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RESEARCH ARTICLE

The Relationship Between Social Intelligence And IQ: A Psychometric Analysis

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Abstract:

Background:

The present article deals with the results of research on the psychological diagnosis of social intelligence and its connection with general intelligence.

Methods:

The analysis of the relationship between the Social Intelligence Scale of the University of Tromso, Norway (TSIS) (Social awareness scale, SA) with the R. Amthauer Intelligence Test was carried out on a sample of 407 students of comprehensive schools aged from 12 to 18. Social Intelligence Scales have relationships with R. Amthauer Intelligence Test. Factor analysis has shown that the TSIS (Social Awareness, SA) is present in the structure of general intelligence. The other two TSIS Social information processing (SP) and Social Skills (SS) scales have minor correlation relationships with R. Amthauer Intelligence Test. The result shows the structural relationships between general intelligence with social intelligence.

The aim of the research is to identify and analyze the regular relationship between general intelligence (IQ) with social intelligence.

Results:

The correlational and factor analysis results established certain relationships in the factor-analytical structure of general intelligence with social intelligence. The correlation relationship of the social awareness subscale (SA) from the Social Intelligence Scale (TSIS) with individual subtests of the R. Amthauer Intelligence Structure Test was revealed.

Conclusion:

Our study established a statistically significant relationship at the significance level of 0.05 between IQ and social intelligence, particularly social consciousness (understanding), which allowed us to connect social intelligence and general (psychometric) intelligence.

Keywords: Social intelligence, Social awareness, Social understanding, General intelligence, Factor structure, Correlation relationship, Factor analysis.

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1. INTRODUCTION

Modern intelligence studies, the results of which sometimes contradict each other, confirm only the complexity and versatility of its psychological nature. A large variety of approaches, a wealth of empirical data characterizes the history of the study of intelligence as a psychological phenomenon.. However, there are still a lot of concerns that continue to spark disagreements among scientists. It is also related to the problem of the essence of intelligence and its types.

Since the development of the first A. Binet and J. Simon Intelligence Tests not only various tools for measuring intelligence have improved, but also scientific ideas about its content and species changed. In connection with the expansion of the very concept of intelligence and the variety of its manifestations in human life and activity, researchers proposed to distinguish, along with other types of intelligence, such types as social and emotional. Thorndike, E.L [1, 2], introduced the concept of social intelligence into psychology a century ago, which meant the manifesting wisdom in human relationships that allows achieving success in interpersonal situations. Meanwhile, up to the present day, the scientific debate about whether social intelligence is a cognitive rather

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than emotional education, a type of intelligence, or a separate phenomenon has not finished yet.

2. LITERATURE REVIEW

Since the beginning of the 70s of the last century, a number of experimental researches have been carried out aimed both at studying various aspects of social intelligence and at assessing and justifying the validity of diagnostic tools. The results of some researches led to the conclusion that social intelligence covers the interest and care of a person for other people, social concern, emotionality and the ability to recognize other people's emotions. On this basis, it was confirmed that it is an independent phenomenon. The cognitive nature of social intelligence was also questioned. In some studies, the relationship between various types of intelligence (verbal, abstract-logical spatial, *etc*.) with social intelligence was not found. For instance, empirical data provided by H. A. Marlowe (1986) indicated its independence from the level of development of verbal and academic intelligence [3], the role of social intelligence in decoding non-verbal signals (Barnes, M. L. *et al*., [4]. Brown, L. T. *et al*. [5], with co-authors, also described the prospects of the research on social intelligence, as well as Jones, K, with co-authors, paid attention to two aspects of social intelligence [6]. Kosmitzki C. *et al*. also pointed out the conceptual foundations of social intelligence [7].

Studies investigating the relationship of social intelligence with an academic performance conducted by N. Frederickson, S. Carlson, W. C., Ward W.C., have shown that social intelligence is unrelated to educational performance, which correlates with the level of mental development [8].

The variety of scientific ideas about the essence and components of intelligence led to the creation of a wide range of diagnostic tools corresponding to the position of researchers. For instance, the technique of Guilford, J. P., Sheppard, L. D., & Vernon, P. A., Wechsler, D., ; Wechsler, D. and others [9 - 11]. One of the new tests is the Tromso University Social Intelligence Scale (TSIS, Norway). Based on the analysis of currently available methods for social intelligence research, its developers D. H., Silvera, M. Martinusse, and T. I. Dahl concluded that, firstly, many of them are time-consuming and difficult to use [12]. Secondly, differences in the definitions of the concept of "social intelligence" cause the absence or low correlation coefficients of different forms of its measurement with each other. According to those involved in adapting this scale, for example, the Italian psychologist G. Gini, its structure will enable researchers to solve, at least partially, the problem of diverse definitions of social intelligence by approaching a common approach to understanding it [13].

3. MATERIALS AND METHODS

407 Binom-Ula Dala secondary school students aged 12 to 18, Nur-Sultan, Republic of Kazakhstan, took part in the experimental study. This research was prepared within the program trust fund study OR 11465474, "Scientific foundations of modernization of the education system and science" (2021-2023), initiated by the Ministry of Education and Science of the Republic of Kazakhstan.

General intelligence was studied by a quite common Amthauer R. Intelligence Test [14]. The Intelligence Structure Test was developed by Rudolf Amthauer in 1953. This test assesses not only the level of general intellectual development but also such components as verbal and non-verbal intelligence. The test consists of nine subtests, each aimed at measuring different intelligence functions.

The R. Amthauer test includes the following subtests:

(1) General awareness and awareness in various fields of knowledge (not only scientific but also every day).

(2) Classification of concepts.

(3) Establishing similarity.

(4) Bringing two concepts under a general category (generalization).

(5) Ability to solve simple arithmetic problems.

(6) The ability to find number series.

(7) The ability to react mentally to images of figures on the plane.

(8) The ability to react mentally to the images of solid figures.

(9) Memorizing words.

Each subtest, except for the fourth one, consists of 20 tasks, and the fourth subtest consists of 16 tasks Amthauer R., Brocke B., Liepmann D. & Beauducel A [15].

The Tromso Social Intelligence Scale was used in the research on social intelligence. This technique represents a three-factor structure that consists of three subscales:

(1) Social information processing (SP).

(2) Social skills (SS).

(3) Social awareness (SA).

According to Silvera D. H., Martinusse M., Dahl T. I. studies and the authors' own calculations, the TSIS scales showed high results of internal consistency (Cronbach's alpha).

According to the authors of the social intelligence scale, the Social information processing subscale describes a person's ability to understand and predict the behavior and feelings of other people. The Social Skills subscale characterizes a person's ability to enter new social situations and social adaptation. The Social Awareness subscale determines a person's ability to be sensitive or immune to events occurring in social situations, to be surprised by them.

Since its publication, the TSIS technique has become widespread in Norway and has been adapted in Italy, Slovakia, Russia. The technique can be used to assess a person's ability to manage social relationships, predict, and interpret the behavior of people around them.

The TSIS diagnostic technique is an ordinal scale of measurement. According to the instructions, the test person must assess the degree of his consent or disagreement with the statements submitted. The range of scale points covers seven points from 1 point ("unlike me completely") to 7 points ("describes me very well").

4. RESULTS

Correlation analysis (according to Spearman) and factor analysis were carried out to identify the associations between general intelligence and social intelligence.

The results of the correlation and factor analysis conducted have established certain connections in the factor-analytical structure of general intelligence with social intelligence.

First of all, correlation analysis has revealed the association of the Social Awareness subscale (SA) from the Social Intelligence Scale (TSIS) with the General Intelligence Coefficient (IQ) from the R. Amthauer test. There are no correlation relationships with the other two Social Information Processing (SP) and Social Skills (SS) subscales. Secondly, the connection of the Social Awareness subscale with four subtests of R. Amthauer test was revealed: "Exclusion of concepts", "Establishment of analogies", "Arithmetic tasks", and "Number series". Table **1** shows the correlation of Social Awareness (TSIS) with Intelligence (Amthauer Test, N-407) *

The factor analysis of the data was carried out according to the following criteria: (Extraction Method: Principal component Analysis, Initial solution, Principal components, Sorted by size and Suppress small coefficients, Absolute value below 0.10, and also without rotation). In this case, it was fundamentally important for us to indicate that the subscale "Social Awareness" (SA) is together with these variables of psychometric intelligence though it has a small dispersion.

The factor analysis revealed 2 factors combining 68.061% and 12.922% of the total dispersion. The first factor has formed by subtest scales of Amthauer Intelligence Test with high factor load and Social Awareness subscale (SA). The second factor has included all the subscales of the Social Intelligence test. At the same time, the SA subscale entered the first and second factors, which indicates the relationship between general and social intelligence. According to factor analysis, social intelligence is present in the structure of general intelligence.

The results of the factor analysis of general and social intelligence are presented in Table **2**.

Table 1. Correlation associations of R. Amthauer Intelligence Test with TSIS.

-			Subtest 2 "Exclusion of concepts."	Subtest 3 "Establishment of analogies"	Subtest 5 "Arithmetic tasks"	Subtest 6 "Finding Numerical Patterns"
Spearman's rho	**SP**	**Correlation Coefficient**	,009	,000	-,008	-,007
		Sig. (2-tailed)	,861	,992	,874	,892
		N	407	407	407	407
	SS	**Correlation Coefficient**	,011	,015	,000	,027
		Sig. (2-tailed)	,818	,768	,996	,584
		N	407	407	407	407
	SA	**Correlation Coefficient**	**,106***	**,114***	**,104***	**,120***
		Sig. (2-tailed)	,033	,021	,037	,015
		N	407	407	407	407

Note: **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 2. Factor analysis of IQ (according to R. Amthauer) and social intelligence (TSIS).

Component Matrix		
	Component	
-	**1** **% of Variance** **68,061**	**2** **% of Variance** **12,922**
Subtest 1 (General Awareness)	,924	-
Subtest 2 (Classification of concepts)	,953	-
Subtest 3 (Establishment of analogies)	,962	-
Subtest 4 (Generalization)	,953	-
Subtest 5 (Ability to solve problems)	,987	-
Subtest 6 (Finding number series)	,973	-
Subtest 7 (Ability to operate on the plane)	,960	-
Subtest 8 (Spatial perception)	,939	-
Subtest 9 (Memory)	,915	-
SP	-	,490
SS	-	,869
SA	,107	,741

Note: Extraction Method: Principal Component Analysis.
a. 2 components extracted.

As it is shown in the table, the correlation coefficient has an SA subscale of 0.05.

5. DISCUSSION

The results obtained, in general, established the presence of a relationship between general and social intelligence. Meanwhile, this relationship remains a matter of argument in the scientific community. Scientists have not had a consensus on the existence of the connection and what substructures of general intelligence social intelligence are associated with yet. For instance, focusing on the cognitive nature of social intelligence, Thorndike, R. L., & Stein, S., Wechsler, D., Wechsler, D., Guilford, J. P. and some others emphasized its dependence on general intelligence [9, 11, 12]. Later, Cantor, N., K., Albrecht Kihlstrom, J.F. discovered the connection of social intelligence with verbal intelligence [16]. However, they contradict the data of H.A. Marlowe, arguing that its development does not depend on the level of verbal intelligence [3]. The results of Lowman, R. L. and Leeman, G. E. research also did not confirm the relationship of general intelligence with social intelligence and social knowledge included in the structure of social intelligence [17]. However, it should be noted that one of the important probable reasons for the inconsistency of empirical data of different researchers may be the use of different diagnostic tools and different ideas about the essence of social intelligence and its components. Hoepener, R., & O'Sullivan, M. pointed to the problem of measuring social intelligence [18]. Although Makovska, Z. Kentos M. indicate a clear correlation relationship between social and abstract intelligence [19]. Similar research on the results of a cluster social study was conducted by Lee J-E and Wong, Ch-M. T *et al*. [20, 21]. Previously, Keating, D. K. also pointed to a study of social intelligence [22].

For a possible explanation of the relationships obtained, it is, in our opinion, appropriate to direct attention to the following two aspects: 1) The correlation of the social awareness subscale with general intelligence and its difference from the other two subscales of the TSIS test; 2) The association of social awareness with the mentioned scales of the R. Amthauer test and general between these scales of the general intelligence test.

Firstly, the analysis shows that the answers to the questions of the Social Information Processing (SP) subscale are based on self-assessments of the test person's own abilities, and skills that rely on past, available communication experience. ("I know", "I can"). For instance: "I know what feelings my actions will cause in other people", "I can predict how other people will react to my behavior", *etc*. The questions of the Social Skills subscale are aimed at assessing communication skills and skills in various situations of interpersonal interaction. For example: "I often have problems finding good talking themes", "I find it difficult to get along with other people", *etc*.

While the Social Awareness subscale is aimed at identifying the problems of the test person, which indicate the state (deficiency or absence) of his ability to understand the internal motives, feelings, needs and thoughts of other people, as well as to present his behavior from their point of view. For example: "People often surprise me with their actions", "Other people are angry with me, and I cannot explain why", *etc*.

Unlike the other two subscales, this subscale assesses the cognitive component of social intelligence, specifically those thinking abilities leading to social awareness. In such a context, the concept "social awareness" is closer to the concept of "social understanding".

R.L.Selman previously pointed out the dependence of the stages of development of social understanding on mental development in his theory of role acceptance. The stage of undifferentiated adoption of the position of the "other" is characterized by the perception of oneself and the other man as different objects, without distinguishing one's inner world from another one. The ability to distinguish between the external and internal world, the understanding of what the other man may feel and think differently characterizes the stage of socio-information acceptance of the position. But the ability to view from the "other's" point of view your own behavior, feelings and thoughts, and also to understand that the "other man" also has such an ability comes only at the next reflective stage of development. At this stage of development, a man can reflect his behavior and motivation and understand other people's points of view, goals and values . According to K. Rogers, the development of this ability is in the empathic understanding, arising when a man perceives the feelings and personal meanings of the other man when he can understand the other man internally, putting himself in the place of another man. Empathic accuracy is also connected with this ability, defined by W. Ickes as the ability to adequately determine what another man thinks or feels. The stage of accepting the position of the "third man" is complicated by the ability to put yourself in the place of the other man, and predict the reactions of the "other man", as well as imagine how "I" and "other" shown from the position of the third party. R.L.Selman connected the development of the highest stage of social understanding with the development of formal-logical operations of intelligence [23, 24].

Secondly, we established a common connection between social awareness and the IQ subtest scales mentioned. It should be noted that they refer to the verbal and non-verbal substructures of intelligence. This common unites the scales of the general intelligence test, providing social understanding abilities.

Analysis of the triad of scales included in the factor with maximum loads indicates a relationship between social awareness with verbal-logical, abstract thinking based on a full range of thought operations. Thus, the successful execution of the Problem-Solving subtest, which has the most significant weight load, is ensured by the participation of all thought operations. The logical conclusion based on the generalization of significant features is preceded by analysis, comparison, isolation of significance, synthesis of identified elements with established relations between them, and functional dependencies, and abstraction. Previously obtained data of Pashchenko, E.V. also showed a positive relationship between levels of social intelligence and mathematical abilities [25]. We agree with his assumption that general and social intelligence function by applying formal-logical operations of conceptual

thinking. It is necessary to admit, though, that the Social Awareness (SA) subscale is present in the factor structure with the highest value of dispersion along with general intelligence. In this case, it was important for us to show that there is a relationship between a given subscale (SA) of social intelligence with separate components of psychometric intelligence, along with the correlation relationships identified.

Two other scales confirm that social awareness is achieved through the ability to high levels of abstraction, generalization. Although implementing the Finding number series subtest requires a level of generalization lower than mathematical, its successful execution, as well as the "Establishing analogies" subtest, requires a high level of generalization. The other subtest scales, "Generalization", "Classification of concepts," also reflect a relationship with abstract thinking. From this point of view, it is no coincidence that the Spatial Imagination scale, determining the level of development of visual-efficient thinking, is inferior to them in weight. Nevertheless, the inclusion of the "Operation on the plane" subtest shows that for awareness of the social situation, the simultaneous coverage of the visual situation is important, capturing its general meaning without detailed verbal reasoning.

Including the factor with lower loads of the General Awareness and Memorization subtests indicates the meaning of social awareness and the verbal short-term memory of the ability to update information necessary for solving or understanding a specific situation.

CONCLUSION

The statistically significant relationship between IQ and social intelligence, particularly social awareness (understanding), which suggests that social intelligence is part of general (psychometric) intelligence. According to the authors, social intelligence is a type of general intelligence. Unlike general intelligence, its object is a man who has a hidden inner world and for this reason, thinking in social intelligence naturally plays an active role. Thinking differs from other cognitive processes. It allows us to discover hidden, internal connections and relationships that cannot be revealed based only on direct perception, past experience, and the achieved level of modes of action.

LIST OF ABBREVIATIONS

SP	=	Social Information Processing
SS	=	Social Skills
IQ	=	Intelligence

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

Not applicable

STANDARDS OF REPORTING

STROBE guidelines were followed in this study.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available within the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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