



**Skills of Growth Mindset and Intellectual Humility,
the interaction with Leadership and Cooperation and their impact on society**

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Abstract

In a world that is constantly changing and evolving, it is imperative that we hark and carefully observe the changes that are occurring, and concurrently create the right conditions and build skills in our children. Transferable skills are necessary for their mental health development, but also, they positively contribute to their academic performance. The field of school psychology should include, in the field of its studies, the phenomenon of these skills and how they could be acquired within the school context. In this paper, four concepts are addressed that fall into the category of these skills: Growth Mindset (GM), Intellectual Humility (IH), Leadership and Cooperation. This study addresses three primary hypotheses: H1: Are the concepts of GM and IH competitive or complementary? H2: Is there a correlation between these two concepts and the concepts of leadership and cooperation? H3: If a correlation exists, what is the interaction effect on personal outcomes (Academic Performance) and on the wider society (Civic outcomes)?

In this study, participants, boys and girls, from 14 to 19 years old, were enlisted from 200 randomly selected schools, in 9 oblasts in Eastern, Southern, Central and Western Ukraine and approximately 8600 questionnaires were analyzed. The Transferable Skills Inventory (TSI) is a new tool to assess transferable skills in adolescents and youth. It is a self-reported questionnaire that assesses life skills. CFA analyses, using correlated, unidimensional, hierarchical and bifactor models and Structural Equation Modeling (SEM) models are used. Statistical analyses demonstrated that there is a highly positive correlation between the concepts of GM and IH, that enables a unified dimension of GM and IH. CFA analysis has also shown that the relationship between GM/IH and Leadership and Cooperation is positive and significant. SEM analyses showed there is a positive and significant relationship between the concepts and Academic outcomes, and a positive but not significant relationship between the three concepts and civic outcomes.

Introduction

As school psychologists, we have an obligation to keep pace with the demands of our time. In a world that is constantly changing and evolving, it is imperative that we hark and carefully observe the changes that are occurring, and concurrently create the right conditions and build skills in our children. These skills, the transferable skills, are necessary for their mental health development, but also, they positively contribute to their academic performance and, consequently, to have permanence of tenure.

Undoubtedly, it is as imperative to cultivate these skills in children, as it is to study other topics that fall within the scope of school psychology, such as learning or developmental disabilities. Therefore, the field of school psychology should include, in the field of its studies, the phenomenon of these skills and how they could be acquired within the school context.

In this paper, four concepts are addressed that fall into the category of these skills: Growth Mindset (GM), Intellectual Humility (IH), Leadership and Cooperation, as collaborative but as competitive concepts as well.

Firstly, the concepts of GM and IH are more individual-centered concepts contributing to the personal development. On the one hand, GM ensures that the individual can strive and demand something better while having self-confidence and seeking guidance, whereas on the other hand, IH promotes the idea of having a modest view of his/her beliefs and being able to review them. This seems competitive, but at the same time, the two concepts are complementary. They have to be able to reconsider their views if they desire something greater, as well as have confidence in themselves. It is required to discern where the limits of questioning are, without constantly eroding their self-confidence.

Secondly, how do these concepts relate to the more socio - central concepts of leadership and cooperation?

This study thus addresses three primary hypotheses:

H1: Are the concepts of GM and IH competitive or complementary?

H2: Is there a correlation between these two concepts and the concepts of leadership and cooperation?

H3: If a correlation exists, what is the interaction effect on (a) personal outcomes (Academic Performance) and (b) on the wider society (Civic outcomes)?

Growth Mindset

The implicit theory of intelligence states that individuals hold two types of beliefs, distinguishing them as a growth mindset (incremental theory) or a fixed mindset (entity theory) (Yeager & Dweck, 2012; Dweck & Leggett, 1988).

Growth mindset is the belief that an attribute is mutable whereas the fixed mindset is the belief that the intelligence or personality are unchangeable. Research in social and educational psychology indicates that mindsets shape meaning-making processes and give rise to different goals, motivations, and behaviors (Dweck, Chiu, & Hong, 1995). Mindsets are remarkably important because they make it possible to form people's motivation (Dweck, 2000; Dweck & Leggett, 1988; Murphy & Dweck, 2016).

These implicit theories are well-established predictors of resilience to challenges in educational contexts (Schroder, Yalch, Dawood, Callahan, Donnellan & Moser, 2017). Moreover, students with a growth mindset are better able to adjust to difficult academic transitions compared to those with a fixed mindset (Yeager et al., 2014). Students who value effort are said to have a growth mindset. They perceive ability as a malleable skill. Those who think intelligence is innate and immutable exert less effort to succeed and have a fixed mindset (permanent capacity).

This is the idea behind a growth mindset in learning (Dweck, 1999, 2007, 2010; Duckworth, 2007). Students who have a growth mindset believe that their intelligence is a quality that can be developed. They do not believe everyone is the same. Instead, they do believe that everyone can increase their intelligence through effort and education. Therefore, they spend their time trying to get smarter and not worrying about how smart they are (Dweck, 2008). In the growth mindset, they can dedicate themselves to the task of getting smarter. Those with a growth mindset understand that mistakes and effort are essential to learning. They, therefore, welcome challenges and seek critical feedback to help them learn (Dweck, 2008). Students with a growth mindset also state that they feel smart when they make an effort and improve with something hard or when they are helping someone else to learn (Dweck 2006). Thus, it is the growth mindset that helps students embrace the values that lead to intellectual growth. Students with a growth mindset endorse learning, mistakes, and effort in a way that promotes their achievement (Dweck, 2008).

Moreover, Ortiz Alvarado, Rodríguez Ontiveros & Ayala Gaytán (2019), in their research, found that the growth mindset had a positive effect on an individual's wellbeing, which meant that people with a growth mindset could achieve a better state of wellbeing. Furthermore, Burnette et al. (2020), stated that students with a growth mindset have higher levels of entrepreneurial self-efficacy and assignment perseverance.

Intellectual Humility

To begin with, I would like to distinguish the terms of General Humility (GH) and Intellectual Humility (IH).

IH, according to Davis et al. (2015), is a subdomain of GH. Even though GH is defined as an interpersonal attitude that is oriented towards others rather than the self, IH has a cognitive notion, meaning that it is focused on the intellectual domain, (Porter & Schumann, 2018) and it includes how people perceive and process information about themselves (Leary, 2018).

Therefore, IH is the keenness to recognize one's intellectual fallibility and address the gaps and appreciate others' intellectual strengths (Porter & Schumann, 2018; Leary, 2018), and act accordingly (Barrett, 2016). Hence, a person who is characterized with IH, and is open to the opposing view, has the motivation and curiosity to seek new and alternative ideas, is less defensive to disagreements and has a stronger emotional self-control when addressing information that is contrary to his/her beliefs and therefore, can facilitate conflict resolution (Porter & Schumann, 2018; Leary 2018; Davis et al., 2015; Zmigrod et al., 2018). To this person, what is most important is to get at the truth than to protect his/her thoughts or to honor himself/herself. In addition, as Church et al. (2015) underline, IH is placed in the middle between intellectual arrogance and intellectual diffidence or it can be considered as the Aristotelian mean between the vices of grandiosity and diminishment of one's ability (Zagzebski, 1996, cited in Krumrei-Mancuso, 2015).

Krumrei-Mancuso (2015) studied the relationship between IH and other prosocial variables and concluded that IH is associated with higher levels of (a) perspective taking and empathetic concern, meaning that one has the cognizance that people have different experiences and is able to see and understand another's viewpoint, (b) gratitude, (c) altruism, (d) benevolence, (e) universalism, and on the contrary she found (f) lower levels of power seeking. Altogether, these variables lead to social interactions with positive outcomes.

IH and GM in education

Research supports that GM might increase IH (Porter & Schumann (2018). Teachers and parents might believe that cultivating IH will probably decrease self-confidence and cause weakness, the opposite of mastery, nonetheless there is a correlation between intellectual humility, mastery behaviors and growth mindset (Burnette et al., 2013; Porter & Schumann, 2018).

As previously mentioned, students with IH are prone to pursue knowledge, understanding, and truth as a way of being knowledgeable and truthful. As a result, they are curious (Krumrei-Mancuso et al., 2019; Leary et al., 2017), they have the willingness to gain knowledge (Krumrei-Mancuso et al., 2019; Leary et al., 2017; Porter & Schumann, 2018) and a high motivation for learning (Haggard et al., 2018; Krumrei-Mancuso et al., 2019) and they also hold an open-minded way of thinking (Krumrei-Mancuso et al., 2019). Therefore, these students work hard to enhance learning and mastery (Porter et al., 2020). When they receive negative feedback, they act in order to redress their mistake and thus be better informed. Between material that is easy and challenging, they choose the one that will increase their knowledge. They endure difficult problems until they have the right answer (Porter et al., 2020). All these behaviors align with those within the concept of GM and how it is implemented in the context of education.

Cooperation

“Instead of viewing our world as a place to beat out everyone else, maybe it is time to look at the world as a place to cooperate” (Johnson & Johnson, 2013).

According to Johnson and Johnson (2013), when students work together with cooperation they learn more, remember longer, and have higher levels of social skills and psychological strength than students who work on their own or when the learning is based on competition.

Cooperative learning happens when students collaborate in learning, reciting, and practicing, so that everyone succeeds academically and personally. Positive interdependence is one of the most important aspects of cooperative learning. “It is the attitude that we are a team and we need each other to be successful. We work together for each other because we believe that together we are greater than the sum of our parts. Together we can accomplish more than we can each do alone” (Johnson & Johnson, 2013).

Laurian-Fitzgerald & Roman (2016) support that people who have the ability to work with others critically and creatively, who have the ability of conflict resolution, and can treat each other in a positive way are those who are going to have a bright working future.

Therefore, it is our obligation, as school psychologists, to foster students to master these important ideas and skills, these social skills and mindset skills, so that they will be prepared for life (Johnson and Johnson, 2013).

Leadership

In this study, I will address two aspects of leadership (a) Servant Leadership (SL) and (b) Transformative Leadership (TL), as social-oriented aspects.

The main role of a servant leader is to serve followers and achieve the goal of nurturing their personal growth and development by creating an environment where support, respect and demand is nourished (Chan, 2016). This, in turn, improves society (Barbuto & Wheeler, 2006, cited in Krumrei-Mancuso, 2018). A servant leader combines both the skill of IH and GM. IH offers the leader the ability to recognize the fallibility of his/her own viewpoint, thereby it gives him/her the opportunity to be open, understanding and respectful to the perspective and knowledge of subordinates and subsequently practice empathy (Krumrei-Mancuso, 2018). In addition, GM equips the leader effectively in serving and leading others for their improvement. A servant leader is a person who constantly learns for the reason that he/she had made a cognizant decision to serve others by evolving and enhancing his/her own skills of active listening, empathy, awareness, commitment to the growth of people, and community building among others (Chan, 2016).

The essence of transformative leadership is to transform or change. It includes the ability to inspire individuals to transform themselves and their world (Vealey, 2005).

Transformative leaders recognize challenges and seek change. They work with courage, hope, faith and optimism, in a context which is creative and interconnected. This change, that they work for, can be applied in organizations, schools or in the whole society (Shields et al., 2018) and they do it by putting into practice their values and concerns (Montuori & Donnelly, 2017).

The first step in this endeavor is to take a critical stance on issues of justice and democracy (Shields et al., 2018). Thus, TL begins by questioning the inappropriate use of power

and of privileges, which result in inequalities (Shields, 2010). What these transformative approaches have in common are that they incorporate the requirement for social improvement, for enhancing equity, and for a thorough reshaping of knowledge and belief structures (Shields, 2010). As William Foster (1986) claimed, leadership “must be critically educative; it can only look at the conditions in which we live, but it must also decide how to change them” (cited in Shields, 2010). Bennis (1986) wrote about the transformative power of leadership as being “the ability of the leader to reach the souls of others in a fashion which raises human consciousness, builds meanings, and inspires human intent” (cite in Shields, 2010).

Nevertheless, TL theorists argue that anyone can lead this change, and we can all contribute, consciously or unconsciously, to change the world we live in. As they express it, TL is “everyone and everywhere leadership, that is apparent in “everyday” activities, without demanding impressive gestures or contexts. And it begins by asking questions about what really matters, what it means to be human being, what human beings are capable of, what it means to “know”, and how we can relate to others” (Montuori & Donnelly, 2017).

The contribution of TL lies in the small, daily acts, which, altogether bring about big changes. Hence, we are all called to reflect on what world we create through our thoughts, through our perceptions and beliefs, through our interactions, and afterwards to reflect on whether these practices are concomitant with the world we want to create and the person we want to be (Montuori & Donnelly, 2017).

So, TL is the leadership that creates our future, today. Transformative leaders are ordinary, everyday citizens, who aim to create a transformative process, starting with themselves, on the one hand, while at the same time contributing creatively, guiding society to a better tomorrow (Montuori & Donnelly, 2017).

Leadership, G.M and I.H

Buchanan and Kern (2017) note that if we want to change our world externally, we need to be willing to change internally as well, starting with our mindset. More specifically, it is necessary to cultivate a way of thinking that will allow us to work collectively, and form students and achievers who aim to do better things, and in turn become better leaders and contributors.

TL starts with self-reflection (Shields et al., 2018), because having an introspection and being grounded is a prerequisite for its success. Then it proceeds with constantly asking

questions and evaluating the decisions according to who benefits and who is burdened by them, who is included and who is excluded, which voices are heard, and which are silenced through these decisions (Shields et al., 2018).

Conclusively, it is obvious that these leaders obtain the skills of GM and IH, and they care not only for themselves but also for the whole community, through better decision-making and better performance (Chase, 2010).

Leadership, Collaboration and Social awareness

I chose to deal with the concept of Servant and TL not just as a mere aspect that can complement the individual-centered concepts of GM and IH, but also because of their emphasis on society and the impact on it.

As reported by Montuori & Donnelly (2017), “transformative leadership is a practice of unveiling our own creativity and leadership, taking responsibility for them, and applying them to mutual benefit, creating collaboration and participatory leadership. It is also an invitation to participate in a collective journey into the future, a journey of creative inquiry, creating ourselves, our relationships, and our communities”. Adding, Buchanan & Kern, emphasize that human development is a collective effort and not just individual, and is directly related to our societies and ecosystems, and is based on the rationale: “not only being the best in the world, but also being the best for the world” (2017).

Leadership and Education

Education is a big part of a country's culture and has the power to make a big difference, especially in the way students think and perceive, as well as in students' beliefs. “Education is not the ultimate level for social transformation, but without it, transformation cannot occur”, notes Freire (1998, cited in Shields, 2010). Education is the key to diminish racism and social stereotypes; it bridges the gap and the differences that exist in a society, while increasing the mental health of young people.

This is the core of TL; to build cultures in the school context, where students feel valued, and not only would they feel that they are not invisible, but on the contrary, within the school environment they would feel safe. All of these are the foundations for better learning (Shields & Hesbol, 2020).

Recent research shows how TL works within the school context. As mentioned above, anyone can practice the concept of TL, whether they are formal or informal leaders (Shields et al., 2018). Nevertheless, these studies focus mainly on how principals or teachers have managed to leverage the principles of TL and bring about change in their school units.

Initially, in a broader context, the concern of these leaders is to build relationships with staff, students, their families, but also with the wider society. These relationships will also provide respect and high levels of support to all students (Shields and Hesbol, 2020).

Their next concern is to secure equity, tackling racism, xenophobia, homophobia or other prejudices, changing the established way of thinking (Shields and Hesbol, 2020), and turning it in the direction of "not only what they have learned to do, but what they can do" (Shields, 2010). In addition, researchers suggest ways, which can be applied, to making better use of the concept of TL in schools. Students firstly need to understand that in addition to the individual interest, they can also contribute to the common good.

In pilot studies conducted by Shields (2020), but also according to Elia et al. (2006), the changes are socially, psychologically and academically positive. In schools where the TL mentality is applied, the students have adequate social-emotional abilities, less probability to get involved in violence and related problem behaviors, and higher levels of academic achievements (Elias et al., 2006). However, it appears that social-emotional learning (that includes self-awareness, self-management, social awareness, relationship skills, responsible decision making) has positive results in terms of academic performance, benefits physical health, reduces internalized as well as externalized problems and improves community participation (Elias et al., 1997; Zins et al., 2004; Greenberg et al., 2003; cited in Elias et al., 2006).

Chan (2015) also concluded that practicing SL in education met the cognitive, individual and social requirements of learners, and it built learner-centered classrooms. The integration of servant leadership theory and practice in education is promising, and aims for collaborative success, instead of competitions and league tables (Chan, 2016).

With the aim of these studies and suggestions and in order to fill the gap that exists in the existing literature, regarding how teenagers can use SL and TL, and in combination with what has been mentioned above about the concepts of GM and IH, I proceed with my own study.

Ukraine

Since study includes data of Ukrainian students, some information about this country is necessary.

Its area is 603,549 sq km and its population is 44,237,000. Ukrainians make up more than three-fourths of the population; there is also a significant minority of Russians. Ukraine is a multi – language and multi-religious country. Ukrainian is the official language, but Russian, Romanian, Polish, Hungarian, Belarusian, Bulgarian are spoken as well, with Christians (mostly Eastern Orthodox; also other Christians, Roman Catholic, Protestant) and Muslims.

Since the World War I ended until 1991, year that Ukraine declared independence, most of the Ukrainian region belonged to the Soviet Union. In 1986, happened the Chernobyl accident at a Soviet-built nuclear power plant. During the 1990s there was an endeavor for economic and political reformation that ended in the dubious presidential election of 2004; mass protests over the results came to be known as the Orange Revolution. As a result, the country remained divided along regional and ethnic lines. Another mass protest movement toppled the government in 2014 (Britannica, 2021).

An armed conflict in eastern Ukraine continues to have a severe impact on civilians with young people and adolescents being the most affected. Not only their physical safety is threatened, hostilities also jeopardize futures and cause psychosocial distress (Unicef, n.d).

Methodology

Ethical considerations

The Commission on Psychology and Pedagogy of the Scientific-Methodical Council of the Ministry of Education and Science of Ukraine accepted this study. It was also authorized by the Sociological Association of Ukraine. The study has been conducted between September and November 2019, according to UNICEF's and national ethical considerations on conducting research with children. Participation was voluntary and participants had the right to refuse to participate. All data remained strictly confidential and stored on an encrypted drive (Lordos et al., under submission).

Participants

Participants were enlisted from 200 randomly selected schools, in 9 oblasts in Eastern, Southern, Central and Western Ukraine: Dnipropetrovsk, Zaporizhzhia, Kyiv, Kyiv city, Luhanska, Lviv, Mykolaiv, Kharkiv, and the government-controlled areas (GCAs) of Donetsk and Luhansk oblasts. Schools were systematically selected to ensure external validity. Tables allowing for equal probability for each class to be selected were used to carry out the selection of classes (Lordos et al., under submission).

2000 participants living in and near Donetsk and Luhansk oblasts, which are the armed conflict areas in eastern Ukraine were not included in the sample to avoid any confounding effects.

In this study, boys and girls, from 14 to 19 years old were included. According to Blackwell et al. (2007), children at the age of 12 and 13 develop cognitive mechanisms that did not have previously. Based on these mechanisms they begin to compare themselves to others, they start feeling the school environment as competitive, and at these ages develop the idea of self-fulfillment as well. These cognitive changes are required before practicing the skills of GM an IH. Therefore, approximately 8643 questionnaires were analyzed in the present study.

Procedure

Before carrying out the study, all head teachers in all participating schools were informed about the purpose of the study and had to give their consent for data collection. Additionally, pupils were informed about the study and how their data would be processed and stored and were asked to decide and respond if they were interested to participate in the study.

Pupils took part in this research voluntarily but were informed about the scope of this research and how it would be utilised by the Ministry of Education and UNICEF. The study was conducted between September and November 2019. Participants filled paper-and-pencil questionnaires (Lordos et al., under submission).

Materials

TSI

The Transferable Skills Inventory (TSI) is a new tool to assess transferable skills in adolescents and youth. It is an 80-item self-reported questionnaire that assesses life skills. Each

of the 20 sub-scales consists of four items, with the exception of the self-management indicator which has three items. Each item is rated on a four-point Likert scale, ranging from 1 “Not at all like me” to 4 “Very much like me” (Lordos et al., under submission).

For the purpose of this study four constructs were used: 1) Growth mindset, 2) Intellectual humility, 3) Leadership and 4) Cooperation. There were also used two indicators: 1) Academic Performance (Mathematics, History, Language and Natural Sciences) and 2) Civic Outcomes (I am not willing to do anything; I would just stay focused on my own personal and domestic affairs; I am willing to use civic and social means of action (be an active citizen) but definitely avoid any kind of violence; I am willing to use all means of change available to me, including violence if necessary and I would definitely not participate in such a Youth Council; it would be a waste of my time; I would definitely participate in such a Youth Council; it is one of the most important things I could do) (Lordos et al., under submission) (Table 1 and 2).

Table 1. *The four Transferable Skills used in this study.*

Transferable Skill	Items
Growth mindset	I learn a lot from feedback and criticism, to become better and smarter at everything I do
	I put a lot of effort into improving myself, acquiring new knowledge and mastering new skills
	I believe that the harder you practice something, the better you will be at it
	I am interested to expand my horizons beyond what I already know
Intellectual humility	I sometimes marvel at the intellectual abilities of other people
	I acknowledge when someone knows more than me about a certain subject
	I recognize that there is a vast range of things I can still learn about how the world works
	I am aware that my knowledge about different issues and topics is incomplete
Leadership	I can think ahead on behalf of my group (e.g. a work group, or a group of friends) and generate useful ideas about our future direction
	I can identify where my team members' strengths lie and how they can utilize these to collaborate better
	I have confidence in my ability to be a leader
	Others tell me I inspire them and help them find direction or meaning
Cooperation	I co-operate with others
	I work easily in groups
	I collaborate with my classmates on school assignments
	I listen carefully to other team members when our team is making a decision

Table 2. *The two indicators used in this study.*

Indicator	Items
Academic Performance	Mathematics
	History
	Ukrainian language
	Natural Sciences
Civic Outcomes	Civic 1
	<i>Which of the following are you willing to do, to change the current conditions in your community or in the society in general?</i>
	I am not willing to do anything; I would just stay focused on my own personal and domestic affairs
	I am willing to use civic and social means of action (be an active citizen) but definitely avoid any kind of violence
	I am willing to use all means of change available to me, including violence if necessary
	Civic 2
<i>If a Youth Council was established in your town or village, where young people can meet and discuss possible actions to address the needs of young people, increase their voice in public affairs and more generally benefit the community, to what extent would you be interested to participate?</i>	
I would definitely not participate in such a Youth Council; it would be a waste of my time	
I would definitely participate in such a Youth Council; it is one of the most important things I could do	

(Lordos et al., under submission)

Statistical Analyses

Firstly, all missing and extreme values were deleted from the dataset. Then, participants (N = 8643) were randomly distributed into two groups using the SPSS random number generator. The CFA analyses, using correlated, unidimensional, hierarchical and bifactor models, were based on the first group and the Structural Equation Modeling (SEM) models were based on the second group.

A good-fitting CFA model is accepted if the value of the CMIN/df is < 5 , the Tucker and Lewis (1973) index (TLI) and the Confirmatory fit index (CFI) (Bentler, 1990) is ≥ 0.90 (Hair et al., 2010). CFI and TLI are comparative statistics (Collier, 2020). In addition, an adequate-fitting model is accepted if the AMOS computed value of the root mean square error

approximation (RMSEA) is less than .08 (Hair et al., 2010). Values less than .08 are acceptable, but a preferred result is less than .05 (Collier, 2020).

Results

Correlated Factors Model

Firstly, a correlated CFA was conducted (Figure 1). The correlated factors model includes two or more latent variables, which are allowed to correlate (Dunn and McCray, 2020).

Results showed that the Bentler’s overall comparative fit index (CFI) was 0.95, the Tucker and Lewis (1973) index (TLI) was 0.94 and the root mean square error of approximation (RMSEA) was .07. The correlation between the variable of G.M and I.H. is 0.83, indicating that there is a high correlation between the two constructs, therefore there is multicollinearity issue.

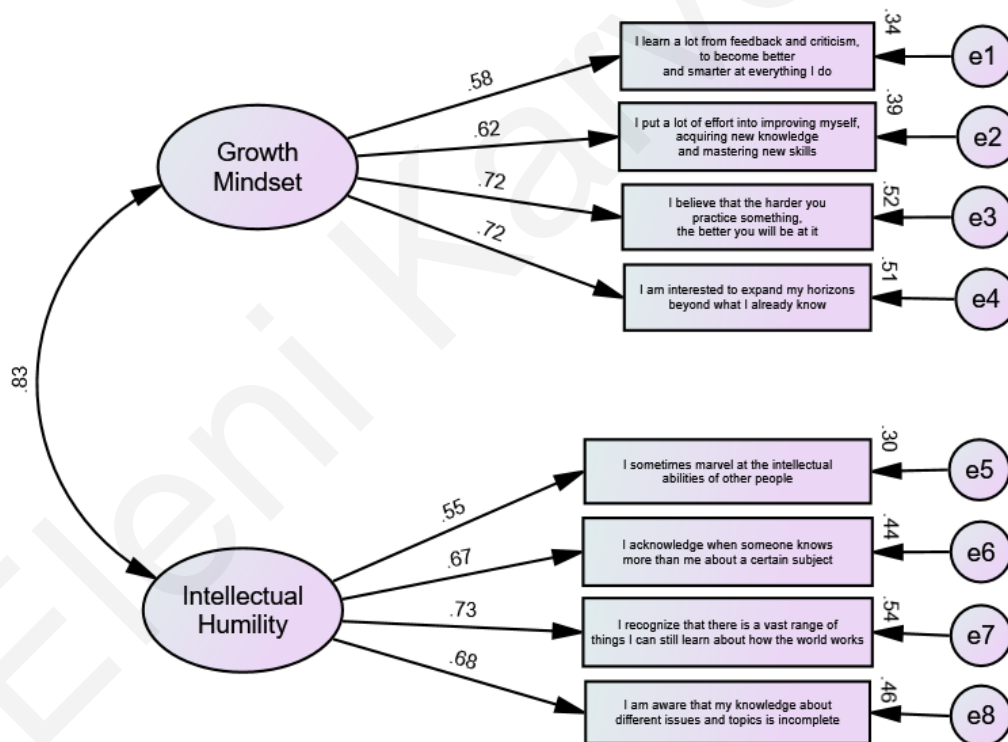


Figure 1. *Growth Mindset and Intellectual Humility correlated model.*

Hierarchical Model

Then a Hierarchical Confirmatory Factor Analysis (CFA) was conducted to evaluate the Growth Mindset and Intellectual Humility second-order structure (Figure 2). The higher-order model estimates two sets of loadings: those illustrating interactions between the observed variables and the pertinent grouping, or subordinate, factor, as well as those illustrating the interactions between the higher-order factor and each of the subordinate factors (Dunn and McCray, 2020).

Results showed that the overall comparative fit index (CFI) was 0.95, the Tucker and Lewis index (TLI) was 0.94 and the root mean square error of approximation (RMSEA) was .07. The Standardized factor loading of the construct on G.M was greater than 1 (2.03), hence the model is not valid.

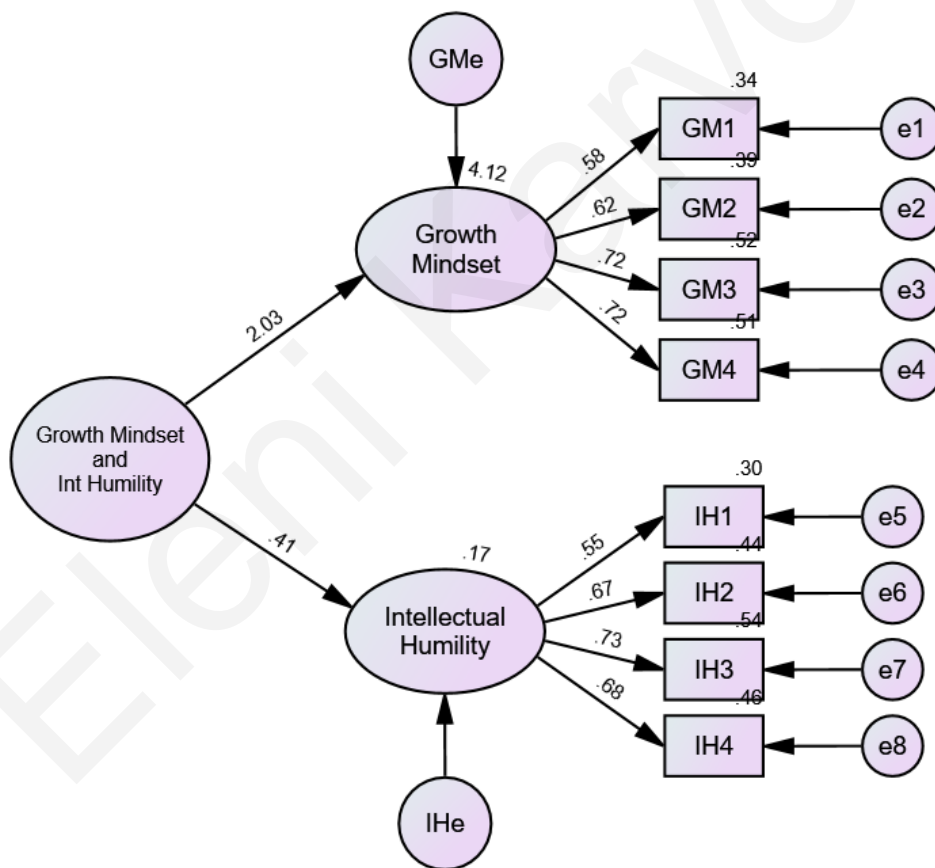


Figure 2.

Growth Mindset and Intellectual Humility Hierarchical model.

Unidimensional Model

The next step involved conducting a Unidimensional Confirmatory Factor Analysis (Figure 3). The unidimensional model makes no distinction between various subgroups of items and hypothesizes a single factor to explain the variation across all observable variables (Dunn and McCray, 2020).

Results showed that the overall comparative fit index (CFI) was 0.92, the Tucker and Lewis index (TLI) was 0.89 and the root mean square error of approximation (RMSEA) was .09, indicating that the model is not good enough.

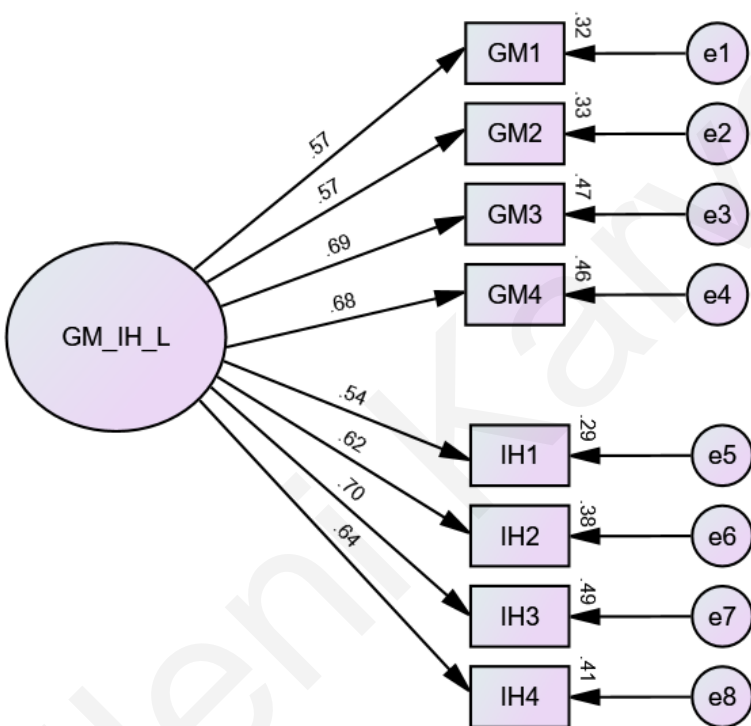


Figure 3.
Growth Mindset and Intellectual Humility Unified model.

Bifactor Model

Lastly, two bi-factor CFA models were conducted, the first for the variable of G.M and the second one for the variable of IH. The bifactor model includes grouping factors that load onto sub-groups of the same set of observed variables in addition to a general factor that loads

directly onto each of the observed variables in the model. The bifactor model's grouping factors are assumed to have no correlation with the general factor (Dunn and McCray, 2020).

The results of the first model showed that the overall comparative fit index (CFI) was 0.97, the Tucker and Lewis index (TLI) was 0.94 and the root mean square error of approximation (RMSEA) was .06. The results of the second model showed that the overall comparative fit index (CFI) was 0.96, the Tucker and Lewis index (TLI) was 0.93 and the root mean square error of approximation (RMSEA) was .07.

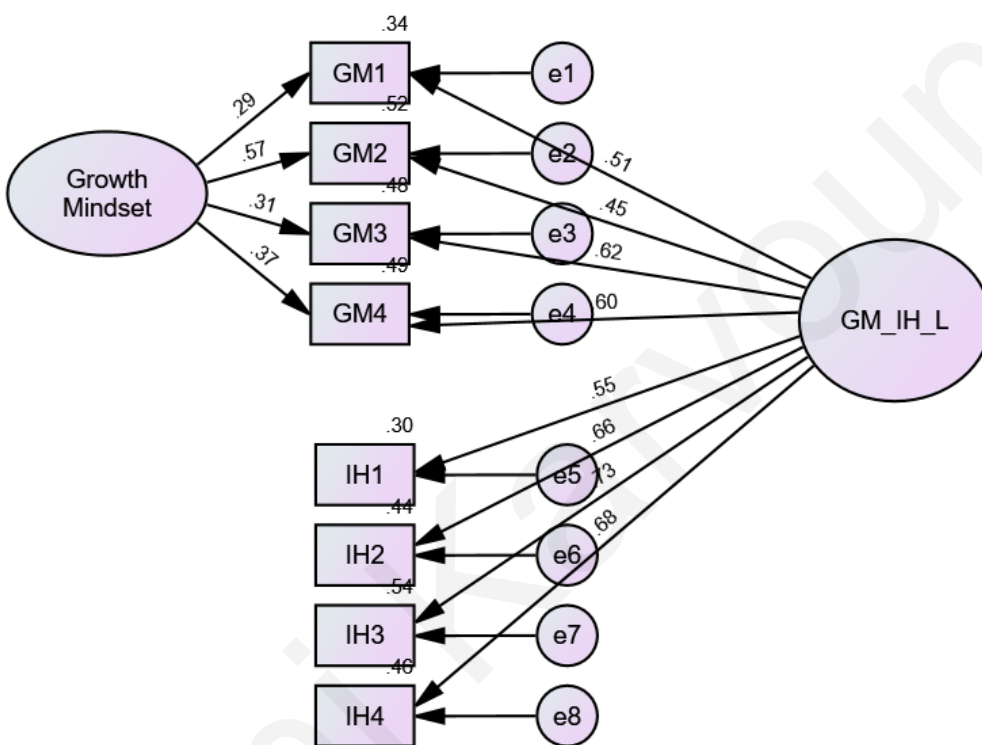


Figure 4.

Growth Mindset and Intellectual Humility Bi-Factor model – Growth Mindset factor.

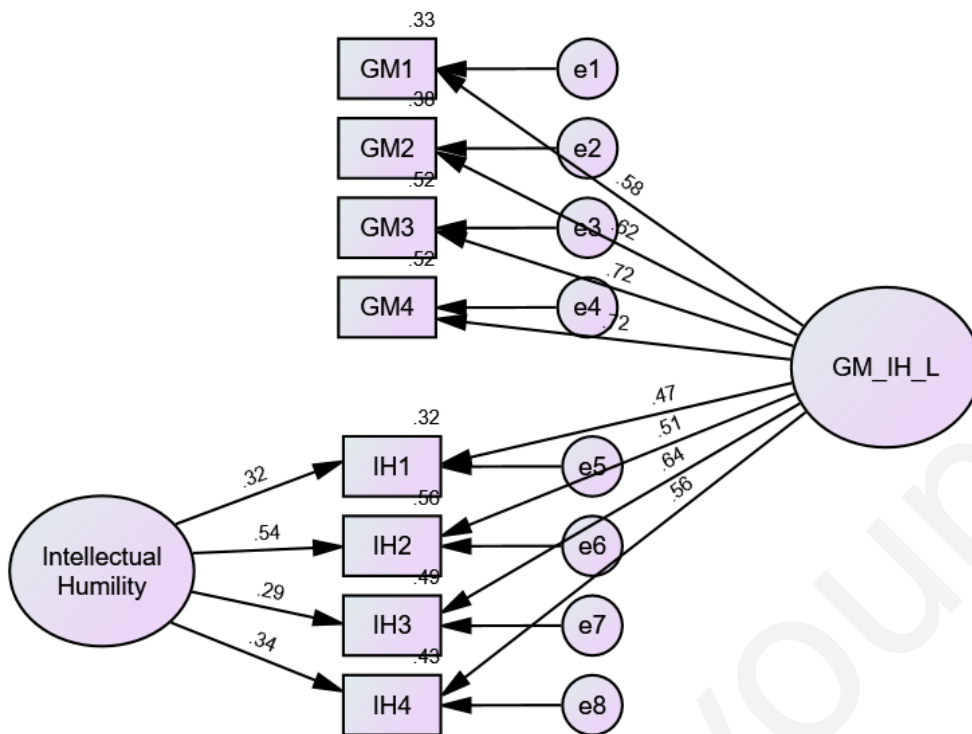


Figure 5.

Growth Mindset and Intellectual Humility Bi-Factor model – Intellectual Humidity factor.

Same models were conducted to examine the relationship between the construct of Leadership and Cooperation. The correlation between the two constructs as shown by the correlated model was 0.58, indicating that there is no significant commonality between the two constructs. Table 3 shows the results of the model fit of the CFA four models, which are not good enough, therefore the two constructs were considered as two independent variables.

Table 3. *Model Fit of the CFA Models for the constructs of Leadership and Cooperation.*

Model Fit of Leadership - Cooperation												
Correlated model			Hierarchical model			Unified model			Bi-factor model			
CMIN/d f	CFI	RMSEA	CMIN/d f	CFI	RMSEA	CMIN/d f	CFI	RMSEA	CMIN/d f	CFI	RMSEA	
25.379	0.95	0.07	25.379	0.95	0.07	104.16	0.77	0.154	28.50	0.95	0.08	

Then a correlated CFA was conducted between the factors of GM/IH, Leadership and Cooperation to examine the relationship of the three factors (Figure 6). Results showed that the Bentler's (1990, 1992) overall comparative fit index (CFI) was 0.92, the Tucker and Lewis (1973) index (TLI) was 0.90 and the root mean square error of approximation (RMSEA) (Steiger, 1990; Steiger & Lind, 1980) was .06. There is also a significant ($p < .001$) and positive relationship between each pair of indicators: GM/IH – Leadership (0.62), GM/IH – Cooperation (0.45) and Leadership – Cooperation (0.58).

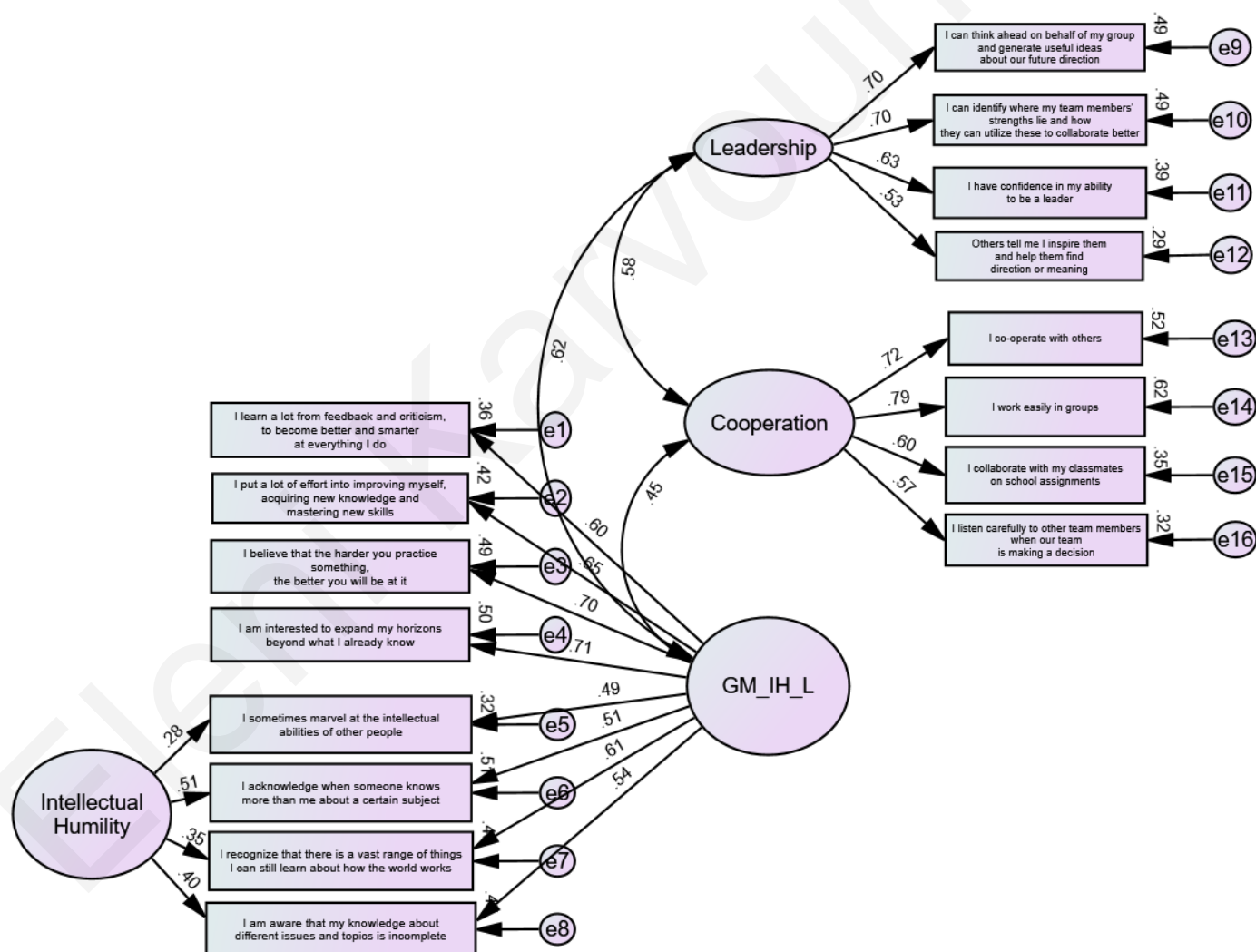


Figure 6.
CFA Correlated Model of the indicators of GM/IH, Leadership and Cooperation.

Structural Equation Modeling (SEM)

The next step involved conducting two multigroup Structural Equation Models through AMOS to test the relationships. SEM is a multivariate technique to test and evaluate multivariate causal relationships (Fan et al., 2016). Participants were divided into three groups based on their preferred gender indication: All, Male, Female

The results of the first model (Figure 7) showed that the fit indices for the model were: CMIN/df = 7.9, TLI = 0.92, CFI = 0.93 and RMSEA = 0.03. The squared multiple correlation was 0.19 for Academic Outcomes. This indicates that 19% variance in Academic Outcomes is accounted by GM/IH, Leadership and Cooperation. The study assessed the impact of GM/IH, Leadership and Cooperation on Academic Performance. The impact of Gm/IH on Academic outcomes was positive and significant ($b = 0.21$, $t = 7.537$, $p < .001$). The impact of Leadership on Academic outcomes was positive and significant ($b = 0.18$, $t = 5.710$, $p < .001$). The impact of Cooperation on Academic outcomes was positive and significant ($b = 0.10$, $t = 4.168$, $p < .001$), supporting H3a.

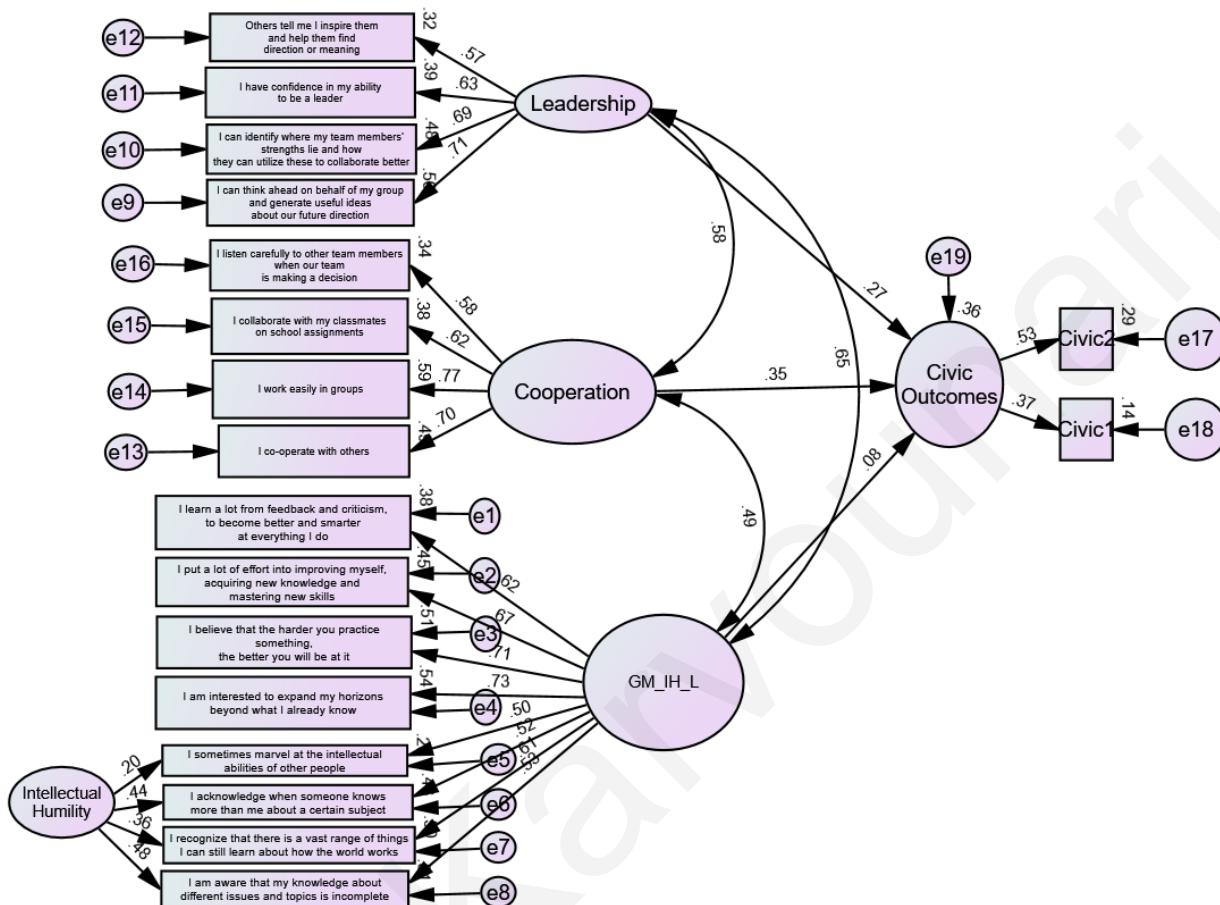


Figure 8.
SEM for the indicators of GM/IH, Leadership and Cooperation on Civic Outcomes.

Gender

While performing the SEM testing three levels of analysis were performed on the data to investigate the gender-based distinction of the outcomes. The data was divided into three groups for analysis. One with All (male and female) participants, another with Male participants, and a third with Female participants. Analysis provides evidence that there is no discernible gender difference in the outcomes, indicating that both male and female teens can make effective use of the abilities.

Table 4 summarizes the factor loadings based on the four CFA’s for the 4 Transferable Skills from the TSI, and tables 5, 6, and 7 summarize the correlation loadings based on Gender

differences (All, Male, Female) of the two SEM models respectively.

Table 4. *Factor Loading of the four Transferable Skills on the four CFA Models.*

Transferable Skill	Item	Factor loading			
		Correlated model	Hierarchical model	Unified model	Bi-factor model
Growth Mindset	I learn a lot from feedback and criticism, to become better and smarter at everything I do	.58	.58	.57	.29
	I put a lot of effort into improving myself, acquiring new knowledge and mastering new skills	.62	.62	.57	.57
	I believe that the harder you practice something, the better you will be at it	.72	.72	.69	.31
	I am interested to expand my horizons beyond what I already know	.72	.72	.68	.37
Intellectual Humility	I sometimes marvel at the intellectual abilities of other people	.55	.55	.54	.32
	I acknowledge when someone knows more than me about a certain subject	.67	.67	.62	.54
	I recognize that there is a vast range of things I can still learn about how the world works	.73	.73	.70	.29
	I am aware that my knowledge about different issues and topics is incomplete	.68	.68	.64	.34
Leadership	I can think ahead on behalf of my group (e.g. a work group, or a group of friends) and generate useful ideas about our future direction	.69	.69	.53	.62
	I can identify where my team members' strengths lie and how they can utilize	.66	.66	.52	.56

Transferable Skill	Item	Factor loading			
		Correlated model	Hierarchical model	Unified model	Bi-factor model
	these to collaborate better				
	I have confidence in my ability to be a leader	.66	.66	.54	.48
	Others tell me I inspire them and help them find direction or meaning	.56	.56	.47	.42
	I co-operate with others	.72	.72	.65	.62
	I work easily in groups	.80	.80	.74	.62
Cooperation	I collaborate with my classmates on school assignments	.60	.60	.57	.48
	I listen carefully to other team members when our team is making a decision	.55	.55	.52	.46

Table 5. Factor Loading of the four Transferable Skills based on Gender (SEM Models)

Transferable Skill	Item	Factor Loading based on Gender					
		SEM Academic model			SEM Civic model		
		All	M	F	All	M	F
	I learn a lot from feedback and criticism, to become better and smarter at everything I do	.61	.64	.59	.62	.64	.59
	I put a lot of effort into improving myself, acquiring new knowledge and mastering new skills	.67	.66	.67	.67	.66	.67
Growth Mindset	I believe that the harder you practice something, the better you will be at it	.71	.70	.71	.71	.70	.71
	I am interested to expand my horizons beyond what I already know	.73	.72	.73	.73	.72	.73
Intellectual Humility	I sometimes marvel at the intellectual abilities of other people	.20	.12	.26	.20	.12	.26

Transferable Skill	Item	Factor Loading based on Gender					
		SEM Academic model			SEM Civic model		
		All	M	F	All	M	F
	I acknowledge when someone knows more than me about a certain subject	.45	.35	.50	.44	.35	.50
	I recognize that there is a vast range of things I can still learn about how the world works	.36	.29	.44	.36	.29	.44
	I am aware that my knowledge about different issues and topics is incomplete	.47	.54	.45	.48	.55	.45
Leadership	I can think ahead on behalf of my group (e.g. a work group, or a group of friends) and generate useful ideas about our future direction	.71	.73	.69	.57	.59	.56
	I can identify where my team members' strengths lie and how they can utilize these to collaborate better	.69	.70	.68	.63	.63	.65
	I have confidence in my ability to be a leader	.63	.63	.63	.69	.70	.68
	Others tell me I inspire them and help them find direction or meaning	.57	.59	.55	.71	.73	.69
Cooperation	I co-operate with others	.70	.72	.69	.58	.59	.56
	I work easily in groups	.77	.78	.76	.62	.56	.66
	I collaborate with my classmates on school assignments	.62	.56	.66	.77	.78	.75
	I listen carefully to other team members when our team is making a decision	.58	.60	.55	.70	.73	.69

Table 6. *Correlation Loading based on Gender (SEM Academic Outcomes)*

Indicators	Gender		
	All	M	F
Cooperation- Leadership	.58	.59	.57
Cooperation- GM/IH_L	.49	.50	.46
Leadership-GM/IH_L	.65	.67	.65
Cooperation – Academic Outcomes	.11	.08	.12
Leadership - Academic Outcomes	.18	.18	.22
GM/IH_L - Academic Outcomes	.21	.23	.16
Mathematics	.63	.65	.62
History	.64	.66	.63
Language	.66	.68	.62
Natural Sciences	.76	.78	.73

Table 7. *Correlation Loading based on Gender (SEM Civic Outcomes)*

Indicators	Gender		
	All	M	F
Cooperation- Leadership	.58	.59	.57
Cooperation- GM/IH_L	.49	.50	.46
Leadership-GM/IH_L	.65	.67	.65
Cooperation – Civic Outcomes	.35	.33	.34
Leadership - Civic Outcomes	.27	.32	.31
GM/IH_L - Civic Outcomes	.08	.07	-.01

All= Male and Female, M=Male, F=Female

Discussion

The purpose of the study was to examine the relationship of the concepts of GM, IH, Leadership and Cooperation. Statistical analyses demonstrated that there is a highly positive correlation between the concepts of GM and IH, that enables a unified dimension of GM and IH. The two concepts are not competitive, but rather they are cooperative, supporting H1. Furthermore, despite the commonality of the two concepts, it is obvious that the concept of GM has a greater significance compared with the concept of IH. Thus, the skill of IH contributes to the extent that it is part of the GM dimension. IH is beneficial, but only when accompanied with hope and motivation for our future progress.

Regarding H2, the CFA analysis has shown that the relationship between GM/IH and Leadership and Cooperation is positive and significant. Possessing the GM/IH skills can consequently lead to favorable outcomes in leadership and cooperative matters, and this connection can have a substantial influence on academic success. A person's technical, psychological, and moral development, which relates to GM/IH mindset, has an impact on their leadership presence, knowledge, skill, and behavior. It motivates emotional intelligence, personal influence, skill, judgment, and insight in the school context (Scouller, 2011). Consequently, inner personal leadership (self-leadership) and academic growth could have positive "ripple" impacts on peers and the wider society, respectively.

Despite having limited immediate impact on civic outcomes, GM/IH does so indirectly through cooperation. Thus, it is crucial to establish the belief that by working together, we can improve ourselves (self-leadership) and others (leadership of others in an interpersonal setting and leadership of systems). Therefore, having an educational system that is oriented not just on academic advancement and achievement but also on the development of social skills, including cooperation, could result in more beneficial outcomes.

Conclusion

In conclusion, we should seriously consider how we can effectively cultivate these skills in the school context, especially since the hypothesis that a correlation between the four concepts is supported, and it could be a factor of change. We should seriously consider how to shape the conditions, so that children will be able to acquire these skills during their school years. As school psychologists, we are called upon, in these times more than ever before, to create the right

conditions for them so that they will grow in a healthy and safe way both for them and for society.

Limitations

There are some limitations to the current study. First, the use of self-report questionnaires, which are subject to several biases may have limited the reliability in measures. Secondly, results are abstracted from a specific population under specific circumstances. It might be appropriate to examine if it also has a comparable pattern in other populations. A third major limitation is that the analyses presented are not able to support causal relations between the variables; therefore, they are only supported by correlation relationships.

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