The Analysis of the Relationship between Personality Characteristics and Auricular Anatomy

Rengin Kosif [1]*, *Murat Diramali*[1], *and Selin Yilmaz*[2]
Bolu Abant Izzet Baysal University
Department of Anatomy, Bolu Abant Izzet Baysal University, Medical Faculty, Turkey[1]
Department of Psychology, Bolu Abant Izzet Baysal University, Faculty of Arts and Science, Turkey[2]
*rengink@yahoo.com**

Abstract: *The anatomy of the auricle has guided us in plastic surgery, genetics, and forensics. Concrete scientific study about personality analyze with the anatomy of the auricle has not been conducted. In this study, it was scientifically researched whether anatomy of auricle can give us clues on personality characteristics or not. The photographs of students were taken via a digital camera and a 45 item personality test was applied at the same time. Measurements were made on the auricle photographs using the Photoshop software, and these were analyzed alongside the results of the personality test. Ear length, ear angle, helix thickness, intertragic notch length, anatomy of the lobule of auricle, tragus-antihelix distance, and helix-antihelix distance all give us information on our personality characteristics. The auricle is a defining feature of the face. Besides, being important in medical branches with its unique structure, the anatomy of the auricle has also gained importance by giving us clues on our personality characteristics.*

Keywords: Auricle anatomy; quantitative; personal characteristics; personal differences

Introduction

This study explores to analyze the relationship between personality characteristics and auricle anatomy. Very few scientific studies are conducted in this area, therefore, this study offers an elaborative quantitative analysis to capture the relationship between personality and auricle anatomy.

The lateral surface anatomy of the auricle is irregularly concave, faces slightly forward and displays many eminences and depressions, which can make contact with various surfaces and can produce a print like a rubber stamp (Meijerman et al, 2004). Auricle and external ear is utilized in the forensic sciences for individual identification and authentication (Purkait and Singh, 2007). Normal auricular anatomy consist tragus, antitragus, helix, antihelix, crus of

helix and antihelix, cymba conchae, scapha, intertragic notch, lobule of auricle (Figure 1). The vertical axis of the normal auricle is tilted posteriorly approximately 20° (Aguilar, 2016).

Figure 1: Anatomy of the auricle. (1: Helix, 2: Crus of helix, 3: Antihelix, 3a: Superior crus of antihelix, 3b: Inferior crus of antihelix, 4: Tragus, 5: Antitragus, 6: Intertragic notch, 7: Lobule of auricle).

External ear morphometry is different in both men and women (Brucker et al, 2003). Age and sex-related morphometry of the external ear has been studied previously (Taura et al, 2015).

Can anatomical properties of auricula be reflected to our personality characteristics? In this study, the aim was to analyze the relationship between personality characteristics and anatomy of auricle.

Materials and methods

Participants

Permission from the Bolu Abant Izzet Baysal University (BAIU) University Clinical Board of Ethics was taken for the study. In our study, 83 female volunteer students with a mean age of 20.77±1.81 and 76 male volunteer students with a mean age of 21.79±1.59 studying at the BAIU participated in our study. The photographs of the students were taken using a Sony

Rengin Kosif , Murat Diramali, and Selin Yilmaz
www.journalofinterdisciplinarysciences.com

α100 digital camera with a Minolta (28.80) lens by placing on a tripod in daylight. The face photographs, taken from the profile with a 1 m. away, and after those were transferred to the computer (Brucker et al, 2003). For profile shooting, the camera's horizontal lines were positioned to align the nose tip with the tragus.

Measures

Then, using the Adobe Photoshop version 14.0 software installed on the computer, below parameters were measured and recorded on an excel spreadsheet.

Helix thickness (HT), antihelix thickness (AHT), auricular length (AL), auricular width (AW), lobule of auricle length (EL), lobule of auricle width (EW), helix-antihelix distance (HAH), tragus-antihelix distance (TAH), x-helix distance (perpendicular) (XH), x-antitragus distance (XATL), intertragic notch length (INCL) and width (INCW).

Auricular angle (ANG°) was measured from the lateral aspect (AL and vertical axis angle) and the auricula-temple distance (HTEML) was measured from the anterior aspect using the Photoshop program (Figures 2). The X point is the point where the inferior crus of antihelix meets the helix. The lobule of auricle was recorded as a free or attached lobule. The auricular tubercle (TA) (Darwin's tubercle) was recorded as present or not. The antihelix was recorded as interior or exterior (protrude or not).
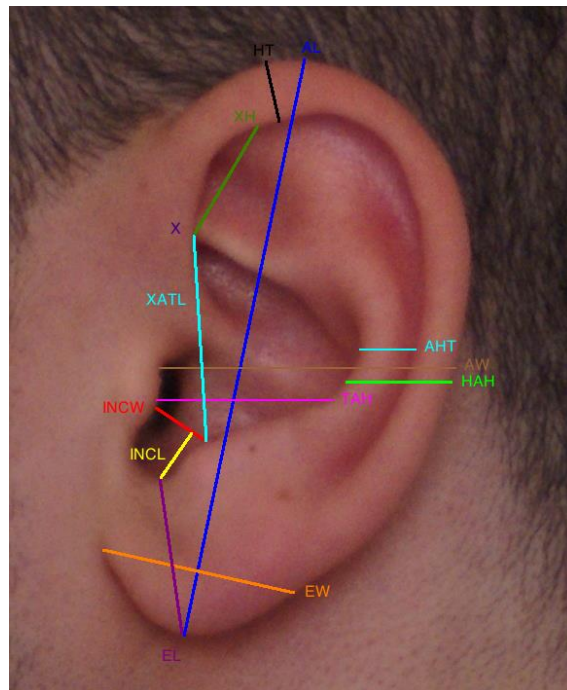

Figure 2: Measurement methods

Rengin Kosif , Murat Diramali, and Selin Yilmaz

The students who were photographed were asked to simultaneously complete a 45 item personality test. The Advanced Basic Personality Characteristics Inventory for the Turkish Culture developed by Prof. Dr. Tulin Gencoz was used for this purpose. This test evaluated the sub dimensions of Extroversion, Conscientiousness, Agreeableness, Openness to Experience, Negative Valence and Neuroticism (Gencoz and Oncul, 2012).

Statistical Methods

The mean values and the standard deviations of the measurements were calculated. The compliance of the variables a normal distribution was examined using the Shapiro-Wilk test. In order to demonstrate the strength and direction of the relationship between the variables, the Pearson Correlation Test for variables showing normal distribution and the Spearman Ranked Correlation Test for those that were not used. For statistical analyses and calculations, the IBM SPSS Statistics 22.0 software (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) was used. In statistical decisions, the level of $p<0.05$ was accepted as the indicator of difference.

Results

The mean values of the measurements taken in millimeters are as shown Table 1.

Table 1: *Descriptive results for face dimensions (mm)*

	Female	Male
AL	75.01±11.18	80.39±12.59
AW	34.20±6.56	36.17±5.40
HT	7.29±2.10	8.37±8.52
AHT	5.73±1.38	8.53±2.68
EL	21.28±4.59	22.01±3.45
EW	24.55±6.67	19.35±4.04
HAH	13.13±2.80	15.36±2.62
TAH	20.00±3.79	19.87±3.84
XH	16.01±3.47	19.97±4.61
XATL	27.87±4.99	27.97±4.66
INCL	8.72±1.80	8.68±2.16
INCW	7.33±1.86	8.40±2.31
HTEML	14.50±3.86	17.28±5.23
ANG°	20.64±6.62	25.85±6.43

Term definition: Auricular length (AL), auricular width (AW), Helix thickness (HT), antihelix thickness (AHT), lobule of auricle length (EL), lobule of auricle width (EW), helix-antihelix distance (HAH), tragus-antihelix distance (TAH), x-helix distance (purpendicular) (XH), x-antitragus distance (XATL), intertragic notch length (INCL) and width (INCW), auricle-temple distance (HTEML), auricular angle (ANG°)

In females, those with attached lobule of auricle formed 22%, while those without formed 78%, while in the same group, the presence of auricular tubercle had a rate of 37.8%, and the absence thus had a rate of 62.2%. In females, the antihelix was 37.3% interior and 62.7% exterior. In males, those with attached lobule of auricle formed 30.3%, while those without formed 69.7%, while in the same group, the presence of auricular tubercle had a rate of 22.4%, and the absence thus had a rate of 77.6%. In males, the antihelix was 44.7% interior and 55.3% exterior. Mean auricular angle was found 20.64±6.62 in female and 25.85±6.43 in the male.

The statistically significant results in females were as follows: A negative correlation was found between intertragic notch length and openness to experience (r= -0.253, p=0.021). As intertragic notch length increased, openness to experience decreased. A negative correlation between intertragic notch length and agreeableness was found (r= -0.256, p=0.019). As intertragic notch length increased, agreeableness decreased. Those with long intertragic notch were closed to experiences and not agreeable. A positive correlation was found between helix thickness and negative valence (r=0.243, p=0.027). If the helix was thick, feelings of negative valence were high. A positive correlation between lobule of auricle length and neuroticism was found (r=0.227, p=0.039).

The statistically significant results in males were as follows: A negative correlation between tragus-antihelix distance and agreeableness was found (r= -0.215, p=0.05). Those with little tragus-antihelix distance were agreeable. A positive correlation between tragus-antihelix distance and negative valence was found (r=0.250, p=0.029). Those with greater tragus-antihelix distance were prone to negative valence. A negative correlation between helix-antihelix distance and negative valence was found (r= -0.247, p=0.032). Those with greater helix-antihelix distance had fewer feelings of negative valence. A negative correlation between auricular angle and extroversion was found (r= -0.229, p=0.046). As the auricle moved away from being perpendicular, extroversion decreased.

A negative correlation was found between auricle-temple distance and extroversion (r= -0.400, p=0.00), auricle-temple distance and openness to experience (r= -0.419 p=0.00). Those with protrude auricle were not extroverted and open to experience. A negative correlation was found between auricular tubercle and agreeableness (r= -0.256, p=0.025). Individuals who have auricular tubercle are not agreeable. Negative correlations were found between lobule of auricle attachment and extroversion (r= -0.242, p=0.035), and openness to experience n (r= -0.249, p=0.030). Those with attached auricular lobule were not extroverted and open to experience.

Table 2: *Correlation of personal traits and auricular dimensions*

	HT	EL	INCL	TAH	HAH	ANG	Protrude auricle	TA existence	Attached LA
Extroversion						r=-0.229 p=0.046 ♂	r= -0.400 p=0.00 ♂		r= -0.242 p=0.035 ♂
Conscienciousness									
Negative Valence	r=0.243 p=0.027 ♀			r=0.250 p=0.029 ♂	r= -0.247 p=0.032 ♂				
Agreeableness			r= -0.256 p=0.019 ♀	r= -0.215 p=0.05 ♂				r= -0.256 p=0.025 ♂	
Neuroticism		r=0.227 p=0.039 ♀							
Openness to Experience			r= -0.253 p=0.021 ♀				r= -0.419 p=0.00 ♂		r=-0.249 p=0.030 ♂

♂: male   ♀: female

Discussion

In humans, the ear is the defining feature of the face and its structure shows signs of sex and age. The morphological characteristics and dimensions of external ear vary in different human ethnics races (Verma et al, 2016). Farkas et al. observed that ear width reaches mature sizes in males at 7 years and in females 6 years of age, and ear length in males at 13 years and in females at 12 years of age (Farkas et al, 1992). However, significant variations are seen in the sizes and the maturation ages between the populations (Kalcioglu et al, 2003). Ear print identification is a matching process between the ear prints from crime scene and the ear prints from database or suspects (Champod et al, 2009). Left ear and right ear of young adult were generally similar in term of measurements, shapes and anatomical structures (Lai et al, 2017). The biometrics of ear is a very interesting issue as during crime scene investigation, ear marks and measurements are often used for identification in the absence of valid fingerprints. Ear biometrics can positively identify an individual using comparative analysis of the human ear and its morphology (Kumar and Singla, 2013). Morphology of the auricle is neglected, though the malformation of the auricle is associated with many congenital disorders and syndromes (Pimple et al, 2013).

The aesthetic appearance of the ear and craniofacial balance are directly related to mental health (Xing et al, 2018). An auricular defect may result from congenital or acquired anomalies such as trauma from burns, accidents, and surgical removal of tumoral lesions. These patients usually suffer from functional as well as psychological problems, which affect their social life because of esthetic concerns (Ariani et al, 2013). Payer et al. assume that the auricular acupuncture for (nonaddicted) psychiatric patients promotes inner self-healing and regulates disturbances in well-being (Payer et al, 2007). Scientific studies analyzing personality based on auricular anatomy has not been conducted. Our study has filled this void. The question "Can the anatomic characteristics of the auricle give us clues on our personality characteristics?" was thus answered with this study.

Rengin Kosif , Murat Diramali, and Selin Yilmaz
www.journalofinterdisciplinarysciences.com

As a result, the personal differences in auricular dimensions enable us to make interpretations of personality characteristics. Those with attached auricular lobule were not extroverted and open to experience. Those with ptotrude auricle were not extroverted and open to experience. If the helix was thick, feelings of negative valence were high in females. Those with greater helix-antihelix distance had fewer feelings of negative valence. Those with greater tragus-antihelix distance were prone to negative valence, and those with little tragus- antihelix distance were agreeable. As intertragic notch length increased, openness to experience and agreeableness decreased.

The human ear is a defining feature of the face. Ears play a vital role in producing a natural and harmonious look and an aesthetically fine facial appearance (Pimple et al, 2013). Auricular anatomy can give us clues on our personality structure. We hope to contribute new results to the disciplines such as anatomy, psychiatry, human resources departments, information technology and forensic medicine.

References

Aguilar, E.F. (2016). *Reconstruction of Congenital Auricular Malformations*. Chapter 23. https://plasticsurgerykey.com/reconstruction-of-congenital-auricular-malformations/, 2016.

Ariani, N., Visser A., Van Oort R. P. et al. (2013). Current state of craniofacial prosthetic rehabilitation, *International Journal of Prosthodontics*, *26*, 57-67.

Brucker, M.J., Patel, J., Sullivan, P. K. (2003). A morphometric study of the external ear: age- and sex-related differences. *Plastic and Reconstructive Surgery, 112*(2), 647-52.

Champod, C., In Li, S. Z., Jain ,A. K. (Eds). (2009). *Encyclopedia of Biometrics*, 248-53.

Farkas, L. G., Posnick, J. C., Hreczko, T. M. (1992). Anthropometric growth study of the ear. *Cleft Palate Craniofac Journal*, *29*, 324-9.

Gencoz, T., Oncul, O. (2012). Examination of Personality Characteristics in a Turkish Sample: Development of Basic Personality Traits Inventory. *The Journal of General Psychology*, *139*(3), 194-216.

Kalcioglu, M. T., Miman, M. C., Toplu, Y. et al. (2003). Anthropometric growth study of normal human auricle. *International Journal of Pediat Otorhino-laryngol*, *67*, 1169-77.

Kumar, P., Singla, A. (2013). Ear biometric: Sex, Bilateral And Ethnic Differences Among Brahmin And Yadav Communities Of Bundelkhand Region Using PCA Technique. *International Journal Scientific and Engineering Research*, *4*, 799-805.

Lai, P. S., Osman, K., Ismail, N. A. (2017). A Preliminary Study on Earprint Identification Among Young Adults in Malaysia. *Journal of Forensic Science & Criminology, 5*(2), 1-9.

Meijerman, L., Sholl, S., Conti, F. D. et al. (2004). Exploratory study on classification and individualization of ear prints. *Forensic Science International*, *140*, 91-99.

Payer, K., Ots, T., G.Marktl, G. et al. (2007). PatientIn-nenzufriedenheit mit der NADA-Ohrakupunktur auf einer psychiatrischen Station – Eine1 Anwendungsbeobachtung. *Deutsche Zeitschrift fur Akupunktur*, *50*(2), 10–13.

Rengin Kosif , Murat Diramali, and Selin Yilmaz
www.journalofinterdisciplinarysciences.com

Pimple, D. H., Geetha, K. N., Katti, K. N. et al. (2013). Morphological Study of External Ear in Mentally Retarded and Healthy Subjects. *Research & Reviews: Journal of Medical and Health Sciences, 2*(4), 92-97.

Purkait, R., Singh P. (2007)Anthropometry of the normal human auricle: a study of adult Indian men. *Aesthetic Plastic Surgery, 31*(4), 371-79.

Taura, M. G., Adamu, L. H., Gudaji, A. et al. (2015). Application of external ear morphometry in age prediction: a pilot study. *International Journal Research in Medical Sciences, 3*(7), 1775-1779.

Verma, P., Sandhu, H. K., Verma, K. G. et al. (2026). Morphological Variations and Biometrics of Ear: An Aid to Personal Identification. *Journal of Clinical and Diagnostic Research, 10*(5), 138-142.

Xing, W., Wang, Y., Qian, J. et al. (2018). Aesthetic Auricular Reconstruction in Adult Patients with Rib Cartilage Calcification Using a Modified Two-Step Technique. *Aesthetic Plastic Surgery, 42*(6), 1556–1564.

Rengin Kosif , Murat Diramali, and Selin Yilmaz
www.journalofinterdisciplinarysciences.com