly fewer items from the biology tape than did positive math/science schematics with math/science university courses. Also positive schematics with no math/science university courses recalled significantly more items from the mathematics/computing tape than did aschematics.

Mathematics performance. A 4-group, one-way analysis of variance on the total score of the mathematics performance test indicated a significant difference among the 4 math/science self-schema groups $F(3,112) = 12.48$, $p < .0001$, $R^2 = .384$. Sheffe tests showed that the negative schematics, with a mean of 18.81, scored significantly lower than the positive schematics with math/science courses ($\bar{X} = 32.31$), the positive schematics without math/science courses ($\bar{X} = 28.00$), and the aschematics ($\bar{X} = 29.88$). Separate analyses of variance for each of the 6 subscores showed that the groups differed significantly on all the skills measured: common symbols, $F(3,112) = 5.89$, $p < .002$; order of operations, $F(3,112) = 15.74$, $p < .0001$; positive and negative numbers, $F(3,112) = 5.82$, $p < .002$; fractions, $F(3,112) = 4.20$, $p < .009$; square root radicals, $F(3,112) = 12.86$, $p < .0001$; and rounding numbers, $F(3,112) = 3.95$, $p < .012$. Post hoc Sheffe tests showed that, for all of these subscores, either the negative schematic group scored significantly lower than all other groups (order of operations, square root radicals); the negative schematics and the positive schematics with no math/science university courses scored significantly lower than the other two groups (common symbols, positive and negative numbers); or the positive schematics with math/science university courses scored significantly higher than all other groups (fractions, rounding numbers).

<u>Career goals</u>. Career goals listed by the subjects were classified into 6 categories, following Hollinger (1983), reflecting the dimensions of gender role traditionality and math/science relevance. The classification broke down as follows: category 1 (nontraditional math careers such as accounting, economics), 5 subjects; category 2 (nontraditional science, such as chemistry, medicine), 15 subjects; category 3 (neutral/traditional math/science, such as nursing, bookkeeping), 9 subjects; category 4 (nontraditional nonmath, such as law, police work), 23 subjects; category 5 (neutral nonmath, such as reporting, graphic design), 19 subjects; and category 6 (traditional nonmath, such as

teaching, flight attendants), 28 subjects. An exploratory 6-group stepwise discriminant analysis was run to determine which variables were relevant to predicting category membership. Variables used were taken from subjects' data for Study 1, and included age, BSRI Femininity factor score, BSRI Masculinity factor score, self-appraised performance in athletics, self-appraisal performance in math/science courses, PPA score, PSPC score, CLM score, Math/science-A factor score and Physical/athletic-A factor score. Only two variables were entered into the canonical discriminant function: math/science-A factor score and self-appraised performance in math/science courses. A third variable, CLM score (confidence in learning mathematics) failed to enter because of high correlations with the previous two. Based on these results, a direct discriminant analysis was run using only the two variables entered in the previous analysis to discriminate among the 6 groups. Only one canonical discriminant function was found to be significant, $F(10, 198) = 4.71$, $p < .00001$, $R^2 = .288$. Table 33 shows the canonical structure, standardized canonical coefficients and class means on the significant canonical discriminant function. It can be seen that the function is most heavily weighted by the math/science-A factor score, and that the function makes the best discrimination between category 2 (nontraditional science) and all other groups. It was found that 73.3% of the subjects in category 2 could be classified correctly using this function, while the percentage of correct classifications was much lower for all other groups (40% for category 1; 22.2% for category 3; 6.7% for category 4; 28.6% for category 5; 37.5% for category 6).

Discussion

The results of this study are mixed with respect to support for self-schema theory. The theory predicts that schematic subjects will endorse more schema-congruent adjectives, display more confidence in self-ratings on schema-relevant adjectives, be able to provide more behavioral examples of schema-congruent traits, and show better recall for schema-relevant information than will aschematic subjects. These predictions were upheld to some extent for trait endorsement, provision of behavioral examples, and recall of information. However, many of the significant differences found on these measures were between positive and negative schematic groups rather than between schematics and aschematics. Most troubling of all is the failure of the confidence measure to show even a trend toward the expected finding of schematics making more confident ratings than aschematics. A parsimonious explanation of these findings, taken as a group, could be that subjects' responses are simply correlated with their self-concepts. There is little evidence here on which to base an argument against Burke, Kraut and Dworkin's (1984) contention that different levels of trait ratings can account for differences in confidence and richness of self-description, without postulating qualitative differences in information processing between different "schema" groups. It would be premature to abandon the self-schema construct as a potential mediating variable in the behaviors under study here. However, it seems apparent that the combination of trait and importance adjectives typically used to measure it is less than adequate. Some other measure, such as response latency, might be preferrable for classifying subjects into schematic and aschematic groups if this line of research is pursued.

The study did provide clear evidence that subject's self-descriptions, at least on the math/science dimension, are related to actual performance. It also demonstrated that self-appraised ability on the math/science dimension is more important than a number of other factors, including "femininity" and "masculinity", in predicting the career goals of female university students. The practical implications of the latter findings are clear: women at (and before) university must be encouraged to and provided with opportunities to increase their math/science-related skills. The results of Study 1 show that some of this encouragement must occur by increasing women's awareness of the importance and career utility of mathematics and science. The development of strategies for achieving these goals should form a large part of the agenda for future applied research in this area.

Study 3

Perceived self-efficacy is a judgment of how well one can execute behaviors required to deal with particular situations (Bandura, 1982). While it is well-established that experiences of mastery can increase an individual's perceived self-efficacy, people vary in their responsiveness to such self-efficacy training. This study was designed as a preliminary test of the idea that responsiveness or resistance to self-efficacy training may be mediated by the presence of a self-schema for the activity in question. The original plan was to compare small groups of negative schematics and aschematics, identified through Study 1, on their responsiveness to self-efficacy training. However, this plan was judged to be not feasible because of the small number of negative schematic individuals identified in the original sample. Those who had been identified were used in Study 2, leaving none for Study 3. In the face of this difficulty, to gather some preliminary data on the relationship among self-efficacy, self-schema, and mastery training, we designed a pilot study using a new population: students in a second-year psychology statistical methods course. The study was designed to gather information about three questions: Do self-efficacy and/or self-schemas for math/science relate to persistence in a math/science type course? Does mastery training in such a course have a measurable impact on self-efficacy? And does self-schema make any difference in students' responsiveness (in terms of self-efficacy) to such training?

Method

Subjects. Subjects were 39 students (31 females and 8 males) enrolled in a second year statistical methods course in the psychology department at the University of Winnipeg. All students participated during the first week of classes as part of a class project.

Measures. The measures used were the same self-schema and self-efficacy (CLM) measures used in Study 1.

Procedure. During the first week of classes, students completed the self-schema and self-efficacy measures in class. At the end of the term, the CLM was readministered to all students, including those who had dropped the course during the term. Comparisons were made between first and second time CLM scores for the class as a whole, for subjects who had dropped the course, and for subjects categorized into the various math/science self-schema groups.

Results and Discussion

Using the same criteria as for Study 2, subjects were categorized in to positive schematics, negative schematics and aschematics for math/science. Eleven subjects met the criteria for positive self-schemas, 10 met the criteria for aschematics, and only one met the criteria for negative self-schema. The remaining 17 could not be categorized. Thus, it was not possible to make any comparisons between aschematics and negative schematics.

Thirteen subjects withdrew from the course during the term. The mean starting CLM score for those who withdrew was 40.0, while for those who stayed it was 42.3. The difference between the two groups was not significant. Thus, mathematics self-efficacy was not predictive of persistence in the course.

For the entire sample, the correlation between the CLM scores taken at the beginning and end of the term was strong and positive, $r = .916$. The mean starting CLM scores were 48.1 for the positive schematics, 39.7 for the aschematics and 39.8 for the unclassified subjects. Among those subjects who stayed in the course, the average increase in CLM scores was 3.85 for the positive schematics, 6.0 for the aschematics, and 4.4 for the unclassified subjects. The differences among the groups were not significant. Thus, there is little suggestive evidence that the aschematics were more responsive to the training than were the other two groups. Further research, with improved measures of math/science self-schemas and a larger sample, might permit the evaluation of the hypothesis at which this study was originally directed: that aschematics and negative schematics may differ in their responsiveness to self-efficacy training.

References

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review. 84, 191-215.

Bandura, A. (1978). The self system in reciprocal determinism. American Psychologist, 33, 344-358.

Bandura, A. (1981). Self-referent thought: A developmental analysis of self-efficacy. In J. H. Flavell and L. Ross (Eds.) Social cognitive development: Frontiers and possible futures. Cambridge, England: Cambridge University Press.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37 (2), 122-147.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. Journal of Personality and Social Psychology, 41, 586-598.

Bem, S. L. (1974). The measurement of psychological androgyny. Journal of Consulting and Clinical Psychology, 42, 155-162.

Bem, S. L. (1975). Sex role adaptability: One consequence of psychological androgyny. Journal of Personality and Social Psychology, 31, 634-643.

Bem, S. L. (1977). On the utility of alternative procedures for assessing psychological androgyny. Journal of Consulting and Clinical Psychology, 45, 196-205.

Bem, S. L. (1979). Theory and measurement of androgyny: A reply to the Pedhazur-Tetenbaum and Locksley-Colten critiques. Journal of Personality and Social Psychology, 37, 1047-1054.

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. Psychological Review, 88 (4), 354-364. (a)

Bem, S. L. (1981). The BSRI and gender schema theory: A reply to Spence and Helmreich. Psychological Review, 88 (4), 369-371.

Bobrow, D. G., & Norman, D. A. (1975). Some principles of memory schemata. In D. G. Bobrow and A. Collins (Eds.) Representation and understanding: Studies in cognitive science. New York: Academic Press.

Burke, P. A., Kraut, R. E., & Dworkin, R. H. (1984). Traits, consistency, and self-schemata: What do our methods measure? Journal of Personality and Social Psychology, 47, 568-579.

Chipman, S. F., & Wilson, D. M. (1985). Understanding mathematics course enrollment and mathematics achievement: A synthesis of the research. In S. F. Chipman, L. R. Brush, & D. M. Wilson (Eds.), Women and Mathematics: Balancing the equation. Hillsdale, NJ:Erlbaum.

Colwill, N. L. (1982). The new partnership: Women and men in organizations. Palo Alto, California: Mayfield.

Colwill, N. L., & Lips, H. M. (1978). Masculinity, femininity and androgyny: What have you done for us lately? Chapter in Lips, H. M. and Colwill, N. L. The psychology of sex differences. Englewood Cliffs, N.J.: Prentice-Hall.

Constantinople, A. (1973). Masculinity-femininity: An exception to a famous dictum? Psychological Bulletin, 80 (3), 389-407.

Eccles-Parsons, J., Adler, T. F., Futterman, R., Goff, S., Kaczala, C., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic choice. In J. Spence (Ed.), Achievement and achievement motivation. San Francisco: W. H. Freeman.

Ernst, J. (1974). Mathematics and sex. Booklet published at the University of California at Santa Barbara.

Fennema, E., & Sherman, J. (1976). Fennema-Sherman Mathematics Attitudes Scales: Instruments designed to lmeasure attitudes toward the learning of mathematics by females and males. JSAS Catalog of Selected Documents in Psychology, 6 (2), 31, (Ms. No. 1225).

Fox, L. H., Brody, L., & Tobin, D. (1985). The impact of early intervention programs upon course-taking and attitudes in high school. In S. F. Chipman, L. R. Brush, & D. M. Wilson (Eds.), Women and mathematics: Balancing the equation. Hillsdale, NJ: Erlbaum.

Henley, N. M. (1977). Body politics: Power, sex, and nonverbal communication. Englewood Cliffs, NJ: Prentice-Hall.

Higgins, E. T., Herman, C. P., & Zanna, M. P. (1981). Social Cognition: The Ontario Symposium (Vol. 1). Hillsdale, NJ: Erlbaum.

Hollinger, C. L. (1983). Self-perception and the career aspirations of mathematically talented female adolescents. Journal of Vocational Behavior, 22, 49-62.

Joreskog, K. G., & Sorbom. D. (1984). LISREL VI: Analysis of linear structural relationships by the method of maximum likelihood (Third edition). Uppsala, Sweden: University of Uppsala, Dept. of Statistics.

Kanter, R. M. (1976). Why bosses turn bitchy. Psychology Today, 9 (2), 56-59, 88-91.

Keenan, J. M., & Bailett, S. D. (1979). Memory for personally and socially significant events. In R. S. Nickerson (Ed.), Attention and performance VIII. Hillsdale, NJ: Erlbaum.

LaFrance, M. (1981). Gender gestures: Sex, sex-role, and nonverbal communication. In C. Mayo and N. Henley (Eds.), Gender and nonverbal behavior. New York: Springer-Verlag.

Lewicki, P. (1983). Self-image bias in person perception. Journal of Personality and Social Psychology, 45, 384-393.

Lewicki, P. (1984). Self-schema and social information processing. Journal of Personality and Social Psychology, 47, 1177-1190.

Lips, H. M. (1981). Women, men, and the psychology of power. Englewood Cliffs, NJ: Prentice-Hall.

Lips, H. M. (In press). Gender and the sense of power: Where are we and where are we going? International Journal of Women's Studies.

Locksley, A., & Colten, M. (1979). Psychological androgyny: A case of mistaken identity. Journal of Personality and Social Psychology, 37, 1017-1031.

Markus, H. (1977). Self-schemata and processing information about the self. Journal of Personality and Social Psychology, 35, 63-78.

Markus, H., Crane, M., Berstein, S., & Sidladi, M. (1982). Self-schemas and gender. Journal of Personality and Social Psychology, 42 (1), 38-50.

Markus, H., & Smith, J. (1980). The influence of self-schema on the perception of others. In N. Cantor and J. Kihlstrom (Eds.), Personality and cognition. Hillsdale, NJ: Erlbaum.

Menzies, H. (1981). Women and the chip. Montreal: The Institute for Research on Public Policy.

Mischel, W., Ebbesen, E., & Zeiss, A. R. (1976). Determinants of selective memory about the self. Journal of Consulting and Clinical Psychology, 44, 92-103.

Myers, A. M., & Finn, P. (In press). The utility of an open-ended measure of self-concept in assessing androgyny and self-esteem research. In P. Caplan (Ed.), Psychology changing for women. Montreal: Eden Press.

Myers, A. M., & Gonda, G. (1982). Utility of the masculinity-femininity construct: Comparison of traditional and androgyny approaches. Journal of Personality and Social Psychology, 43 (3), 514-522.

Myers, A. M., & Lips, H. M. (1978). Participation in competitive amateur spoorts as a function of psychological androgyny. Sex Roles, 4 (4), 571-578.

Myers, A. M., & Start-Adamec, C. (In press). Issues in relating indeces of psychological adjustment to androgyny. In P. Caplan (Ed.), Psychology changing for women. Montreal: Eden Press.

Myers, A., & Sugar, J. (1979). A critical analysis of scoring the BSRI: Implications for conceptualization. JSAS Catalog of Selected Documents in Psychology, 9, 24, (Ms. No. 1833).

Neisser, U. (1976). Cognition and reality. San Francisco: Freeman.

Nisbett, R. E., & Ross, L. (1980). Human inference: Strategies and shortcomings of social judgement. Englewood Cliffs, NJ: Prentice-Hall.

Oglesby, C. A. (1978). Women and sport: From myth to reality. Philadelphia: Lea and Febiger.

Orlofsky, J., Aslin, A. L., & Ginsburg, S. D. (1977). Differential effectiveness of two classification procedures on the Bem Sex Role Inventory. Journal of Personality Assessment, 41, 414-416.

Pedhazur, E., & Tetenbaum, T. (1974). Bem Sex Role Inventory: A theroetical and methodological critique. Journal of Personality and Social Psychology

Perlmuter, L. C., & Monty, R. A. (Eds.). (1979). Choice and perceived control. Hillsdale, NJ: Erlbaum.

Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. Journal of Personality and Social Psychology, 35 (9), 677-688.

Rorbaugh, J. B. (1979). Femininity on the line. Psychology Today, 13 (3), 30-42.

Rubenstein, C. (1982). Wellness is all: A report on Psychology Today's survey of beliefs about health. Psychology Today, 16 (10), 28-37.

Ryckman, R. M., Robbins, M. A., Thornton, B., & Cantrell, P. (1982). Development and validation of a physical self-efficacy scale. Journal of Personality and Social Psychology, 42 (5), 891-900.

Scheier, M. R. (1976). Self-awareness, self-consciousness, and angry aggression. Journal of Personality, 44, 627-644.

Science Council of Canada. (1981). Who turns the wheel? Proceedings of a workshop on the science education of women in Canada. Ottawa: Minister of Supply and Services.

Scott, J. P. (1981). Science subject choice and achievement of females in Canadian high schools. international Journal of Women's Studies, 4 (4),

Sherman, J. (1983). Factors predicting girls' and boys' enrollment in college preparatory mathematics. Psychology of Women Quarterly, 7, 132-140.

Snyder, M. (1974). The self-monitoring of expressive behavior. Journal of Personality and Social Psychology, 30, 526-537.

Snyder, M. (1979). Self-monitoring processes. In L. Berkowitz, (Ed.), Advances in experimental social psychology (Vol. 12). New York: Academic Press.

Spence, J. T., & Helmreich, R. L. (1978). Masculinity and femininity: Their psychological dimensions, correlates, and antecedents. Austin, University of Texas Press.

Spence, J. T., & Helmreich, R. L. (1979). The many faces of androgyny: A reply to Locksley and Colten. Journal of Personality and Social Psychology, 37, 1032-1046.

Spence, J. T., & Helmreich, R. L. (1981). Androgyny versus gender schema: A comment on Bem's gender schema theory. Psychological Review, 88 (4), 365-368.

Swann, W. B., & Hill, C. A. (1982). When our identities are mistaken: Reaffirming self-conceptions through social interaction. Journal of Personality and Social Psychology, 43 (1), 59-66.

Taylor, S. E., & Crocker, J. (1981). Schematic bases of social information processing. In E. T. Higgins, C. P. Herman, and M. P. Zanna (Eds.), Social cognition: The Ontario Symposium (Vol. 1), 89-134.

Tobias, S. (1976). Math anxiety. Ms. Magazine, 5 (3), 56-59, 92.

Tobias, S., & Weissbrod, C. (1980). Anxiety and mathematics: An update. Harvard Educational Review, 50 (1), 63-70.

Westkott, M., & Coakley, J. J. (1981). Women in sport: Modalities of feminist social change. Journal of Sport and Social Issues, 5 (1), 32-43.

Winter, D. G. (1973). The power motive. New York: Free Press.

Witte, R. S. (1980). Statistics. New York: Holt, Rinehart, & Winston.

Zajonc, R. B. (1980). Cognition and social cognition: A historical perspective. In L. Festinger (Ed.), Retrospections on social psychology. New York: Oxford University Press.

Reference Note

1. Lips, H. M. Unpublished data on the competence/effectiveness self-schema.

Table 1

Frequency Distribution of Scores on the Fennema-Sherman Confidence in Learning Mathematics Scale (CLM)*

Range	Frequency	Percent of Total
12 - 22	40	9.09%
23 - 32	54	12.27%
33 - 42	70	15.91%
43 - 52	63	14.32%
53 - 62	73	16.59%
63 - 72	140	31.82%
Total	440	

* The CLM consists of 12 items on which respondents indicate level of agreement. Each item was followed by six response alternatives ranging from Strongly agree to Strongly disagree. A high score indicates strong confidence in one's ability to learn and perform on mathematical tasks.

Table 2

Frequency Distribution of Scores on the Perceived Physical Ability (PPA) Subscale of the Physical Self-Efficacy Scale.

Range		Frequency	Percent of Total
14 - 22		17	3.89
23 - 32		93	21.28
33 - 42		173	39.59
43 - 52		133	30.43
53 - 59		21	4.81
	Total	437	

Table 3

Frequency Distribution of Scores on the Physical Self-Presentation Confidence (PSPC) Subscale of the Physical Self-Efficacy Scale

Range		Frequency	Percent of Total
24 - 35		7	1.59
36 - 45		108	24.49
46 - 55		195	44.62
56 - 65		119	26.98
66 - 71		12	2.72
	Total	441	

Table 4

Percentage of Subject* Listing Each Attribution Category as a Reason for Level of Performance, Broken Down by Math/Science Participation**

	Avoid Math/Science	Take Math/Science
Number of subjects	161	274
No interest, like, enjoy	40.4	16.4
Interest, like, enjoy	12.4	37.6
No ability	13.7	6.6
Ability	17.4	33.9
No background, poor past performance, experience	16.8	4.7
Background, positive past performance, experience	1.9	4.4
No work, no effort	11.2	8.0
Hard work, effort	14.3	26.3
Negative attitude	12.4	4.0
Positive attitude	5.6	6.6
Not relevant	4.9	5.1
Relevant	2.5	6.2
Discouraged	2.5	0.4
Encouraged	0.6	2.2
No time	1.9	4.7
Time	0.6	2.2
Negative teacher influence	2.5	0.7
Positive teacher influence	1.9	4.0
Negative peers and siblings	0.6	-
Positive peers and siblings	-	0.4
Negative parents	1.2	0.4
Positive parents	1.2	2.6

* Many subjects listed several reasons; thus the percentages do not add to 100.

**Based on subjects' response to a question about taking courses in mathematics and science requirements.

Table 5

Percentage of Subjects* Listing Each Attribution Category as a Reason for Level of Performance, Broken Down by Self-Rated Performance Level

	Performance level				
	Extremely Poorly	Moderately Poorly	Fair	Moderately Well	Extremely Well
Number of subjects	11	44	130	196	54
No interest, like, enjoy	45.5	52.3	47.7	9.7	1.9
Interest, like, enjoy		4.5	9.2	45.4	55.6
No ability	45.5	11.4	20.0	1.5	1.9
Ability	9.1	2.3	6.9	42.3	50.0
No background, poor past performance, experience	36.4	25.0	15.4	2.6	
Background, positive past performance, experience			2.3	4.6	5.6
No work, no effort	9.1	13.6	19.2	4.1	
Hard work, effort			8.5	33.2	35.2
Negative attitude	9.1	27.3	10.0	2.6	
Positive attitude			1.5	10.2	9.3
Not relevant		6.8	8.5	3.6	1.9
Relevant			1.5	7.7	11.1
Discouraged		6.8	1.5		
Encouraged				2.6	3.7
No time		2.3	10.0	1.0	
Time				3.1	1.9
Negative teacher influence	9.1	4.5	2.3		
Positive teacher influence			0.8	4.6	7.4
Negative peers and siblings			0.8		
Positive peers and siblings				0.5	
Negative parents			2.3		
Positive parents			1.5	1.5	7.4

* Many subjects listed several reasons; thus the percentages do not add to 100.

Table 6

Percentage of Subjects* Listing Each Attribution Category as a Reason for Level of Performance, Broken Down by Math/Science Participation** and Self-Rated Performance Level

	Avoid Math/Science Performance Level					Take Math/Science Performance Level				
	Ext. Poorly	Mod. Poorly	Fair	Mod. Well	Ext. Well	Ext. Poorly	Mod. Poorly	Fair	Mod Well	Ext. Well
Number of subjects	9	29	68	49	6	2	15	62	147	48
No interest, like, enjoy	44.4	48.3	51.5	24.5		50.0	60.0	43.5	4.8	2.1
Interest, like, enjoy			5.9	26.5	50.0		13.8	12.9	51.7	56.3
No ability	44.4	13.8	20.6			50.0	6.7	19.4	2.0	2.1
Ability	11.1	3.4	7.4	34.7	66.7			6.5	44.9	47.9
No background, poor past performance, experience	33.3	34.5	17.6	4.1		50.0	6.7	12.9	2.0	
Background, positive past performance, experience			2.9	2.0				1.6	5.4	6.3
No work, no effort	11.1	10.3	19.1	2.0			20.0	19.4	4.8	
Hard work, effort			5.9	36.7	16.7			11.3	31.8	37.5
Negative attitude		37.9	11.8	2.0		50.0	6.7	8.1	2.7	
Positive attitude			1.5	14.3	16.7			1.6	8.8	8.3
Not relevant		3.4	8.8		16.7		13.3	8.1	4.8	
Relevant			1.5	6.1				1.6	8.2	12.5
Discouraged		10.3	1.5					1.6		
Encouraged				2.0					2.7	4.2
No time			4.4				6.7	16.1	1.4	
Time				2.0					3.4	2.1
Negative teacher influence		6.9	2.9			50.0		1.6		
Positive teacher influence			1.5	4.1					4.8	8.3
Negative peers and siblings				1.5						
Positive peers and siblings									0.7	
Negative parents			2.9					1.6		
Positive parents			1.5	2.0				1.6	1.4	8.3

* Many subjects listed several reasons; thus the percentages do not add to 100.
** Based on subjects' response to a question about taking course in mathematics and science departments.

Table 6A

Stepwise Multiple Regression of Attributions for Math/Science Performance on Self-rated Math/Science Performance Level

Variable	B Value	Standard Error	Type II ss (Unique)	F	p
Intercept	3.25				
Positive interest	-.34	.10	8.19	11.99	.0006
Positive ability	-.59	.14	13.21	19.32	.0001
Hard work/effort	-.54	.14	10.44	15.28	.0001
Lack of ability	-.45	.16	5.76	8.42	.0039
Lack of background	.52	.09	21.79	31.89	.0001
Lack of interest	.56	.09	24.83	36.32	.0001
Negative attitude	.44	.22	2.76	4.03	.0453
Positive teacher influence	.49	.10	16.00	23.41	.0001
Positive background	.50	.23	3.40	4.97	.0263

Table 7

Percentage of Subjects* Listing Each Attribution Category as a Reason for Level of Athletic Performance, Broken Down by Regular Athletic Participation**

	No Regular Participation	Regular Participation
Number of subjects	136	297
No interest, like, enjoy	18.4	6.4
Interest, like, enjoy	17.7	36.4
No ability	13.2	8.4
Ability	11.8	16.5
No background, poor past performance, experience	6.6	5.7
Background, positive past performance, experience	5.9	8.1
No work, no effort	25.7	12.5
Hard work, effort	7.4	16.2
Negative attitude	11.8	11.8
Positive attitude	5.9	10.1
Not relevant	3.7	2.0
Relevant	5.2	9.4
Discouraged	2.9	1.7
Encouraged		2.0
No time	9.6	5.7
Time	0.7	1.4
Unfit, overweight	11.0	4.0
Fit, in shape	4.4	9.4
Negative teacher influence		.3
Positive teacher influence		
Negative peers and siblings		.7
Positive peers and siblings	.7	2.7
Negative parents		1.0
Positive parents	2.2	2.0
Disability, health problems	3.7	1.4

* Many subjects listed several reasons; thus the percentages do not add to 100.

** Based on subjects' response to a question about regular athletic activities.

Table 8

Percentage of Subjects* Listing Each Attribution Category as a Reason for Level of Athletic Performance, Broken Down by Self-rated Performance Level

	Performance Level				
	Extremely Poorly	Moderately Poorly	Fair	Moderately Well	Extremely Well
Number of subjects	18	51	158	186	23
No interest, like, enjoy	27.8	23.5	17.7		
Interest, like, enjoy		2.0	10.76	54.8	56.5
No ability	27.8	21.6	16.46	.5	
Ability			6.33	25.8	34.8
No background, poor past performance, experience	27.8	15.7	7.6	.5	
Background, positive past performance, experience			1.27	13.4	21.7
No work, no effort	22.2	19.6	34.8	2.2	
Hard work, effort			5.06	25.3	21.7
Negative attitude	22.2	29.4	15.8	3.8	
Positive attitude		2.0	1.27	17.2	13.0
Not relevant		5.9	5.1		
Relevant			3.17	14.0	17.4
Discouraged	11.1	5.9	2.5		
Encouraged				2.7	4.3
No time	5.6	5.9	13.3	3.2	
Time				2.7	
Unfit, overweight	11.1	21.6	8.9		
Fit, in shape		2.0	3.17	14.5	4.3
Negative teacher influence					
Positive teacher influence					
Negative peers & siblings	5.6	2.0			
Positive peers & siblings				3.8	8.7
Negative parents		2.0	.63		
Positive parents				3.2	13.0
Disability, health problems	11.1	3.9	3.8	.5	

* Many subjects listed several reasons; thus the percentages do not add up to 100.

Table 9

Percentage of Subjects* Listing Each Attribution Category as a Reason for Level of Performance, Broken Down by Regular Athletic Participation** and Self-Rated Performance Level

	No Regular Participation Performance Level					Regular Participation Performance Level				
	Ext. Poorly	Mod. Poorly	Fair	Mod. Well	Ext. Well	Ext. Poorly	Mod. Poorly	Fair	Mod. Well	Ext. Well
Number of subjects	16	32	50	36	1	2	19	105	147	22
No interest, like, enjoy	31.25	21.88	26.0				26.32	13.33		
Interest, like, enjoy		3.13	6.0	52.78	100.0			13.33	55.78	54.55
No ability	25.0	28.13	10.0			50.0	10.53	20.0	.68	
Ability			8.0	30.56	100.0			5.71	24.49	31.80
No background, poor past performance, experience	25.0	9.38	4.0			50.0	26.32	9.52	.68	
Background, positive past performance, experience			2.0	19.44				.95	12.25	22.73
No work, no effort	18.75	21.88	46.0	5.56		50.0	15.79	29.52	1.36	
Hard work, effort			6.0	16.67	100.0			4.76	26.53	18.18
Negative attitude	18.75	25.0	8.0	2.78		50.0	36.84	20.0	4.08	
Positive attitude				22.22			5.26	1.91	16.33	13.64
Not relevant		6.25	6.0				5.26	4.76		
Relevant			4.0	11.11	100.0			2.86	14.97	13.64
Discouraged	12.5	3.13	2.0				10.53	2.86		
Encouraged									3.4	4.55
No time	6.25	9.38	14.0	5.56				12.38	2.72	
Time				2.78					2,72	

Table 9 (Continued)

	No Regular Participation Performance Level					Regular Participation Performance Level				
	Ext. Poorly	Mod. Poorly	Fair	Mod. Well	Ext. Well	Ext. Poorly	Mod. Poorly	Fair	Mod. Well	Ext. Well
Unfit, overweight	12.5	21.8	12.0				21.05	7.62		
Fit, in shape		3.13	2.0	11.11				3.81	15.65	4.55
Negative teacher influence										
Positive teacher influence										
Negative peers and siblings						50.0	5.26			
Positive peers and siblings				2.78					4.08	9.09
Negative parents							5.26	.95		
Positive parents				8.33					2.04	13.64
Disability, health problems	12.5	3.13	4.0				5.26	2.86		

* Many subjects listed several reasons; thus the percentages do not add to 100.
** Based on subjects' response to a question about regular athletic activities.

Table 10

Stepwise Multiple Regression of Attributions for Athletic Performance on Self-rated Athletic Performance Level

Variable	B Value	Standard Error	Type II SS (unique)	F	Prob.> F
Intercept	3.72				
Positive interest	-.67	.16	16.83	18.53	.0001
Negative attitude	-.65	.16	15.13	16.65	.0001
Lack of background	-.93	.20	20.44	22.50	.0001
Lack of interest	-.65	.13	23.69	26.08	.0001
Lack of effort	-.79	.19	15.37	16.92	.0001
Unfit/overweight	-.67	.14	20.04	22.06	.0001
Lack of ability	-3.72	.96	13.79	15.18	.0001
Negative teacher influence	.34	.11	9.06	9.98	.0017
Disability	-.99	.30	10.07	11.09	.0009

Table 11

Reasons Given by Women to Explain Why They Were Studying Mathematics or Science[1] (n=279)[2]

Reason	Percent of Sample
Program Requirement	57.3%
Interest/Liking	50.5%
Useful/Relevant	13.9%
Ability/Done well in past	13.9%
Expect to do well	1.1%
Curious about topic	1.4%

1 When more than one reason was listed, all reasons were coded. Therefore, the percentages do not add to 100.

2 Although only 184 subjects were obtained from the list of students who were taking or had taken math or science courses, 279 answered in the affirmative to the question of whether they were taking or had taken such courses. We believe the extra subjects were responding re courses taken in pre-university years.

Table 12

Reasons Given by Women to Explain Why They Were Not Studying Mathematics or Science[1] (n=165)

Reason	Percent of Sample
Fear it is too difficult	9.1%
Have had previous problems	17.6%
No interest	56.9%
No background	13.3%
Not relevant or required	23.6%
No time	2.4%

[1] When more than one reason was listed, all reasons were coded. Therefore, the percentages do not add to 100.

Table 13

Reasons Given by Women for Participation in Regular Athletic Activity (n=297)

Reasons	Frequency	Percent of Sample
Enjoy, like	150	50.51
Get into/Stay in shape	175	58.92
Fellowship	32	10.77
Lose weight/Prevent gain	25	8.42
To get exercise	34	11.45
A break from school/Home routine	13	4.38
Relaxation	18	6.06
Good at it/Ability	9	3.03
Cheap transportation	14	4.71
Psychological benefits/Morale, etc.	70	23.57

Table 14

Reasons Given by Women for Not Participating in Regular Athletic Activity (n=136)

Reasons Why They Do Not	Frequency	Percent of Sample
Too busy	83	61.03
Lazy	19	13.97
Not enjoy/Like	35	25.74
Unathletic/Unco-ordinated	11	8.09
Too tired	3	2.21
Illness	9	6.62

Table 15

Intercorrelations for Variables in Study 1

	M/S-A	M/S-B	PHYS/ATHL-A	PHYS/ATHL-B	BEMFEM	BEMMASC	AGE	CLM	PPA	PSPC	PERF/MS	PERF/PHYS
M/S-A	1.00											
M/S-B	.423	1.000										
PHYS/ATHL-A	.000	-.009	1.000									
PHYS/ATHL-B	.019	.000	.621	1.000								
BEMFEM	.071	-.079	.074	.085	1.000							
BEMMASC	.091	.121	.224	.178	-.044	1.000						
AGE	-.250	.062	-.160	-.119	-.094	-.102	1.000					
CLM	.734	.305	.051	.022	.076	.178	-.277	1.000				
PPA	.106	.046	.639	.479	.021	.432	-.210	.152	1.000			
PSPC	.033	.083	.111	-.079	-.046	.395	.123	.111	.321	1.000		
PERF/MS	.577	.232	.105	.093	.089	.196	-.271	.608	.141	.056	1.000	
PERF/PHYS	.069	.027	.474	.324	.057	.201	-.082	.076	.479	.167	.076	1.000

KEY: PERF/MS = self-rated performance in math/science
PERF/PHYS = self-rated performance in physical/athletic activities
M/S-A = math/science-A factor score
M/S-B = math/science-B factor score
PHYS/ATHL-A = physical/athletic-A factor score
PHYS/ATHL-B = physical/athletic-B factor score

82

Table 16

Results of Stepwise Mul .iple Regression to Predict Total Numbers of Math/Science Course Credits

	B Value	Standard Error	Type II SS	F	p
Intercept	4.358				
Math/Science-A factor score	2.090	.185	1484.143	127.17	.0001
Age	-.061	.018	141.356	12.11	.0006

Table 16(A)

t-Values For the Relationships Between x and y Variables in the LISREL Causal Analysis of a Model for Math/Science Course Participation

	CLM	Math/Sci-A	Math/Sci-B	Perform. Rating	Perf/Int	Perf/Time
Total Math/Sci Courses	0.023	3.941*	0.764	0.780	2.033*	-0.736
Other courses with Math/Sci Content (Yes/No)**	2.793*	-0.899	0.268	-0.898	2.054*	-0.964

(Continued)	Perf/Abil	Part/Int	Part/Req'd	Part/Rel	Masculinity	Age
Total Math/Sci Courses	-0.028	5.014*	0.029	3.366*	0.199	-2.868*
Other courses with Math/Sci Content (Yes/No)	-2.631*	-1.870	1.630	-2.249*	-0.607	2.423*

* $p < .05$

** yes = 1 ; no = 0

Table 17

T-Values from Causal Analysis of Model to Predict Participation in Athletic Activities

	PPA	PSPC	PERFMS	PHYS/ATHL-A	PHYS/ATHL-B	PERFAB	PERRFINT	PERFTIME	PARTLIKE	AGE	BEMMASC
Regular participation in athletic activities	- 4552*	.425	19.655*	.710	.524	-3.210*	-3.455*	-2.492*	.098	.372	.147

KEY: PERFMS = self-rated performance in athletic activities

PERFAB = attribution of performance to ability

PERFINT = attribution of performance to interest

PERFTIME = attribution of performance to time

PARTLIKE = attribution of participation to liking

* $p < .05$

Table 18

Percentage of Subjects* Who Said They Would Feel Less Feminine Engaging in Certain Activities, Broken Down by Gender Category**

	Gender Category			
	Feminine	Masculine	Androgynous	Undifferentiated
Number of subjects	106	117	106	89
Chairing a meeting	1.9			1.1
Playing competitive sports	7.6	2.6	2.8	4.5
Not likeing children	22.6	11.1	22.6	22.5
Spending a lot of time studying		.9	1.1	
Doing strenuous physical exercise	2.8	2.6	2.8	3.4
Enjoying math or science		.9		
Getting the best marks in class	.9	.9		
Choosing a career instead of a traditional family life	6.6	4.3	5.7	7.9
Being physically strong	14.2	7.7	9.4	7.9
Taking a computer course		.9		
Expressing anger toward other people	6.6	5.1	4.7	11.3
Doing well in a physics course	1.9	.9	.9	1.1
Being overweight	49.1	45.3	46.2	51.7
Putting your own needs ahead of your family's needs	6.6	6.8	6.6	10.1
Pursuing a demanding career	3.8	7.6	2.8	6.7
Other activities	11.3	7.7	9.4	5.6

* Many subjects listed more than one activity, thus percentages do not add to 100.

** Gender category is based on BSRI scores, employing a median split.

Table 19

Sample Responses to the Question, "What does femininity mean to you?" for Each Coding Category

Coding Category	Sample Responses
Rejection of stereotype	Being feminine does not mean wearing frilly clothes, being dumb, or having children.
Different from masculinity/males	Possessing the qualities and characteristics that are usually associated with women and not men.
Attractive to opposite sex/ pleasing men	Being attractive to men.
Emotional/Expressive adjectives	Being a nurturing, caring person.
Autonomy	Being able to do what is important to "you", when you want to do it, and how.
Self-acceptance	It means that I like being what I am and who I am.
Stereotype	The act of producing and caring for children and a family--being a female.
Balance between masculinity/femininity	Being the best I can--balancing male and female roles.
Being a person/individual/ human being	I think of being a human being, with individual desires and dreams.

Table 20

Percentage of Subjects* Using Various Categories to Define Femininity, Broken Down by Gender Categories

	Gender Category			
	Feminine	Masculine	Androgynous	Undifferentiated
Number of subjects	106	117	106	89
Rejection of stereotype	3.8	5.9	7.6	5.6
Femininity as something different from masculinity	8.5	4.3	6.6	7.9
Attractive to the opposite sex/pleasing males	2.8	5.1	1.9	2.3
Emotional, expressive adjectives	23.6	11.9	19.8	21.4
Autonomy	15.1	16.2	16.9	13.5
Self-acceptance	33.0	24.8	33.9	25.8
Stereotype	26.4	24.8	27.4	28.1
Maintaining a balance of traditional and nontraditional	6.6	5.1	5.7	11.2
Being a person	7.6	8.6	10.4	5.6
Stating femininity is not important	5.7	13.7	6.6	4.5
Stating femininity is important	4.7	.9	.9	
No mention of the importance of femininity	87.7	84.6	92.5	92.1

* Many subject listed more than one activity, thus percentages do not add to 100.

Table 21

Mean Scores on the "Masculinity" and "Femininity" Single BSRI Items for Math/Science Avoiders and Participants

	Avoiders (n=163)	Participants (n=279)
Self-appraised femininity	5.34	5.33
Importance to self-view of level of femininity	2.34	2.50
Self-appraised masculinity	4.46	4.63
Importance to self-view of level of masculinity	2.80	2.70

Table 22

Mean Scores on the "Masculinity" and "Femininity" Single BSRI Items for Physical/Athletic Activities Avoiders and Participants

	Avoiders (n=135)	Participants (n=296)
Self-appraised femininity	5.39	5.29
Importance to self-view of level of femininity	2.36	2.50
Self-appraised masculinity	4.48	4.59
Importance to self-view of level of masculinity	2.81	2.72

Table 23

Rotated Factor Pattern Matrix for Principal Components Analysis with Varimax Rotation of Responses to the BSRI*

Item	Factor 1	Factor 2	Factor 3
1. Self-reliant (M)			-.514
2. Yielding (F)			
3. Helpful (N)	.671		
4. Defends own beliefs (M)		.471	
5. Cheerful (F)	.456		
6. Moody (N)			.497
7. Independent (M)			-.484
8. Shy (F)		-.487	
9. Conscientious (N)			
10. Athletic (M)			
11. Affectionate (F)	.516		
12. Theatrical (N)			
13. Assertive (M)		.742	
14. Flatterable (F)			
15. Happy (N)	.463		
16. Strong personality (M)		.670	
17. Loyal (F)	.469		
18. Unpredictable (N)			
19. Forceful (M)		.651	
20. Feminine (F)	.478		
21. Reliable (N)	.437		
22. Analytical (M)			
23. Sympathetic (F)	.672		
24. Jealous (N)			.596
25. Leadership abilities (M)		.727	
26. Sensitive to needs of others (F)	.728		
27. Truthful (N)	.450		
28. Willing to take risks (M)		.578	

Table 23 (Continued)

Item	Factor 1	Factor 2	Factor 3
29. Understanding (F)	.702		
30. Secretive (N)			
31. Makes decision easily (M)			-.472
32. Compassionate (F)	.741		
33. Sincere (N)	.644		
34. Self-sufficient (M)			-.529
35. Eager to soother hurt feelings (F)	.590		
36. Conceited (N)			
37. Dominant (M)		.722	
38. Soft-spoken (F)		-.522	
39. Likable (N)	.602		
40. Masculine (M)			
41. Warm (F)	.715		
42. Solemn (N)			
43. Willing to take a stand (M)		.634	
44. Tender (F)	.690		
45. Friendly (N)	.614		
46. Aggressive (M)		.715	
47. Gullible (F)			.553
48. Inefficient (N)			.486
49. Acts as a leader (M)		.726	
50. Childlike (F)			.552
51. Adaptable (N)			
52. Individualistic (M)		.523	
53. Doesn't use harsh language (F)			
54. Unsystematic (N)			
55. Competitive (M)			
56. Loves children (F)	.563		
57. Tactful (N)			
58. Ambitious (M)		.469	
59. Gentle (F)	.738		
60. Conventional (N)			
% of varince explained:	14.47	12.08	7.05

* Only loadings of .45 or greater are included here.

Table 24

Rotated Factor Pattern Matrix of Principal Components Analysis with Varimax Rotation of Self-Appraisal (A) and Importance to Self (B) Items on the Masculinity and Femininity Scales of the BSRI

Variable		Factor 1	Factor 2	Factor 3	Factor 4	(h^2) Commonality
A59	Gentle	.714				.537
A44	Tender	.704				.562
A32	Compassionate	.688				.544
A41	Warm	.659				.508
A26	Sensitive to	.655				.496
B59	Gentle	.651				.496
A23	Sympathetic	.633				.417
B26	Sensitive to	.619				.472
B32	Compassionate	.617				.481
A56	Loves children	.609				.409
B44	Tender	.609				.448
A29	Understanding	.607				.452
B41	Warm	.589				.426
B29	Understanding	.583				.459
A35	Eager to soothe	.582				.349
B23	Sympathetic	.578				.433
B56	Loves children	.542				.383
B35	Eager to soothe	.529				.411
B11	Affectionate	.518				.328
A11	Affectionate	.514				.454
A20	Feminine	.482				.232
A49	Acts as leader		.718			.596
A25	Has leadership abilities		.704			.583
A46	Aggressive		.696			.530
A37	Dominant		.662			.522
A13	Assertive		.648			.552
A19	Forceful		.559			.325

Table 24 (Continued)

Variable		Factor 1	Factor 2	Factor 3	Factor 4	(h^2) Commonality
A16	Strong personality		.551			.511
A43	Willing to take a stand		.521			.477
A10	Athletic		.476			.285
A55	Competitive		.474			.259
A58	Ambitious		.467			.313
A8	Shy		-.494			.273
A38	Soft-spoken		-.510			.322
B13	Assertive			.596		.389
B46	Aggressive			.583		.413
B49	Acts as leader			.561		.422
B19	Forceful			.553		.325
B25	Has leadership			.529		.383
B28	Willing to take risks			.514		.286
B31	Makes decisions easily			.510		.303
B37	Dominant			.506		.363
B16	Strong personality			.503		.327
B58	Ambitious			.456		.286
A7	Independent				.651	.467
A34	Self-sufficient				.618	.410
A1	Self-reliant				.599	.421
A52	Individualistic				.525	.398
A31	Makes decision easily				.502	.316
B1	Self-reliant				.482	.376
B7	Independent				.448	.351
Eigenvalue		9.550	6.806	6.311	5.164	27.831
Percent of variance		11.94	8.51	7.89	6.46	34.79
Percent of covariance		34.31	24.45	22.68	18.56	

Table 25

Endorsement of Trait Adjectives by the Different Schema Groups

Me/Not Me Questions	All Study 2 n=116	Group 1 Positive Physical Schematic n=18	Group 2 Negative Physical Schematic n=17	Group 3 Physical Aschematic n=16	Group 4 Positive Math No Math n=17	Group 5 Positive Math Math/Physics n=16	Group 6 Negative Math n=16	Group 7 Math Aschematic n=16
INFORMED								
Me	102	15	14	13	16	14	15	15
Not Me	10	2	2	2	1	2		1
Missing	4	1	1	1			1	
ACTIVE								
Me	93	17	11	9	17	15	13	11
Not Me	19		6	6		1	2	4
Missing	4	1		1			1	1
LOGICAL								
Me	103	15	16	13	17	14	14	14
Not Me	11	2	1	3		2	1	2
Missing	2	1					1	
MATHEMATICAL								
Me	63	8	8	10	14	15	1	7
Not Me	51	9	9	6	3	1	14	9
Missing	2	1					1	
LIVELY								
Me	98	16	15	11	17	13	13	13
Not Me	15	1	2	4		3	2	3
Missing	3	1		1			1	
INDEPENDENT								
Me	110	17	17	15	16	16	15	14
Not Me	4			1	1			2
Missing	2	1					1	

Table 25 (Continued)

Me/Not Me Questions	All Study 2	Group 1 Positive Physical Schematic	Group 2 Negative Physical Schematic	Group 3 Physical Aschematic	Group 4 Positive Math No Math	Group 5 Positive Math Math/Physics	Group 6 Negative Math	Group 7 Math Aschematic
ACCURATE								
Me	102	16	16	11	16	14	15	14
Not Me	10	1	1	4		2		2
Missing	4	1		1	1		1	
WELL CO-ORDINATED								
Me	95	16	14	13	14	13	11	14
Not Me	17	1	3	2	2	3	4	2
Missing	4	1		1	1		1	
BRIGHT								
Me	109	17	15	15	16	15	15	16
Not Me	2		1			1		
Missing	5	1	1	1	1		1	
METHODICAL								
Me	94	14	15	10	16	14	12	13
Not Me	17	3	2	5		2	2	3
Missing	5	1		1	1		2	
ATHLETIC								
Me	59	16	3	4	9	10	7	10
Not Me	53	1	14	11	7	6	8	6
Missing	4	1		1	1		1	
CAPABLE								
Me	112	17	17	16	16	16	15	15
Not Me	1							1
Missing	3	1			1		1	
PRECISE								
Me	95	16	16	10	15	14	14	10
Not Me	18	1	1	5	2	2	1	6
Missing	3	1		1			1	
VIGOROUS								
Me	83	17	9	9	14	11	12	11
Not Me	31		8	7	3	5	3	5
Missing	2	1					1	

Table 25 (Continued)

Me/Not Me Questions	All Study 2	Group 1 Positive Physical Schematic	Group 2 Negative Physical Schematic	Group 3 Physical Aschematic	Group 4 Positive Math No Math	Group 5 Positive Math Math/Physics	Group 6 Negative Math	Group 7 Math Aschematic
ACHIEVER								
Me	101	17	16	12	17	13	14	12
Not Me	12		1	3		3	1	4
Missing	3	1		1			1	
ANALYTICAL								
Me	97	16	15	12	16	15	12	11
Not Me	16	1	2	3	1	1	3	5
Missing	3	1		1			1	
AGILE								
Me	87	17	9	8	12	14	13	14
Not Me	26		8	7	5	2	2	2
Missing	3	1		1			1	
RESPONSIBLE								
Me	111	16	17	14	17	16	15	16
Not Me	3	1		2				
Missing	2	1					1	
OBJECTIVE								
Me	101	16	16	14	13	14	14	14
Not Me	12	1	1	1	4	2	1	2
Missing	3	1		1			1	
HEALTHY								
Me	110	17	16	14	17	15	15	16
Not Me	4		1	2		1		
Missing	2	1					1	
AWARE								
Me	113	17	17	16	17	15	15	16
Not Me	1					1		
Missing	2	1					1	
RATIONAL								
Me	108	15	16	15	17	15	15	15
Not Me	6	2	1	1		1		1
Missing	2	1					1	

Table 25 (Continued)

Me/Not Me Questions	All Study 2	Group 1 Positive Physical Schematic	Group 2 Negative Physical Schematic	Group 3 Physical Aschematic	Group 4 Positive Math No Math	Group 5 Positive Math Math/Physics	Group 6 Negative Math	Group 7 Math Aschematic
OUTDOORSY								
Me	76	16	8	8	9	13	10	12
Not Me	38	1	9	8	8	3	5	4
Missing	2	1					1	
ORGANIZED								
Me	101	17	14	12	15	13	14	16
Not Me	13		3	4	2	3	1	
Missing	2	1					1	
SCIENTIFIC								
Me	55	6	9	8	11	15	2	4
Not Me	59	11	8	8	6	1	13	12
Missing	2	1					1	
STRONG								
Me	87	16	11	8	16	12	11	13
Not Me	26	1	6	8	1	4	3	3
Missing	3	1					2	
EFFICIENT								
Me	111	17	15	16	17	15	15	16
Not Me	3		2			1		
Missing	2	1					1	
SYSTEMATIC								
Me	102	15	15	13	17	15	15	12
Not Me	12	2	2	3		1		4
Missing	2	1					1	
ENERGETIC								
Me	96	17	14	10	16	12	13	14
Not Me	17		3	5	1	4	2	2
Missing	3	1		1			1	
SELF-CONFIDENT								
Me	97	16	12	12	17	10	14	16
Not Me	17	1	5	4		6	1	
Missing	2	1					1	

Table 26

Mean Confidence Ratings of Trait Adjectives Broken Down by Schema Group

	Total (n=116)	Positive Physical Schematic	Negative Physical Schematic	Physical Aschematic	Positive Math with no Math History	Positive Math with Math and/or Physics History	Negative Math Schematic	Math Aschematic
Informed	4.35	4.44	4.24	4.38	4.59	4.31	4.31	4.19
Active	4.57	5.22	4.41	4.06	5.06	4.69	4.19	4.25
Logical	4.55	4.78	4.65	4.38	5.12	4.69	4.00	4.19
Mathematical	4.32	4.89	4.06	4.13	4.24	4.88	3.63	4.38
Lively	4.51	4.89	4.29	4.56	4.65	4.38	4.31	4.44
Independent	4.87	4.94	4.94	4.44	5.29	4.94	5.06	4.44
Accurate	4.59	4.61	4.47	4.50	4.94	4.75	4.44	4.44
Well Co-Ordinated	4.48	5.17	4.29	4.25	4.82	4.44	3.88	4.44
Bright	4.85	4.94	4.71	4.88	5.29	4.94	4.38	4.81
Methodical	4.59	4.72	4.47	4.63	5.00	4.50	4.63	4.19
Athletic	4.43	5.39	3.82	4.06	4.76	3.94	4.06	4.88
Capable	4.94	5.17	5.12	4.69	5.47	4.63	4.56	4.88
Precise	4.42	4.83	4.24	4.50	4.53	4.56	4.13	4.13
Vigorous	4.20	4.78	4.06	3.88	4.47	4.00	4.19	3.94
Achiever	4.68	4.94	4.82	4.75	5.06	4.50	4.50	4.13
Analytical	4.40	4.67	4.53	4.19	4.65	4.50	4.25	3.94
Agile	4.34	5.00	4.18	4.19	4.53	4.00	4.13	4.31
Responsible	5.35	5.67	5.59	5.00	5.24	5.31	5.13	5.50
Objective	4.36	4.61	4.24	4.56	4.41	4.50	3.94	4.25
Healthy	5.02	5.28	5.18	4.44	5.18	4.75	4.94	5.31
Aware	4.66	4.89	4.65	4.75	5.00	4.13	4.44	4.75
Rational	4.53	4.78	4.59	4.31	4.82	4.44	4.13	4.56
Outdoorsy	4.58	5.33	4.24	3.69	4.82	4.56	4.44	4.88

Table 26 (Continued)

	Total (n=116)	Physical Schematic	Negative Physical Schematic	Physical Aschematic	Positive Math with no Math History	Positive Math with Math and/or Physics History	Negative Math Schematic	Math Aschematic
Organized	4.76	5.17	5.06	4.56	5.06	4.31	4.56	4.50
Scientific	4.16	4.28	3.94	3.94	4.24	5.19	3.50	4.06
Strong	4.47	5.06	4.71	3.81	4.65	3.88	4.44	4.69
Efficient	4.75	5.11	4.88	4.25	5.06	4.50	4.56	4.81
Systematic	4.74	4.89	4.59	4.13	4.82	4.69	4.19	3.94
Energetic	4.60	5.17	4.65	4.38	5.00	4.25	4.13	4.56
Self-Confident	4.66	5.11	4.53	4.31	4.88	4.69	4.38	4.69

Table 27

Mean Number of Behavioral Examples Provided for Schema-Related Traits by Math/Science Self-Schema Groups

	Group			
	Positive; No Math History	Positive; With Math History	Negative	Aschematic
Analytical	.18	.69	.13	.13
Bright	.00	.31	.00	.00
Capable	.00	.25	.00	.00
Mathematical	1.76	2.00	.19	.94
Systematic	.18	.44	.06	.00
Poor with Numbers	.06	.00	1.38	.81
Unscientific	.35	.00	1.06	.75
Inefficient	.00	.00	.00	.00
Unorganized	.00	.00	.00	.00

Table 28

Results of Four-Group One-Way Multivariate Analysis of Variance on the Number of Behavioral Examples of Schema-Related Traits Provided by Math/Science Self-Schema Groups*

Trait	R^2	Univariate F	p
Analytical	.189	4.76	.0049
Bright	.255	6.97	.0005
Capable	.201	5.11	.0033
Mathematical	.297	8.58	.0001
Systematic	.196	4.96	.0039
Illogical	.048	1.02	.3903
Poor with Numbers	.373	12.12	.0001
Unscientific	.198	5.02	.0037

* The adjectives inefficient and unorganized were not included in the analysis because of zero values for all groups.

Table 29

Mean Number of Behavioral Examples Provided for Schema-Related Traits by Physical/Athletic Self-Schema Groups

	Group		
	Positive	Negative	Aschematic
Athletic	5.22	.47	1.25
Energetic	1.33	.29	.38
Strong	1.44	.44	.18
Poorly Co-ordinated	.11	.94	.13
Inactive	.00	.41	.38
Unhealthy	.17	.59	.13

Table 30

Results of Three-Group One-Way Multivariate Analysis of Variance on the Number of Behavioral Examples of Schema-Related Traits Provided by Physical/Athletic Self-Schema Groups

Trait	R^2	Univariate F	p
Athletic	.454	19.93	.0001
Energetic	.205	6.20	.0040
Strong	.269	8.81	.0005
Poorly Co-ordinated	.174	5.06	.0101
Inactive	.133	3.68	.0327
Unhealthy		1.10	.3405

Table 31

Mean Number of Items Recalled in Five Categories Broken Down by Schema Groups (Study 2)

Schema Group:	Category of Recall Material: Physical Education	Library Science	Math/ Computing	Journalism	Biology
Positive Physical	5.7	6.1	6.3	10.5	7.2
Negative Physical	4.9	7.5	4.5	11.6	6.9
Physical Aschematic	7.3	10.3	6.9	12.8	8.6
Positive Math (no math history)	8.5	8.2	7.9	10.5	8.2
Positive Math (with math/physics)	4.8	4.6	6.8	9.6	11.6
Negative Math	7.1	7.6	5.9	10.3	5.6
Math Aschematic	7.6	6.6	4.4	9.8	8.5

Table 32

Results of 7-Group one-Way Multivariate Analysis of Variance on the Number of Items Recalled From Career Information Tapes by Different Self-Schema Groups

	Univariate F	p
Total Biology	3.56	.0029
Total Journalism	.62	.7144
Total Library Science	1.74	.1186
Total Math	2.48	.0275
Total Physical	1.66	.1385

Table 33

Results of a Direct Discriminant Function Analyses to Discriminate Among Six Career Plans Groups (Study 2)

Variable	Canonical Structure Total	Between	Within
Self-Appraised Math/Science performance	.635	.837	.587
Math/Science-A factor score	.973	.992	.966

Standardized Canonical Coefficients

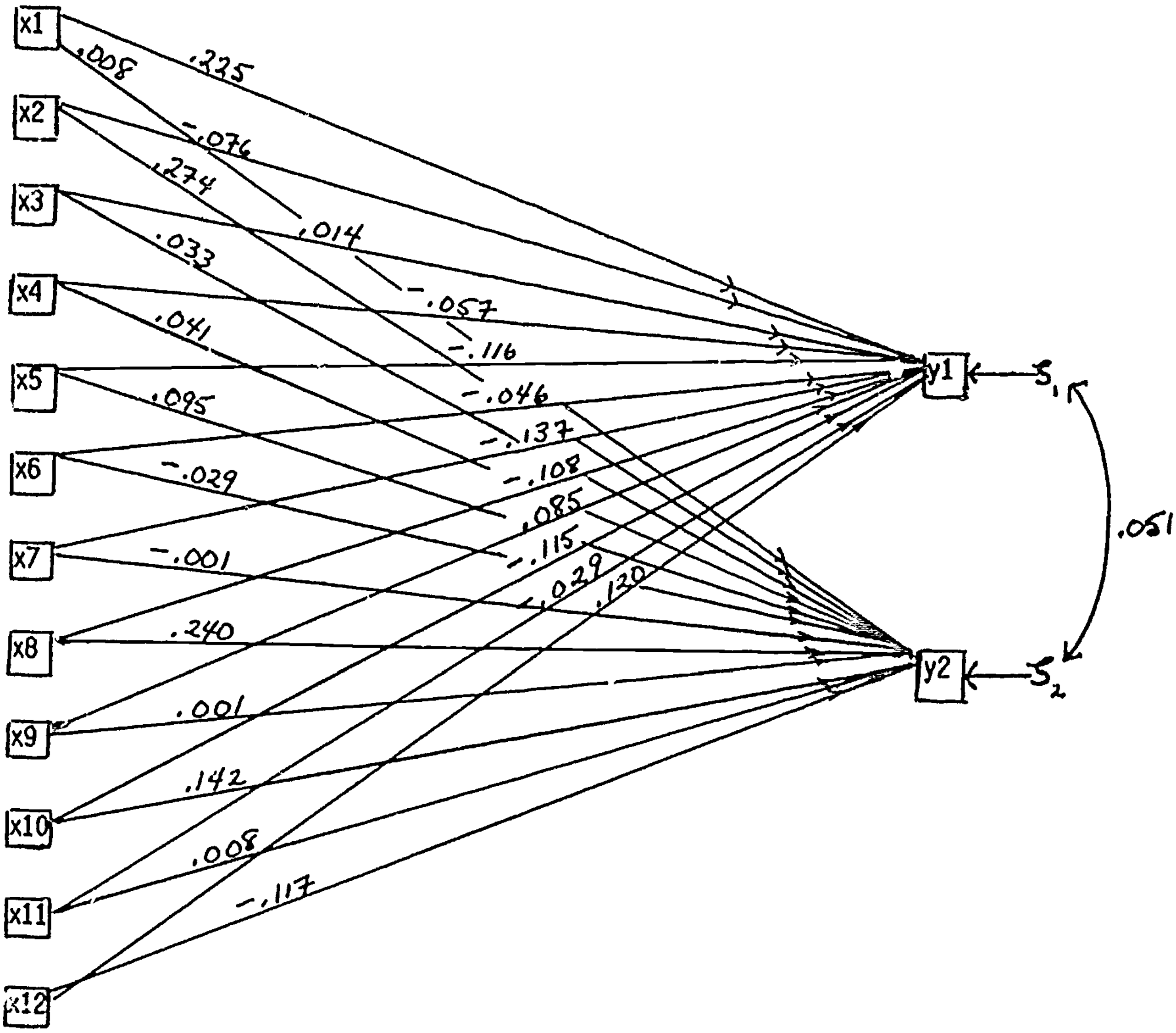
Self-Appriased Math/Science performance	.296
Math/Science-A factor score	.995

Class Means on Canonical Variable

Career Plans Category	
1	0.453
2	1.257
3	0.557
4	-0.243
5	-0.053
6	-0.599

Figure 1

Model for predicting math/science course participation, with path coefficients as calculated by LISREL V' causal analysis program

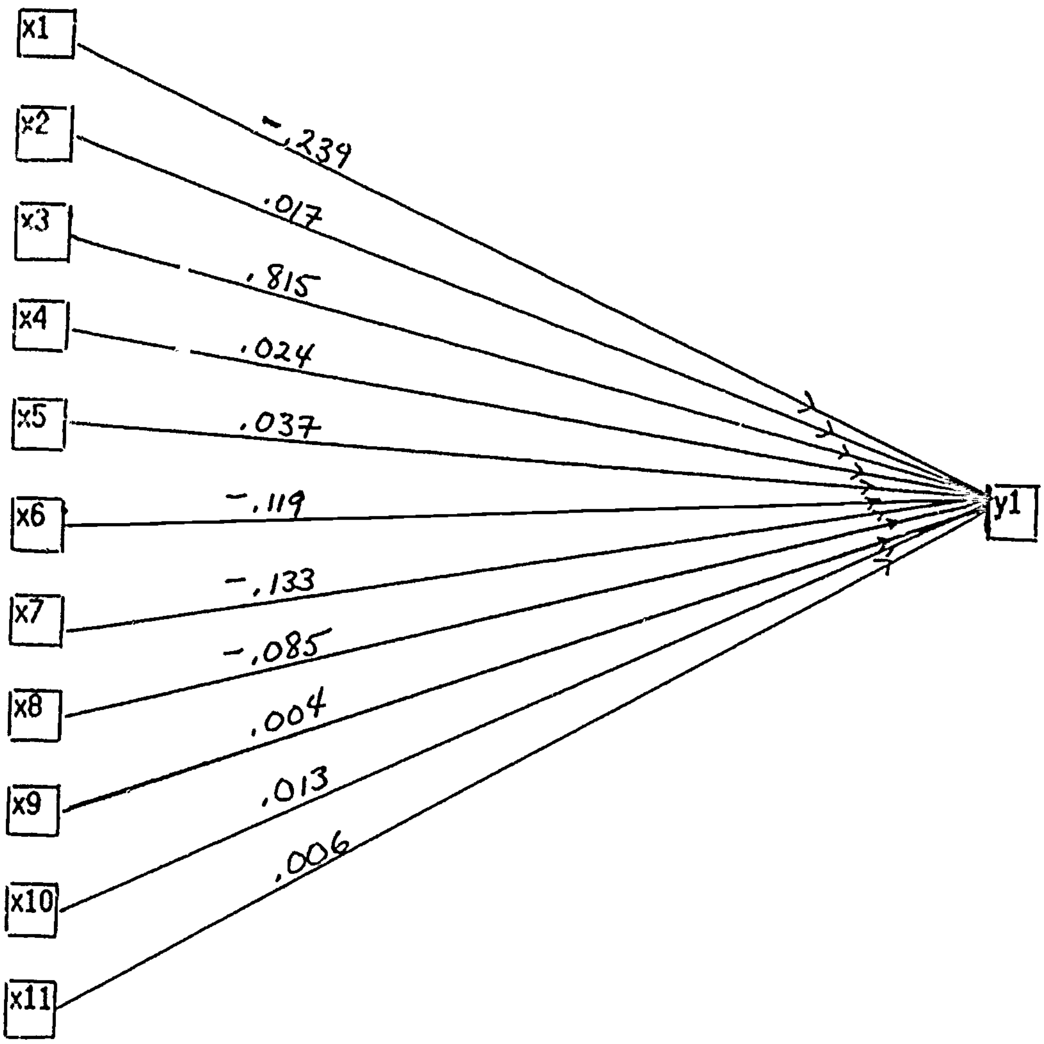


x1=CLM score
x2=math/science-A factor score
x3=math/science-B factor score
x4=self-rated m/s performance
x5=performance attributed to interest
x6=performance attribn to time
x7=performance attributed to ability
x8=participn attribn to interest
x9=participn attribn to requirement
x10=participn attribn to relevance
x11=BSRI Masculinity score
x12=age

y1=participation in courses with math/science content (yes/no)
y2=total number of courses taken in math/science departments

Figure 2

Model for predicting physical/athletic participation, with path coefficients as calculated by LISREL VI causal analysis program



x1=PPA score
x2=PSPC score
x3=self-rated performance in athletics
x4=physical/athletic-B factor scr
x5=physical/athletic-A factor score
x6=performance attribn to ability
x7=performance attributed to interest
x8=performance attribn to time
x9=participn attribn to liking
x10=age
x11=BSRI Masculinity score

y1=participation in regular physical/athletic activity (yes/no)