

Personality Factors (Five-Factor Model, FFM) in Persian Male & Female Students: The Role of Brain Asymmetries

Amir Mohammad Shahsavarani¹, Hassan Ashayeri², Yalda Ghafourian Sharif³, Morvarid Lotfian⁴, Kolsoum Sattari⁵, Mostafa Mohammadi⁶, Iman Hosseini⁷

¹ PhD, Neuropsychologist and Neurosociologist. Institute of PsychoBioSocioEconomic Sciences, Yerevan, Armenia.

² MD, Neuropsychologist and Neuropsychiatrist, Iran medical sciences University. Tehran, Iran.

³ MS, Clinical Psychology, Department of Psychology, Science and Research Branch, Islamic Azad University, Zanján, Iran.

⁴ MS, Psychologist, Institute of PsychoBioSocioEconomic Sciences, Tehran, Iran.

⁵ MA, Curriculum Design, Institute of PsychoBioSocioEconomic Sciences Tehran, Iran.

⁶ PhD, Psychologist, Department of Social Psychology, University of Lausanne, Lausanne, Switzerland.

⁷ BS, Clinical Psychology. Institute of PsychoBioSocioEconomic Sciences, Tehran, Iran.

amirmohammadshi@gmail.com

Abstract: The aim of this study was to investigate the personality differences between male and female students according to brain asymmetries. 762 Subjects were chosen by random multi-session sampling method Tehran Universities. Subjects administered the NEO-PI-R all in one session. As the sample distribution was not normal, the results were analyzed by Mann-Whitney U. The results showed that male students had higher scores than female students only in neuroticism ($p < 0.05$). Female students had higher scores in extraversion, openness to experience, agreeableness and conscientiousness ($p < 0.05$). Some parts of the results are not consistent with the literature on Five-Factor Model of Personality. The differences in results are probably because of consideration of a wide range of neuropsychological control variables.

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¹ . PhD, Neuropsychologist and Neurosociologist. Institute of PsychoBioSocioEconomic Sciences, Yerevan, Armenia. Corresponding Author. amirmohammadshi@gmail.com

² MD, Neuropsychologist and Neuropsychiatrist, Iran medical sciences University. Tehran, Iran.

³ MS, Clinical Psychology, Department of Psychology, Science and Research Branch, Islamic Azad University, Zanján, Iran.

⁴ MS, Psychologist, Institute of PsychoBioSocioEconomic Sciences, Tehran, Iran.

⁵ MA, Curriculum Design, Institute of PsychoBioSocioEconomic Sciences Tehran, Iran.

⁶ PhD, Psychologist, Department of Social Psychology, University of Lausanne, Lausanne, Switzerland.

⁷ BS, Clinical Psychology. Institute of PsychoBioSocioEconomic Sciences, Tehran, Iran.

Introduction

Personality can be assumed as the Holistic performance of all higher Cortical functions. Personality components (factors) is related to all individuals' life aspects such as education, job, and interpersonal functioning (Dorros, Hanzal, & Segrina, 2008) and even eating behaviors (Provencher et al., 2008).

According to behavioral genetics studies (e. g., Schultz & Schultz, 2006; Plomin, Defries, McClearn, & Rutter, 1997), genes determine a kind of extent for personality and behavior in beings and environment can only change the degree of appearing of these characteristics in their extent. Genetic researches in the field of personality have focused on

five extended personality dimensions, which include many aspects of personality (Goldberg, 1990). The five-factor model is one of the most heuristic and progressive models of personality (Tokar, 1995). Many researchers have emphasized on the role of five-factor model in assessment of personality (e.g., Taylor & McDonald, 1999; Goldberg, 1993).

This pattern is resulted from several decades of concentrated research on personality traits (Haghshenas, 2006; Garrousi Farshi, 2001). Recent empirical researches show the strong presence of five domains and factors of personality (e.g., Digman, 1994; Goldberg, 1990). Many personality psychologists agree that general personality can be

best described in terms of the dimensions of the Five-Factor Model (FFM; Costa & McCrae, 1992; Digman, 1990). The FFM had a strong appeal to personality psychologists because a wide range of studies demonstrated that virtually all personality constructs identified in major models of personality description could be represented within this FFM framework (Markon, Krueger, & Watson, 2005; O'Connor, 2002). The FFM provides a dimensional description of personality on five broad factors. These five domains (factors) include Neuroticism (N), Extroversion (E), and Openness to experience (O), Agreeableness (A) and conscientiousness (C) (Decuyper, De Fruyt, & Buschman, 2008; Costa & McCrae, 1992). Any of these factors have six traits that totally include 30 traits (Bagby et al., 1999).

One of the most important works on the five-factor model was done by Costa and McCrae (1985, 1992). They made a personality inventory according to this model (NEO-PI-R, 1992). As Taylor and McDonald (1999) posits, not only NEO-PI-R has the distinguished psychometric characteristics, but also has succeeded in consistency with personality traits constructs that are measured by different measurement systems including Myers-Briggs Type Indicator (MBTI, Wink, 1993), Cattell 16-factor personality questionnaire (Cattell, Eber, & Tatsuka, 1970) and Eysenck Personality Questionnaire (Eysenck, & Eysenck, 1964).

This Inventory has been translated and normalized to many languages such as Persian (Haghshenas, 2006; Garrousi Farshi, 2001); Dutch (Hoekstra, Ormel, & De Fruyt, 1996), French, Chinese, Arabic and Spanish (Zhang, 2003).

One of the most prominent aspects of neuronal organization is brain asymmetry that affects many dimensions of sensory, motor, cognitive and emotional functioning in human being (Hugdahl, 2008). The main indicator of neuronal organization is lateralization. It seems that lateralization is a fixed phenomenon (Porac, and Coren, 1976). In central nervous system (CNS), leftward planum temporale asymmetry has been found repeatedly and is one of the most consistent indices of asymmetry across the extant human cortex (Knaus et al., 2009). Among various aspects of visible lateralizations is handedness. Researches show that abilities of left hemisphere of right-handers are different from left-handers in many aspects and even they have different hemispheric cortical structures (Hervé, Mazoyer, Crivello, Perchey, & Tzourio-Mazoyer, 2005). For example, left-handers have less reaction time than right-handers in response to stimuli that need spatial analysis (Teixeira, 2008). Eye dominance is another visible presentation of brain asymmetry that is defined as a tendency to prefer visual inputs of one eye rather

than the other (Shneor, & Hochstein, 2008). Brain imaging studies indicate more and faster activation at the time the dominant eye is stimulated (Mendola, & Connor, 2007). In addition, some brain disorders show asymmetric onset and progression (e.g., Stamenova, Roy, & Black, 2009). It revealed that even peripheral attention in running is biased according to hemispheric asymmetries (Toussaint, Fagard, 2008). It seems that these two forms of asymmetries, because of their extended effects on behavioral functioning and making biases on sensory data input to primary sensory cortex, have significant role in changing and moderating individuals' executive functions. Therefore, they may have effects on personality as the holistic output of higher cortical functions performance.

According to neuropsychological studies, it revealed that higher cortical functions such as personality are executed in different manners in men than women (Kandel, Schwartz, & Jessel, 2000; Denes, Pizzamiglio, 1999). For example, men and women show important differences in clinical conditions in which deficits in cognitive control are implicated that leads to significant differences in impulse control between sexes (Li, Zhang, Duann, Yan, Sinha, & Mazure, 2009). In addition, results derived from NEO-PI-R studies show gender differences in scores and profiles (e.g., Chapman, Duberstein, Sörensen, & Lyness, 2007; Lippa, 2006) in a manner that causes different standard scores and profiles for each gender (McCrae et al., 2004). For example, McCrae et al. (2004) and Costa, Terracciano, and McCrae (2001) found significant gender differences in neuroticism and agreeableness scores. Furthermore, the existence and persistence of these gender differences proved in elders (Chapman, Duberstein, Sörensen, & Lyness, 2007).

Much researches have been conducted on FFM and many variables have assessed in relation to it such as birth date (e.g., Hartman, Reuter, & Nyborg, 2006), birth order (e.g., Saroglu, & Fiasse, 2003), Brain activities (e.g., Jaučovec, & Jaučovec, 2007), Religion (e.g., Saroglu, & Fiasse, 2003), and intelligence (e.g., Hartman, Reuter, & Nyborg, 2006).

In addition, FFM studies conducted in various age groups such as school students (Bilalić McLeod, & Gobet, 2007), 22-yearold youth (Jaučovec, & Jaučovec, 2007), 22-29 youth (Saroglu, & Fiasse, 2003) and ages above 65 (Chapman, Duberstein, Sörensen, & Lyness, 2007). However, in all these studies subjects' age did not considered as a neuropsychological (as an indicator of the level of maturation and development of CNS) and psychosocial (as peer group effect) control variable. Moreover, factors such as education and lateralization are not considered as control variables. Although

gender has received much attention that NEO-PI-R has different gender norms, but differential comparisons that consider gender and lateralization effects on personality factors have not been conducted yet.

With respect to such issues, the aim of the present study was to investigate the personality factors of male and female students according to brain asymmetries.

Method

Participants

The population was consisted of all right-hander & right-eye BA/BS & upper students in Tehran Universities (Nearly 14000 students). 762 students were selected by random multi stage sampling (437 female & 325 male). According to Heponiemi (2004) and Heponiemi, Keltikangas-Jarvenin, Puttonen, & Ravanja (2003) the developmental and maturational aspects of neurological characteristics of people aged between 21 and 36 is nearly similar. Hence, in this study this age range has been selected ($M = 26.7$). All the subjects answered to NEO-PI-R in one session.

Control Variables

As the essence of the present research was assessing the role of brain asymmetries and gender in individual differences, the researchers emphasized on control variables and selected as maximum control variables as possible. In fact, the study has nearly full-experimental condition in conduction. The control variables include education (at least BA/BS student); age (between 21 and 36); handedness (right-hander) and eye dominance (right-eyed), that checked by neuropsychological screening test (Lezak, Howieson, Loring, Hannay, & Ficsher, 2004); Marital status (single); residence (living in Tehran); having no pathological history of CNS, no pathological history of visual system, no kind of color blindness (Assessed by Ishihara Color-Blindness test), no history of Visual agnosia, no history of encephalitis and other CNS diseases, No current usage of medicine that affect visual & attentional systems, no history of drug dependency and/or drug abuse, no current drug dependency and/or drug abuse; having no refraction defections; having no history of and/or current psychotic disorders (Schizophrenia, psychotic depression and etc.), and having no history of and/or current psychological and/ or psychiatric disorder. All of these were assessed using a structured clinical interview and neuropsychological screening checklist designed by researchers. In addition, all the experiment phases were done in between 3 and 7 pm in order to controlling the diurnal rhythms fluctuations.

Measures

Neo-PI-R: The NEO-PI-R has 240 items and measures Big Five personality factors, as well as 30

facets (six by dimension), although they were not used in the present study. The construct validity of the NEO PI-R, and its previous version—the NEO-PI–, has been clearly demonstrated by the replicability of its five-factor structure in several languages and cultures (Caprara, Barbaranelli, Hahn, & Comrey, 2001; Katigbak, Church, & Akamine, 1996). The reliability coefficients oscillate between 0.86 and 0.92 (McCrae, & Allik, 2002; Costa & McCrae, 1992). In this study, the Persian version of NEO-PI-R was used and has reliability coefficients between 0.56 and 0.92 (Garrousi Farshi, 2001).

Ishihara Color-Blindness test: In order to screening subjects to have no color-blindness problems, the Ishihara Color-Blindness test was used. This test is a booklet with 38 colorful figures and by administrating the instructions the experimenter can find any kind of color-blindness problems (if exists).

Neuropsychological screening checklist: In order to assess the control variables in each subject and due to the wide range of control variables, all the control variables were put in a checklist (Neuropsychological screening checklist) by researchers and the interviewers used it to assess subject.

Procedure

After determining subjects (primary subjects) by sampling method discussed above, the interviewers assessed control variables in individuals and if the persons' characteristics matched the desired pattern, he/she filled out a written subscription and administered the NEO-PI-R in one session. To respect ethics, all the subjects filled out written subscriptions.

Analysis

After data gathering, all the findings analyzed by SPSS 17 in order to measuring personality differences among male and female students. The normality of sample group distribution was assessed by one-sample Kolmogorov-Smirnov Normality test. Because the distribution the sample data was not normal, nonparametric Mann-Whitney U test for hypothesis testing and inferential analysis.

Results

The primary results (row scores) of administrating the NEO-PI-R in male and female students are presented in figure 1. In factor *neuroticism (N)*, male students got more scores than female students. In contrary, female students got more scores in factors *extraversion (E)*, *openness to experience (O)*, *agreeableness (A)*, and *conscientiousness (C)*. The mean scores of male students in personality factors are $N = 10$, $E = 113$, $O = 109$, $A = 115$, and $C = 121$. The mean score of female students are $N = 105$, $E = 128$, $O = 120$, $A = 131$, and $C = 137$.

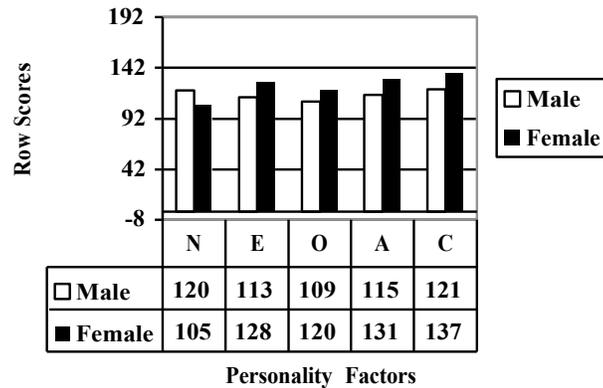


Figure 1. Male and female personality factor plot for row scores

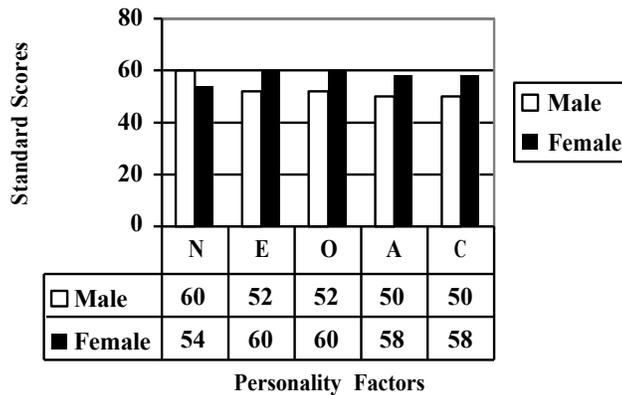


Figure 2. Male and female personality factors plot for standard scores

In order to make a better understanding, row scores converted to standard scores via Inventory profiles that adopted for each gender separately in the inventory manual and presented in figure 2. Male standard scores include N = 60, E = 52, O = 52, A = 50, and C = 50. Standard scores for female personality factors include N = 54, E = 60, O = 60, A = 58, and C = 58.

According to sensitivity of the study design for maximum controlling in all aspect of the research, in order to make sample results more representative to population, at first data were tested by Kolmogorov-Smirnov normality test to assess the normality of sample distribution in population (table 1).

Because the test result showed that, the sample distribution was not normal in all factors and facets, the data analyzed by Mann-Whitney U nonparametric test to compare the male and female subjects' scores. The descriptive characteristics of the study results are

presented in table 2. The mean rank of male subjects is higher than female subjects only in neuroticism (N). In the contrary, female subjects get higher ranks in the rest four factors include Extroversion (E), and Openness to experience (O), Agreeableness (A) and conscientiousness (C).

The statistical results of Mann-Whitney test for each gender are presented in table 3. According to the results, the differences of both gender groups is significant ($\alpha < 0.05$). It means that right-hander and right-eyed male and female student have significant differences in all personality factors include Neuroticism (N) (< 0.03), Extroversion (E) (< 0.000), and Openness to experience (O) (< 0.000), Agreeableness (A) (< 0.000), and conscientiousness (C) (< 0.000).

Table 1. Kolmogorov-Smirnov test for distribution normality

	N	Kolmogorov-Smirnov Z	Asymp. Sig. (2 tailed)
N1	762	1.460	.028
N2	762	1.817	.003
N3	762	2.913	.000
N4	762	2.402	.000
N5	762	2.576	.000
N6	762	3.094	.000
N	762	2.287	.000
E1	762	2.228	.000
E2	762	1.963	.001
E3	762	2.969	.000
E4	762	2.179	.000
E5	762	2.328	.000
E6	762	3.389	.000
E	762	1.639	.009
O1	762	2.417	.000
O2	762	2.751	.000
O3	762	1.752	.003
O4	762	3.254	.000
O5	762	3.113	.000
O6	762	2.892	.000
O	762	2.185	.000
A1	762	2.410	.000
A2	762	2.099	.000
A3	762	2.335	.000
A4	762	3.433	.000
A5	762	3.443	.000
A6	762	3.015	.000
A	762	1.782	.003

C1	762	3.236	.000
C2	762	2.058	.000
C3	762	2.751	.000
C4	762	2.719	.000
C5	762	2.212	.000
C6	762	2.703	.000
C	762	1.916	.001

Table 2. Descriptive statistics of personality factors in both genders

factors	Groups	N	Rank mean	Sum of Ranks
Neuroticism (N)	Female	437	368.1	160850
	Male	325	398.4	129082
	Total	762		
Extraversion (E)	Female	437	427.94	187011.5
	Male	325	319.05	103691.5
	Total	762		
Openness to experience (O)	Female	437	423.58	185103.5
	Male	325	324.92	105599
	Total	762		
Agreeableness (A)	Female	437	429.32	187614
	Male	325	317.2	103089
	Total	762		
Conscientiousness (C)	Female	437	434.14	189717.5
	Male	325	310.27	100985.5
	Total	762		

Table 3. Results of Mann-Whitney nonparametric test

	Neuroticism (N)	Extraversion (E)	Openness to experience (O)	Agreeableness (A)	Conscientiousness (C)
Mann-Whitney test	65156	50716.5	52624.5	50114	48010
Sig.	.03	.000	.000	.000	.000

Conclusion

The study results showed that both genders have significant differences in all five factors. Male students got more scores in Neuroticism (N), while female students got higher scores in Extraversion (E), Openness to experience (O), Agreeableness (A), and Conscientiousness (C).

Neuroticism (N)

In present study, male student got higher scores than female students in Neuroticism (N). These results are different from all the studies done in this field yet. Correlational, experimental, and longitudinal studies have found that neuroticism is positively associated with negative affect (Ng, 2009). Chapman, Duberstein, Sörensen, & Lyness (2007) found that women got more scores than men in N. Goodwin, & Gotlib (2004) revealed that women reach higher levels of N than men do and men get significant lower scores in this factor. In addition, Costa, Terracciano, & McCrae (2001), and Lynn, & Martin (1977) in their studies found that men's scores in N is significantly less than women's.

The causes of gender differences in N are unclear yet. It may start from low ages. Social

influences may cause men and women to choose different ways of Coping styles and experiencing the surrounding world. For this reason, women work harder and have more negative outcome expectancies, while men have more positive thoughts and expectancies of outcome than women do (Goodwin, & Gotlib, 2004). This issue can be an explanation of persistent gender differences that stemmed in genetic structures (Chapman, Duberstein, Sörensen, & Lyness, 2007). Lowe & Reynolds (2006) showed high levels of anxiety in elder women that can be caused by age-related transitions. In addition, younger women have higher levels of N (Lowe, & Reynolds, 2006; Sinnott, & Shifren, 2001; Feingold, 1994).

Extraversion (E)

In the field of Extraversion (E), the study results are divergent to some extent. Theoretically, the dynamics of Extraversion have been conceived of as approaches towards the world that focus outward (Eysenck, 1952, 1967; Jung, 1913/1971) and empirically, extraversion represent variations in talkativeness, dominance, forcefulness, energy, warmth, enthusiasm, and sociability (Costa &

McCrae, 1992). Such variations have been seen in conversational behavior with novel social partners (e.g., Thorne, 1987). In addition, Extraversion related to feeling closer to friends (Berry, Willingham & Thayer, 2000). Extraversion also has been related to positive mood (Kemper et al., 2008). In present study, female students got higher scores than male student in E and these results are in concordance with Godwin, & Gotlib (2004) study. However, some studies found that male subjects got higher cores in E than female subjects do (Lynn, & Martin, 1997; Costa, & McCrae, 1988). Although the cause of differences in results is indefinite, it might be the effect of the subjects' age (peer groups effect). Women get higher scores than men in E especially in Activity facet (E4) in young ages, but eventually by growing older this difference between genders become less and even in senile ages the scores are inverted. That means old men get higher scores in E than old women do (Chapman, Duberstein, Sörensen, & Lyness, 2007; Lee, 2005).

Openness to Experience

Openness to experience is a personality factor that to some extent affects from environment. Openness to Experience is manifested in the "breadth, depth, and permeability of consciousness, and in the recurrent need to enlarge and examine experience" (McCrae & Costa, 1997; p. 826). People higher in Openness to Experience have a stronger preference for novelty, variety, intense experience, and complexity (McCrae, 1996). Conversely, people lower in Openness to Experience have a stronger preference for familiarity, routine, security, and simplicity (McCrae, 1996). Openness to experience (openness) is often characterized as cognitive flexibility or exploration (Aukes, Alizadeh, Sitskoorn, Selten, Sinke, Kemner, et al., 2008). Characteristic adaptations associated with Openness could include strategic inclinations toward thinking in ways that are conducive to breadth, inclusiveness, and novelty of ideas (Vaughn, Bauman, & Klemann, 2008).

The results of the study revealed that female students got higher scores in O than male students. However, Chapman, Duberstein, Sörensen, & Lyness (2007) findings are exactly inverted. Although no documented cause for this difference has been found yet, a hypothesis that explains the gender differences in O emphasizes on mutual influences of personality and job. According to this hypothesis, gender differences in O may be initiated during education and causes different educational and job choices. For example, women more prefer aesthetically oriented jobs whilst men more prefer information-oriented jobs (Costa, McCrae, & Holland, 1984). On the contrary, spending many years in activities that are

convergent to basic individual tendencies reinforces these tendencies and causes the gender differences to appear (Chapman, Duberstein, Sörensen, & Lyness, 2007). It is notable that these differences are based on central tendency indexes and averages and researchers must take the individual differences in each gender & population in mind.

Agreeableness (A)

Agreeableness (A) figures prominently in modern personality theory, especially within the Big Five model of personality (e.g., Costa & McCrae, 1992). Agreeableness is negatively related to a variety of antisocial tendencies. High levels of agreeableness dissociate the typically strong relationship between blame and anger (Meier & Robinson, 2004). Moreover, Agreeableness (A) is linked to increased tendencies towards prosocial thoughts, feelings, and behaviors. For example, agreeableness is correlated with increased forgiveness (e.g., McCullough & Hoty, 2002), as well as increased tendencies to experience prosocial feelings (Wilkowski, Robinson, & Meier, 2005), and to help others (Penner, Dovidio, Piliavin, & Schroeder, 2005). In sum, less agreeable individuals appear to be predisposed towards antisocial thoughts, feelings, and actions, whereas highly agreeable individuals appear predisposed towards prosocial thoughts, feelings, and actions (Wilkowski, Robinson, & Meier, 2006).

The study results in concordance with other studies (e.g., Chapman, Duberstein, Sörensen, & Lyness, 2007) show that women get higher scores in A than men do. In addition, Bilalić, McLeod, & Gobet, (2007) found that girls got higher scores than boys in A. Similar findings are reported about gender differences in this factor and higher scores of females in grown up adults (e.g., Rubinstein, 2005; Goodwin & Gotlib, 2004; Costa, Terracciano & McCrae, 2001). It seems that women and girls tend to score higher than men and boys on A (Pursell, Laursen, Rubin, Booth-LaForce, & Rose-Krasnor, 2008).

It seems that because women have the nurturing role more, thus their agreeableness level is higher than men's level (Costa, Terracciano & McCrae, 2001). Both evolutionary and social role theory have comprehensive explanations to credit this issue. Evolutionary theory, with respect to the importance of generation continuation, emphasizes on the adaptive superiority of women nurturing behaviors for fertility and reproduction (Buss, 1995). While, social role theory attributes women nurturing behaviors to socialization of female gender role (Eagly, 1987). These explanations represent gender differences in agreeableness. This factor seems to be constant in personality during whole life (Chapman, Duberstein, Sörensen, & Lyness, 2007).

Conscientiousness (C)

Few studies investigated the role of conscientiousness and gender differences in this factor separate from other factors. This factor is the last factor of FFM and maybe the least attended one. In humankind, prosocial behavior requires self-regulation and self-control, constructs that define conscientiousness. Conscientiousness (C) is also inversely associated with maladjustment (Caspi, Roberts, & Shiner, 2005). C is best described as the ability of impulse control and using the plan and programs in behavior toward goals (Costa and McCrae, 1992).

In present study, female students got higher scores in C than male students. Some researches approve these findings (e.g., Pursell, Laursen, Rubin, Booth-LaForce, & Rose-Krasnor, 2008). Women and girls tend to score higher than men and boys on Conscientiousness (C) (Pursell, Laursen, Rubin, Booth-LaForce, & Rose-Krasnor, 2008). However, some researchers pose that men, because of factors that interfere in nurturing in social environment during childhood such as receiving more encouragement and attention, more achievement expectancies and receiving more rewards than women do, get higher scores in C (e.g., Goodwin & Gotlib, 2004; Bienvenu et al., 2001).

The findings of the present study are to some extent different from other studies. With respect to previous studies (e.g., Pursell, Laursen, Rubin, Booth-LaForce, & Rose-Krasnor, 2008; Bilalić, McLeod, & Gobet, 2007; Chapman, Duberstein, Sörensen, & Lyness, 2007; Lowe & Reynolds, 2006; Rubinstein, 2005; Goodwin & Gotlib, 2004; Costa, Terracciano & McCrae, 2001; Sinnott & Shifren, 2001) the differences in results could be explained in control variables. In this study, a wide range of control variables from demographic to lateralization are considered so that we can claim that in this study the degree of control is at the same level of experimental designs. Some of these issues are discussed below:

1. The first difference is about visible asymmetries of the subjects. In this study, all male and female subjects were right-handers and right-eyed. As it explained in introduction, asymmetries and therefore lateralizations are the issues that can change cognitive processing states of people and hence, personality, as the holistic functioning of higher cortical functions, influences from these issues. One of this study results is approving the role of lateralization of eye & hand on personality differences. Because previous studies did not consider such control variables, their results are different from ours. The asymmetrical variables, therefore, can be responsible for as major causes of result differences.
2. Next issue is marital status that was not considered as a control variable in other researches. Marriage, because of its interactional essence and intimate relations and because of making social supports, is considered as a health shelter. These social supports usually facilitate individual stress reduction mechanisms (Sarafino, 2008). Considering that personality factors, such as N that interacts directly with distress and C that manifests impulse control mechanisms, represent global functioning of individuals' behavior, hence, controlling this factor (unmarried subjects) seems to have effects on the study results.
3. The third parameter is about the age range of subjects. In studies that similar age ranges were investigated (e.g., Goodwin & Gotlib, 2004) the results were congruent. As considered before, Heponiemi (2004) and Heponiemi, Keltikangas-Jarvenin, Puttonen & Ravanja (2003) researches revealed that neuropsychological aspects of development and maturation of nervous system of people aged between 21 and 36 are similar. In present study, consideration of this issue ended in results that are different from other studies to some extent. In other words, this study results approve the works of Heponiemi (2004) and Heponiemi, Keltikangas-Jarvenin, Puttonen & Ravanja (2003).
4. The fourth effectual factor is subjects' education. In this study, all the subjects were at least BA/BS students. This factor, in addition to making the knowledge base and experiences of subjects specific, implicitly is a kind of intelligence screening of the subjects.
5. Moreover, issues such as residence (living in Tehran); having no pathological history of CNS; having no pathological history of visual system; having no kind of color blindness (Assessed by Ishihara Color-Blindness test); having no history of Visual agnosia; having no history of encephalitis and other CNS diseases; No current usage of medicine that affect visual & attentional systems; no history of drug dependency and/or drug abuse; having no current drug dependency and/or drug abuse; having no refraction defections; having no history of and/or current psychotic disorders (Schizophrenia, psychotic depression and etc.); and having no history of and/or current psychological and/ or psychiatric disorder that affects attention were the control variables. Such a wide range of control variables were not in any previous studies in the field of

personality and indeed the present study acted like an experimental study by controlling such biological and neural variables.

The major limit of the study was the length of the NEO-PI-R. Subjects must administer to all the items in one session in addition to screening interview. This made the study process for subjects long and made them exhausted. Moreover, many target individuals refused to answer the NEO-PI-R or did not completely answer it. In addition to these subjects' down flow, some subjects refused to take back their answer sheet, because of the checking precious aspects of individuals. Considering the handedness and eye-dominance were other obstacles to reach the pure randomized sampling. Further researches and studies are needed in order to improve the sampling results and more adjustment of the sample group to total population. In addition, other age groups should be considered and investigated as well as neurological aspect to make a better understanding of the effects of brain asymmetries on behavior and personality.

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