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Explaining the Role of Environmental Factors on the Scholastic Aptitude of Ninth-Grade Students

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ABSTRACT

This study was aimed at clarifying the position of environment and heredity in scholastic aptitude by investigating the role of family, educational, and economic factors in the scholastic aptitude of ninth-grade students. This applied study adopted a quantitative approach and a descriptive causal- comparative method in terms of data collection. The statistical population of the research included all 1,234,641 students in the ninth grade of the secondary schools in Iran in the academic year of 2020–2021. The sample size contained 11790 students selected through proportionate stratified random sampling. The data were collected using a 64-question Scholastic Aptitude Test and analyzed using descriptive statistics as well as the MANOVA using the SPSS 25 software. The research results showed that among the family factors, the mother's educational level; among the educational factors, the type of school and educational assistance classes; and among the economic factors, the family income, had a significant role in the students' scholastic aptitude ($P < 0.05$). Moreover, the linear combination of family factors and educational factors does not have a significant role in scholastic aptitude while the linear combination of economic factors has a significant role. In general, among family, economic, and educational factors, economic factors have a more significant role in scholastic aptitude.

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Introduction

The search and selection of elite and talented people for learning or for doing a specific job or skill has been one of the challenges of humankind for a long time (Piirto, 2007). Regarding decisive academic decisions, two methods can be mentioned based on the degree and quality of the orientation toward personal tastes or internal capacities of people: preference-oriented and talent-oriented. In the preference-oriented type, decision-making is known to be centered on the wishes of influential people and external factors. In contrast, the talent-oriented type is associated with focusing on the inherent characteristics of the individual and the internal factors (Zivari-Rahman, 2022). Moreover, although preference-oriented academic decisions can lead to some success with extra effort and imposing hardships, due to the lack of attention to talents and capabilities (Bokander & Bylund, 2020, Wai et al., 2022), they are likely to cause fatigue, burnout and a lot of attrition (Bazán et al., 2020). In fact, each person has a set of unique inborn talents (Krisna et al., 2016), which means that that person is an unexampled and extraordinary case in both external and internal aspects, and no other person is, has been or will be exactly like them (Bauer et al., 2023; Thunnissen & Van Arensbergen, 2015).

Talent is outstanding inherent abilities (Gagné, 2015) or the inherent capacity for learning and having skills in a specific field or discipline (PandiaVadivu et al., 2016). Experts define scholastic aptitude as the possession of the inherent and basic capacities to succeed in one or more academic fields (Meyer, 2021), exceptional abilities in scientific fields (Gagné, 2004), quick learning of and interest in a specific subject area (Feldhusen, 2005), learning with ease (Rasmussen & Rasmussen, 2015), potentials to achieve educational goals (Meyer, 2021), outstanding learning abilities (Gagné, 2015), and the capacity to learn specific subjects (PandiaVadivu et al., 2016). Although these definitions, presented for talent and scholastic aptitude, indicate the existence of different and various views in the area of scholastic aptitude, it can be concluded that innateness with having outstanding ability in the educational field is one of the common points in all definitions of scholastic aptitude.

Talentedness comes from generation (genetics) (Choudhury et al., 2023). Nature does not give any talent, but it transmits some genetic potentials (Bouchard Jr., 1997; Plomin, 1997; Scarr, 1997). Genetic potentials are revealed in interaction with stimulating experiences provided by parents, family, home, schools, teachers, and curricula (Hadar et al., 2023). Some children have the genetic potential to learn more complex and abstract schemas, to learn easier, earlier, and faster, or to remember and retrieve information better than others (Feldhusen, 2005). These features will result in the learning and school achievements being placed on higher than average or very high levels **(**Wachs, 1992**).** There is ample evidence that talented children develop superior abilities in themselves while possessing high IQ and enjoying the enriched development opportunities provided by their parents and teachers (Benbow et al., 1996; Bloom, 1985; Ericsson, 1996; Holahan & Sears, 1995; Simonton, 1997; Terman & Oden, 1959). They learn quickly and get far ahead of their age-mates and thus may be seen as precocious (Feldhusen, 2005, Kulkarni et al., 2022).

In the current philosophical discussion, some authors talk about "developed" or "adopted" as well as "natural" and "inborn" scholastic aptitudes (e.g., Anderson, 2004; Brighouse & Swift, 2014; Giesinger, 2011; Satz, 2007). However, in general, most authors in discussions of educational justice only refer to "natural" scholastic aptitude when they use this term (e.g., Calvert, 2014; Sachs, 2012; Shields, 2015). In addition, most authors provide a static and not dynamic concept of talent in which scholastic aptitudes are somehow considered as unchanging (Meyer, 2021). Some authors criticize the reference to "natural" scholastic aptitudes for ignoring these external circumstances. For example, Vopat (2011) mentioned that talent should be attributed to the environment in which the child was raised.

Scholastic aptitudes are the potentials for achieving educational goals. For example, when a child enters school, they may have the potential to do very well in mathematics. This potential is self-acquired and the result of an educational process. In adopting this point of view, it should not be neglected that the natural gifts of the child will somehow contribute to this potential. We can acknowledge the presence of biological dimension but still emphasize that it is not enough to achieve the real potential, and there must exist various environmental factors for this (Meyer, 2021).

Children often find many different resources and opportunities to advance and enhance their growth and education, especially if their parents are prosperous professionals or well-educated ones (Rasmussen & Rasmussen, 2015). However, the children from poor families may be deprived of many stimulating and excellent educational experiences, and as a result, they are constantly impaired in the progress and development of cognitive abilities (Feldhusen, 2005). Studies by Rasmussen and Rasmussen (2015) showed that understanding of scholastic aptitude is intertwined with the students' backgrounds and school experiences. Bourdieu (1997), linking talent to the concept of habit and the formation of cultural capital, stated that talent is the product of the investment of time and cultural capital in an embodied state. Therefore, talent is not primarily

about having psychological characteristics such as independence and reflexivity or motivation for investment and effort. It is a matter of accessing a set of social and cultural resources, learning these resources, and being in an environment where such mobilization is possible (Bourdieu & Passeron, 1977).

Hansen (1995) and Feldhusen (2003) mentioned talent as something natural and inherent that is related to personal potential while Rasmussen and Rasmussen (2015) concluded that the students who have educational, cultural, and social capital around would also have high scholastic aptitude; and talented students have stable family relationships, and their parents have relatively high social status and educational levels. Andersen (2005), Rasmussen (1999), and Ulriksen et al. (2009) have determined an important and decisive role of family, economic and social factors in the emergence and development of talent. According to the results of conducted research, it seems that heredity and environment both play a role in having scholastic aptitude, and by possessing this view, Gagné named a set of "catalysts" that can transform God-given talents into high-level performances. Talent is the result of nature and nurture. According to the DMGT model, presented by Gagné (2005), talents (T) arise from the gradual transformation of high natural abilities, namely gifts (G), through a long development (D) process, with the catalytic help of intrapersonal (I) characteristics and environmental (E) effects. As a result, the talent criteria encompass the combined impacts of all these distinct resources (G, I, D, E) (Gagné, 2007).

In general, some studies consider the role of genetics and inborn potential to be more critical in having scholastic aptitude (Aberg-Bengtsson, 2005; Blanch & Aluja, 2013; Coyle, 2015; Feldhusen, 2005; Fernández et al., 2019; Jarvin & Subotnik, 2015; Matejko et al., 2013; Meyer, 2021; PandiaVadivu et al., 2016; Schalkwyk, 2011; Schroth & Helfer, 2009; Thunnissen & Van Arensbergen, 2015; Vinkhuyzen et al., 2009; Young & Fisler, 2000). Some other studies, however, stated that the environment is a more meaningful and influential factor in having scholastic aptitude (Burrs, 2013; Cooper et al., 2008; Manichander & Brindhamani, 2014; Shatunova & Sterz, 2018) while others report that genetics and environment both have an equal proportion in having scholastic aptitude (Akpotor & Egbule, 2020; Bazán et al., 2020; Gagné, 2004, 2007, 2015; Lee & Seo, 2019; Rasmussen & Rasmussen, 2015; Wai & Lovett, 2021).

As the research findings show, there are fundamental differences in the opinions about the role of environmental factors such as family, educational, and economic factors in scholastic aptitude. In fact, there is still no general agreement in this field, and determining the position of family, educational, and economic factors in having aptitude, especially scholastic aptitude, is an open problem. Thus, it seems that examining the role of family, educational, and economic factors in students' scholastic aptitude can be useful in determining the role of environmental factors in scholastic aptitude. In this regard, the present research was conducted to investigate the role of family, educational, and economic factors in the scholastic aptitude of ninth-grade students.

Method

This study adopted a quantitative causal-comparative method.

Participants

The statistical population of the research included all of the 1,234,641 students in the ninth grade of secondary school in Iran in the academic year 2020-2021[1]. Note that the main study from which this paper was extracted was aimed at standardizing the scholastic aptitude test at the national level with the coordination of the officials of the Ministry of Education. That is why the sample size is very large. The sampling method was a stratified cluster in such a way that according to the number of students in each province based on gender and school type, the test was conducted electronically in 680 classes and among 13600 students, and finally, 11790 people answered the questionnaire completely.

Instruments

The data were collected using Zivari Rahman's Scholastic Aptitude Test (2022). At the beginning of this test, 35 questions are asked about general characteristics, including personal, school, educational, family, economic, counseling, tutoring, etc. The main test has 64 questions that measure scholastic aptitude in two general dimensions, verbal and mathematical aptitudes, based on the framework and content of the SAT. In the main study, the test's content validity ratio (CVR) was .72, based on the opinion of experts. The convergent validity of the designed test with the scores obtained from the fifth edition of the Wechsler Intelligence Scale for Children (WISC-V) shows that the correlation of verbal

1 ** It should be noted that this paper was extracted from the Ph.D. dissertation of University of Tehran, titled "Preparation and Standardization of the Academic Aptitude Test of Ninth-grade Students." This dissertation was implemented with the support of high-ranking officials of the Ministry of Education at the national level, with a large sample size. Also, the tools and the psychometric indicators mentioned in this paper are reported from the main study.

reasoning with verbal comprehension is 0.516, and with intelligence quotient (IQ) is 0.384. It also shows that the correlation coefficient of mathematical reasoning with quantitative reasoning and with intelligence quotient (IQ) are 0.696 and 0.355, respectively. Therefore, it can be concluded that the convergent validity of the scholastic aptitude test is satisfied when compared with the WISC-V. Also, the convergent validity of the scholastic aptitude test with the scores of the academic courses in the ninth grade was assessed by examining the correlation coefficient, showing that the correlation coefficient of the verbal and mathematical aptitude test with the related courses was between 0.23 and 0.47, which indicates the appropriate convergent validity of the test. The construct validity of the scholastic aptitude test was first investigated through the exploratory factor analysis method, and according to the obtained results, the two factors of verbal and mathematical talents in the test explain 51% of the variance of the scholastic aptitude in ninth-grade students. Also, the construct validity of the test was checked through the confirmatory factor analysis method and R software and the results are: $X^2/Df = 3.79$, GFI = 0.93, CFI = 0.94, and RMSEA = 0.059. Therefore, the measurement model of the latent variables of the scholastic aptitude sub-tests has an acceptable fit and construct validity with regard to the relevant questions. Also, the results of the confirmatory factor analysis show that the factor loading of all questions was higher than 0.40, which indicates the appropriateness of the obtained factor loadings.

Procedure

In the main study, for the electronic implementation of the test, after negotiating with the ministries of education and obtaining the necessary approvals, the test's link, along with the table related to the sample size in the center of the province and cities, was sent nationwide by the relevant expert in the Ministry of Home Affairs to the Deputy of Secondary Education in the general offices of each province. Then they were asked to provide the test link to the ninth-grade students, class by class, according to the sample table. Finally, from January 1, 2021, to April 10, 2021, 11600 students answered the test. After collecting the data, the data were examined, and the students who did not answer more than 15 questions were removed. Therefore, 1292 students who answered electronically were excluded, and the data of 11790 students were analyzed. It should be noted that, in addition to the mentioned sample, the test, along with the WISC-V IQ test, was conducted by the Psychometric Publishing Institute among 203 students. This information was used to check the convergent validity and correlation between the subscales of scholastic aptitude and IQ.

The data were analyzed using descriptive statistics such as frequency, mean value, and standard deviation tables and the inferential test of MANOVA via the SPSS 25 software.

Findings

Description of demographic characteristics

Based on the results presented in Table 1, from 11790 participants of the study: 49.5 were female and 50.55% were male. The age of the majority of the participants (96.1%) was 15 years, and considering the place of education**:** 57% was studying in the cities, and 43% in the villages.

Table 1.
Frequency Distribution of the Participants' Demographic Characteristics

Variable	Dimensions	Frequency	Percentage	Verbal Aptitude		Mathematical Aptitude	
				M	SD	M	SD
Gender	Girl	5830	49.45	13.73	10.03	11.59	8.84
	Boy	5959	50.55	13.62	10.30	12.46	9.08
Age	14	128	1.1	12.26	9.71	11.24	8.18
	15	11326	96.1	13.71	10.18	12.05	8.97
	16	336	2.8	12.84	9.86	11.61	9.14
Place of Education	City	6722	57.0	14.10	10.21	12.28	8.97
	Village	5068	43.0	13.35	10.13	11.84	8.97

To investigate the role of family factors (the education levels of mothers and fathers, the occupation of mothers and fathers, and the amount of importance parents give to a child's education), the MANOVA was used.

Table 2.
Descriptive Statistics of Verbal and Mathematical Aptitudes based on Family Factors

Variable	Dimensions	Frequency	Percentage	Verbal Aptitude		Mathematical Aptitude	
				M	SD	M	SD
Mother's Education Level	Illiterate	881	7.5	13.04	9.90	11.55	9.24
	Elementary	2692	22.9	13.45	10.10	11.87	8.88
	Guidance	2244	19.1	13.63	10.18	11.97	8.99
	Diploma	3820	32.4	13.68	10.11	12.12	8.93
	Associate	529	4.5	13.78	10.23	11.70	9.08
	Bachelor	1169	9.9	13.91	10.28	12.15	9.02
	Master	323	2.7	15.63	10.70	13.44	9.22
	Ph.D.	121	1.0	15.96	11.65	13.64	8.21
Father's Education Level	Illiterate	616	5.2	12.70	9.83	11.40	9.05
	Elementary	2087	17.7	13.38	10.11	11.50	8.92
	Guidance	2760	23.4	13.65	10.14	11.91	8.89
	Diploma	3396	28.8	13.79	10.22	12.26	9.06
	Associate	706	6.0	13.52	10.07	12.05	8.85
	Bachelor	1308	11.1	13.83	10.16	12.39	8.99
	Master	702	6.0	14.44	10.44	12.59	8.97
	Ph.D.	207	1.8	14.84	10.46	12.92	8.90
Mother's Occupation	Housewife	10129	85.9	13.64	10.11	12.02	8.96
	Freelance Job	337	2.9	13.09	10.33	11.36	9.21
	Government Employee	868	5.3	14.99	10.65	12.95	9.19
	Private Company Employee	110	0.9	13.63	9.41	10.85	8.65
	Part Time Employee	82	0.7	15.04	11.99	13.26	10.07
	Other	257	2.2	12.99	10.09	11.31	8.46
Father's Occupation	Farmer	1027	8.7	13.54	10.16	11.81	8.82
	Rancher	262	2.2	13.37	10.27	11.58	8.84
	Shopkeeper	470	4.0	13.56	10.40	11.97	8.90
	Freelance Job	4690	39.8	13.61	10.16	11.93	8.95
	Government Employee	2266	20.0	13.87	10.21	12.37	9.11
	Private Company Employee	545	4.6	14.11	9.99	12.39	8.80
	Part Time Employee	83	0.7	14.75	11.27	13.23	9.68
	Unemployed	544	4.6	12.78	9.72	11.63	8.67
	Other	1789	15.2	13.77	10.18	12.05	9.11
The amount of importance parents give to education	Very Little	260	2.2	11.07	10.18	10.47	9.27
	Low	662	5.6	13.52	9.98	11.78	9.13
	Much	3552	30.1	13.73	10.18	11.97	8.80
	Very Much	7312	62.0	13.75	10.17	12.13	9.02

Examining the assumptions of MANOVA

To check the homogeneity of the variance and covariance matrix, Box's M test was used. Considering that the significance level is 0.947 and greater than $\alpha = 0.05$, therefore, the null hypothesis is not rejected at this level ($P < 0.05$, $F = 0.835$). As a result, it can be said that the assumption of homogeneity of variance and covariance matrix of variables is valid. To test the equality of variances, Leven's test was used, and the significance of verbal aptitude ($P < 0.05$, $F = 1.085$) and mathematical aptitude ($P < 0.05$, $F = 1.079$) are both greater than the significance level of $\alpha = 0.05$; therefore, the assumption of equality of variances between the groups is valid. To test the normality of the distribution of scores, the Kolmogorov-Smirnov (K-S) test was used, and the significance of verbal aptitude ($P = 0.411$) and mathematical aptitude ($P = 0.26$) is greater than the significance level of $\alpha = 0.05$; as a result, the distribution of scores in both variables can have a normal distribution.

The results of the MANOVA in Table 3 show that there is a significant difference in verbal and mathematical aptitudes based on the mother's education level ($P < 0.05$), but there is no significant difference based on the father's education level ($p > 0.05$).

The results of the MANOVA in Table 3 show that there is a significant difference in verbal and mathematical aptitudes based on the mother's education level ($P < 0.05$), but there is no significant difference based on the father's education level ($p > 0.05$). However, there is no significant difference between verbal and mathematical aptitudes based on the occupation of parents and the importance parents give to their child's education ($p > 0.05$). Also, the linear combination of the five investigated family factors did not have a significant role in the verbal and math aptitudes of students ($p > 0.05$).

Table 3.
Tests of Between-Subjects Effects Family Factors

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power[c]
Mother's Education Level	Verbal Aptitude	2409.693	7	344.242	3.333	.002	.002	.963
	Mathematical Aptitude	1114.398	7	159.200	1.982	.049	.001	.784
Father's Education Level	Verbal Aptitude	531.832	7	75.976	.736	.642	.000	.324
	Mathematical Aptitude	239.185	7	34.169	.425	.887	.000	.191
Mother's Occupation	Verbal Aptitude	588.689	6	98.115	.951	.457	.000	.383
	Mathematical Aptitude	393.246	6	65.541	.814	.559	.000	.328
Father's Occupation	Verbal Aptitude	924.621	9	102.736	.996	.440	.001	.508
	Mathematical Aptitude	874.315	9	97.146	1.207	.285	.001	.607
The amount of importance parents give to education	Verbal Aptitude	467.013	3	155.671	1.510	.210	.000	.402
	Mathematical Aptitude	46.399	3	15.466	.192	.902	.000	.086
A1 * A2 * A3* A4 * A5	Verbal Aptitude	17484.210	151	115.789	1.127	.138	.015	.991
	Mathematical Aptitude	11693.197	151	77.438	.968	.595	.013	.991

To investigate the role of educational factors (the type of school, the amount of parental assistance in academic matters, the use of educational supplementary classes, and the use of books and educational supplementary materials), the MANOVA was used.

Table 4.
Descriptive Statistics of Verbal and Mathematical Aptitudes Based on Educational Factors

Variable	Dimensions	Frequency	Percentage	Verbal Aptitude		Mathematical Aptitude	
				M	SD	M	SD
Type of school	Government (Public)	8601	73.0	12.28	8.97	11.83	8.93
	Exemplary Public	1156	9.8	11.84	8.97	12.18	9.00
	Non-profit	1374	11.7	12.28	8.97	13.03	9.12
	Other	569	5.5	11.84	8.97	12.29	9.00
Use of Educational Assistance Classes	No	8610	73.1	13.43	10.03	11.79	8.89
	Yes	3175	26.9	14.34	10.50	12.67	9.17
Use of Books and Educational Assistance Materials	No	6840	58.1	13.36	10.05	11.76	8.91
	Yes	4941	41.9	14.10	10.32	12.40	9.04

Considering that the significance level of Box's M test is greater than $\alpha = 0.05$, the assumption of homogeneity of the variance and covariance matrix of the variables is valid. Leven's significance of verbal

aptitude (P < 0.05, F = 1.55) and mathematical aptitude (P < 0.05, F = 1.80) are both greater than the significance level of α = 0.05; therefore, the assumption of equality of variances between groups is valid.

The results of the MANOVA in Table 5 show that there is a significant difference in verbal and mathematical aptitudes based on the type of school (P < 0.05). Also, there is a significant difference in verbal aptitude based on using or not using educational assistance classes (P < 0.05). On the other hand, there is no significant difference in verbal and mathematical aptitudes based on using or not using books and educational assistance materials (p > 0.05). Also, there is no significant difference in mathematical aptitude based on using or not using educational assistance classes (p > 0.05). Furthermore, the linear combination of the three investigated educational factors did not have a significant role in the verbal and mathematical aptitudes of students (p > 0.05).

Table 5
Tests of Between-Subjects Effects Educational Factors

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power[c]
Type of School	Verbal Aptitude	1867.198	3	622.399	6.036	.000	.002	.960
	Mathematical Aptitude	886.105	3	295.368	3.684	.011	.001	.806
Use of Educational Assistance Classes	Verbal Aptitude	553.215	1	553.215	5.365	.021	.000	.639
	Mathematical Aptitude	130.208	1	130.208	1.624	.203	.000	.247
Use of Books and Educational Assistance Materials	Verbal Aptitude	333.150	2	166.575	1.616	.199	.000	.343
	Mathematical Aptitude	217.439	2	108.719	1.356	.258	.000	.294
B1 * B2 * B3	Verbal Aptitude	326.699	3	108.900	1.056	.366	.000	.289
	Mathematical Aptitude	237.000	3	79.000	.985	.399	.000	.271

To examine the role of economic factors (monthly family income and whether they are supported by supporting institutions such as welfare and relief committees), the MANOVA was used.

Table 6.
Descriptive Statistics of Verbal and Mathematical Aptitudes Based on Economic Factors

Variable	Dimensions	Frequency	Percentage	Verbal Aptitude		Mathematical Aptitude	
				M	SD	M	SD
Average monthly family income in millions (tomans)	Less than 3	4628	39.3	13.47	10.07	11.82	8.88
	3 - 5	3854	32.7	13.60	10.19	12.04	8.96
	6 - 10	1950	16.5	13.62	10.14	11.88	8.91
	11 - 15	555	4.7	14.17	10.05	12.60	9.22
	16 - 20	212	1.8	14.82	10.91	12.82	8.83
	21 - 30	125	1.1	15.58	11.11	13.57	10.19
	More than 30	219	1.9	15.68	10.46	13.90	9.51
Being Supported by Supporting Institutions	No	10797	91.7	13.80	10.24	12.14	8.97
	Yes	978	8.3	12.32	9.29	10.83	8.89

Considering that the significance level of Box's M test is greater than α = 0.05, the assumption of homogeneity of the variance and covariance matrix of the variables is valid. Leven's significance of verbal aptitude (P < 0.05, F = 1.76) and mathematical aptitude (P < 0.05, F = 1.45) are both greater than the significance level of α = 0.05; therefore, the assumption of equality of variances between groups is valid.

Table 7.
Tests of Between-Subjects Effects Economic Factors

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power[c]
Family Income	Verbal Aptitude	1815.180	6	302.530	2.938	.007	.002	.904
	Mathematical Aptitude	1895.867	6	315.978	3.951	.001	.002	.973
Being Supported by Supporting Institutions	Verbal Aptitude	249.368	1	249.368	2.422	.120	.000	.343
	Mathematical Aptitude	1.470	1	1.470	.018	.892	.000	.052
C1 * C2	Verbal Aptitude	1434.369	6	239.061	2.322	.031	.001	.810
	Mathematical Aptitude	1186.906	6	197.818	2.473	.022	.001	.838

The results of the MANOVA in Table 7 show that there is a significant difference in verbal and mathematical aptitudes based on the income of the families ($P < 0.05$). However, there is no significant difference in verbal and mathematical aptitudes based on whether or not one is a member of a supporting institution ($p > 0.05$). Also, the linear combination of the two investigated economic factors has a significant role in the verbal and mathematical aptitudes of students ($p < 0.05$).

Discussion

According to the results, most of the students (73%) were studying in government (public) schools and only 11.7% were studying in non-profit schools. These results indicate that most students in Iran use the services of public schools; therefore, it is necessary for the policies of the country to support and equip these schools more. Also, according to these results, it can be stated that non-profit schools have not yet been able to expand as needed due to various reasons such as high tuition fees, high start-up costs, strict licensing, etc.

Most participants' mothers (81.9%) and fathers (75.1%) had a high school diploma degree or less indicating the low level of literacy of the students' parents, which can lead to different problems, such as the low ability to help the students complete their homework or solve their deficiencies and shortfalls, and so on. Therefore, it is necessary to improve the quality of education in schools, especially in those schools where the parents of the students have little literacy because, in such families, parents cannot play an effective role in compensating for educational deficiencies. Most mothers (85.9%) were housewives, which indicates the subordinate role of mothers in the country's employment rate and also their low rate of social activities. It seems that one of the reasons why the majority of the participants' mothers were housewives can be their low level of literacy. Most of the fathers (39.8%) were freelancers, which indicates that fathers prefer freelance jobs for various reasons, such as low literacy, low salary rate for employees, the non-availability of government or service jobs, etc.

The family income of most of the participants (72%) was less than 6 million toman per month, which shows that, according to the cost conditions of the households, most of the students' families were not in proper economic conditions. This issue can be one of the reasons why parents do not choose non-government schools. On the other hand, low family income can be an obstacle to students attending extra classes and buying educational supplementary materials. This issue would lead to educational discrimination. Perhaps one of the reasons for low family income is the low level of parents' education and the lack of employment of most parents, especially mothers.

About 73% of the students did not use other educational extra classes (outside of school), which can be due to various reasons, especially the low income of families and parents' lack of perceived need for compensatory classes due to their low level of literacy. More than 58% of the students did not use educational aids and self-help books, which can be due to the low income of the families and their financial problems or the low cultural and social level of the families. however, 92% of the students said their parents were attentive to their education and followed their educational affairs, so it can be concluded that the reason why the students did not use the classes, educational aids, and self-help books is something other than the parents' lack of sense of responsibility, and as mentioned before, economic, cultural, and social problems can be among these reasons. About 40% of the students said that their parents did not help them in the field of education and homework or they couldn't help them, and the possible reasons for this can be the parents' low literacy and their

full engagement in daily activities, especially those related to family livelihood. According to these results, the duties of schools, especially in underprivileged areas, are to hold free extra classes for the students in schools and to address the academic problems of the students in underprivileged schools.

The results of the research showed that among the family factors, the mother's education level has an effect on the verbal and mathematical aptitudes of the ninth-grade students. In this way, there is a significant difference between the verbal and mathematical aptitudes of students whose mothers' education levels were master's or Ph.D. and those whose mothers were illiterate or had basic literacy. Of course, it should be noted that this difference is very prominent, but not much, as the maximum difference is 2.92. This shows the low but significant effect of parents' education level on students' performance in the academic aptitude test. Students whose parents attach too much importance to the student's academic issues are not different from those whose parents attach too little importance to the student's academic issues.

On the other hand, according to the obtained results, parents' occupation did not have a significant effect on the students' performance in the scholastic aptitude test. These findings indicate the subordinate role of family factors in the students' scholastic aptitude. But it should be noted that the family, as the first and most important base of a student's individual life, plays an essential role in developing the children's aptitudes. A rich and persistent family environment that: pays special attention to the children's needs; tries to provide suitable conditions for children's education and growth; is more connected to the educational environment, and is more concerned about the academic and educational affairs of the students usually succeeds in developing the children's scholastic aptitude. In an ideal state, children's talents are first identified at home and school, and the children are encouraged to participate in experiences that develop these talents. From a young age, children are usually involved in experiences that help them recognize the strengths of their emerging aptitude, set short-term and long-term educational and career goals, and enroll in those educational experiences and curricula that are within their learning abilities.

Parents can play an essential role in stimulating students to reveal their talents in a way that literate, studious, and persistent parents can bring out the hidden talents of the students by posing them to challenging and problem-oriented issues and by creating conditions that require genius and talent. To the extent that the cultural investment of parents can lead to the creation of a talented generation (Rasmussen & Rasmussen, 2015). On the other hand, receiving rewards and reinforcements from teachers and parents for basic learning itself causes motivation to learn more, and this factor paves the way for the development of hidden talents. So, talented people receive more rewards compared to people who are in the normal range (Gagné, 2004). In this regard, Rasmussen and Rasmussen (2015) concluded that students who have stable family relationships and whose parents have relatively high social status and education possess higher aptitude. Also, Vopat (2011) and Gagné (2005) have mentioned that, besides genetics, the importance and decisiveness of the role of the environment, including the family, in having aptitude.

Other results of the research showed that among the educational factors, the type of school, the place of study, and the use of educational extra classes have a significant effect on students' verbal and mathematical aptitudes, so that students who study in non-government schools performed better in the scholastic aptitude test. Also, the students who used educational extra classes performed better in the academic aptitude test. Of course, it should be noted that the difference between the students who were studying in public and non-government schools was not very significant. Also, the most significant difference was between the students who used educational extra classes and those who did not. This statistic shows the low impact of educational factors on students' performance in the scholastic aptitude test. Therefore, educational factors such as studying in non-government schools with high facilities, the use of compensatory and educational assistance classes, as well as the use of educational supplementary materials, can slightly affect the performance of the students in scholastic aptitude tests. Nonetheless, they cannot have a prominent role, which shows the important role of heredity in scholastic aptitude.

Definitely, we cannot deny the impact of environmental factors, especially educational factors. Although environmental and heredity factors can affect the students' performance in scholastic aptitude tests, it seems that the role of heredity is more prominent. In confirmation of these results, Bourdieu and Passeron (2017) stated that rich educational resources can improve scores on the scholastic aptitude test. Gagné (2005), along with heredity, mentioned the important and effective role of environmental factors (of which the educational environment is one dimension) in the emergence of talent. In this regard, Rasmussen and Rasmussen (2015) stated that educational factors can play a role in the development of scholastic aptitude in terms of human resources (teachers, consultants, principals, etc.), facilities, laboratories, challenging and attractive courses and content, rich textbooks, and dynamic and problem-oriented educational and curricular programs. Therefore, it should be noted that

the high heritability of talent does not mean that environmental influences are unimportant. Thus, to achieve exceptional levels of ability, practice and effort are necessary, even for those who have genetic potentials for developing their talent.

Moreover, the results of the research indicate that economic factors (family income level, coverage by supportive institutions) have an effect both on the students' verbal and mathematical talents. There was a significant difference between the performance in the scholastic aptitude test of the students whose family income was more than 20 million tomans per month and the students whose family income was less than 10 million tomans. The students whose families had more income showed better performance. Of course, this difference was not very prominent. Moreover, the students who were in absolute poverty and were under the supervision of supportive institutions had a weaker performance in the scholastic aptitude test than the students who were not in absolute poverty. Generally, based on the research results, those students whose family income is high and who are not covered by supportive institutions such as the Welfare or Relief Committee (are not in absolute poverty) perform better in the scholastic aptitude test. However, the students whose family income is low and who are in absolute poverty (that the government should give minimal help to their families to survive) perform poorly in the scholastic aptitude test.

In confirmation of these results, Rasmussen and Rasmussen (2015) stated that children who have prosperous families show higher scholastic aptitude. Feldhusen (2005) added that children from poor families may be deprived of many stimulating and excellent educational experiences, and as a result, they are constantly impaired in the progress and development of cognitive abilities. Bourdieu (1997) believed talent is the product of the investment of time and cultural capital in an embodied state. It should be noted, as said, that the role of economic factors in the performance of the scholastic aptitude test is significant but not very high. This shows that the economic factor, as one of the environmental factors, plays a small role in the performance in the scholastic aptitude test, and it seems that other factors, especially heredity, play a more prominent role. Therefore, it is important to pay attention to the fact that placing the student in a rich cultural, social, educational, and economic environment can play a role in the emergence of scholastic aptitude.

Conclusions

According to the research results, it can be said that environmental factors do not play a critical role in the scholastic aptitude of students, which indicates that the existence of scholastic aptitude is more of an inherent characteristic and potential ability and is not much influenced by the environment, instead it is the "development" of talent which is influenced by the environment. Therefore, it can be concluded that the existence of scholastic aptitude, potentially, is more of an internal and inherent characteristic and having a scholastic aptitude requires an inherent and innate potential that must exist inside a person. Talent is more intrinsic than experimental and acquired, and the environment plays a more critical role in the development of talent than the formation or existence of it. The genetic potential of talented students interacts with environmental experiences and causes the creation of learning and school achievements at above-average or very high levels (Feldhusen, 2005; Wachs, 1992). High heritability does not mean that environmental influences are unimportant. Practice and effort are necessary to achieve exceptional levels of ability, even for those with genetic potential for developing talent. However, differences in genetic structure determine individual differences in talents. High levels of performance do not automatically follow God-given talents meaning that, for example, a person may be born with high levels of talent, which are their innate potential but remain unknown due to lack of education and inappropriate environment.

Only a few students have their talent mainly developed when they enter adulthood (Piirto, 2015) because there are many obstacles in the way of its development. We all may remember some people who had extraordinary talent but did not want or could not develop it and use it because the environmental and educational conditions were not favorable for them. For example, a student who is affected by psychological traumas at home, such as divorce or poverty, may be so involved in those problems that they may not find the opportunity to develop their talent. In the absence of an appropriate family and the required factors affecting the development of talent (such as suitable curricular content and an encouraging atmosphere), it should be the school, a teacher, or a coach that identifies the student's talent and encourages them to pursue their studies or provides them with an experience that their parents could have done for the student if they were in a better situation. The influencing factors and individuals should try to create a mentality of talent development in the students so that they will try harder. Because if they reach the mindset that talent cannot be developed, they will make less effort to succeed and reveal their hidden talents.

The present study had some limitations: Due to the limited time and human resources, it was impossible to

perform the test individually, while the individual performance of the test, the type of reaction of the students, the response process, and their analysis could have provided the researcher with better information about the test. Also, due to the size of the statistical population and the spread of the Coronavirus at the time of the research, the conditions for conducting the test in person were not available.

Based on the obtained results, the following suggestions are made for the school consultants, parents, and school officials to manage and develop the students' scholastic aptitude:

- Parents who themselves have come to the conclusion that they do not have extraordinary scholastic aptitude in a field should not expect their children to be extraordinary in that field because an essential aspect of aptitude is hereditary.
- Parents should expect their students to have performance in scholastic aptitude tests according to their capacity and inherent potential.
- School consultants may identify the students with high scholastic aptitude who have poor family conditions from the economic, social, and cultural points of view and introduce them to charitable organizations with regard to educational affairs and pave the way for them to attend reinforcement classes and use educational aids.
- Government officials should try to strengthen the educational facilities and materials of government (public) schools.
- Points should be considered for the students from deprived areas about admission to higher-level schools and appropriate fields of study.
- Parents should spend as much time as possible to help the students and find the solution to their problems, and in case of inability in this regard, provide the conditions for their attendance in reinforcement classes and their use of educational aids.
- It is suggested that in future studies, the relationship between the performance of parents and children in scholastic aptitude should be assessed in order to better specify the role of heredity in scholastic aptitude.

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