Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 6, 9816-9831

A Multivariate Analysis Of Aggression And Big Five Personality Traits In Relation To Temperature And Gender

Naresh Behera[1] , Sipra Khuntia[2]

[1]Ph.D. Research Scholar, Department of Psychology, Banaras Hindu University, Varanasi, nareshbehera1998@gmail.com
[2]Ph.D. Research Scholar, Department of Psychology, Ravenshaw University, Cuttack, sipra281293@gmail.com

Abstract. The current study examined the impact of temperature and gender on aggression and personality traits. A sample of 225 college professionals aged 30 to 55 years was selected for the study. The two instruments were used: the aggression questionnaire (Buss & Perry, 1992) and the Big five Personality Inventory (John & Srivastava, 1999). The current study utilized a multivariate design, and MANOVA was used for data analysis. The results revealed that aggression, agreeableness, conscientiousness, and openness to experience were influenced by the factor of gender, but extraversion and neuroticism were not influenced by it. The temperature influenced aggression and impacted four traits of the big five personalities i.e., extraversion, agreeableness, conscientiousness, and neuroticism, but openness to experience was not affected by temperature. The aggression and openness to experience were not also moderated by gender and temperature. The non-AC classroom teachers scored higher on the aggression levels than AC college teachers. AC classroom teachers were found to be more sociable, friendly, competent, organized, careful, self-disciplined, enthusiastic, and forceful compared to those who were working or sitting in non-AC classrooms. The male college teachers scored high on agreeableness, conscientiousness, and openness to experience traits, and they were also more agreeable with others and social rules, and they were having more conscientiousness about activities and curiosity to explore things and drive toward achievement than female college teachers.

Key Words: Temperature, Personality Traits, Gender, Aggression, East-Odisha.

INTRODUCTION

Aggression is the behavior that directs some injury toward the target (Berkowitz, 1981). It is said to be any activity directed toward an individual to purposefully hurt somebody (Dollard et al., 1939). Many times, aggression will be a pestilent act that transforms one person into another to purposefully hurt others (Geen, 2001). The behavior in any form associated with targeting or hurting another organism that has the potential to avoid such treatment refers to called as "aggression" (Baron & Richardson, 1994). The heat hypothesis stated that physical temperature can potentially increase aggression and aggressive behavior in an organism (Anderson, 1996). Anderson & Bussmann re-analyzed and defined through empirical data which is fairly consistent but not similar regarding aggression affected by temperature (Bell, 2005). The data collected from archival sources interpreted that higher temperature increased aggression, and a high heat level increased aggressive behavior (Bussmann et al., 2005). Though many factors affect aggressive behavior, physical discomfort is considered the main to aggression. Hence, the aversive and uncomfortable temperature is considered aggressive behavior towards other organisms (Baron et al., 1994).

Theories of Aggression and Temperature

The Negative Affect Escape Model states that an increase in temperature level increases negative effects like annoyance, discomfort, feeling of irritation, and violence up to a specific infliction point. After surpassing this infliction point, aggressive behavior and violence will be decreased as the temperature increases. The individual who uses the escape motive (overcome the temperature) will overcome the aggressive motive (Baron & Bell, 1972; Bell & Baron, 1976). This model suggested that high temperature overrides the negative affect, and the escaping tendency will be stronger. Still, low to moderate temperature levels develop negative affect, and the aggressive motive will be stronger. The more extreme temperature leads to a higher level of negative affect, and the escaping tendency will be stronger and decrease the aggressive behavior. Baron and Bell's work suggested that the infliction area should be around 85° F in almost all situations. Another viewpoint

of this theory states that cold temperature also creates negative affect and leads to aggression. Another model, General Aggression Model (GAM) defines aggressive behavior as affected by two input factors, psychological (personal) and environmental (situational), which determine an individual cognition, arousal, and state of affect (Anderson et al., 1995). Unlike the NAEM (Negative Affect Escape Model), GAM predicted a direct relationship between temperature and aggression without any infliction point (Rotten & Lohan, 2001). The Routine Activity Theory developed by Cohen and Felson in 1979 explains why crime occurs. This theory states that committing a criminal act requires a suitable target. There must be a lack of suitable targets from the beginning to prevent a crime, and motivational offenders must be present. Avoidance theory is uniform to RAT (Routine Activity Theory) and NAEM developed by Cohen et al. (2004) and Rotten and Cohen (2001). This theory suggested that people attempt to avoid the conditions which create negative affect for the day of high temperature related to less socialization which happens the lesser amount of violence and crime. Zillmann's theory of Excitation Transfer applied to aggression and temperature relationship (Zillmann, 1983). This theory has some assumptions that an excitatory state is associated in terms of human sympathetic activation. When people experience long changes in excitation reactions, they tend to be like silent conditions. Therefore, excitation and arousal may be misattributed to other provoking situations, conditions, or individuals. The excitation transfer theory states that excessive temperature leads to arousal or excitation, and the temperature induces physiological changes that must be attributable. The excitation transfer theory also states this transfer affects aggressive behavior, if available, of a silent cue that produces aggressive motives. The simple negative affect model proposes that negative affect is a sufficient cause to produce aggression without a dispositional cause (Berkowitz, 1983, 1984). Previous studies stated that negative conditions may increase aggressive thoughts and feelings which are relatively linked with many aversive conditions and experiences (Green & O' Neal (1969). According to the physiological thermoregulatory model, temperature is related to aggression in the nerve and endocrine systems of the body. Exposure to high temperatures leads to physiological changes in the body, like changes in respiration rate, increased blood pressure, heart rate, hormonal changes in the body, skin, blood vessels, and dilation. This theory also suggested that temperature decreases body metabolism of thyroid-stimulating hormone, increases the basal metabolic rate, increases galvanic skin response, and increases systolic blood pressure in the human body. The hypothalamus plays an important role in understanding thermo-regulation and maintains other metabolic activities in the body (Bligh, 1973).

Temperature and Aggression

The research conducted on the "temperature and tempers: negative heat impact on language and mood", stated that when the temperature is above 20̊ Celcius with increased irritability and aggressiveness, those behaviors reinforce violence and conflict (Sutton, 2019). A study was conducted on extreme temperature and violence across ages and gender. It was evinced from the data to have lower incomes, higher unemployment, and vodka consumption which increases the impact of extreme temperature and violence (French et al., 2019). Aggression is affected by high or low temperatures, whether by a condition or act of nature, necessitating regulation of thermostatic settings which can influence hostile and aggressive behavior (Bell & Baron, 1977). Some researchers concluded that there was no difference in aggression among college students of two different colleges (Mahmood & Kakamad, 2018).

Temperature and Personality Traits

Traits do not relate to the causes of behavior, feelings, and thoughts of humans but rather interacted and are associated with cognitionsded, humcognitionies, and emotions. Hence, these are considered as lat factors rather than reflective factors of personality. Personality traits come under many different aspects (source traits-Cattell, 1950; biological traits-Eysenck, 1967; trait2-Wiggins, 1984). The three main types of traits are cardinal, central, and secondary traits, which were defined by Allport (1961). Previous studies suggested that personality traits differ across the variations of geographical regions. Such variations in the regions influence human personality traits and predict a broad array of mental, social, economic, and health-related outcomes (Wei et al., 2017). The temperature shapes the fundamental dimension of the personality of human beings because the habitual behavior of human beings comes under the personality traits (Wei et al., 2017). The temperature shapes human personality traits and temperaments by directly affecting individual activities (for example, outdoor activities versus indoor exploration) and indirectly affecting collective behaviors (for example, agriculture) that direct individual activities.

Gender and Aggression

A safe learning environment, supportive teacher behaviors, positive peer interactions, gender, and academic achievement significantly impact students' aggression (Akman, 2021). Gender is the strongest predictor of aggression and violence. According to the results of this study, males were more involved in aggressive and violent behavior than females, which was influenced by motive, attitude, and consequences (Padget & Tremblay, 2020). A study on gender differences in aggression took 100 participants (an equal number of both genders) from a university. The results of this study revealed that female students showed a high level of aggressive behavior compared to male students. This study also suggested that there will be ambiguous results among males and females in aggression. In modern life, aggression will vary in both genders (Shaban & Kumar, 2016). The males used more aggressive behavior than the females. The males used direct aggression, but the females used more indirect aggression. (Archer, 2004). Previous studies concluded that males hold instrumental aggression and females hold a graphic or social representation of aggression (Tapper & Boulton, 2000). Gender differences in the aggression of adults were measured and stated that males used the instrumental type of aggression, but girls used the graphic or social representation of aggression. The researchers also analyzed different types of databases related to aggressive behavior in different cultures and communities, and they concluded that the culture of a warmer climate develops aggressive behavior and is a causal factor in influencing temperature (Bjorkqvist et al., 1994). The gender differences in aggression were tested with a sample of 100 participants, and the findings suggested no gender differences in aggression (Ghosh, 2012). An investigation was done on gender differences in aggression and found that females experience more aggression than their counterparts, and conclusions were drawn from 400 men and 248 female participants of young adults (Krahe et al., 2005; Edalati et al., 2010). The evidence drawn from a previous study indicated that 33% of men and 25% of women were experiencing aggression (Leonard, 2002). The males experience more aggression than their female counterparts, and the conclusion is based on an analysis of 200 participants (Akhtar et al., 2015). The physical aggression of victimized males was evinced to be higher than victimized females (Veiskarami et al., 2015). Physical violence was more expressed by men and physical hostility was more among women (Fries et al., 2013). An observational study's results revealed that men were more involved in aggressive behavior than women, and the conclusion was drawn based on gender and aggression differences (Hay, 2007).

Gender and Personality Traits

The Big Five personality traits are extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience (Costa & McCrae, 1992; Goldberg, 1993). The study of personality and gender concluded that women are less anxious and assertive than men (Maccoby & Jacklin, 1974). They also concluded that no gender differences in self-esteem and locus of control. The NEO-PI-R is an operationalization instrument of the Five-Factor Model (FFM), in which broad five factors of personality are measured. A previous study of personality traits and gender differences was related to neuroticism and openness to experience factors and not to other factors (Wiggins, 1979). In the personality trait of neuroticism, the females scored higher than males (Lynn & Martin, 1997). Neuroticism composes anxious moods, negative feelings, and emotions like anger, depressed mood, distress, and shame (Lynn & Martin, 1997). The females experience more anxiety than males (Feingold, 1994), more experienced depressive moods compared to males (Nolen-Hoeksema, 1987), but lower self-esteem than their male counterparts (Kling et al., 1999). Some studies found that females experience higher levels of neuroticism compared to males (Scherwitz et al., 1991), while other studies reported contrasting findings to it (Ross & Willigen, 1996) or evinced that there were no gender differences among male and female adults (Averill, 1982). Examination of considerable empirical evidence showed that females are more sensitive and emotional than males. While comparing the facial expression of males and females by taking into account emotions, females show more facial expressions (Eisenberg et al., 1989), and well-decoded nonverbal signs of feelings and emotions than male adults (McClure, 2000). Females score slightly higher than males in the conscientiousness trait of personality (Feingold, 1994). The researcher analyzed the seven related studies of this trait and concluded in this way.

Personality Traits and Aggression

The agreeableness trait of the Big five personality is strongly related to aggressive behavior (John & Srivastava, 1999). Self-aggression, peer group aggression, and violence are negatively related to these personality factors (Heaven, 1996; Gleason et al., 2004). The personality trait of conscientiousness is characterized by competence, organization, care, self-discipline, and achievement-oriented behavior (John & Srivastava, 1999). It tends to be negatively related to aggression (Sharpe & Desai, 2001). The Extraversion

trait of the personality is characterized by gregariousness, being energetic, adventurous, enthusiastic, and outgoing (John & Srivastava, 1999), and the findings related to aggression were having mixed results. Sharpe and Desai (2001) suggested a negative relationship between self-aggression and extraversion, whereas Gallo and Smith (1998) expressed a positive correlation between physical aggression and extraversion. The personality traits of shy, moody, hostile, tense, depressed, and low levels of self-confidence are the characteristics of neuroticism (John & Srivastava, 1999), and there is a positive relationship between aggression and neuroticism (Sharpe & Desai, 2001). Openness to experience personality traits denotes imagination, broad interests, excitement, unconventionality, and curiosity (John & Srivastava, 1999), unrelated to aggression (Gleason et al., 2004). Human aggression is the by-product of multiple factors (Anderson & Bushman, 2001; Kristensen et al., 2003). According to General Aggression Model, personality is the key dimension for understanding the personal factors of aggressive behavior. Human emotions and aggression are influenced by personality factors (Anderson & Bushman, 2001). Agreeableness and conscientiousness personality traits are negatively correlated with aggressive behavior and attitude (Anderson et al., 2004).

Objectives

The current study focuses on the impact of temperature and gender on aggression and personality traits. The researchers want to study AC and non-AC college teachers of both genders and examine the relationship between aggression and personality factors.

The current study specifically deals with:

1. To examine the impact of temperature (AC classroom versus non-AC classroom) on the aggression level among college teaching professionals of Odisha.
2. To examine the impact of temperature (AC classroom versus non-AC classroom) on the Big Five personality factors (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to experience) of college teaching professionals of Odisha.
3. To examine the impact of gender (male versus female adults) on the aggression level among college teaching professionals of Odisha.
4. To examine the impact of gender (male versus female adults) on the Big Five personality factors (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to experience) of college teaching professionals of Odisha.

METHOD

Participants of the Study and Design

Table 1
Sample distribution across gender and temperature groups

	Groups	Sample Size
Gender	Male	125
	Female	100
Temperature	AC Group	125 (75 Male and 50 Female)
	Non-AC Group	100 (50 Male and 50 Female)

The current study used purposive sampling techniques for data collection. The college teaching professionals from Odisha were taken as the population of this study. The sample consisted of 225 college teaching professionals within the age group of 30 to 55 years. The samples were taken from some government and private institutions in Odisha. The participants of the current study were selected from Ravenshaw University, S. B. Women's College, MPC Autonomous College, and the colleges that come under North Orissa University. The samples were collected from 100 female (50 AC and 50 Non- AC) teachers and 125 (75 AC and 50 Non-AC) male teachers (See Table 1). The current study utilized a multivariate research design. There were two independent variables (temperature and gender) and each variable consisted of two levels. The temperature is categorized as AC and Non-AC, and the gender is categorized as male and female adults. In temperature, one is the treatment group, and the other is the control group. Aggression and personality traits are two basic dependent variables of the current study.

Measures

The Aggression Questionnaire. The aggressive behavior was measured by using a questionnaire, namely the aggression questionnaire developed by Buss and Perry (1992). The aggression questionnaire consisted of 29 items and which are scored by using the 5 points scale. This scale measures four components of aggression: Physical, Verbal, Anger, and Hostility. It indicates how characteristics of a person are responded to each statement with two items in reverse form. The total score will be a summation of all component scores. The reliability of the aggression questionnaire is .60, and the validity is .84.

The Big-Five Personality Inventory. The Big five Personality Inventory assesses personality traits (John & Srivastava, 1999). This instrument has a total of 44 items to measure the big five dimensions or traits of personality (Goldberg, 1993. Again, each of the dimensions is further classified into personality facets. The instrument was based on a Likert scale design with five rating systems. The rating ranges from 1 (Strongly Disagree) to 5 (Strongly Agree). A total of 10-15 minutes is taken to complete this questionnaire. The test-retest reliability of this inventory is .71, and the convergent validity is .60.

Procedure & Statistical Analysis

The researcher administered individually one by one through the physical involvement for data collection. A good rapport was formed with the participants and then the instruction on the test measures was given. After giving adequate instruction about the scale, the researcher created a comfortable psychological and physical environment in which the respondents can give his/her view without any hesitation. In this process, the researcher followed all the ethical guidelines. The questionnaire was given to 225 college teachers belonging to two classroom environments. One classroom and working environment were controlled by an AC classroom, and another was having a normal temperature or non-AC classroom. This aggression questionnaire (Buss & Perry, 1992) consisted of 29 questions, and the participants were asked to rate themselves on a 5 points scale. The Big five Personality Questionnaire (John & Srivastava, 1999) had 44 items. They responded to all questions during the allotted time of data collection. The researcher interacted with the participants and observed that the teachers in the AC classroom were very cordial and social, and the teachers in the normal classroom were less social and interactive. Strict confidentiality was ensured. For the analysis of data, descriptive and inferential statistics was used. The mean, standard deviation, and multivariate analysis of variance were used for data analysis through the SPSS for Windows version 20.

RESULTS

Table 2 Mean and standard deviations of independent variables on dependent variables.

Descriptive Statistics					
	Gender	**Temperature**	**M**	**SD**	**N**
Aggression Levels	Male	AC Group	81.2933	21.90876	75
		Non-AC Group	69.3200	16.69955	50
		Total	76.5040	20.76855	125
	Female	AC Group	77.3200	17.40331	50
		Non-AC Group	62.0200	17.71255	50
		Total	69.6700	19.08675	100
	Total	AC Group	79.7040	20.24727	125
		Non-AC Group	65.6700	17.51482	100
		Total	73.4667	20.28216	225
Extraversion	Male	AC Group	28.9200	4.68684	75
		Non-AC Group	25.2800	4.83626	50
		Total	27.4640	5.05541	125
	Female	AC Group	27.0600	3.53646	50
		Non-AC Group	26.6600	1.83626	50

		Total	26.8600	2.81059	100
	Total	AC Group	28.1760	4.34605	125
		Non-AC Group	25.9700	3.70491	100
		Total	27.1956	4.21063	225
Agreeableness	Male	AC Group	36.8000	2.53622	75
		Non-AC Group	33.9000	2.27901	50
		Total	35.6400	2.81528	125
	Female	AC Group	35.7200	4.32855	50
		Non-AC Group	28.1000	5.99404	50
		Total	31.9100	6.45903	100
	Total	AC Group	36.3680	3.39482	125
		Non-AC Group	31.0000	5.37108	100
		Total	33.9822	5.12606	225
	Male	AC Group	31.6933	3.38108	75
		Non-AC Group	31.0000	4.49943	50
		Total	31.4160	3.86503	125
	Female	AC Group	22.0200	6.13950	50
		Non-AC Group	26.8000	5.52176	50
		Total	24.4100	6.28626	100
	Total	AC Group	27.8240	6.66002	125
		Non-AC Group	28.9000	5.43743	100
		Total	28.3022	6.15697	225
Neuroticism	Male	AC Group	18.9600	4.44923	75
		Non-AC Group	22.4600	7.80949	50
		Total	20.3600	6.23518	125
	Female	AC Group	21.5000	5.06388	50
		Non-AC Group	21.5400	6.19483	50
		Total	21.5200	5.62907	100
	Total	AC Group	19.9760	4.84845	125
		Non-AC Group	22.0000	7.02808	100
		Total	20.8756	5.98828	225
Openness to experience	Male	AC Group	38.2000	3.46410	75
		Non-AC Group	38.9000	3.12495	50
		Total	38.4800	3.33747	125
	Female	AC Group	36.5400	1.69284	50
		Non-AC Group	37.4200	4.75991	50
		Total	36.9800	3.58160	100
	Total	AC Group	37.5360	2.99339	125
		Non-AC Group	38.1600	4.07436	100
		Total	37.8133	3.52045	225

The mean and standard deviation of all variables are presented in Table 2. The mean scores of aggressions and personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience) with independent factors gender (male and females) and temperature (AC and non-AC group) are presented over here.

Table 3

Box's Test of Equality of Covariance Matrices

Box's M	401.959
F	6.060
df1	63
df2	95973.398
Sig.	.000

Note. It tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

Table 3 presented the Box's M test of equality of covariance of dependent variables across the groups using p<.001, as a criterion. The results of covariance matrices were significant, $p < .001$, which indicates that there are significant differences in covariance matrices. Therefore, the assumption is violated and Pillai's Trace is an appropriate test to further analysis.

Table 4 Multivariate Test

Effect		**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
Gender (Male & Female)	Pillai's Trace	.442	28.527	6.000	216.000	.000	.442
	Wilks' Lambda	.558	28.527	6.000	216.000	.000	.442
	Hotelling's Trace	.792	28.527	6.000	216.000	.000	.442
	Roy's Largest Root	.792	28.527	6.000	216.000	.000	.442
Temperature (AC & Non-AC Group)	Pillai's Trace	.397	23.678	6.000	216.000	.000	.397
	Wilks' Lambda	.603	23.678	6.000	216.000	.000	.397
	Hotelling's Trace	.658	23.678	6.000	216.000	.000	.397
	Roy's Largest Root	.658	23.678	6.000	216.000	.000	.397
Gender × Temperature	Pillai's Trace	.206	9.319	6.000	216.000	.000	.206
	Wilks' Lambda	.794	9.319	6.000	216.000	.000	.206
	Hotelling's Trace	.259	9.319	6.000	216.000	.000	.206
	Roy's Largest Root	.259	9.319	6.000	216.000	.000	.206

Table 4 presented the analysis of multivariate tests, by using the Pillai Trace test with an alpha level of .05. Results indicated that this test is significant, Pillai's Trace= .44, $F(1, 221) = 28.52, p < .05$, multivariate $\eta^2 = .44$. The F is significant, which indicates that there are significant differences between male and female college teachers in aggression and personality traits. If we take the effect of temperature, this is significant, Pillai's Trace = .39, F (1. 221) = 23.67, p<.001, multivariate η^2 = .39 (39%). This significance of F indicates that temperature has ian mpact on aggression levels and personality traits of college teachers. The researchers were interpreting the interaction effect between gender and temperature using the Pillai's Trace test = .20, F (1. 221) = 9.31, p<.001, multivariate η^2 = .20 (20%). This significance of F indicates that there is a significant interaction effect between the factors gender and temperature.

Table 5 Levene's Test of Equality of Error Variances

	F	**df1**	**df2**	**Sig.**
Aggression Levels	5.707	3	221	.001
Extraversion	13.005	3	221	.000
Agreeableness	31.614	3	221	.000

Conscientiousness	10.608	3	221	.000
Neuroticism	20.608	3	221	.000
Openness to experience	21.110	3	221	.000

Note. It tests the null hypothesis that the error variance of the dependent variable is equal across groups.

The test of error variance of dependent variables of the present study has presented in Table 5. The table defines that the error variance of dependent variables was significant, and these vary from one variable to others. As we will see this table 5 the assumption of the test was violated among dependent variables $p < .05$.

Table 6 The tests of Between-Subjects Effects

Source	Dependent Variables	Total Sum of Squares	df	Mean Sum of Square	F	Sig.
Gender	Aggression Levels	1733.019	1	1733.019	4.824	.029*
	Extraversion	3.142	1	3.142	.196	.659
	Agreeableness	645.469	1	645.469	41.844	.000***
	Conscientiousness	2624.582	1	2624.582	111.999	.000***
	Neuroticism	35.787	1	35.787	1.042	.308
	Openness to experience	134.449	1	134.449	11.354	.001***
Temperature	Aggression Levels	10143.201	1	10143.201	28.233	.000***
	Extraversion	222.567	1	222.567	13.857	.000***
	Agreeableness	1509.142	1	1509.142	97.833	.000***
	Conscientiousness	227.739	1	227.739	9.718	.002**
	Neuroticism	170.885	1	170.885	4.976	.027*
	Openness to experience	34.042	1	34.042	2.875	.091
Gender × Temperature	Aggression Levels	150.910	1	150.910	.420	.518
	Extraversion	143.149	1	143.149	8.912	.003**
	Agreeableness	303.796	1	303.796	19.694	.000***
	Conscientiousness	408.510	1	408.510	17.432	.000***
	Neuroticism	163.249	1	163.249	4.753	.030*
	Openness to experience	.442	1	.442	.037	.847
Error	Aggression Levels	79398.287	221	359.268		
	Extraversion	3549.640	221	16.062		
	Agreeableness	3409.080	221	15.426		
	Conscientiousness	5178.927	221	23.434		
	Neuroticism	7590.220	221	34.345		
	Openness to experience	2617.100	221	11.842		
Total	Aggression Levels	1306550.000	225			
	Extraversion	170381.000	225			

	Agreeableness	265714.000	225			
	Conscientiousness	188720.000	225			
	Neuroticism	106085.000	225			
	Openness to experience	324492.000	225			

*p<.05 **p<.01 ***p<.001

Because of the significance of MANOVA, we will now test the univariate ANOVA results. In the MANOVA test, all dependent variables are significant, through the test of ANOVA we can know which specific variables are affected by the factors. The univariate analysis examined the big five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience), and aggression in relation to gender and temperature factors. Table 6 presented between-subjects effects on males and females with AC and non-AC groups. There is a significant difference in gender on aggression levels of college teachers, F (1, 221) = 4.82, $p < .05$. However, there is a non-significant effect of gender on the extraversion and neuroticism personality trait, F (1, 221) = .196, and 1.042, p = .659. The current study suggested that agreeableness, conscientiousness, and openness to experience were having significant effects in relation to gender, F (1, 221) = 41.84, 111.99, and 11.354, $p < .001$. After the analysis, the main effect of temperature on aggression, there was a significant effect of temperature on aggression, F (1, 221) = 28.23, $p < .001$. But there was non-significant effect of temperature on openness to experience, F (1, 221) = 2.87, p = .091. The impact of temperature was found to be significant in the personality traits of extraversion, agreeableness, conscientiousness, and neuroticism, F (1. 221) = 13.85, 97.83, 9.71, and 4.97, $p < .05$. By the analysis of interaction effect between gender and temperature, findings revealed that there was a significant interaction effect between gender and temperature on aggression levels of college teachers, F (1, 221) = .420, p = .518, and openness to experience trait, F (1, 221) = .037, p = .847. There was a significant interaction effect in the personality traits of extraversion, agreeableness, conscientiousness, and neuroticism traits with relation to gender and temperature, F (1, 221) = 8.91, 19.69, 17.43, and 4.75, $p < .001$.

Table 7 The Pairwise Comparisons of the independent variable gender on the aggression levels and personality traits

Dependent Variable	**Gender Type-1**	**Gender Type-2**	**Mean Difference**	**Sig.**
Aggression Levels	Male	Female	5.637*	.029*
Extraversion	Male	Female	.240	.659
Agreeableness	Male	Female	3.440*	.000**
Conscientiousness	Male	Female	6.937*	.000**
Neuroticism	Male	Female	-.810	.308
Openness	Male	Female	1.570*	.001**

*p<.05 **p<.001

Table 7 presented post-hoc results of the test of Tukey's of gender differences on aggression and big five personality traits. There were significant differences in the aggression levels of male and female college teachers. In the analysis of extraversion and neuroticism trait, male and female college have non-significant differences which denotes that they were having gender equality in social activities, disturbed mood, feeling anxious and unstable mood, tension, and depressed mood. But in agreeableness, conscientiousness, and openness to experience traits, there were significant gender differences among male and female college teachers ($p < .001$).

Table 8 The Pairwise Comparisons of the independent variable temperature on the aggression levels and personality traits

Dependent Variable	**Temperature 1**	**Temperature 2**	**Mean Difference**	**Std. Error**	**Sig.**
Aggression Levels	AC Group	Non-AC Group	13.637*	2.566	.000***
Extraversion	AC Group	Non-AC Group	2.020*	.543	.000***
Agreeableness	AC Group	Non-AC Group	5.260*	.532	.000***
Conscientiousness	AC Group	Non-AC Group	2.043*	.655	.002**

Neuroticism	AC Group	Non-AC Group	1.770*	.794	.027*
Openness	AC Group	Non-AC Group	.790	.466	.091

*p<.05 **p<.01 ***p<.001

Table 8 presented post hoc results of the test of Tukey's temperature effect on dependent variables. There was a significant effect of temperature on aggression, extraversion, agreeableness, conscientiousness, and neuroticism, but a non-significant effect on openness to experience personality traits. The results show that non-AC college teachers were showing more aggressive behavior than AC college teachers. In the same way, AC college teachers were more sociable and friendly, competent, organized, careful, self-disciplined, enthusiastic, and forceful compared to those who were working or sitting in non-AC rooms. The results also revealed that those who were sitting and working in non-AC rooms, were more tensed, moody, hostile, depressed, and had low levels of self-confidence which was supported by the earlier study (Sharpe & Desai, 2001). But openness to experience does not influence by temperature, and both levels of college teachers (AC/non-AC) had the same level of imagination, interest, excitement, and curiosity which was also supported by the previous study (Gleason et al., 2004).

Figure 1 Aggression levels of college teachers in relation to gender and temperature

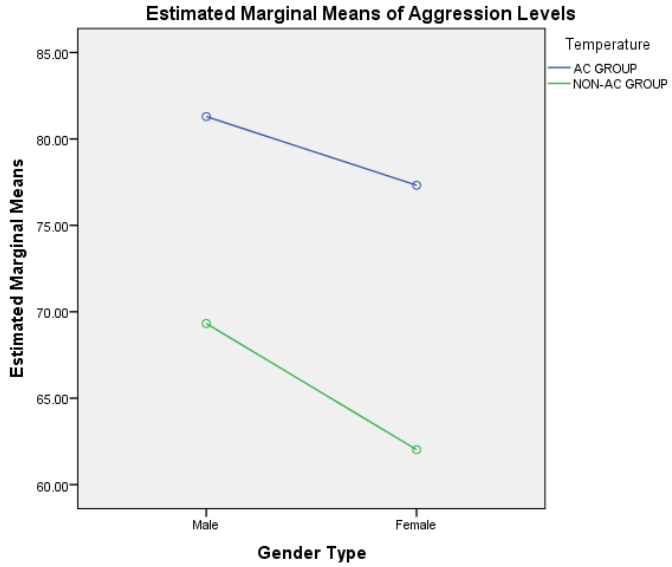


Figure 2 Extraversion personality trait of college teachers in relation to gender and temperature

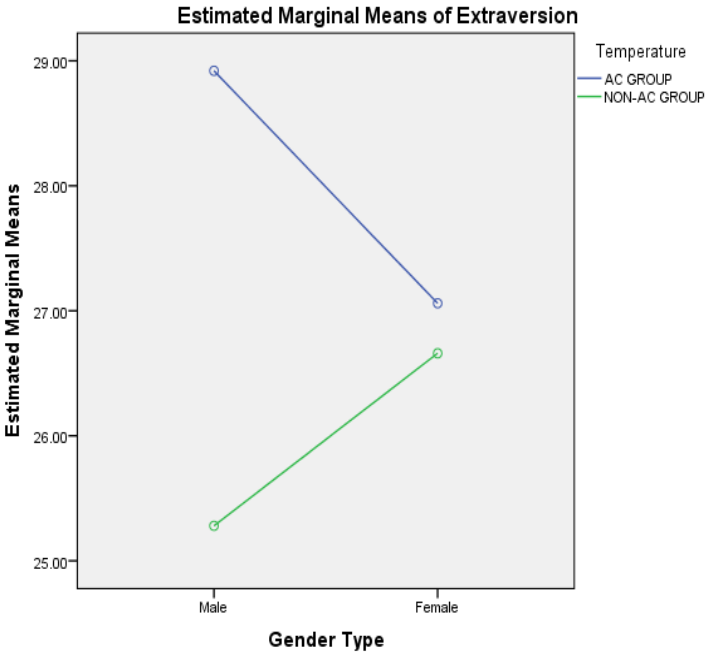


Figure 3 Agreeableness personality trait of college teachers in relation to gender and temperature

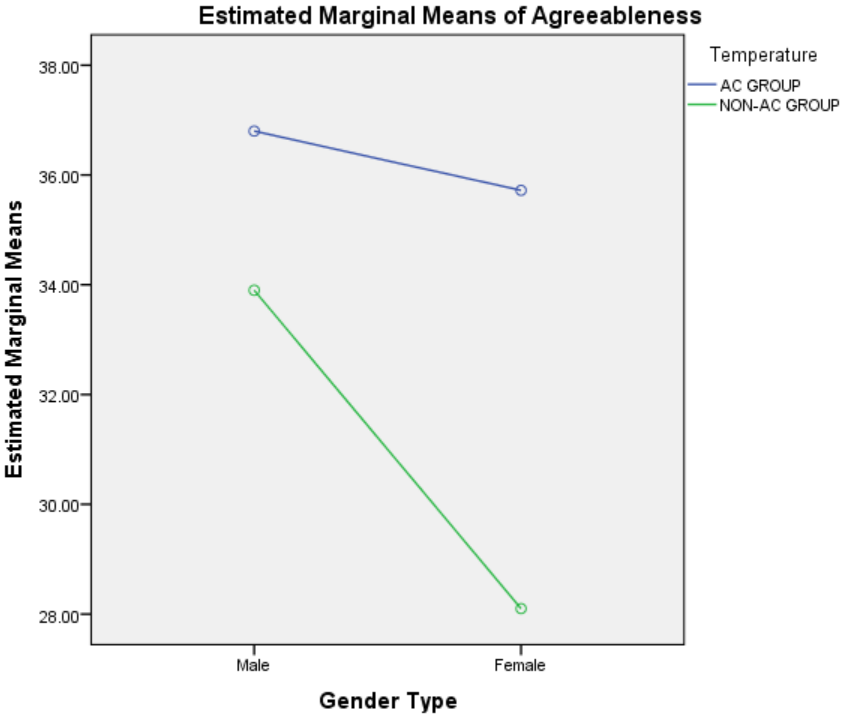


Figure 4 Conscientiousness personality trait of college teachers in relation to gender and temperature

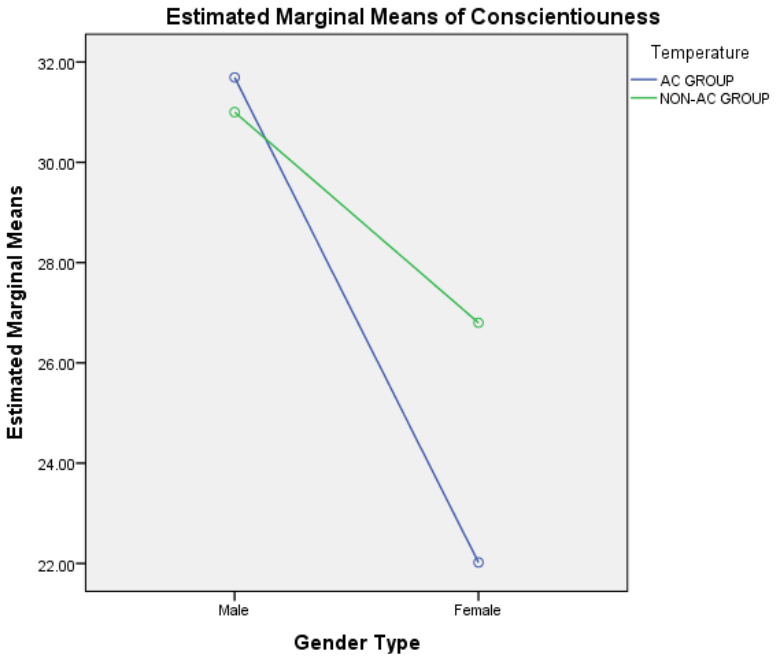


Figure 5 Neuroticism personality trait of college teachers in relation to gender and temperature

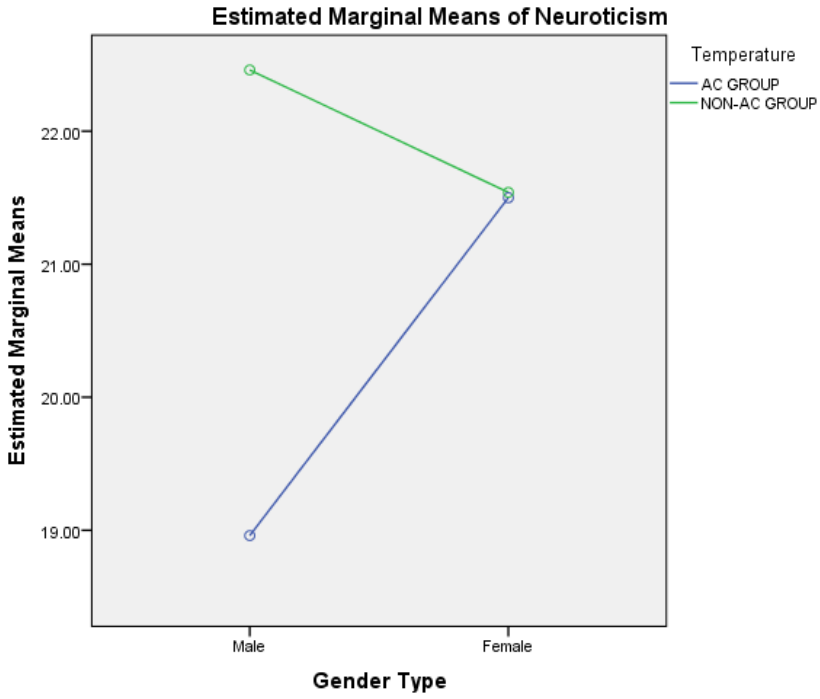
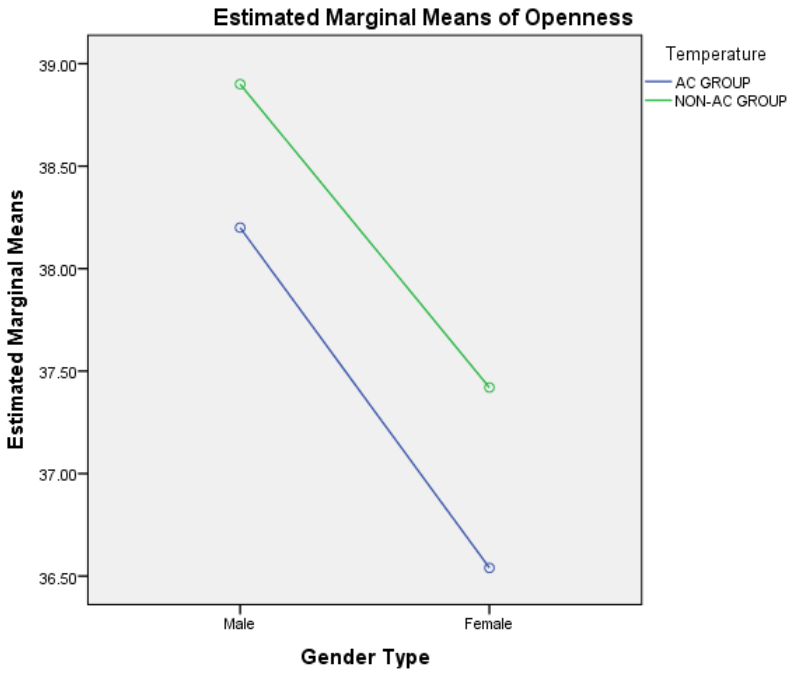


Figure 6 Openness to experience personality trait of college teachers in relation to gender and temperature



DISCUSSION AND CONCLUSION

The current study aimed at examining the role of temperature and gender on aggression and big five personality traits. The results of the current study concluded that gender and temperature had influenced the aggression levels of college teachers. The social role theory proposed physical strength and body size between men and women. Women can bear children and men can handle social and family demands that have historically contributed to distinct positions of work and responsibility in society. As a finding, women have less power and positions oriented and dominated by men (Eagly & Steffen, 1986). The present study revealed that male college teachers expressed more physical and hostile aggression but female college teachers expressed more verbal aggression than their male counterparts. According to General Aggression Model (GAM), aggression is not only influenced by physical factors but also by situational, and personal factors. Personal factors including cognitive, biological, and personality, can also influence aggression (Anderson, and Bushman, 2018). To reduce territorial aggression, applying the treatment of methimazole also reduce metabolic rate. It suggested that exposure to high temperatures reduces aggression and other metabolic rates and prevents hyperthermia (Bao et al., 2021).

The current study also revealed that gender influenced the big five personality factors agreeableness, conscientiousness, and openness to experience, but did not influence extraversion and neuroticism personality traits. Similarly, the trait of openness to experience did not influence by temperature but influenced by gender. Other personality traits like extraversion, agreeableness, conscientiousness, and neuroticism were influenced by temperature ($p < .001$). The current study concluded that male college teachers had more curiosity, imaginative, wide interest, excitement, forgiving, less demanding, organized, achievement striving, self-discipline, not more impulsive, and more competence than their female counterparts. The teachers who were working and sitting in the AC classrooms were more sociable, energetic, adventurous, enthusiastic, less tensed, depressed, moody, and anxious than the non-AC classroom teachers. Previous studies concluded that people tend to be tolerated local temperature and climate (Eurowinter, 1997; Keatinge et al., 2000; Curriero et al., 2002; Braga et al., 2002), and this toleration may be due to physiological acclimation, patterns of activities, or other adaptation mechanisms, such as having heating or air conditioning at home (Eurowinter Group, 1997; Keatinge et al., 2000). The results of temperature increased aggression were supported by several previous studies and found that idea of temperature will cause an increase in aggressive thoughts, feelings, and behaviors (Wilkowski et al., 2009). The hot temperature directly impacts aggression and violence and climate change is indirectly related to the development of adulthood aggression and violence (Novelo & Anderson, 2019). Previous studies of gender differences in aggression supported the current study, males were preferring more aggressive emotions and behavior compared to their female counterparts (Padget & Tremblay, 2020).

Some studies stated that temperature influences aggression among people and gender is a causal factor to determine aggression levels between them (Shaban & Kumar, 2016).

Limitations of the Study

One big limitation of this study is the small sample size. The ability to detect small effects requires a large number of participants, which may reduce sampling error. Another limitation of this study, the samples were taken in one profession (College teachers only), for an effective study required a different profession. The third limitation of the current study is the age group; the researchers take only the specific age group.

Implications of the Study

This study has practical applications for professionals, psychologists, and teachers. This research can be used for theory building, concept formation, and further empirical research purposes.

Suggestions for Future Research

Suggestions for future research will be based on the application of a larger sample size for data collection. A random sampling technique will be used to reduce the sampling bias among participants which is observed in the purposive sampling technique. A mixed approach technique can be suggested to apply both quantitative and qualitative techniques for data collection in an in-depth manner. In future research cross-cultural comparison can be taken into consideration. Different age groups can also be taken for comparative analysis.

Acknowledgment

The researchers have given thanks to the participants for their support, active participation, and providing consent for this research.

Author's Contribution

Both the authors have equally contributed to this research (for concept definition, review work, method of study selection, data collection, and writing for the manuscript).

Conflict of Interest

There is no conflict of interest among the researchers.

References

1. Akhtar, J., & Kushwaha, A. K. S., (2015). Gender differences in aggressive behavior of adolescents. Research paper, 5. 525-527.
2. Akman, Y., (2021). The Relationship between School Climate and Students' Aggressive Behaviors. International Journal of Progressive Education, Vol. 17 (2), 430-448.
3. Allen, J. J., Anderson, C. A., & Bushman, B. J. (2018). The General Aggression Model Current Opinion in Psychology, 19, 75-80. https://doi.org/https://doi.org/10.1016/j.copsyc.2017.03.034
4. Allik, J. & McCrae, R. R., (2004). Toward a geography of personality traits: Patterns of profiles across 36 cultures. Journal of Cross-Cultural Psychology, 35, 13–28.
5. Anderson, C. A. (1989). Temperature and aggression: Ubiquitous effects of heat on the occurrence of human violence. Psychological Bulletin, 106, 74–96.
6. Anderson, C. A. (2001). Heat and violence. Current Directions in Psychological Science, 10, 33–38.
7. Anderson, C. A., & Anderson, D. C. (1984). Ambient temperature and violent crime: Tests of the linear and curvilinear hypotheses. Journal of Personality and Social Psychology, 46, 91–97.
8. Anderson, C. A., & Anderson, K. B. (1996). Violent crime rate studies in philosophical context: A destructive testing approach to heat and the southern culture of violence effects. Journal of Personality and Social Psychology, 70, 740–756.
9. Anderson, C. A., & Anderson, K. B. (1998). Temperature and aggression: Paradox, controversy, and a (fairly) clear picture. In R. G. Geen & E. Donne stein (Eds.), Human aggression: Theories, research and implications for social policy (pp. 248–298). San Diego, CA: Academic Press.
10. Anderson, C. Anderson, K. & Douser, W. (1996). Examining an affective framework: Weapon and temperature effects to aggressive thoughts, affect, and attitudes. Personality and Social Psychology Bulletin. 22(4), 366-376.
11. Anderson, C. A., Anderson, K. B., Dorr, N., De Neve, K. M., & Flanagan, M. (2000). Temperature and aggression. Advances in Experimental Social Psychology, 32, 63–133.
12. Anderson, C. A., Bushman, B. J., & Groom, R. W. (1997). Hot years and serious and deadly assault: Empirical tests of the heat hypothesis. Journal of Personality and Social Psychology, 73, 1213–1223.
13. Anderson, C. A., & DeLisi, M. (2011). Implications of global climate change for violence

in developed and developing countries. In J. P. Forges, A. W. Kruglanski, & K. D. Williams (Eds.), The psychology of social conflict and aggression (pp. 249–265). New York, NY: Psychology Press.
14. Anderson, C. A., & Huesmann, R. L. (2003). Human aggression: A social-cognitive view. In M. A. Hogg & J. Cooper (Eds.), The sage handbook of social psychology (pp. 259–287). Thousand Oaks, CA: Sage Publications.
15. Archer, John (2004). Sex Differences in Aggression in Real-World Settings: A Meta-Analytic Review. Rev Gen Psychol. 8. https://doi.org/10.1037/1089-2680.8.4.291
16. Archibald, S., & Richards, P. (2002). Converts to human rights? The popular debate about war and justice in rural Sierra Leone. Africa, 72, 339–367.
17. AuliCiems, A., & DilBartolo, L. (1995). Domestic violence in a subtropical environment: Police calls and weather in Brisbane. International Journal of Biometeorology, 39, 34– 39.
18. Bailey, C. A., & Ostrov, J. M., (2008). Differentiating forms and functions of aggression in emerging adults: associations with hostile attribution biases and normative beliefs. Journal of Youth Adolescence,37:713–722.
19. Barlett, C. P., & Anderson, C. A. (2012). Direct and indirect relations between the Big 5 personality traits and aggressive and violent behavior. Personality and Individual Differences, 52(8), 870–875. https://doi.org/10.1016/j.paid.2012.01.029
20. Baron, R. A., & Bell, P. A. (1976). Aggression and heat: The influence of ambient temperature, negative affect, and a cooling drink on physical aggression. Journal of Personality and Social psychology,33(3),245255. https://doi.org/10.1037/0022-3514.33.3.245
21. Baron, R. A., & Richardson, D. R. (1994). Human aggression (2nd ed.). New York: Plenum.
22. Barthelemy, J. J., & Lounsbury, J. W. (2009). The relationship between aggression and the big five personality factors in predicting academic success. Journal of Human Behavior in the Social Environment, 19(2), 159–170. https://doi.org/10.1080/10911350802687125
23. Bettencourt, B. H., & Miller, N., (1996). Gender differences in aggression as a function of provocation: A meta-analysis, Psychological Bulletin, 119, 422-447.
24. Bjorkqvist, K. (2018). Gender Differences in Aggression. Current Opinion in Psychology, 19, 39-42. https://doi.org/https://doi.org/10.1016/j.copsyc.2017.03.030
25. Buss, A. H. (1961). The Psychology of Aggression. New York: Wiley. Crick, N. R., & Grotpeter, J. K. (1995). Relational aggression, gender, and social-psychological adjustment. Child Development, 66, 710-722.
26. Buss, A.H., & Perry, M. (1992). The Aggression Questionnaire. Journal of Personality and Social Psychology, 63, 452-459.
27. Crick, N. R., & Grotpeter, J. K., (1995). Rational aggression, gender, and social-psychological adjustment. Society for research in child development, 66, 710-722.
28. Davoodi, F., Hassanzadeh, H., Zolfaghari, S. A., Havenith, G., & Maerefat, M. (2018). A new individualized thermoregulatory bio-heat model for evaluating the effects of personal characteristics on human body thermal response. Building and Environment, 136, 62–76. https://doi.org/10.1016/j.buildenv.2018.03.026
29. Eagly, A. H., & Steffen, V. J. (1986). Gender and aggressive behavior. A meta-analytic review of the social psychological literature. Psychological Bulletin, 100, 309-330.
a. https://doi.org/10.1037/0033-2909.100.3.309.
30. Edalati, A., & Redzuan, M., (2010) women aggression (A Review). Report and Opinion, 2.
31. Fries, L., Kaylor, G. A., Bares, C., Han, Y., & Delva, J., (2013). Gender differences in self-reported self- reported physical aggression predictors: Exploring theoretically relevant dimensions among adolescents from Santigo, Chile, 2.
32. Ghosh, S. M., (2013). A comparative study on aggression between boys and girls adolescent. International Journal of behavioral social and movement sciences, 2, 76-82.
33. Gleason, K. A., Jensen-Campbell, L. A., & Richardson, D. S. (2004). Agreeableness as a predictor of aggression in adolescence. Aggressive Behavior, 30, 43–61.
34. Goldberg, L. R. (1992). The development of markers for the Big-Five Factor structure. Psychological Assessment, 4, 26–42.
35. Hay, D., (2007). The gradual emergence of sex differences in aggression alternative hypothesis. Psychological Medicine, 1-11, https://doi.org/10.1017/S0033291707000.
36. Hobgood, D. K. (2011). Personality traits of aggression-submissiveness and perfectionism associated with ABO blood groups through catecholamine activities. Medical

Hypotheses, 77(2), 294–300. https://doi.org/10.1016/j.mehy.2011.04.039
37. Hyde, J. S. (1984). How large are gender differences in aggression? A developmental meta-analysis. Developmental Psychology, 20(4), 722-736. https://doi.org/10.1037/0012-1649.20.4.722
38. John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), Handbook of personality: Theory and research, 2, 102–138. New York: Guilford Press.
39. Krahe, B., & Berger, A., (2005). Sex difference in aggression among young adults in Germany. Sex Roles, 52, 829-838.
40. McCrae, R. R. & Terracciano, A., (2005). Personality profiles of cultures: aggregate personality traits. Journal of Personality and Social Psychology, 89, 407–425.
41. Nahida S. & Kumar, P. (2016). Young Adults and Aggression: A Comparative Study of Gender Differences. International Journal of Indian Psychology, 3(4). https://doi.org/10.25215/0304.031
42. Padgett, Jessica & Tremblay, Paul & Carducci, Bernardo & Nave, Christopher & Fabio, Annamaria & Saklofske, Don & Stough, Con. (2020). Gender differences in aggression. Encyclopedia of Personality and Individual Differences 173-177. https://doi.org/10.1002/9781118970843.ch206
43. Rentfrow, P. J., Gosling, S. D. & Potter, J., (2008). A theory of the emergence, persistence, and expression of geographic variation in psychological characteristics. Perspective. Psychol. Sci. **3**, 339–369.
44. **R**entfrow, P. J. & Jokela, M. in The Praeger Handbook of Personality Across Cultures Vol. 1 (ed. Church, A. T.) 225–249 (Praeger, Santa Barbara, CA, 2017).
45. Sagie, A., Stashevsky, S., & Koslowsky, M. (2003). Misbehaviour and dysfunctional attitudes in organizations. Misbehaviour and Dysfunctional Attitudes in Organizations (pp. 1–276). Palgrave Macmillan. https://doi.org/10.1057/9780230288829
46. Shaban, N., & Kumar, P., (2016). Young Adults and Aggression: A Comparative Study of Gender. The International Journal of Indian Psychology, (9), 106-114.
47. Sharpe, J. P., & Desai, S. (2001). The revised Neo Personality Inventory and the MMPI-2 Psychopathology Five in prediction of aggression. Personality and Individual Differences, 31, 505–518.
48. Veiskarami, H., A., Salimy, H., Zangiabad, M., & Hosseini, S.A., (2015). Comparative analysis of physical victimization among male and female high school students of Iran. International journal of science, 9, 9-12
49. Zhao, D., & Feng, P. (2015). Temperature increase impacts personality traits in aquatic non-native species: Implications for biological invasion under climate change. Current Zoology, 61(6), 966–971. https://doi.org/10.1093/czoolo/61.6.966