

Gender Difference in Interpersonal Intelligence : A Meta-Analysis

Fang-Pin Lai^a, Kai-Hao Liu^b, Li-Ru Chen^b, Shao-Shiun Chang^b

^a Department of Industrial Engineering and Management, National Chin-Yi University of Technology, TAIWAN.

^b Department of Industrial Education and Technology, National Changhua University of Education, TAIWAN.

ABSTRACT

The aim of the study is to examine the literature of meta-analysis concerning whether interpersonal intelligence varies with the gender, verify the possible causes between them, end the debate of different perspective and analyze the influential factors of interpersonal intelligence development. In addition, by detail-to-detail testing the characteristic of the literatures, including the subject categories, published years, languages and published categories, the study analyzes the interference variables on the appearance of interpersonal intelligence. Using the meta-analysis, compiled from 2000 to 2016 published academic journals, through the inclusion, exclusion and search of the research guidelines. Proposed the research framework and empirical analysis, by Comprehensive Meta-Analysis of the operation. Extract the main effect size of the literatures, and then analyze the overall average effect of Hedges's *g*. Based on the study found that interpersonal intelligence education to develop substantive recommendations, as references for practical and research workers.

KEYWORDS

interpersonal intelligence, gender difference, meta-analysis.

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Introduction

Interpersonal intelligence is one of the multiple intelligences theories proposed by American scholar Howard Gardner in 1983. The core argument of this theory is to refute the written intellectual test of "intelligence test" (Gardner 2008) emphasizes that every individual's intelligence composes different spectrum (Gardner & Hatch, 1989). Anyone can use their own intelligence to learn other intelligent aspects (Biggs & Collis, 1991).

To face the twenty-first century, the era of well-developed network information, the essential competencies of learners : problem solving, independent

CORRESPONDENCE Fang-Pin Lai ✉ lion0829@gmail.com

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thinking, innovative design, and the ability to work with peers (Gardner, 1999; Sun, Tsai, Finger, Chen and Yeh, 2008). A person who knows to think what can do favor to the future and is willing to roll up his sleeves and team up with the teammates is the future business leader, also the potential future world leader (Blanchard, 2010).

As a result, interpersonal intelligence is an important indicator of group interaction. According to the research, the performance of interpersonal intelligence can be sense by each other's emotions, sounds and actions that revealed the hidden meaning (Good, 2000 ; Wong & Law, 2002 ; Child, Faulkner, & Tallman, 2005 ; Armstrong, 2009), thus can quickly establish a healthy interpersonal relationship and enhance group work efficiency (Good, 2000 ; Child, Faulkner, & Tallman, 2005).

Gardner (1983) invests in psychology, neurology, biology, sociology, anthropology, and the field of art and humanities, in a systematic way to study and summarize the relationships between different human intelligence and abilities. Multiple intelligence research is different from the traditional intelligence test, taking the subject's self-estimation of the way. From the self-assessment of the diversity of intelligence generated by the study of gender differences found that human beings have a variety of intelligence as long as given the appropriate environment, opportunities, encouragement and teaching, will achieve moderate development and beyond the original presupposition (Gardner, 2008).

Individuals have every intelligence, multiple intelligence emphasizes the cognitive function, rather than a distinction between the individual with what kind of intelligent theory, everyone has a variety of intelligence, but a variety of intelligence strengths and weaknesses are different, or in all stages of life in the case of the development of intelligent development of different (Checkly, 1997 ; Armstrong, 1999).

Interpersonal intelligence is in the range of multiple intelligences, especially when Gardner (1983) constructed personal intelligence investigating two aspects of human nature: one is inner level, which is interpersonal intelligence, and the other is external development and extend the wisdom of others, that is interpersonal intelligence.

The interpretation of interpersonal intelligence refers to the ability to "pay attention to and distinguish the abilities of others", especially to perceive and distinguish the emotions, intentions and motivations of others, including the expression of facial expressions, sounds and actions, the identification of different interpersonal relationships and the ability to respond appropriately to the implication and co-work effectively with others (Armstrong, 1997 ; Gardner, 1983/1999).

Armstrong (2000) explains that interpersonal intelligence includes the ability to build and maintain relationships that can play a role in the community, the sensitivity to others' facial expressions, tones, and postures, and the perception of all signs of interpersonal relationships.

Lazear (1999/2000) emphasizes that interpersonal intelligence is to cultivate dependencies between individuals through interactions, communication,

teamwork, cooperative learning, empathy, social skills, team competition, and group planning.

Silver, Strong and Perini (2000/2002) state that people acquired with better interpersonal intelligence skill can cooperate with others efficiently and are sensitive to other people's emotions, attitudes, changes in desire. They usually show friendly, outgoing characteristics and know how to respond appropriately to others.

By sensing facial expressions, sounds and movements, identifying the implication of different interpersonal relationships, and responding appropriately to these hints, people can differentiate others' emotions, intentions, motivations and sensory abilities (Armstrong, 2000 / 2003).

These people have certain characteristic in common, such as show consideration, correspond with environment instantly, change their stubborn attitude, take good care of others, put themselves in other people's shoes, good at observing other's expression and grasp the movements of these minds (Gardner, 1993).

Interpersonal intelligence manifestations vary with gender and age (Birditt & Fingerman, 2003). Therefore, Lazear (2004) divide the procedure of interpersonal intelligence development into three levels, from the basic level, learning skills of interpersonal relationships and compromise or consent to a strategy, to the complex skills level, starting to learn social skills, build peer relationship, gain cooperation ability, put oneself in other people's shoes, and understand other people's minds.

In the last level of integration, people fully realize the group dynamics, interpersonal relationships, human social behavior, and can appreciate the cultural and individual differences. In addition, with the sensation of facial expressions, sounds and actions, the identification of different interpersonal relationships, and the appropriate reaction, excellent interpersonal intelligence has the ability to distinguish the emotions, intentions, motivations and senses from others (Armstrong, 2000/2003).

These characteristics act as the foundation of interpersonal relationships, and enable one to develop good emotional quotient and interpersonal sensitivity. Hamarta, Deniz and Saltali (2009) discuss the correlation between predictive variables of emotional quotient. They divide it into three aspects, interpersonal intelligence, adaptability, stress management and general emotions. It is found that dependency relationship can effectively predicted emotional intelligence interpersonal intelligence.

Furthermore, interpersonal intelligence and security dependencies show positive relations. Numerous scholars propose explanation for interpersonal intelligence to emphasize that interpersonal intelligence is an essential ability for people to contact, being active in groups, and interact with others in society, and that interpersonal intelligence is a key factor for people to distinct other people's emotions, motivation, and communication. As Gardner (1993) says, intelligence can be taught by education. With thorough learning and practice, interpersonal intelligence can be better developed.



It is not difficult to find out that past research rarely explored the relationship between gender difference and interpersonal intelligence performance. Most of them analyze the difference of gender from multiple intelligence, but little of the research combine the two. There are divergent views among past research. According to some studies, male interpersonal intelligence is higher than that of women (Nasser, Singhal, & Abouchedid, 2008).

On the other hand, another researcher believe that women have a high interpersonal intelligence performance (Rammstedt, & Rammsayer, 2000; Chan, 2007; Nasser, Singhal, & Abouchedid, 2008; Türksoy, Yanci, & Güder, 2015). Neto and Ruiz (2008) studied the self-multiple intelligence assessment and gender difference of 242 Portuguese female students. They discovered that men show better interpersonal intelligence than women in multiple intelligence.

Oppositely, Ms. Wang et al. (2009) studied the impact of creative drama teaching on children's self-concept, interpersonal intelligence and creativity among 105 Taipei and Xinbei City children. The study showed that children's interpersonal intelligence showed no gender difference.

Moir and Jessel (1993) explain the performance of gender and intelligence from a scientific view and propose the argument concerning brain sex. Among the creatures on earth, human beings show the most distinctive gender difference.

They believed that gender is determined before birth, and gender difference are derived from the brain differences. Not only the constructions of brains are different between men and women, but also the ways to deal with the message are different, resulting in different perception, priority setting and behavior.

With postnatal factors conditions, gender difference are formed in intelligence performance. It is worthwhile to study the differences in the performance of interpersonal intelligence under the fact that brains construction and the ways to cope with the message differed in gender.

Various studies have shown that there are a wide range of studies on gender difference. One conduct the research combining gender difference, human rights and mental patients. From the level of home and community, the research analyzes how different gender of mental illness show the demand perception to human rights (Vijayalakshmi, Reddemma, & Math, 2012).

Document feature is an information that can obtain directly from the study sample of the literature. Nonetheless, there are several factors that may interfere the results, as following :

1. Subject categories : baby, elementary school student, junior high school student, senior high school student, college and above.
2. Published years : divided into 2000-2007 and 2008-2016 , two periods.
3. Published languages : divided into Chinese and English. To investigate the effect of domestic and interpersonal intelligence performance generated.
4. Published categories : divided into Journals, publications, master's thesis and doctoral dissertation.

The document features listed above are available directly from the study sample of the literature, which may indirectly affect the performance of interpersonal intelligence.

Research Methods

Meta-analysis is considered the most meaningful research method, which brings the progress of scientific exploration, increases the precision and statistic of research, and solves the problem that original researches could not answer (Alderson, Green, & Higgins, 2004). This study uses meta-analysis from scientific, systematic, objective aspects to conduct a comprehensive literature (Light & Pillemer, 1984). Integrate the results of the past individual research and form the measurement method for research (Glass, McGaw, & Smith, 1981).

In this process, try to eliminate the error of different sources and find the real relationship between the variables and correlation (Hunter & Schmidt, 1990). From the results of individual studies using statistical process analysis found that the key point of the study is to focus on the average effect size after weighted. Choosing weighted average effect size, Hedges's g shows the difference between gender and interpersonal intelligence performance.

In addition, meta-analysis model has two kinds of effects : fixed -effects model and random-effect model. From the results of variables effect analysis, the study found samples with higher heterogeneity adopt random-effects model.

Borenstein, Hedges, Higgins and Rothstein (2010) pointed out that the random-effect model is more consistent with the actual sampling allocation because this method do not subject to the limitation of common effect and produce better results than the fixed-effect model. The analogy of the results is broader.

2.1 Research design

This study uses code book as a research tool to integrate and research the characteristic values of the relevant literature. In order to ensure the correctness of the encoded content, each coded item is explained (Cooper et al., 2009). In the process of data coding, the published journals and the unpublished master's thesis are numbered. First measure the number of sex samples, the mean and the standard deviation. Then process the constructs effect of the interpersonal intelligence performance while at the same time code the constructs to form the sample file-drawer. As Table 1 and Figure 1 :

Table 1: Literature Code Book

Journal paper	Male group			Female group			S C	P Y	P L	P C
	M	SD	N	M	SD	N				
江文吉(2001)	31.44	6.98	32	33.68	6.94	364	2	2	1	1
陳俐婷(2002)	17.74	0.57	27	19.38	0.55	29	2	2	1	1



王淑芬(2003)	33.52	9.18	29	34.87	8.01	291	2	2	1	1
劉佳園(2005)	3.49	0.66	68	3.73	0.60	56	2	1	1	1
丁國翔(2007)	14.53	2.88	56	14.85	2.92	35	2	3	1	1
鄭如婷(2007)	3.03	0.81	98	3.50	0.61	100	2	2	1	1
葉玉環(2008)	3.751	0.63	54	3.904	0.442	46	2	1	2	1
張孟琪(2009)	20.86	4.22	41	22.63	4.012	392	2	2	2	1
張珮芬(2009)	69.64	13.3	33	74.27	11.37	334	2	3	2	1
陳家凌(2009)	2.102	0.41	18	1.954	0.374	219	2	1	2	1
黃新棟(2009)	13.19	3.47	41	13.57	3.01	388	2	4	2	1
呂勝瑛(2010)	3.72	0.61	64	3.84	0.56	100	1	5	2	1
許淑婷(2012)	3.584	0.80	10	3.837	0.805	175	1	2	2	1
賴幸佩(2012)	39.3	10.5	21	40.4	9.3	291	2	4	2	1
朱錦鳳(2013)	66.72	13.3	14	67.53	11.90	274	1	5	2	1
葉俊偉(2014)	48.40	26.8	37	32.89	28.30	48	1	2	2	1
Beatrice (2000)	117.1	15.7	54	122.2	8.1	51	1	5	1	2
Furnham(2004)	114.0	13.1	84	114.0	12.99	138	1	6	1	2
Buchann(2005)	114.8	18.5	12	117.3	19.80	250	1	6	1	2
W.Chan (2007)	11.72	2.51	18	12.72	1.95	110	1	2	1	2
Ramzi (2008a)	118.4	0.82	40	123.1	1.103	247	1	5	2	2
Nerguz (2009)	28.03	5.13	10	29.21	4.755	140	1	6	2	2
Burcu (2010)	3.74	1.59	11	3.75	1.50	116	1	1	2	2

Ayşe (2015) 2.16 0.41 39 2.38 0.410 60 1 6 2 2

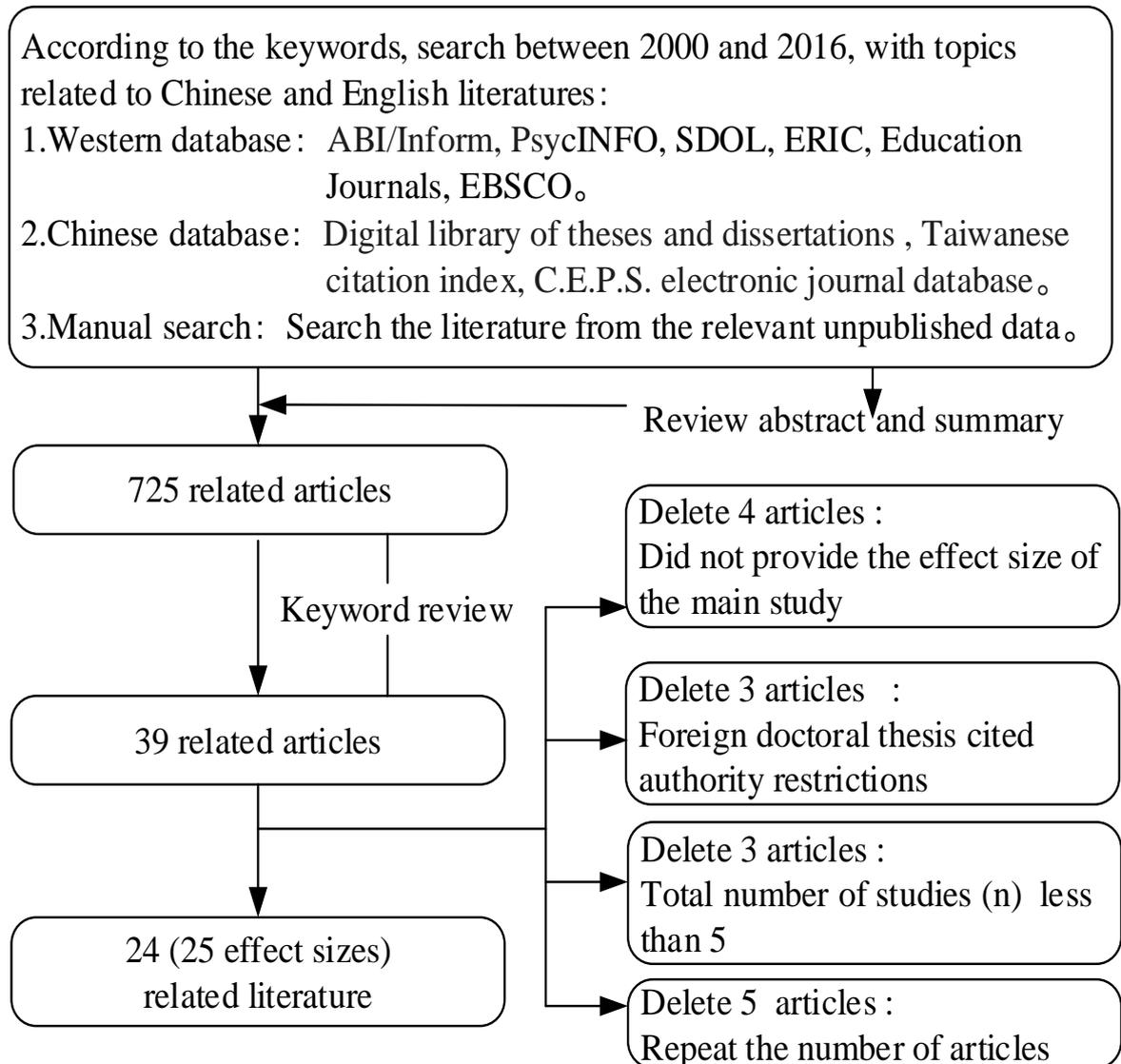


Figure 1 : Literature collection process

The database includes : ABI / Inform, PsycINFO, SDOL (Science Direct Online Library), ERIC, Education Journals, EBSCO Discovery Service (EDS), Digital library of theses and dissertations and Taiwanese citation index, C.E.P.S. electronic journal database.

The study use keywords to cross-query and meta-analyze related vocabulary from the database system. Among the reference of published and



unpublished literature, the main keywords are divided into two types of cross-word index : (1) gender difference and interpersonal intelligences. (2) gender difference and multiple intelligences. This study includes the number of samples (N), the mean (M) and the standard deviation (SD) of the discrete mass, which were "gender difference", "interpersonal intelligence" and "multiple intelligences". There are four criteria for exclusion: (1) the effect of the main study is not provided. (2) foreign doctoral dissertation cannot obtain and the restrictions to quote. (3) the total number of studies N is too small (<5). (4) reiteration of articles.

2.2 Data processing

1. Select the number of men and women the average and the standard deviation in the literature to calculate Hedges'sg using comprehensive Meta-Analysis version 3.0 and set the random-effects model to measure the overall average effect size.

2. The effect size Hedges's g holds the standard that female represents positive and the male show negative. See the equation of gender difference in the interpersonal intelligence performance as follow:

$$\text{Hedges's } g = \frac{\bar{X}_{G1} - \bar{X}_{G2}}{S_{pooled}}$$

\bar{X}_{G1} represents Female's average

\bar{X}_{G2} represents Male's average

S_{pooled} represents combined standard deviation

The effect size (ES) is explained. When the weighted average effect size is not between the confidence interval and is greater than zero, it means that the gender difference is positively related to the interpersonal intelligence performance and the female interpersonal intelligence performance is higher than that of the male. On the contrary, if the weighted average effect size is between the confidence interval and less than zero, it represents that gender difference and interpersonal intelligence performance have a negative relationship and that male interpersonal intelligence performance is higher than that of women. If the weighted average effect size is equal to zero, there is no gender difference in interpersonal intelligence. Cohen (1992) states that when the weighted average effect size is small level at about ± 0.20 , middle scale at about ± 0.50 , and greater level at $\geq \pm 0.80$.

3. Heterogeneity Q

Use Cochran's Q to test whether studies are heterogeneous and set type I error $\alpha = 0.05$

$$Q = \sum_{i=1}^k \left[w_i (r_i - \bar{r})^2 \right]$$

If the Q test was significant ($p < 0.05$), $I^2 > 75\%$, use random-effect model to calculate the average effect size.

4. Publication Bias

Publication bias refers to meta-analyze published literature, excluding the unpublished research. In general, the study found that the literature which was tested statistically significant was more likely to be accepted by the journal, and

that the literature which was not tested statistically significant was not only uneasy to be published, but also easily locked in the drawer by the researchers.

Rosenthal (1979) called this consequence “The file drawer problem” or “The iceberg phenomenon”. There are three sources of publication bias: (1) Researchers tend not to publish studies that are tested insignificant. (2) The review committee tends to accept a study with significant statistical result. (3) Tend to accept funded studies(張紹勳 · 2014). This study uses two methods : (1) Use funnel plot to investigate the distribution (2) Calculate Fail-safe Number to eliminate the deviation of the source.

5. Adjust the moderator variables, this study calculated the heterogeneity Q test. When the heterogeneity $p < 0.05$ reached a statistically significant level, and $> 75\%$ represents high heterogeneity, the researcher will adopt random-effect model to estimate the average effect size. Then, the researchers should subgroup the samples and analyze in detail ; that is, adjust the moderator variables (Zhang Shaoxun, 2014) to further understand how the moderator variables effect the subjects.

The structure of the study consists two levels. Firstly, the study aims to integrate the results between gender difference and interpersonal intelligence performance and views the relationship between the two. The second layer analyzes the impact of the variables on the interpersonal intelligence performance from the characteristics of the collected literature, including the subject category, publication age, published language and the publication category. The study further validates the results from the first layer integration and analyzes how to adjust the effect of interpersonal intelligence performance. Research framework is shown in Fig. 3.

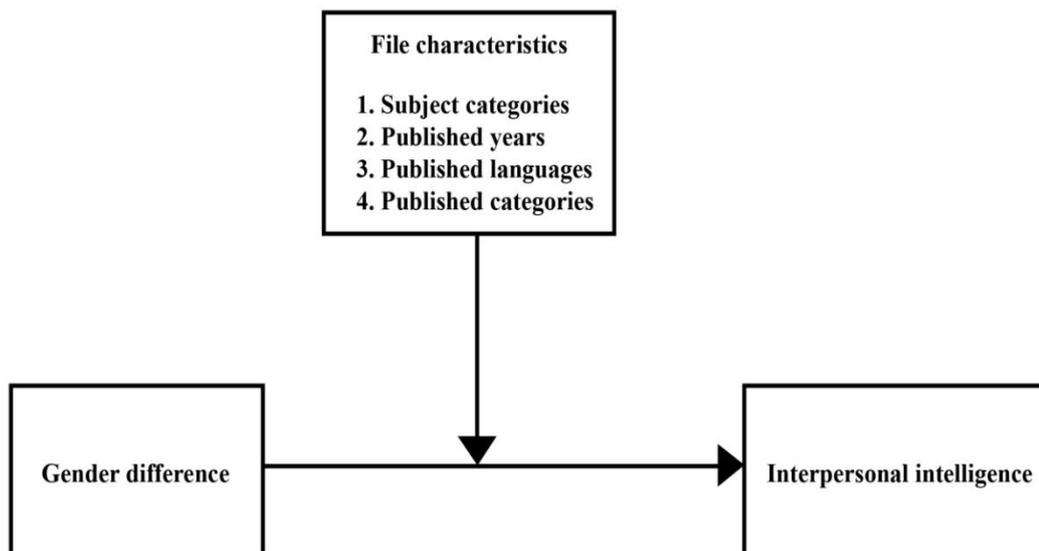


Figure 3 : Research framework

Results



The study examined the relationship between gender difference and interpersonal intelligence and make essential recommendations and contributions on the development of interpersonal intelligence.

The key finding of this study is the argument that ends all points of view. The establishment of gender differences does form a different manifestation of human intelligence. Based on the random effects model, the average effect amount Hedges's g was 0.441, approaching moderate positive effect. Women in interpersonal intelligence perform better than men. There are differences between the human intelligences that show gender. Yet, the result is not particularly strong.

In addition, testing subjects such as category, publication year, publishing language and publishing categories and other variables will resulting in the regulation of interpersonal intelligence performance.

Conclusion

In conclusion, this paper uses the method of meta-analysis. To build a rigorous research structure, this study collects all aspects literatures, undergoing the process of inclusion and exclusion, and rigorous processes the effect size data.

In the history of interpersonal intelligence, women gradually get out of their families, devote more time to interpersonal communication and maintenance, and indirectly enhance their opportunities for interaction and communication with others and develop comparative advantages Interpersonal intelligence, the text for the development of interpersonal intelligence and future research put forward substantive proposals.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Dr. **Fang-Pin Lai** - Department of Industrial Engineering and Management, National Chin-Yi University of Technology, Taiwan.

Kai-Hao Liu - Department of Industrial Education and Technology, National Changhua University of Education, Taiwan.

Li-Ru Chen - Department of Industrial Education and Technology, National Changhua University of Education, Taiwan.

Pr. **Shao-Shiun Chang** - Department of Industrial Education and Technology, National Changhua University of Education, Taiwan.

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