Original Article

Age and gender might influence big five factors of personality : a preliminary report in Indian population

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Abstract

Age and gender are two important physiological variables which might influence the personality of an individual. The influence of age and gender on big five personality domains in Indian population was assessed in this cross-sectional study that included 155 subjects (female=76, male=79) aged from 16-75 years. Big five personality factors were evaluated using 60-item NEO-Five Factor Inventory (NEO-FFI) at a single point in time. Among the big five factors of personality, *Conscientiousness* was positively correlated (r=0.195; P<0.05) with age in total study population, and retained the significance (P<0.05)in men only when analyzed by gender subgroups. Further, age and gender sub-group analysis also showed that Neuroticism was inversely correlated with age in women aged 26-35 years (P<0.05). Neuroticism and Extraversion showed a positive correlation with age in men aged 36-45 years (P<0.001 and P<0.05, respectively). Neuroticism was inversely correlated with age in men aged 46-55 years (P<0.05). This preliminary report suggested that personality traits might change with age, and is gender-dependent.

Introduction

Personality is defined as a dynamic and organized set of characteristics possessed by an individual that uniquely influence their cognition, emotions, motivation, and behavior in various situations. There are several factors that significantly impact personality, such as illness (1), adaptation to certain circumstances (2), people, and relations (3). It has been shown that even if these factors are kept consistent, two key physiological factors that influence personality are age and gender (4, 5).

Assessment of personality is complex, and a precise assessment is required because of its multifaceted and multidimensional nature. The big five model of personality, a tool to assess personality (6), has gained popularity in the past half century. It encompasses five major dimensions of personality like Neuroticism, a measure of (low) emotional stability, stress and nervousness, Conscientiousness, a measure of hard-working, dedication and being orderly, Agreeableness, a measure of kindness and considerate, Openness to experience, measure of intellect/imagination, and creativity and Extraversion, a measure of enthusiasm, energy and sociability (7, 8). Studies have shown that these personality

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measures significantly vary between men and women (9-11), and the differences can be extreme. For example, a study showed that women scored higher than men on Agreeableness and Neuroticism (12). Similarly, personality also changes with age though previously it was suggested to be fixed by age 30, there by limiting personality changes after this age in the life span (13). Recent studies have shown the positive trends of age with Agreeableness and Conscientiousness, negative trend for Neuroticism, while there were no specific trends for Extraversion and Openness experience (9, 14-18). Such differences have been demonstrated in various cross-cultural populations (19, 20). Additionally, the big five factors of personality are shown to be associated with chronic diseases (21), which suggest that health, gender, and age have cumulative effects on personality of an individual (22). Therefore, understanding such differences will help to better manage overall good health and better lifestyle. To the best of our knowledge, there is no such study that has evaluated the influence of age and gender on personality in Indian population though there are studies that have evaluated the concept of big five factors in Indian scenario (23, 24). Since, India is culturally and ethnically different from Western world, especially with respect to a significantly different position of men and women in Indian society, this difference can be either more prominent or subtle in our population. Keeping this in consideration, we planned a sub-analysis from our earlier study (25, 26) wherein we assessed the influence of age and gender, the two important physiological variables, on big five factors of personality.

Materials & methods

This preliminary analysis was conducted on a subpopulation from a larger study done at Integral Health Clinic (IHC), Department of Physiology, All India Institute of Medical Sciences (AIIMS), New Delhi, and included participants recruited from January 2009 to October 2011. All consecutive incumbents attending the IHC, an outpatient lifestyle intervention facility, were enrolled in this study. The study population included subjects referred from AIIMS OPDs, their relatives, and those who joined IHC for general fitness and health. The details have

been published previously (25, 26). The key inclusion criterion for this analysis was ability to respond to all the questions of the NEO-FFI questionnaire. Participants with history of immunological disorders, major neurological or medical illness, history of serious heart disease (heart attack, angina, cardiac surgery or congestive heart failure), history of serious mental illness, morbid obese (BMI $\geq$35 kg/m^2), and those addicted to alcohol and smoking were excluded. All participants were scored using the NEO-Five Factor Inventory (NEO-FFI) on big five personality factors i.e. 'Neuroticism', 'Extraversion', 'Agreeableness', 'Openness' and 'Conscientiousness'. Only those subjects were included who responded to all the questions in the personality questionnaire. All participants provided their written informed consent prior to any study-specific procedures. The objectives of this analysis were to assess the influence of age and gender on the big five factors of personality, and if the personality changes over time or remains fixed during lifespan. The complete data for personality questionnaire was available for 155 subjects (76 female, 79 male; 16 to 75 years). The participants were categorized in five age groups: 16-25 years, 26-35 years, 36-45 years, 46-55 years, and 56-75 years, to see the effect of age in different phases of life. Grossly, the age groups represented late adolescence (16-25 years), early adulthood (26-35 years), adulthood (36-45 years), middle age (46-55 years) and older adults (56-75 years).

The personality was assessed using Neuroticism Extraversion Openness to Experience Five Factor Personality Inventory Revised (NEO-FF PI-R), a validated tool (27), administered at a single point in time. The shortened 60-item NEO-FF PI-R provides a quick, reliable, and accurate measure of the big five factors of personality, and concisely measures Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. The alpha reliabilities for NEO-FFI range from 0.63 to 0.82.

SPSS Version 16.0 was used for the statistical analysis in this study. The association between the age and the personality scores for both men and women were evaluated using Pearson Correlation Coefficient. The comparison between age-specific and gender-specific subgroup analysis was carried out

using Spearman's rho correlation coefficient. Additionally, the regression models were used to outline the relations of age and gender with different personality factors. Thus, for each of the big five factor, three possible models (Linear, Cubic and Quadratic, as below) were considered (28) and unstandardized regression-coefficients (β) with standard error (SE) were performed to show the effect of age and gender simultaneously on each of the big five factors of personality.

Model	Design
Linear	$B5 = b0 + b1\ (Age) + b2\ (Gender) + b3\ (Age*Gender)$
Quadratic	$B5 = b0 + b1\ (Age) + b2\ (Gender) + b3\ (Age*Gender) + b4\ (Age)^2 + b5\ (Age^2*Gender)$
Cubic	$B5 = b0 + b1\ (Age) + b2\ (Gender) + b3\ (Age*Gender) + b4\ (Age)^2 + b5\ (Age^2*Gender) + b6(Age)^3 + b7\ (Age^3*Gender)$

In the above equations, B5 stands for the big five factors being modeled, Age represents age centered around its mean, and Gender is a contrast code for gender.

The study was conducted in accordance with the Declaration of Helsinki and was approved by Institute Ethics Committee. All participants provided their written informed consent.

Results

A total of 155 subjects, 76 women and 79 men with a mean age of 40.0±13.22 years and 37.0±10.38 years, respectively, were included in the analyses. Of these 155 subjects, 89 subjects were healthy, 49 subjects had a documented chronic disorder (diabetes, n=12; hypertension, n=18; psychological, n=14; other, n=5), and 17 were overweight/ obese. The study provides information about heterogeneous individuals and contains measurements of personality at single time point, allowing for cross-sectional analysis. The heterogeneous sample comprises individuals with different educational backgrounds (20% with a graduate degree and 80% with above a graduate degree), diverse work statuses (84% employed and 16% not employed, including those in school, or retired), and different marital statuses (23% single, 75% married, 2% widowed).

TABLE I : Age groups and Gender differences in the NEO-FFI personality scores.

NEO-FFI personality scores	Age groups					Overall scores
	16-25 years median (range)	26-35 years median (range)	36-45 years median (range)	46-55 years median (range)	56-75 years median (range)	
Number of Participants	17 (M=8; F=9)	61 (M=30; F=31)	29 (M=15; F14)	32 (M=13; F19)	16 (M=13; F3)	155
Neuroticism						
Men	23.5 (17.0-27.0)	21.0 (11.0-29.0)	20.0 (11.0-23.0)***	22.0 (11.0-26.0)*	21.0 (15.0-27.0)	20.0±5.0
Women	22.0 (11.0-29.0)	22.0 (15.0-29.0)*	20.0 (14.0-26.0)	20.0 (15.0-28.0)	18.0 (16.0-22.0)**	21.0±4.36
Extraversion						
Men	29.0 (22.0-34.0)	29.5 (17.0-36.0)	30.0 (26.0-36.0)*	30.0 (21.0-36.0)	28.0 (22.0-36.0)	29.0±4.02
Women	28.0 (26.0-31.0)	28.0 (19.0-36.0)	30.0 (25.0-36.0)	28.0 (21.0-36.0)	30.0 (21.0-31.0)	8.0±3.74
Agreeableness						
Men	28.8 (25.0-34.0)	27.0 (20.0-36.0)	30.0 (20.0-36.0)	27.0 (20.0-29.0)	25.0 (22.0-36.0)	27.0±4.0
Women	29.0 (25.0-36.0)	27.0 (14.0-36.0)	27.0 (23.0-31.0)	28.0 (25.0-31)	28.0 (28.0-31.0)	27.0±3.18
Openness						
Men	26.0 (23.0-27.0)	23.0 (13.0-28.0)	25.0 (18.0-29.0)	23.0 (13.0-28.0)	23.0 (18.0-30.0)	24.0±4.0
Women	24.0 (13.0-28.0)	25.0 (13.0-29.0)	23.5 (18.0-26.0)	23.0 (18.0-29.0)	23.0 (22.0-27.0)**	24.0±3.80
Conscientiousness						
Men	31.50 (28.0-33.0)	31.5 (25.0-36.0)	31.0 (25.0-36.0)	33.0 (28.0-42.0)	33.0 (23.0-42.0)	32.0±3.0
Women	33.0 (30.0-36.0)	30.0 (23.0-43.0)	31.0 (25.0-35.0)	31.0 (27.0-42.0)	33.0 (28.0-46.0)	32.0±4.49

All the values are in median (range).
Spearman's rho correlation coefficient is significant at **0.01 level; ***0.001 level & * 0.05 (2-tailed)
** Positive correlation (r=1.000) between Neuroticism and the age group 56-75 years in Women
** Negative correlation (r=−1.000) between Openness and the age group 56-75 years in Women
* Negative correlation (r=−0.346) between Neuroticism and the age group 26-35 years in Women
*** Positive correlation (r=0.670) between Neuroticism and the age group 36-45 years in Men
* Negative correlation (r=−557) between Neuroticism and the age group 46-55 years in Men
* Positive correlation (r=0.579) between Extraversion and the age group 36-45 years in Men

It was observed that *Conscientiousness* increased with increasing age starting right from the late adolescence to old age i.e. 16 to 75 years (Pearson's r=0.195, P=0.015; Fig. 1). However, other personality factors i.e. Extraversion, Openness, Neuroticism and Agreeableness showed the trend but no statistical correlation was observed with age. Similarly, a gender sub-group analysis, to correlate big five factors with age, showed that Conscientiousness had a significant correlation with age in men (r=0.231; P=0.041). For all other factors, there were trends observed in both men and women but none of the correlations were statistically significant.

Further, the big five factors were compared between men and women based upon age groups as described earlier. Neuroticism had a significant negative correlation with age in women aged 2635 years (r=–0.346; P<0.05). Neuroticism and Extraversion showed a significant positive correlation with age in men aged 36-45 years (r=0.670; P<0.001 and r=0.579; P<0.05, respectively). Neuroticism, however was negatively correlated with age in men aged 46-55 years (r=–0.557; P<0.05) (Table I).

Additionally, using unstandardized regression-coefficient (β) with SE, it was observed that Conscientiousness showed significant linear (r^2=0.039, P=0.015) relationship with age (Table II and Fig. 2). Accordingly, a more complex model
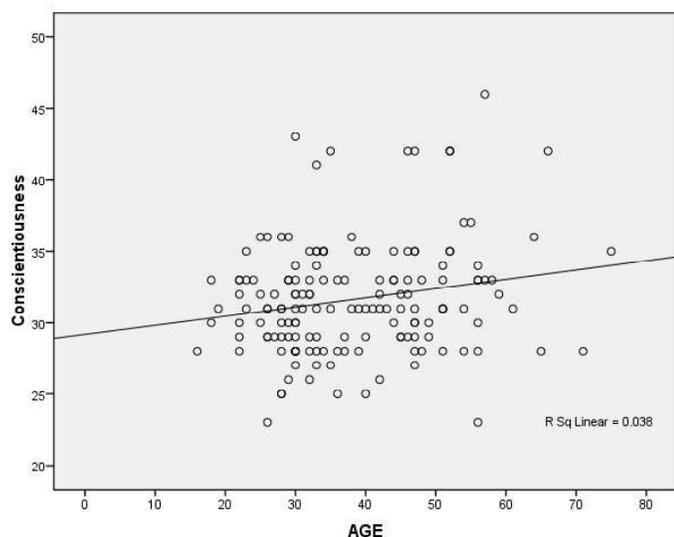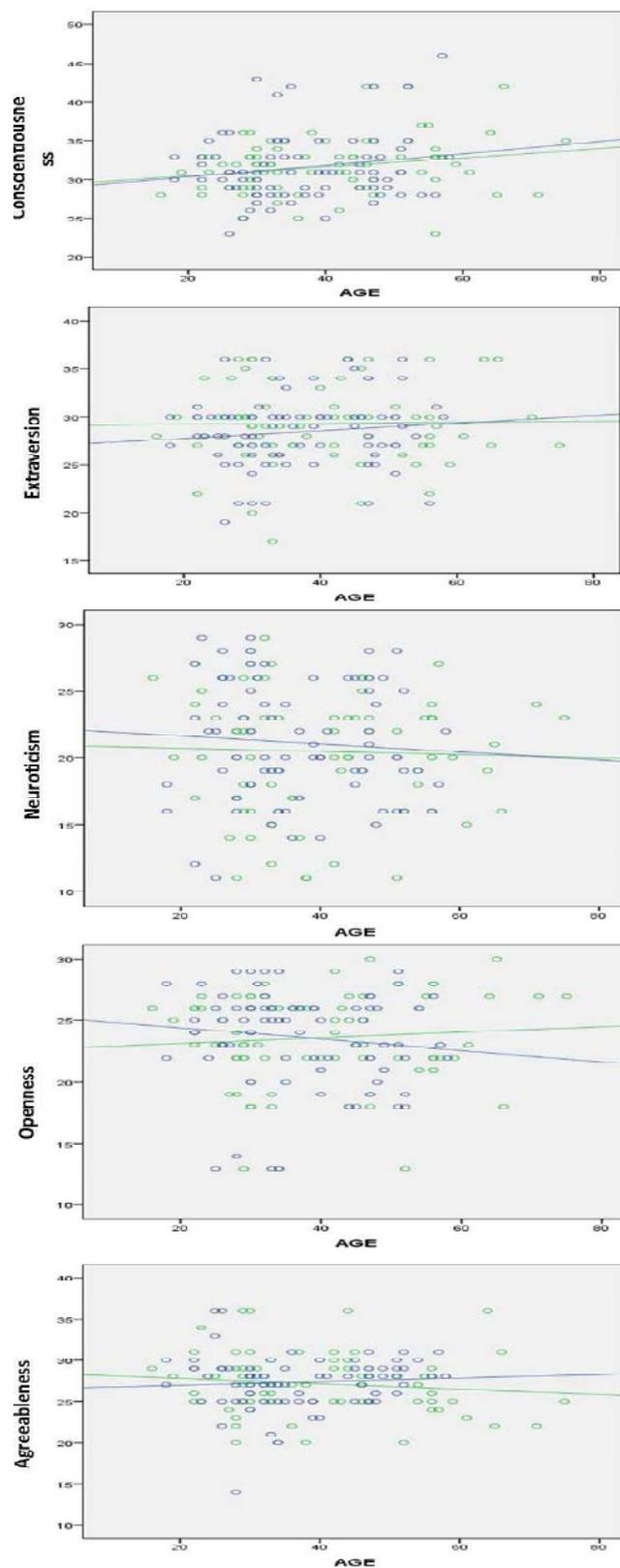

Fig. 1: Influence of age on *Conscientiousness.*

Fig. 2: Mean big five scores broken down by age and gender, with fit curves from the regression models in total population (n=155).
Footnote: Line indicates regression fit, and circles indicate mean values; blue=women, green=men.

TABLE II : Effect of Age and gender on the NEO-FFI personality Scores.

Regression term	R square	Unstandardized coefficients		p-value
		β	Standard Error	
Conscientiousness, Linear	0.039			
Constant		29.082	1.092	p<0.001
Age		0.067	0.027	0.015
Gender		0.231	1.092	0.833
Age × Gender		−0.008	0.027	0.764
Conscientiousness, Cubic	0.058			
Constant		29.146	8.626	0.001
Age		0.178	0.670	0.791
Gender		−4.007	2.965	0.179
Age × Gender		0.173	0.120	0.151
Age^2		−0.006	0.017	0.712
Age^2 × Gender		−0.004	0.002	0.123
Age^3		7.983	0.000	0.559
Age^3 × Gender		−3.911	0.000	0.115
Agreeableness, Linear	0.010			
Constant		27.459	0.947	p<0.001
Age		−0.005	0.024	0.331
Gender		0.923	0.947	0.829
Age × Gender		−0.026	0.024	0.273
Agreeableness, Cubic	0.056			
Constant		37.544	7.378	p<0.001
Age		−0.678	2.536	0.234
Gender		−3.032	0.573	0.239
Age × Gender		0.141	0.102	0.172
Age^2		0.013	0.014	0.371
Age^2 × Gender		−4.361	0.000	0.699
Age^3		−6.569	0.000	0.574
Age^3 × Gender		−3.495	0.000	0.100
Neuroticism, Linear	0.008			
Constant		21.596	1.250	p<0.001
Age		−0.021	0.031	0.607
Gender		−0.644	1.250	0.501
Age × Gender		0.009	0.031	0.774
Neuroticism, Cubic	0.028			
Constant		29.228	9.890	0.004
Age		−0.615	3.399	0.279
Gender		3.691	0.768	0.425
Age × Gender		−0.171	0.137	0.215
Age^2		0.015	0.019	0.442
Age^2 × Gender		8.60	0.000	0.453
Age^3		0.000	0.000	0.441
Age^3 × Gender		3.596	0.000	0.205
Extraversion, Linear	0.019			
Constant		28.028	1.080	p<0.001
Age		0.023	0.027	0.323
Gender		1.072	1.080	0.402
Age × Gender		−0.017	0.027	0.532
Extraversion, Cubic	0.029			
Constant		28.757	8.610	0.001
Age		−0.075	2.959	0.508
Gender		1.964	0.669	0.911
Age × Gender		−0.056	0.119	0.637
Age^2		0.004	0.017	0.831
Age^2 × Gender		−12.814	0.264	0.782
Age^3		−3.762	0.000	0.711
Age^3 × Gender		9.149	0.000	0.670
Openness, Linear	0.011			
Constant		23.983	1.053	p<0.001
Age		−0.011	1.053	0.214
Gender		−1.313	0.026	0.671
Age × Gender		0.034	0.026	0.202
Openness, Cubic	0.024			
Constant		27.979	8.353	0.001
Age		−0.243	2.871	0.947
Gender		−0.190	0.649	0.708
Age × Gender		−0.008	0.116	0.945
Age^2		0.004	0.016	0.824
Age^2 × Gender		6.513	0.000	0.571
Age^3		−1.268	0.000	0.924
Age^3 × Gender		6.046	0.000	0.800

Regression models of the Relations of Age and Gender to the big five. Unstandardized-Coefficients (β) with SE to show the effect of age on 'Conscientiousness' domain is significant at the 0.015 level at r=0.039. Gender is contrast-coded: Female = −1, Male = 1.

would be retained only if the improved fit model had $F > 25$ ($P < 10^{-5}$) over a simpler model, which was not found for rest of the four personality factors i.e., Extraversion, Openness, Neuroticism and Agreeableness because of small R square values. Hence, we have reported simplest model and model with the highest R square value, which was observed for Conscientiousness personality factor.

Discussion

To the best of our knowledge, this is the first report from Indian population that evaluated the effect of age and gender on the big five personality factors, i.e. Neuroticism, Extraversion, Conscientiousness, Openness and Agreeableness. Overall, the results indicated that personality traits are not fixed and are liable to change throughout the life, and in part depend upon the gender of an individual. These results can be generalized to urban population living in big cities since the population in this study represented this section.

The results showed that Conscientiousness increased with increasing age, suggesting that there is a positive change in personality with increasing age. Conscientiousness encompasses competence, self-discipline, achievement, dutifulness, deliberations, and increase in this factor with age depicts stronger moral and social values (29, 30), balanced behavior (31, 32), and healthier circumstances and relationships (33). Similar pattern has been observed in previous studies (34, 35). These results also suggest that changes in certain factors of personality might extend beyond 30 years of age as well, and remain dynamic throughout the life span (28). Interestingly, in the gender subgroup analysis, Conscientiousness retained its significance only in men throughout ages 16 to 75 years. The present finding was in-line with Feingold study (36), which showed that men tend to show higher levels of assertiveness, aggressiveness, and self-esteem though low levels of trust, anxiety, and tender-mindedness. Contrastingly in previous studies women scored higher on Conscientiousness scores vs. men (34, 37). A possible reason of this discrepancy could be cultural differences in the populations studied.

Neuroticism encompasses anxiety, hostility, depression, self-consciousness, impulsiveness, vulnerability, and represents a negative aspect of the personality. The analysis on the basis of age and gender showed that 'Neuroticism' decreased with age in women aged 26-35 years. This suggests that women of this age group have lesser negativity, which is possibly due to their emotional satisfaction and their efforts in raising family keeping them engaged, and therefore making them happy and contented. This age group of women in India is the group that enters the phase of marriage and motherhood, which is known to have a positive effect on personality (38). The results also showed that there was a trend towards an overall decrease in Neuroticism and Openness, an increase in Extraversion and Conscientiousness, while flat trend for Agreeableness, however none of these were statistically significant.

In the current study, it was observed that 'Extraversion' increased with increasing age in men aged 35-46 years, which denotes increase in gregariousness, assertiveness, activity, excitement-seeking, positive emotions. Contrastingly, this age group of men aged 35-46 years also experienced an increase in Neuroticism with age while the next age group, i.e. men aged 46-55 years showed a decrease in Neuroticism. This suggests that on one hand, the age group of 35-46 years is energetic and sociable (features of Extraversion), while nervous and tense (features of Neuroticism) at the other. This may be due to the professional and societal success and/or pressures experienced by this group since they are vying to be more sociable and energetic but at the same time are hostile and competitive at professional and/or personal fronts.

Studies have shown that such cultural differences are noticeable with regards to the big five factors, e.g. Neuroticism was lower in older participants versus younger participants in Germany, Portugal, and Korea while there were no age related differences in Italy and Croatia (39). Previous studies have shown that Extraversion as well as Neuroticism was negatively associated with age (14-17, 39-41). These studies also showed positive trends with increasing age for Conscientiousness and Agreeableness, and flat trends with Extraversion and Openness to

experience from the emerging adulthood through middle ages. The age group analysis in these previous studies indicated that Extraversion and Openness scores were lower in older individuals as compared to younger individuals. On the other hand, Agreeableness was higher in older individuals compared to younger individuals. Older individuals scored lower on Neuroticism than younger individuals in the British population, and this was just reverse in the German population (35).

However, the results of current study cannot be directly compared with previous studies because of two main reasons: firstly, due to the cultural and ethnic differences between Indian and other populations. Secondly, in most of the previous studies the data was pooled for men and women while the current study analyzed the personality differences due to gender also. Further, the present analysis also showed curvilinear relationship of age with big five factors. Overall, the results suggest that personality remains dynamic throughout life. Also, cultural differences seem to control personality as the results in current study were different vs. observed in other cultural populations.

This study had a few limitations. Since this is a preliminary report, the sample size was not powered enough to detect the differences in personality based on age and gender. Nonetheless, the findings from this study are notable because this is the first report that evaluates the influence of two important physiological variables, age and gender, on personality in Indian population.

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