Association between general intelligence, creativity and wisdom in gifted adolescents: empirical findings from a non-western country

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Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

Authors Contribution

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Alireza Abadi, Mohsen Rajabi and Mahdi Olamafar. The first draft of the manuscript was written by Mohsen Rajabi and all authors commented on previous versions of the manuscript. Masoumeh P. Tajrishi developed the initial idea, advised on the search criteria, and supervised this Master's dissertation at the University of Social Welfare and Rehabilitation Sciences. All authors read and approved the final manuscript.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Social Welfare and Rehabilitation Sciences (SWRS) Research Ethics Committee (Ref: IR.USWR.REC.1398.192) and national research committee and with the 1964 Helsinki declaration and its later amendments.

Availability of data and material

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Abstract

The links between general intelligence, creativity and wisdom has been widely investigated and documented over the past years. However, there is currently no consensus on how these constructs are related among gifted students. In this study, we aimed to explore the intersections of general intelligence, creativity, and wisdom among sample of gifted adolescent students in Iran. In the academic year of 2019-2020, 532 talented male secondary students aged 15 to 18 studying in private high schools were selected using a purposive sampling method. In total, 70 students who scored 120 or more on the Raven's Advanced Progressive Matrices, were recognized as gifted and asked to complete the Abedi-Schumacher Creativity Test and the Three-Dimensional Wisdom Scale. The results indicated that there is a positive and significant correlation between creativity and wisdom (r =.53, p < .001). However, the correlation between general intelligence and wisdom (r = .15, p = .05), and the correlation between general intelligence and creativity (r = .17, p = .05) did not turn out to be meaningful. With regard to the links between creativity and wisdom, it could be concluded that creativity and its development have an important role in the development of wisdom leading to a successful and satisfying life. Future research studies in gifted education, therefore, should prioritize creativity as an attempt for students to achieve development and growth. The current study enriches the empirical research on the interplay between general intelligence, creativity, and wisdom in gifted adolescents living in Iran.

Keywords: adolescence, intelligence, creativity, wisdom, gifted students, non-western

Introduction

Intelligence and creativity, intrinsically, are widely considered as positive traits. Some scholars (Kampylis and Valtanen 2010; Dollinger et al. 2007) include societal benefit in definition of the creativity and argue creativity is associated with benevolence and is grounded in values. Yet some studies have placed less of an emphasis on positive traits of creativity and found creativity to be correlated to dishonesty (Gino and Ariely 2012), lack of integrity (Beaussart et al. 2013), envy (Breidenthal et al. 2020), and deception (De Dreu and Nijstad 2008). Similarly, although general intelligence is strongly positively associated with openness (Furnham et al. 2007; Harris et al. 2019; DeYoung et al. 2014; Gignac et al. 2004) and general cognitive ability (Kovacs and Conway 2019), it has indicated no associations with positive constructs in personality such as agreeableness or emotional stability (Bipp et al. 2008). Despite dark side of intelligence and creativity, which can be used for a vast range of negative behaviours (Runco 2019; Gill et al. 2013), across the human lifespan, they have been a prominent feature of human development, beneficial inventions or medical advances to make life much easier for human beings. Previous findings (Glück 2020a; Sternberg 2007) highlight that wisdom is a crucial factor which draws upon intelligence and creativity in the development of optimum solutions to complex problems. Wisdom is generally considered as a multifaceted concept that consists of cognitive, reflective, and affective components (Takahashi and Overton 2002). Wisdom integrates the ability to reflect on complicated subjects in a complex way with certain intellectual capacities and personality facets (Glück 2020a). Sternberg (2003) believed that creativity and intelligence are often studied in isolation from other conceptually related constructs and principal mental skills, however they are closely related concepts, especially intelligence and wisdom. While these three attributes would seem to be interrelated, it is less clear which of the two

constructs of intelligence and creativity play a fundamental role in the development of wisdom.

General Intelligence and Creativity

The concept of intelligence corresponds to an extremely complex reality and is manifested under various aspects (Lynch and Kaufman 2019). Previous authors considered intelligence a general factor or trait which is manifested in a wide array of behaviours (Todd and Bohart 2005; Fiori and Vesely-Maillefer 2018). According to Wechsler (2008), intelligence is the aggregate capacity of the individual to act purposefully, to think rationally and to deal effectively with the social environments and abstract issues. This is the most widely used definition of intelligence. Generally, intelligence is the ability to consciously and actively adapt to the new circumstances and conditions. Since new circumstances are complex and variable in nature, it could be predicted that different types of intelligence have the same variety and complexity (Chamberlin and Chamberlin 2010). Spearman (1904) first described general intelligence as an entity, *g*. Considering various tests, he realized that there is a general factor (*g*) for people's success and he labeled it general intelligence. He believed that g-factor is that part of mental capacities which is the prerequisite for success in all aspects (Lynch and Kaufman 2019).

The term used today as giftedness refers to general intelligence (Simonton 2021). Given the expansion of science and previous research, the term giftedness is applied to not only education and getting high grades but also to its other aspects and dimensions. In the public opinion, however, the term giftedness is used for those students with better academic achievements. In consequence, it is observed that many students in gifted schools have no successful experiences and enter the society by getting high grades. In some cases,

these students even experience psycho-social challenges, psychological distress and high levels of anxiety (Stoeger et al. 2018).

Creativity or creative intelligence is another term which has attracted researchers, psychologists, and pediatricians for school-aged children with special needs (Kronfeldner 2009; Shevlin 2021). As Brockman (1993) highlights, creativity is an effort to find the unknown in every field, being original, and developing different solutions to every new problem, and new encounters. Most researchers in this field strongly agree that to be creative something must be both (a) novel/original and (b) useful/beneficial/valuable (Kaufman 2016; Simonton 2012). Intelligence does not always result in creativity and a person with creative intelligence might lack an overall high general intelligence, and vice versa (Besançon et al. 2013). It should be highlighted that creativity and general intelligence are separate concepts and some studies have confirmed very weak (Guignard et al. 2016; Miller 2016) or no correlation between these constructs (Lynch and Kaufman 2019; Guignard et al. 2016). As such, general intelligence and creative intelligence can be investigated as separate constructs.

Creativity also includes the talent for identifying visual objects and non-predefined concepts. In other words, creative intelligence is the main basis for great achievements which is used individually and allows people to grab the best option among the available solutions through selective thinking, analogies and metaphors (Houtz 2003). Consequently, creative thinking encompasses specific dimensions of art, science and technical activities. When a person shapes or improves social innovations, it is considered they possess a high quality of life and have helped improve their personality development (Maslow 1954). The main recurring finding that can be found through review of the creative person or creative

actor is that high levels of openness to experience is associated with higher levels of creativity (Feist et al. 2017).

Wisdom

Wisdom is generally perceived in older adults and is fortified through the life experience; therefore, research findings have not provided ample evidence about the development of wisdom in childhood and adolescence (Asadi et al. 2019). However, Strenburg (2001) has suggested that wisdom should be instructed in schools as wisdom-related attitudes begin to steeply increase during adolescence (e.g., Staudinger and Pasupathi 2003). Lynch and Kaufman (2019) explain wisdom should be considered as an exceptional level of human functioning, which is obviously distinct from social intelligence and creativity. Wisdom contains the balanced intersection of motivational and intellectual capacity in conjunctions with interpersonal interactions, including the skills to listen, appraise, and give advice (Baltes and Staudinger 2000). There are five key factors that commonly appear across definitions of wisdom: (a) social decision-making and life knowledge, (b) prosocial behaviors and altruism, (c) contemplation and self-knowledge, (d) dealing with ambivalence, and (e) emotional equilibrium and self-regulation (Bangen et al. 2013). Indeed, a wise person seeks to live a good life and helps others to do the same (Ardelt 2003; Yang 2013; Schwartz and Sharpe 2006). From a social perspective, being wise is useful both for the person and people who live in the community (King et al. 2004).

Some studies have shown that general wisdom-related knowledge and wise reasoning are subject to the particular circumstances and positions and, therefore, are less likely to remain stable compared to personal wisdom (Ardelt et al. 2019; Grossmann et al. 2016). As such, Sternberg (2004) suggest that teaching for wisdom should aim to cultivate personal

wisdom rather than general wisdom to have enduring impacts (Sternberg et al. 2008). Sternberg (2001) highlighted the necessity to include wisdom in school education curriculum. This is one of the first academic endeavor which have expressed the idea of teaching wisdom thorough formal education for school-aged adolescent. His study, which provides a short scientific history of wisdom (the Balance Theory of Wisdom), explains the vital benefits of teaching wisdom in the contemporary era for school-age adolescents. Secondary schools need to teach for wisdom and develop wise and ethical leaders, not just smart ones (Sternberg 2019; Ferrari and Kim 2019; Uge et al. 2019; Kironoratri 2020). Numerous studies have recently highlighted that wisdom helps young people succeed and improves their quality of life, promotes a profound understanding of what matters in their life, and cultivates a deep curiosity about their external environment (Glück 2020a).

Empirical Studies of Intelligence, Creativity, and Wisdom

Unfortunately, there have been few attempts to explicitly investigate all these three constructs together (Sternberg et al. 2019; Lynch and Kaufman 2019). Here, we will briefly review some exceptions that studied the links between general intelligence, creativity and wisdom.

Sternberg (1985) recruited participants from around the US to investigate the characteristics of intelligence, creativity, and wisdom. The results suggested a correlation of 0.42 to 0.78 between wisdom and intelligence and of 0.24 to 0.48 between wisdom and creativity. These findings confirm the concept of wisdom is closer to intelligence than creativity. However, it seems that wisdom is conceptually different from intelligence and creativity. Sternberg revealed that intelligence and creativity are activated by intrapersonal interests whereas wisdom is activated by the desire to serve the common good. Sternberg

et al. (2009) shared their many years of experience teaching wisdom, creativity and intelligence to achieve a successful life, based on complementary balance theories about each construct. They stated that "in order to become successful members of the community, students must develop wisdom-related thinking skills". The authors concluded that wisdom-related thinking skills should be included in the school curriculum by assuming that: a) the purpose of school was to pave the way for students' success in life, and b) higher degrees of wisdom in the face of ambiguous daily problems help individuals in childhood and adolescence and in the future throughout adulthood to make the right decisions and critically reflect upon oneself. In 2009, Tekin and Taşğin investigated the links between creativity and intelligence in 121 gifted students of 5th and 6th grade in Turkey. The results suggested that parents' level of education is of great importance. In addition, giftedness was composed of several features. Gifted students seemed to have high intelligence, creativity and a sense of responsibility in performing their duties in functional domains. Similarly, Guignard et al. (2016) explored the relationship between intelligence and creativity in gifted and non-gifted children. The links between intelligence and creativity was investigated using the Wechsler Intelligence Scale for Children-fourth edition (WISC-IV) and EPoC (Evaluation of Potential Creativity) to measure intelligence and creativity in 338 French school-age children (118 gifted and 220 non- gifted children with an IQ of lower than 120). The results suggested a weak correlation between intelligence and creativity. In addition, there was a strong correlation between integrated verbal thinking and perceptual reasoning or processing speed. These results showed that in discussions of intelligence, instead of focusing on general intelligence, giftedness should be conceptualized as a high ability in a specific cognitive domain, and intellectual intelligence (giftedness) and creative intelligence (creativity) had to be differentiated.

The link between creativity and wisdom has been also investigated in a sample of young adolescents in recent years. For example, using a mixed method approach, Płóciennik (2018) aimed to identify and analyze specific manifestations of wisdom in 369 Polish school-age children, during mental activity involving open tasks. The research findings revealed that creativity is one of the predictors of wisdom in children. The results also suggested that wisdom was typically associated with the post-formal period of human development and resulted from an individual's accumulation of human life knowledge and professional experiences. Thus, people become curious and such questions as 'Can one understand wisdom?', or 'What signs might indicate wisdom in children?' arise in their mind.

Studies to date have shown that intelligence and creativity are distinct and non-correlated components (Sternberg 2003; Guignard et al. 2016). However, recent findings on the concepts of intelligence, creativity and wisdom confirm that these constructs are distinct in a limited sense and have some semantic commonalities in a broader sense (e.g. Sternberg and Kaufman 2019). These studies revealed that some semantic relations and correlations between general intelligence, creativity, and wisdom can be observed in children and adolescents. However, more research seems necessary to determine which of the two constructs of intelligence and creativity is more strongly related to wisdom.

While the existing evidence on the relationships between intelligence and creativity with wisdom is very limited and sparse (Lynch and Kaufman 2019), there is even less research and focus on how these three constructs correlate among gifted adolescents. Although there has been some efforts to explore the relationships between these constructs, no study has yet investigated the associations between general intelligence, creativity and wisdom in a sample of gifted adolescents living in non-Western countries. A

key limitation of the the existing literature is that investigations on general intelligence, creativity and wisdom are widely conducted in Western, Educated, Industrialized, Rich, and Democratic (WEIRD) participants (Park and Kim 2021; Asadi et al. 2019). Given the importance of considering cultural differences in wisdom-related performance (Ferrari and Alhosseini 2019; Yang and Intezari 2019), and partial consistency of findings in the extant literature, additional analyses of the intersections between general intelligence, creativity and wisdom in non-Western cultures will elucidate important patterns for future studies in this field.

Method

Participants

Using purposive sampling method (Hulley 2007), 70 gifted students aged between 15 and 18 years were recruited from different high schools in Tehran, Iran. Data were collected in the academic year of 2019–2020. The following demographic characteristics were reported by the students: age, grade point average (GPA) score (Mean = 3.8), household income, and school type. In this study, the mean age of participants was 17.8 (SD = .73) and most participants (72.9%) were from independent schools. The study was also approved by the University of Social Welfare and Rehabilitation Sciences (USWR) Research Ethics Committee, and it was launched on 21 October 2019 in Tehran, Iran.

Measures

Raven's Advanced Progressive Matrices (RAPM; Raven 1965). The RAPM was first developed by Raven in 1938 and the revised version was used in 1956 to measure the general intelligence factor (g). It is a 60-item test each with a missing element. The test-

taker is given six to eight choices to pick from and fill in the missing piece. Each correct answer is scored according to the answer key. The participant's total score is reported in percent considering the total score and participant's age and then the intelligence quotient is calculated. The participants were classified into 7 groups based on their IQ scores or total scores. IQ scores were categorized as very superior, superior, high average, average, low average, borderline and mentally retarded. In a study on 2561 students aged between 12 and 18, Chamorro-Premuzic and Furnham (2008) confirmed the reliability of 0.88 to 0.99, 0.76 to 0.93 and 0.80 to 0.82 using split-half, test-retest and Kuder–Richardson methods.

The Abedi-Schumacher Creativity Test (CT; Abedi 2015). The Abedi-Schumacher Creativity Test contains 60 3-point scale and was developed based on Torrance's theory of creativity (Torrance 1993). It was conducted on 650 students and normalized in Tehran (Almeida et al. 2008). This questionnaire consists of four subscales or components: fluidity (items 1 to 22), extension (items 23-33), originality (items 34-49) and flexibility (items 50-60). In each item, 0, 1 and 2 indicate low, medium and high creativity, respectively. The total score obtained in each subscale indicates the participant's score in that section and the total score for the four subscales shows the total score of creativity. The total score of creativity ranges from 0 to 120. The scores 100-120 indicate very high creativity, 85- 100 high creativity, 75-85 medium creativity, 0-75 low creativity and lower than 50 very low creativity. In the study by Abedi (2011), the validity coefficients of the subscales (fluidity, extension, originality and flexibility) were 0.85, 0.80, 0.82 and 0.84, respectively, using retest. The internal consistency coefficients of the subscales using Cronbach's alpha were 0.75, 0.61, 0.61 and 0.66, respectively, for fluidity, extension, originality and flexibility. In this study, Cronbach's alpha coefficient for the creativity subscales was 0.87.

The Three-Dimensional Wisdom Scale (3D-WS; Ardelt 2003). Wisdom was assessed by the cognitive, reflective, and affective dimensions of the 3D-WS. This is a 39-item test with 14, 12 and 13 questions measuring cognitive, reflective and affective dimensions, respectively. Participants answer the questions on a 5-point scale (strongly disagree=5, disagree=4, neither agree nor disagree=3, agree=2, strongly agree=1). Items 1, 2, 3, 5, 6, 12, 17 and 20 are scored inversely. To calculate the score of each subscale, the scores for all items in the subscale are summed up. To calculate the total score of the questionnaire, the scores for all the items in the questionnaire are summed up. The minimum and maximum scores in this scale are 39 and 195. The higher the score obtained in this questionnaire, the wiser is the test-taker and vice versa. Ardelt (2003) reported the reliability of the questionnaire ranged from 0.71 to 0.85. Reliability of the questionnaire was between 0.75 and 0.84 according to ordinal theta. The total reliability was 0.69 according to ordinal alpha. A Cronbach's alpha coefficient of 0.79 was obtained for the wisdom subscale.

Procedures

Data collection consisted of two separate phases. In phase one, 532 talented students were tested with the RAPM. This phase was conducted by a trained examiner in a suitable, quiet, and simply decorated classroom. Before the test started, the examiner made an effort to establish rapport with each student. The RAPM administration took approximately 45 to 50 minutes to complete. When scoring finished, 70 students with an IQ of 120 and higher were selected as gifted students and eligible for the next part of the study. In the second phase, the examiner administered the CT and the 3D-WS to gifted students. Test administrations followed the standard procedure for each test, as described in the respective manuals. The CT required 40 minutes and the 3D-WS required 35 minutes. It is worth mentioning that to

reduce bias in answers, the objective of the questionnaire was not discussed with the participants.

Data Analysis

The analysis strategy included three steps. In the first step, outliers were detected and deleted and the normality and multicollinearity of the variables were assessed. Next, we reported descriptive statistics (mean and standard deviation) for each variable. Pearson correlation coefficient was carried out between all variables to ensure that there are significant correlations between variables in order to conduct the regression analysis. In the third step, to assess the normality of the research data, the one-sample nonparametric Kolmogorov-Smirnov test was used. Then, regression analysis was used to find out whether there was a relationship between general intelligence and wisdom, and between creativity and wisdom. The level of statistical significance was set at $p < .05$. All analyses were conducted using IBM SPSS 26.

Results

Socio-demographic characteristics of study participants are presented in Table 1. Descriptive indices including mean and standard deviation of participants for general intelligence, creativity, as well as wisdom and its components are listed in Table 2. [*Table 1 and 2 near here*]

Table 1

Socio-demographic Characteristics of Participants

Characteristics	N (%)
Age	

	Mean (SD)	17.81 (0.73)
	15 years	7 (10)
	16 years	23 (32.8)
	17 years	21 (30)
	18 years	19 (27.2)
Household Income		
	Low	2 (2.8)
	Middle	11 (15.7)
	High	38 (54.4)
	Very High	16 (22.8)
	Prefer Not to Say	3 (4.3)
School Type		
	State	9 (12.8)
	Independent	51 (72.9)
	Special Provision	10 (14.3)

Table 2

Mean and Standard Deviation of Intelligence, Creativity, Wisdom and Their Components

Variable		Mean (SD)	Min	Max
Intelligence		126.76 (4.96)	120	136
Creativity		84.70 (13.32)	54	112
	Fluidity	21.95 (3.46)	14	29
	Originality	19.95 (4.39)	9	29
	Flexibility	21.95 (3.46)	10	30
	Extension	21.77 (3.35)	15	28
Wisdom		133.90 (16.34)	99	170
	Cognitive	48.35 (6.62)	34	66
	Reflective	41.31 (6.20)	30	55
	Affective	44.22 (6.64)	20	59

Given the results listed in Table 2, among intelligence, creativity and wisdom, the highest and the lowest standard deviation among the three variables belonged to wisdom and intelligence, respectively. To answer research questions, i.e. to determine the relationship of the components of creativity with wisdom and the relationship of intelligence with the

components of wisdom, Pearson correlation coefficient (correlation matrix) was used. Table 3 summarizes the results of the analysis. [*Table 3 near here*]

Table 3

Correlation Matrix of The Research Variables

Variables	1	2	3	4	5	6	7	8	9	10
1. Intelligence	1									
2. Creativity	*0.174	1								
3. Fluidity	*0.229	**0.787	1							
4. Flexibility	*0.022	**0.873	**0.533	1						
5. Originality	*0.191	**0.909	**0.684	**0.715	1					
6. Extension	*0.174	**0.809	**0.491	*0.652	**0.643	1				
7. Cognitive	*0.204	**0.521	*0.519	*0.348	**0.559	**0.340	1			
8. Reflective	*0.115	*0.490	**0.460	**0.376	**0.487	*0.334	*0.608	1		
9. Affective	**0.062	**0.340	*0.294	0.224	*0.294	**0.363	**0.530	**0.532	1	
10. Wisdom	*0.151	**0.535	**0.504	**0.375	**0.531	**0.412	**0.852	*0.842	*0.824	1

Note. ** Correlation is significant at $p < .001$
* Correlation is significant at $p < .05$

As shown in Table 3, there was a significant correlation between creativity and wisdom (r = .53) at $p < .001$. There was no significant correlation (r = .15) between general intelligence and wisdom at $p < .01$. In addition, there was no significant correlation (r = .17) between general intelligence and creativity at $p < .01$. The strongest correlation was between the originality dimension of creativity and the cognitive subscale of wisdom (r = .56) and no correlation was found between the flexibility dimension of creativity and intelligence (r = .02). The relationships between the other subscales and variables are shown in the table 3.

In order to assess the normality of the research data, the one-sample nonparametric Kolmogorov-Smirnov test was used. The results are shown in Table 4. [*Table 4 near here*]

Table 4

The One-sample Nonparametric Kolmogorov-Smirnov

	Kolmogorov–Smirnov test		
	Item	Degree of freedom	Significance level
Intelligence	0.146	70	0.001
Creativity	0.082	70	0.200*
Fluidity	0.094	70	0.200*
Flexibility	0.130	70	0.005
Originality	0.108	70	0.043
Extension	0.087	70	0.200*
Wisdom	0.094	70	0.200*
Cognitive	0.074	70	0.200*
Reflective	0.103	70	0.061
Affective	0.070	70	0.200*

Note. * Lower significance level

a. Lilliefors significance correction

According to Table 4, scores have a normal distribution except for intelligence and the flexibility dimension of creativity. In order to examine the links the constructs, regression analysis was used to find out whether there was a relationship between general intelligence and wisdom, and between creativity and wisdom. The regression relationship between wisdom and creativity is shown in Table 5. The regression relationship between wisdom and components of creativity is shown in Table 6. Since there was no significant relationship

between intelligence and wisdom, no model was suggested for it. According to the results, creativity is more related to wisdom than general intelligence. [*Table 5 and 6 near here*]

Table 5

Regression Relationship Between Creativity and Wisdom

Model		Unstandardized coefficients		Standardized coefficient	t	p value
		B	Standard error	Beta		
1	Constant	78.301	10.768		7.272	<0.001*
	Creativity	0.656	0.126	0.535	5.226	<0.001*

A. Dependent variable: wisdom scores

Table 6

Regression Relationship Between Wisdom and The Dimensions of Creativity

Model		Unstandardized coefficient		Constant	t	p value
		B	Standard error	Beta		
1	Constant coefficient	75.476	12.813		5.890	<0.001*
	Fluidity	1.225	0.662	0.260	1.852	0.069
	Flexibility	-0.302	0.572	-0.082	-0.528	0.599
	Originality	1.236	0.653	0.332	-1.891	0.063
	Extension	0.606	0.694	0.125	0.874	0.385

Discussion

The aim of this study was to determine the relationship between general intelligence and creativity with wisdom in gifted adolescent students. The results suggested that there was a significant positive relationship between creativity and all its dimensions except for flexibility and wisdom. These findings, which are in line with those of some other studies (Płóciennik 2018; Guignard et al. 2016; Sternberg 2003; Sternberg 1990), indicate the significance of creativity in the growth and development of wisdom in gifted adolescents. The significant positive relationship between creativity and wisdom in students highlights that in gifted students, general intelligence does not necessarily bring intellection and creates the indicators of success in them. However, creativity and its cultivation can lead to intellection. In fact, general intelligence alone does not suffice to cultivate wisdom, and creativity is pivotal to and essential for wisdom. General intelligence could help cultivate wisdom in these people as a helping parameter together with creativity (Glück 2020a; Glück 2020b). Therefore, a specific amount of intelligence is necessary for wisdom, but it does not suffice for its manifestation. As mentioned earlier, Runco (2019) believes that in those schools that encourage innovation and creativity and value their students' creativity, students show more creativity which leads to intellection compared to those that focus on educational achievements or higher grades.

Adolescent students address a wide range of their needs by creating new and innovative solutions using effective and creative strategies such as creative thinking, divergent thinking and problem-solving skills. These creative strategies help them to tackle their weaknesses and improve their strengths by providing various techniques such as deep data encoding. In addition, classroom participation and extracurricular activities probably provide the ground for the development of the required skills in order to enhance their

creative, analytical, and practical abilities. Their problem-solving skills improve gradually by expanding these abilities, they move from problem solving to new ideas by utilizing creative thinking skills, and their creative thinking helps them overcome personal and educational challenges. To explain the creativity variable, we can say that adolescent students probably lack stereotypical thinking and, when they realize their strategies are not appropriate for learning, they ignore them and replace them with other strategies or organize materials in a creative way and then learn them. They think about various applications of information by reading materials and acquiring new information. They think of ways to promote better learning, how to use them in their personal life and their professions in the future. Overall, a wide range of creativity-related functions, including the ability to associate, combine, modify, or transform ideas will lead to the growth and development of wisdom in school-age adolescents.

Using their wisdom, students can profoundly perceive complex matters and if they lack sufficient information, they seek for more information instead of making hasty judgments or ill-informed decisions. This cognitive feature, which is a combination of insight, cognition and motivation, brings them success and improves their performance in early adulthood. In addition, they have the potential to reason well and think logically about new issues. Their emotional and motivational capabilities lead to the contemplative look. Instead of making hasty judgment and being controlled by intense emotions, they prefer to ruminate on people, the universe, and themselves, which is a prerequisite for today's world and success. Therefore, as considered in the present study, it is essential to identify the factors affecting development of students' wisdom which can increase their productivity, life satisfaction, and vitality both in the school environment and professional life.

The findings of the current study, which showed no significant relationship between general intelligence and creativity, failed to conform to the results of other relevant studies (Sternberg 2003; Sternberg 2001) that found a relationship between these constructs. A review of pervious studies on gifted populations can clarify how the results of this study did not support other relevant findings. Some researchers confirm that the relationship between intelligence, creativity and wisdom could be different in gifted and non-gifted samples. Through the study of gifted samples, Barron (1963, 1969) discovered that general intelligence had no strong correlation with creativity but a string correlation was observed in a sample of participants with average intelligence. Schubert (1973) and Weinstein and Bobko (1980) also observed that the correlation between intelligence and creativity varies with different ranges of IQ score. They confirmed that intelligence shows a weaker association with creativity in those who have higher IQ scores than participants with the lower IQ scores (Sligh 2003). Similarly, with a sample of 233 gifted students aged 8 to 12 in US, Hlasny (2008) indicated that there is no correlation between intelligence and creativity. Moreover, according to the threshold theory, a correlation exists between IQ scores and creativity at an IQ level of 120 whereas no correlation is observed between them at IQ scores below 120. Previous studies also suggested that intelligence in its general and traditional sense overlapped successful intelligence which is the basis of creativity and wisdom (Almeida et al. 2008; Sternberg 2018).

Study Limitations and Future Directions

Although this study provides valuable source of information about the links between intelligence, creativity and wisdom in gifted adolescents, it is not without its limitations. One of the limitations of the study is that it was conducted on male gifted adolescents from high

schools in Tehran, Iran. Therefore , caution should be exercised in generalizing the findings to other age groups, geographical locations, and female gifted students. In addition, generalizability of our findings is impacted given the results were possibly due in part to nonrandom selection of the sample, the possibility of sampling bias should be considered. It is suggested to conduct a similar study on female gifted students in high schools to compare the results. In future research, the different dimensions of intelligence should be examined using a different measure (such as Wechsler Intelligence Scale) and their relationship with the other construct-related variables.

Future investigations may have benefits in including public high schools in their research design and sampling strategy. Eason et al. (2009) highlight that students in private schools are more creative than those in public schools. Given this difference and the fact that this study was conducted in private schools, it is necessary to conduct a similar study to recruit eligible students in public schools.

Conclusion

To our knowledge, this is the first time that the links between general intelligence, creativity, and wisdom have been investigated in gifted students living in n non-Western culture. Given the complexity of factors associated with the development of wisdom in gifted students, understanding these factors will contribute to a better understanding of wisdom structures and can have significant implications for teachers to promote the progress of wisdom in gifted education. Using these findings, educators and teachers should have a strong incentive to identify and develop creativity and wisdom in young student to help them think constructively and behave wisely in their personal and professional life. In addition, specific training programs aimed at the identification and manifestation of wisdom

in practice should be developed in educational settings to change the way students think about and act in their lives. based on the results, we found creativity plays a substantial role in the development of wisdom, particularly among male gifted students. In this regard, schools and educational settings are also required to pay special attention to fostering creativity and facilitating creative problem-solving skills from early adolescence. Educational leaders and teachers should be more focused on students' psychosocial process, creatine thinking, and wisdom-related knowledge than higher grades and outstanding academic performance. What matters in the modern world is their successful and satisfactory life, which is largely independent of school grades and academic achievements.

Finally, this study provides a rich source of information for the Iranian research communities and gifted education to consider comprehensive approach for the development of creativity and wisdom among students. Also, the present study emphasized the importance of future research on the associations between these three constructs among gifted and non-gifted students around the world. It would be an interesting topic for the prospective studies to cover these constructs in young students from diverse cultural backgrounds.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Social Welfare and Rehabilitation Sciences (SWRS) Research Ethics Committee (Ref: IR.USWR.REC.1398.192) and national research committee and with the 1964 Helsinki declaration and its later amendments.

Consent to Participate

Informed consent was obtained from all individual participants (students and their parents) included in the study.

Availability of data and material

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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