

The Comparison of Iranian School Children Performance in Self-concept, Self-efficacy, Self-esteem and Anxiety

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Abstract: The main objective of the present study is to explore the differences between male and female school children performance in students' psychosocial factors; general self-concept, science self-concept, self-efficacy, science self-efficacy, self-esteem, anxiety, and science anxiety among lower secondary school children. The participants in the study consisted of 680 lower secondary school children, 14 year olds (317 male and 363 female) at Tehran and Shahriar city, the province of Tehran, Iran. Five valid and reliable instruments were used to assess Self-concept Attribute Attitude Scale, State-Trait Anxiety Inventory, Coopersmith Self-Esteem Inventory, General Self-Efficacy, and Science Self-Efficacy. Descriptive statistics, and to compare male and female students in different variables, MANOVA was used. The results showed that, except for self-concept, there are significant differences in science self-concept, self-efficacy, science self-efficacy, self-esteem, anxiety, and science anxiety between male and female students. This study supports the previous finding that boys perform better than girls in the courses related to science. This worthy performance has been reflected in their science self-concept and has resulted in larger mean score in boys in this psychological variable rather than girls.

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1. Introduction

Students who believe in their abilities tend to perform more successfully (Bandura, 1993). One of the most important issues of development, education and academic achievement is to consider the student's psychological dimensions in the curriculum. One of these dimensions is *self-efficacy* (first introduced in Bandura & Adams, 1977). Sue, Sue, and Sue (1986) stated that a person with high self-efficacy may engage in a more health-related activity when an illness occurs, whereas a person with low self-efficacy would harbor feelings of hopelessness, and following on from this, science self-efficacy is the belief in one's own capability to study science, in terms of organizing and executing the skills and knowledge needed to manage science content and processes (Miller, 2006).

Self-concept refers to the global understanding a sentiment has of him or herself (Fleming & Courtney, 1984). They also mentioned that it presupposes, but can be distinguished from self-consciousness, which is simply an awareness of one's self. It is also more general than self-esteem, which is the purely evaluative element of the self-concept. science self-concept is a term used to describe one's perception of the self in relation to achievement in science (Byrne & Shavelson, 1987) and one's confidence in science (Campbell, 1992). Self-esteem can generally

be defined as the set of attitudes and beliefs that a person bears in relation to the outside world, which includes expectations of success/failure, the effort required for possible success and the reaction to possible failure (Coopersmith, 1967, 1981). Spielberger et al. (1983) state that anxiety is a psychobiological process involving stressors that evoke perceptions of threat, which culminate in an unpleasant emotional reaction. As its name would suggest, science anxiety in students is a debilitating fear of learning science but with the emotion processed on a cognitive level, and lastly, science anxiety manifests itself primarily during examinations, but is distinct from an apprehension towards examinations in general, since students who exhibit science anxiety often react normally in their non-science subjects (Mallow, 1994).

Therefore, Naderi, et al., (2009) indicated that there is no relationship between self-esteem and academic achievement ($r = .074$, $P > 0.05$). And also, Kennedy (1996) states that science self-efficacy does not significantly influence academic achievement. Meanwhile, Milford (2011) conducted a study that showed the relationship was negative between self-concept and academic achievement in science (i.e., countries with higher science self-concept tend to achieve lower on scientific literacy), while science

self-efficacy and science self-concept positively influenced science achievement.

Moreover, one of the most remarkable findings from TIMSS 2007 regarding Iranian Eighth Graders is that male students' science achievement scores have declined significantly (Sharanavard, et al., 2013), while female students' scores have shown a significant improvement compared to the scores of 1999 and 1995 (in Martin, Mullis, Foy, & Olson, 2008). Likewise, a study conducted by Comber and Keeves (1973) showed that girls consistently performed less well than boys in science (Sharanavard, et al., 2012). Similarly, Simpson and Oliver (1990) found that although, males achieved higher scores and possessed a more positive attitude than females, the females were significantly more motivated to achieve in science. Also, Tirri and Nokelainen (2011) show that females tend to attribute success to effort more than males. While totally the anxiety in girls is more than boys, but in science the anxiety of boys has a larger mean score than that of girls, while the research conducted by Spielberger (1972), report higher anxiety levels among females than males, vice versa.

Çakır, Şahin and Şahin (2000), in their study, found out that the variable of gender did not influence science self-concept. A study conducted by Davis (1980), asserted that there are not statistically significant relationship between the sex of the students at each of the four grade levels and their anxiety toward science (at the .05 level). And also, he stated that students of both sexes in each of the grades nine through twelve are equally anxious toward science. Whereas, several studies, for instance, Qi and Zhang (2010) showed that the interaction of students' gender and their self-esteem reached a significant level. And also they stated that the analysis of the interaction revealed that girls in the top and middle self-esteem groups score the teachers higher than the boys, while as for the low self-esteem group, the evaluation of girls and boys are quite similar. Besides, in the evaluation, the interaction of the students' self-esteem and their gender reaches a significant level. Preckel et al., (2008) in their study about gender differences in gifted and average-ability students assert that in both groups, boys earned significantly higher test scores in academic self-concept. A study done by Mahyuddin et al. (2006) showed that girls have higher self-efficacy ($t = -2.7$; $X = 35.5$; $SD = 4.5$; $p = 0.006$) in the English language compared to boys. The under representation of girls in science classes can cause the excluded group to suffer a loss of self-esteem and self-concept (Cohen & Cohen, 1980). Cipriani-Sklar (1996) revealed a significantly positive higher science self-concept in girls. The correlation of science self-concept and science self-efficacy was higher for girls

($r = .53$) than for boys ($r = .39$), as was the correlation of science self-concept and science achievement ($r = .53$ for girls, $r = .39$ for boys) (Britner, 2002). Gender has been found to be a significant factor in many studies of science anxiety (Mallow, 1994; Mallow, 1986).

There is a statistically significant relationship between gender and a person's self-esteem for his or her physical abilities (Longmire, 2008). Qi & Zhang (2010) indicated that the students with low self-esteem score of the teachers, and girls from the groups with high and middle self-esteem have a higher evaluation of the teachers than boys.

Based on to above mentioned and importance of the factors in academic achievement, this study generalized this information to specifically Iranian eighth grade lower secondary school students. Some studies obtained similar results and the other studies were showed different results. This study determined whether, the gender can influence on general self-concept, science self-concept, self-efficacy, science self-efficacy, self-esteem, anxiety, and science anxiety among Iranian eighth grade lower secondary school students.

2. Material and Methods

2.1. Sample

The sample for this study is selected from the total population of Eighth Grade students in lower secondary schools from large community schools in Tehran city as urban and Shahriar as suburban and the rural areas of Shahriar, during the academic year of 2010/2011. For the present study, stratified sampling was used, and therefore the sample of this study involves two centrally-located school districts among 21 districts of Tehran with 120 male and 160 female students, and also Shahriar lower secondary schools with 202 male and 198 female students.

2.2. Procedure

Data was collected by means of structured questionnaires and the questionnaires were applied in class. Based on verbal agreements of the training lecturers and participants, the questionnaire forms were distributed to the 680 participants and were asked to complete the questionnaires simultaneously at the start of a core lecture and return them to their lecturer Immediately after completing them. All completed questionnaires were passed on to the researchers.

2.3. Measures

All participants responded to Iranian translation of the instruments in this study which is listed below. They were translated into Persian and then the questionnaires were verified by the panel of lecturers and researchers to check the format, arrangement, appropriateness of the content and the language used in the instruments (Asghar-Nezhad,

Karimi Klwadapanahi, & HeydariI, 2004; Fathi-Ashtiani, Ejei, Khodapanahi, & Tarkhorani, 2007; Fathi, 2006b; Hayati & Ostadian, 2008; Khodarahimi, 2010).

2.3.1. Self-concept Attribute Attitude Scale (SaaS);

The SaaS instrument was developed by Campbell (1991). The response format is a five-point Likert scale. The first version of SaaS was developed by factor analyzing the data from 1300 high achieving high school students, with exploratory and confirmatory factor analyses determined for each sample. These factors were extracted by using the Principal Component Analyses with varimax iterations. The three factors that were produced from the factor analyses are math self-concept, science self-concept, and general self-concept. In the present study, only general self-concept and science self-concept were used which include 6 and 14 items relating to general self-concept, For example, I take a positive attitude toward myself and science self-concept, for example, I have a lot of self-concept in science. A major contribution to the validity of the self-concept scales comes from the extensive factor analyses used in the development of the SaaS. Most items had factor loadings in excess of .60 (Campbell, 1991). Alpha reliability values were calculated for general self-concept of 0.85 and a science self-concept of 0.89 were used, (Carmines & Zeller, 1979). In this study, the reliability coefficient for each subscale ranged between 0.87 for science self-concept and 0.61 for general self-concept.

2.3.2. State-Trait Anxiety Inventory (STAI);

The STAI developed by Spielberger (1970a) contains self-report scales for measuring both state and trait anxiety. The S-Anxiety Scale (STAI Form Y-1) used in this study consists of twenty statements designed to evaluate how a respondent feels at that particular time, for example, I feel calm in science. The T-anxiety (STAI Form Y-2) refers to the relatively stable-individual differences in anxiety proneness, i.e., the tendency of an individual to perceive stressful situations as a threat, and to then respond to these situations with a heightened S-anxiety reaction (O'Neil & Spielberger, 1979) and used in this study consists of twenty statements, for example, I feel pleasant. The S-Anxiety Scale required the respondent to determine how he or she feels at a particular moment in time. Evidence bearing on the construct validity of the state scales was derived from a sample of 977 undergraduate students at Florida State University with a median r of .73 for females and .60 for males (Spielberger, Gorsuch, & Lushene, 1983). Caldwell (1988) obtained an alpha coefficient of 0.94 for the S-Anxiety. T-Anxiety scores (Dreger, 1978; Katkin, 1978). In this study, the reliability

coefficient for each subscale ranged between 0.88 for S-Anxiety and 0.85 for T-Anxiety.

2.3.3. Coopersmith Self-Esteem Inventory (CSEI);

The CSEI measures general self-esteem. Coopersmith's (1967) own inductive work examined CSEI scores as they related to other personality constructs. The present study has used the Adult Form of the CSEI, which is adapted from the School Short Form for children. The CSEI-A is a 58-item questionnaire completed by respondents by way of answering a five-point Likert scale. As Coopersmith (1967) claims, the questionnaire is designed to measure "the evaluation a person makes and customarily maintains with regard to him or herself". The CSEI has been the subject of many validity research studies (Taylor & Reitz, 1968). For example, I spend a lot of time daydreaming. A study by Kokenes (1978) confirmed the construct validity of the subscales used to measure of self-esteem that were proposed by Coopersmith. Test retest reliability for the CSEI was originally reported by Coopersmith to be 0.88 for a sample of 50 children in grade V and 0.70 for a sample of 56 children, 12 years old (Azar & Vasudeva, 2006). In this study, the Cronbach's coefficient alpha for CSEI was 0.86.

2.3.4. General Self-Efficacy (GSE);

General Self-Efficacy (GSE) developed by Sherer et al. (1982) is designed to gauge self-efficacy in clinical, educational, and organizational settings (Chen, Gully, & Eden, 2001). The measure contains items assessing GSE and social self-efficacy, but only GSE items be considered in the present study. As Sherer et al. (1982) claim, these items tap a "general set of expectations that the individual carries into new situations." The GSE Scale contains is 17-items, for example, When I make plans, I am certain I can make them, while the response format is a five-point Likert scale. The sum of item scores reflects general self-efficacy, meaning that the higher the total score, the more self-efficacious the respondent. Convergent validity has been established in studies comparing the general self-efficacy scale and similar clinical measures (Sherer, *et al.*, 1982). Reliability, measured with Chronbach's alpha, was found to be .86 for General Self- Efficacy (Sherer, *et al.*, 1982). In this study, the Cronbach's coefficient alpha for CSE was 0.79.

2.3.5. Science Self-Efficacy Questionnaire (SSEQ);

The SSEQ was developed by Smist (1993) to assess students' self-efficacy in science by measuring beliefs about competence in school science tasks (Smist, 1993). The SSEQ-A is a 27-item questionnaire completed by respondents by way of answering a five-point Likert scale. The SSEQ was developed to assess students' self-efficacy in science by measuring students' own beliefs about their competence to

perform or complete science-related tasks. This questionnaire includes physics, chemistry, biology, and laboratory. The researcher has used science totally. In the present study, only science self-efficacy was included which includes nine items related to science, for example, I can use a computer in science class. In this study, the Cronbach's coefficient alpha for SSEQ was 0.70.

3. Results

Data was analyzed by using statistical package for social sciences (SPSS 18.0). Besides descriptive statistics, MANOVA was also used in this study.

3.1. Descriptive statistics;

A perusal of table 1 reveals that the largest mean scores on self-efficacy for male students is 192.16 with the SD of 25.4 and the smallest mean scores on science anxiety for male students is 21.24 with the SD of 4.3. Also the largest mean scores on self-efficacy for female students is 185.82 with the SD of 24.91 and the smallest mean scores on science anxiety for female students is 20.30 with the SD of 4.34.

3.2. MANOVA

To compare male and female students in different variables, MANOVA (Multivariate Analysis of Variance) was used. First, the important assumptions for the method such as, outlier and homogeneity of variance-covariance matrices were investigated.

The results of normality show the distribution of science self-concept, self-concept and anxiety in boy and girl groups have non-normal distribution, but, the results of Shapiro Wilk show that all variables in two groups have normal distribution. The results of statistics of skewness and kurtosis show that all values of this statistics are common range ± 1 . Therefore, the assumption of normality can be accepted (Meyers, Gamset, & Guarino, 2003). Based on the results of Mahalanobis distances, there was no multivariate outlier data. The results of Box's Test shows that covariance matrix of dependent variables in different levels of independent variable of gender is not equal ($p < 0.001$). Therefore, the assumption of equality of covariance of the matrix of dependent variables is not supported. The results of Levene's test shows that the assumption of equality of variance for all of the dependent variables in two groups (boy and girl) can be accepted.

Based on the results of Box's Test, Pillai's trace results is used instead of Multivariate Wilks' lambda results, in order to report significance of linear combination of the dependent variables in different levels of gender. Since, significant level is smaller than $\alpha = 0.01$, the null hypothesis stating that there is no significant difference between boys and girls in

dependent variables can be rejected ($F_{(7,672)} = 5.182$, $P < 0.0001$). Consequently, there is significant different between two groups of boys and girls in dependent variables.

Finally, based on the results of table 2, the investigation of performance of two groups in each variable shows that except for self-concept ($p > 0.05$), there is significant difference in the other variables between two groups ($p < 0.05$). Investigation of η coefficient for the significant variables shows that in science self-concept, science anxiety, anxiety, self-esteem, self-efficacy, and science self-efficacy respectively 2.5%, 1.2%, 4.3%, 2.7%, 1.6% and 1.5% of variance is due to independent variable of gender.

4. Discussion

The Investigation of the results of descriptive statistics in two groups shows that mean of science self-concept for boys is more than girls. These results also are in line with other studies (Cipriani-Sklar, 1996; Cohen & Cohen, 1980) indicated that science self-concept for boys is more than girls. While, some of other studies showed that this variable for girls is more than boys (Britner, 2002). Moreover, many studies showed that there is no difference between male and female students in science self-concept and science anxiety (Çakir, et al., 2000; Davis, 1980). This finding supports the old findings that boys perform better in the courses related to physics has been reflected in their science self-concept and has resulted in larger mean score in boys in this psychological variable rather than girls (Beaton, et al., 1996; Erickson & Farkas, 1991; Martin, et al., 2000).

Investigation of the results of the mean of self-esteem for girls is more than boys. This result is in line with other studies such as, (Qi & Zhang, 2010) indicated that this variable for girls more than boys. Although, in the other studies signified that self-esteem for boys more than girls (Cohen & Cohen, 1980) The greatest effect of gender was on anxiety and self-esteem. The gender was determined 4.3% and 2.7% variances respectively for those variables. Also, available evidences have supported gender differences in self-esteem (Sar-Abadani-Tafreshi, 2006). It could be said that the source of anxiety and self-esteem are different in girls and boys. If we accept that the ability in science is more important among boy groups, therefore, the amount of their science anxiety will be higher than that of girls but the source of anxiety or the feeling of self-efficacy in girls may be more related to the verbal domain.

Finally, the mean of self-efficacy and science self-efficacy for boys is more than girls. In line with this result, Mahyuddin et al. (2006) showed that similar results in their study. It could be said that the culture influences the relation between self-efficacy, self-esteem and achievement. According to Bandura

(1997), multicultural societies possess lower self-efficacy than individualistic ones. The investigation of cultural differences in social cognitive theory can serve as a sound basis for research. Understanding the relation between self-efficacy, self-esteem and achievement in Iran, as a more multicultural and traditional society than western societies, and comparing the results with previous research findings could pave the way for a better understanding of self-efficacy.

5. Conclusion

The results indicated that there is no statistically significant difference between boys and girls in the variable, self-concept however, in the science self-concept variable; the mean of the boys group is more than the girls. Therefore this finding supports the previous finding that, boys perform better in the courses related to physics and its worthy performance has been reflected in their science self-concept and has resulted in larger mean score in boys in this student's psychological variable rather than girls. While, there are several demographic that could be affect the preference for the relationship between self-concept, self-efficacy, self-esteem, anxiety and gender which should be studied in the future, in the present study focused on gender only. Implication of the study was derived from the fact that student's psychological factors are important indicators for quality learning outcomes, students who believe in their abilities tend to perform successfully. If students

can be enabled to be more aware of their abilities and the ways in which they are likely to achieve better, they can be encouraged to develop more effective and more flexible psychological factors. Future research should examine whether the present findings generalize to other samples and settings. In addition, there may be cultural differences that influence the concept of self as it relates to achievement.

Table 1. Descriptive Statistics with respect to gender

Dependent Variables	Gender	Mean	Std	N
Science self-concept	Girl	46.49	10.05	364
	Boy	49.68	9.86	316
	Total	47.97	10.08	680
Self-concept	Girl	57.98	10.26	364
	Boy	59.33	9.89	316
	Total	58.61	10.11	680
Science anxiety	Girl	20.30	4.34	364
	Boy	21.24	4.3	316
	Total	20.73	4.35	680
Anxiety	Girl	46.20	10.86	364
	Boy	41.51	11.18	316
	Total	44.02	11.25	680
Self-esteem	Girl	47.06	10.9	364
	Boy	43.57	9.79	316
	Total	45.43	10.54	680
Self-efficacy	Girl	185.82	24.91	364
	Boy	192.16	25.4	316
	Total	188.77	25.32	680
Science self-efficacy	Girl	27.66	6.86	364
	Boy	29.29	6.33	316
	Total	28.42	6.67	680

Table 2. Tests of Between-Subjects Effects with respect to gender

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Gender	Science self-concept	1719.047	1	1719.04	17.304	.000	.025
	Self-concept	308.138	1	308.13	3.023	.083	.004
	Science anxiety	150.655	1	150.65	8.042	.005	.012
	Anxiety	3724.149	1	3724.14	30.711	.000	.043
	Self-esteem	2063.023	1	2063.02	19.054	.000	.027
	Self-efficacy	6804.681	1	6804.68	10.764	.001	.016
	Science self-efficacy	449.588	1	449.58	10.234	.001	.015
	Error	Science self-concept	67355.869	678	99.34		
Self-concept		69111.393	678	101.93			
Science anxiety		12700.761	678	18.73			
Anxiety		82216.635	678	121.26			
Self-esteem		73408.747	678	108.27			
Self-efficacy		428627.254	678	632.19			
Science self-efficacy		29786.188	678	43.93			

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