

## Heritability of Aggressive Behavior in Selected Cultural Groups in Mindanao, Philippines

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**Abstract:** Mindanao, considered as one of the least peaceful part of the country, has been an interesting site for the study of aggression, an intentional act that is directed toward another individual with the goal of inflicting harm or injury. With Mindanao's high ethnic diversity, this study was conducted to determine the heritability and the variability of aggressive behavior among selected groups in Mindanao, specifically the Maranao, Cebuano, Boholano, Ilocano, Ilonggo, Bicolano, Chavacano and Butuanon. The data were gathered from the 240 family respondents from selected areas in Mindanao with the aid of the Buss-Perry Aggression Questionnaire. The Analysis of Variance (ANOVA) and the Box plot were used to analyze the variability of aggression among the eight cultural groups in the four subtypes of aggression: Anger, Hostility, Verbal Aggression and Physical Aggression. The ANOVA test showed significant difference in hostility and physical aggression among the groups while the box plot analysis showed the Ilonggos as the group being the most hostile and most physically aggressive, followed by the Maranao group. For the heritability of aggression, the correlation analysis was used between the paired up mother-daughter, mother-son, father-daughter, and father-son. Some pairs among the different cultural groups showed a positive correlation while other pairs showed low or no correlation at all. The positive correlation indicated the genetic basis of the aggression while the low correlation or no correlation indicated the strong environmental influence on human aggression in Mindanao.

**Key words:** Heritability, Variability, Aggression, Mindanao.

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### INTRODUCTION

Mindanao, the second largest island and the most ethnic-diverse in the Philippines, is considered as one of the least, if not the least, peaceful part of the country. Outbreaks of ethno-religious conflict and violence have been going on in the island for a long time, even before 1970s (Houben, 2003).

Violence in Mindanao is usually associated with the aggressiveness of the people living in the area. This aggressive behavior is generally characterized as an intentional act that is directed toward another individual with the goal of inflicting harm or injury (Bhattacharjee *et al.*, 2008). Aggression can be seen as a normal phenomenon. Human aggression is much more complex, involving personal history and decision-making processes (Deutsch, 2004).

According to Lorenz and Skinner (2000), aggression in humans is an inherited, spontaneous tendency. It is a complex social behaviour that is influenced by numerous genetic and environmental factors (Dierick, 2009).

Previous studies have associated the hormone serotonin with anger and aggression in both humans and animals and have shown that increased serotonin activity is related to a decrease in angry and aggressive behaviour. In the studies, researchers sought to determine if this relationship was genetically determined. These studies are the first to look at the relationship between variations in the serotonin receptor 2C gene and anger and hostility (ScienceDaily, 2007). With this serotonin-aggression relationship, it could be assumed that aggression has genetic basis. According to Miczek *et al.* (2007), brain serotonin (5-HT) has been implicated in the neurobiological mechanisms of aggression and violence more than any other molecule in the brain. The regulation of the release of this 5-HT from the serotonergic neurons and glutamergic input to these neurons is a candidate mechanisms for the transition between adaptive and escalated types of aggressive behaviour.

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Based on their recent findings, Miczek and his colleagues hypothesize that the enhanced inhibitory autoreceptor function is a normal compensatory adaptation to the more reactive state of the brain 5-HT system in highly aggressive animals. They further speculate that an excessive activation (i.e., overshoot) of an autoreceptor brake may be a causative link in the cascade of events leading to the hypofunction of 5-HT neurons that characterizes violent and pathological forms of aggressive behaviour.

Some studies have been conducted showing that a genetic abnormality may help explain why some people are more prone to feelings of anxiety and aggression than others. Researchers have discovered a gene, *Pet-1*, in mice that regulates level of a serotonin, a chemical messenger that allows cells to communicate with each other in the brain and spinal cord. This serotonin is the chemical responsible for controlling anxiety, impulsive violence, and depression in humans. A particular study suggested that *Pet-1* is required for normal development of serotonin cells. Mice who didn't have this gene failed to develop enough serotonin cells in fetus, which leads to very low serotonin levels throughout the developing brain and, in turn, results in altered behaviour in adults (Croft, 2009).

Many studies about the heritability of aggression suggest an overall consensus that there is some genetic influence on aggression and antisocial behaviour. However, there is striking variability among these studies. An illustration for this variability is the two studies wherein in one study, conducted on 68 pairs of adolescent twins, the result showed correlations of 0.57 for monozygotic twins and 0.18 for dizygotic twins, suggesting a substantial genetic effect. However, in another study conducted on 38 twin pairs, the researcher failed to find significant heritability for the twins (Miles and Carey, 1997).

Culture is an entirely humans factor that also plays a role in aggression. While other differences in aggression such as gender-related differences remain consistent, cultural differences have a definite relationship with both direct and indirect expressions of aggression. In one study, American men were shown to accept physical aggression more readily than Japanese or Spanish men, while Japanese men preferred direct verbal conflict more than their American and Spanish counterparts. Even within American culture, southerners were shown to generally both become more aroused and to respond more aggressively than northerners when affronted (Citizendium, 2010).

Being the most diverse in ethnicity, Mindanao is composed of several cultural groups. Among them are the original settlers, such as the Maranaos, the Butuanons and the Chavacanos, and the migrants, such as the Cebuanos, the Boholanos, the Bicolanos, the Ilocanos, and the Ilonggos. These groups vary in the level of aggressiveness, with Maranao being usually depicted as the most aggressive among them all.

Thus, this study was conducted to know the heritability and variability of aggressive behaviours among and between the cultural groups in selected areas in Mindanao.

### ***Methodology:***

#### ***Study Population:***

Sampling was conducted in the selected areas in Mindanao, specifically Iligan City, Marawi Cit, Lanao del Norte and Butuan.

#### ***Sampling Method:***

A questionnaire on aggression, the Buss-Perry Aggression Questionnaire, was personally given to the respondents, randomly sampled from the different cultural groups namely Maranao, Cebuano, Boholano, Ilocano, Ilonggo, Bicolano, Chavacano and Butuanon, with a supplementary interview conducted.

#### ***Data Gathering:***

The researcher asked the permission of each respondent for their participation to the survey. Personality behaviour was asked to the respondents with the aid of the aggression questionnaire (Appendix A).

The questions on the AQ were divided according to the four subtypes of aggression: Anger, Hostility, Verbal Aggression and Physical Aggression. Respondents rated their response to each item in the AQ on a 5-point scale ranging from 1 (not at all like me) to 5 (completely like me). For each subtype, the questions pertaining to that subtype was then summed up. These were used for the evaluation of heritability and variability for each subtype.

The respondents were asked to indicate their cultural affiliation. The information was the basis for the grouping of the respondents based on their cultural group.

**Statistical Analysis:**

The data gathered was interpreted using a statistical tool, correlation analysis. For this analysis, pairing between mother to each daughter and son, and between father to each daughter and son, was employed. These were to determine the maternal and paternal influence of the heritability of aggressive behaviour. The p- and r-values for each pairs: mother-daughter, mother-son, father-daughter, and father-son, were obtained for the analysis. P-values that were less than or equal to 0.05 indicated that there was high probability for heritability for they have significant values. R-values that were closer to 1 indicated that there was positive correlation or the values were less influenced by environmental factors. Otherwise, there was low correlation or no correlation at all.

Other statistical tools were used to analyze the data for variability of aggressive behaviour: the ANOVA and the Box-plot. ANOVA or the Analysis of Variance provides a statistical test of whether or not the means of several groups are all equal. The values that are less than or equal to 0.05 indicate significant difference between the group.

The other statistical tool, the Box-plot, is a convenient graphical presentation of the differences in the cultural groups. The box contains the middle 50% of the data. The upper edge of the box indicates the 75<sup>th</sup> percentile of the data set, and the lower hinge indicates the 25<sup>th</sup> percentile. The line in the box indicates the median value of the data.

**RESULTS AND DISCUSSION**

The respondents were randomly selected from some areas in Mindanao. They were grouped according to their cultural group. As shown in the table 1 below, out of the 240 families surveyed, highest number (25 %) came from the Maranao group, with a total of 254 individuals surveyed in these families, while the lowest number (5.8 %) came from the Bicolano, with a total of 68 individuals surveyed in these families (Table 1).

**Table 1:** Frequency distribution of all the families who participated in the study.

Cultural group	Number of Family Respondents	Number of Individual Respondents	Percentage (Family Respondents)
Maranao	60	254	25 %
Cebuano	56	228	23.3 %
Boholano	21	102	8.8 %
Chavacano	15	75	6.3 %
Bicolano	14	68	5.8 %
Ilocano	16	88	6.7 %
Ilonggo	42	172	17.5 %
Butuanon	16	84	6.7 %

The respondents were then asked to answer the Buss-Perry Aggression Questionnaire. The data gathered from the survey were then analyzed using the statistical tools: ANOVA, Box-plot and correlation analysis. To test the variability of aggressive behaviour between the cultural groups, ANOVA and Box-plot analysis were used in all subtypes of aggression for all the cultural groups.

The ANOVA test for the different subtypes of aggression in all the cultural groups were shown in the following tables. The yellow-highlighted numbers in the tables are the p-values less than 0.05 which indicate a significant difference between the cultural groups (Table 2).

**Table 2:** ANOVA for Anger in all cultural groups.

	Maranao	Cebuano	Boholano	Chavacano	Bicolano	Ilocano	Ilonggo	Butuanon
Maranao		0.92	1.00	1.00	0.51	0.97	1.00	0.95
Cebuano	1.75		0.67	0.67	1.00	1.00	0.99	1.00
Boholano	0.70	2.45		1.00	0.22	0.78	0.98	0.73
Chavacano	0.69	2.44	0.01		0.22	0.79	0.98	0.73
Bicolano	2.77	1.02	3.47	3.46		0.99	0.81	0.99
Ilocano	1.48	0.27	2.18	2.17	1.29		1.00	1.00
Ilonggo	0.67	1.08	1.37	1.35	2.10	0.81		1.00
Butuanon	1.62	0.14	2.32	2.30	1.16	0.13	0.95	

Table 2 shows that in terms of Anger, there is no significant difference among the different cultural groups. This is also shown on a box-plot analysis for anger in Figure 1-A.

**Table 3:** ANOVA for Hostility in all cultural groups.

	Maranao	Cebuano	Boholano	Chavacano	Bicolano	Ilocano	Ilonggo	Butuanon
Maranao		0.58	0.37	1.00	0.04	1.00	0.99	0.11
Cebuano	2.62		1.00	0.23	0.91	0.67	0.11	0.99
Boholano	3.06	0.44		0.11	0.98	0.46	0.05	1.00
Chavacano	0.80	3.42	3.86		0.01	1.00	1.00	0.02
Bicolano	4.40	1.78	1.34	5.20		0.06	0.00	1.00
Ilocano	0.19	2.43	2.87	0.99	4.21		0.97	0.15
Ilonggo	1.27	3.89	4.33	0.47	5.67	1.46		0.01
Butuanon	3.89	1.27	0.83	4.69	0.51	3.70	5.16	

\*yellow-colored numbers = significant

For the subtype Hostility, there are two yellow-highlighted p-values which indicate significant difference between the Bicolano and Maranao (0.04), and between the Bicolano and Chavacano (0.01), as shown on Table 3.

**Table 4:** ANOVA for Verbal Aggression in all Cultural Groups.

	Maranao	Cebuano	Boholano	Chavacano	Bicolano	Ilocano	Ilonggo	Butuanon
Maranao		0.43	0.96	0.11	0.92	0.95	0.93	0.27
Cebuano	2.94		0.97	1.00	0.99	0.98	0.99	1.00
Boholano	1.53	1.42		0.71	1.00	1.00	1.00	0.91
Chavacano	3.88	0.94	2.36		0.81	0.75	0.79	1.00
Bicolano	1.76	1.19	0.23	2.13		1.00	1.00	0.96
Ilocano	1.62	1.33	0.09	2.27	0.14		1.00	0.93
Ilonggo	1.72	1.22	0.20	2.16	0.03	0.11		0.95
Butuanon	3.31	0.37	1.78	0.57	1.56	1.69	1.59	

Same with the subtype anger, there is no significant difference in the aggressive behaviour among the groups in terms of verbal aggression (Table 4). This is also shown in the box-plot analysis in Figure 1-C.

**Table 5:** ANOVA for Physical Aggression on all Cultural Groups.

	Maranao	Cebuano	Boholano	Chavacano	Bicolano	Ilocano	Ilonggo	Butuanon
Maranao		0.15	0.04	1.00	0.23	1.00	1.00	0.03
Cebuano	3.69		1.00	0.25	1.00	0.54	0.05	1.00
Boholano	4.35	0.65		0.08	1.00	0.25	0.01	1.00
Chavacano	0.33	3.37	4.02		0.35	1.00	1.00	0.06
Bicolano	3.43	0.26	0.92	3.10		0.67	0.09	1.00
Ilocano	0.98	2.71	3.37	0.65	2.45		0.96	0.20
Ilonggo	0.56	4.26	4.91	0.89	4.00	1.55		0.01
Butuanon	4.51	0.81	0.16	4.18	1.08	3.53	5.07	

\*yellow-colored numbers = significant

As shown on the yellow-highlighted numbers in Table 5, there is a significant difference among the cultural groups for the last subtype of aggression, which is the physical aggression. There are significant differences between the Ilonggo and Cebuano (0.05), Ilonggo and Boholano (0.01), Butuanon and Maranao (0.03), and Butuanon and Ilonggo (0.01).

The figure above (Figure 1) shows the box-plot analysis of the four subtypes of aggression.

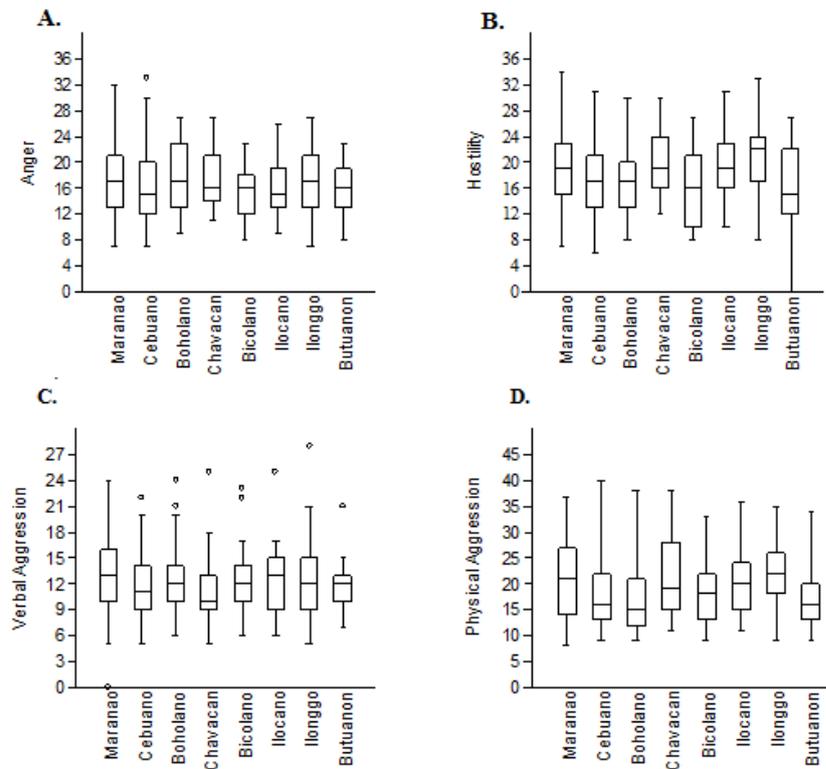
For the subtype hostility (Figure 1-B), it is shown that Ilonggos are the most hostile among the cultural groups while the Butuanons are the least hostile among the groups.

The Box-plot analysis for Physical Aggression (Figure 1-D) showed significant differences. It is further shown that Ilonggo are the most physically aggressive among all the other groups, closely followed by the Maranao. The least physically aggressive among the groups are Boholanos.

In the different sub-types of aggression, Maranao group consistently has the maximum data score (Figure 1). Furthermore, its average score is consistently on the highest three among the cultural groups.

This high score in the aggression questionnaire of Maranao people can be associated with their culture. They tend to be more aggressive when their *maratabat*, the family honour, is threatened. *Maratabat* is defended primarily by the Maranaos and becomes the cause of much family and community tension and conflict, or *rido* (Manderson and Bennett, 2003).

Another group who has consistent high scores in the aggression questionnaire are the Ilonggos. This could also be attributed to their culture and values. Ilonggos are known to be very passionate people. They are known to express their emotions, love or anger, without reservations (Rabuco, 2010).



**Fig. 1:** Box-plot Analysis in all cultural groups for (A) Anger, (B) Hostility, (C) Verbal Aggression, and (D) Physical Aggression.

Another statistical tool, the correlation analysis, was used to determine the heritability of the aggressive behaviours. In doing the correlation analysis, the parents and offspring were paired: mother and daughter, mother and son, father and daughter, and father and son. The p and r values were then obtained from the statistical analysis of the four pairs. P-values less than 0.05 would indicate that the parent and offspring are correlated while p-values greater than 0.05 will indicate otherwise. The correlation coefficient, or r-values, will indicate if the parent and offspring is positively or negatively correlated. R-values closer or equal to 1 will indicate a positive correlation while values closer to or equal to -1 indicate negative correlation. Those values closer to or equal to 0 will indicate low correlation or no correlation at all. In the next tables, the yellow-highlighted numbers under the P-value column indicate a significant correlation between the pair. On the other hand, the pink-highlighted numbers under the R-value column indicate a positive correlation between the pair.

Table 6 shows the p and r values of the different cultural groups with respect to anger, a subtype of aggression. These were determined by the analysis of the respondents' answer to questions 1, 9, 18, 19, 23, and 28 of the Buss-Perry Aggression questionnaire.

**Table 6:** P- and r-values of the Cultural groups with respect to Anger.

	Mother-Daughter		Mother-Son		Father-Daughter		Father-Son	
	P	r	P	R	p	R	P	r
Maranao	<0.0001	0.514	0.0005	0.404	0.0061	0.298	0.0001	0.456
Cebuano	0.0015	0.403	0.0320	0.276	0.3852	0.127	0.0016	0.416
Boholano	0.4878	0.113	0.2422	0.479	0.0179	0.690	0.9382	0.020
Chavacano	<0.0001	0.707	0.0002	0.745	0.0824	0.567	0.2311	0.288
Bicolano	0.1278	0.394	0.1094	0.465	0.1684	0.408	0.0755	0.597
Ilocano	0.752	0.057	0.0507	0.608	0.0582	0.336	0.1925	-0.495
Ilonggo	0.4069	0.142	0.0391	0.403	0.0019	0.475	0.0066	0.504
Butuanon	0.1464	0.344	0.2211	-0.263	0.3225	0.261	<0.0001	0.833

\*yellow-colored numbers = significant correlation

pink-colored numbers = positive correlation

Each of the four pairs of the Maranao group is correlated, but only one pair, the mother and daughter, has r-value closer to 1, thus, a positive correlation (Table 6). Both in the Cebuano and Ilonggo groups, three pairs are correlated but are low correlations. One pair in the Boholano and Butuanon groups showed a positive correlation. The Chavacano group has two pairs with positive correlation. Bicolano and the Ilocano groups have no pair at all that is correlated.

Table 7 shows the p- and r- values of the correlation analysis of each of the four pairs of each cultural group with respect to Hostility, which were determined by the analysis of the respondents' answer to questions 3, 7, 10, 15, 17, 20, 24 and 26 of the Buss-Perry Aggression questionnaire. The table shows that the four pairs of the Maranao group are correlated, with two showing positive correlation. Also, all the four pairs of the Cebuano have low correlation. One pair from the Boholano and Ilonggo and two pairs from Chavacano have positive correlation. The Bicolano groups have positive correlation in all of its four pairs, while both the Ilocano and Butuanon have none.

**Table 7:** P- and r-values of the Cultural Groups with Respect to Hostility.

	Mother-Daughter		Mother-Son		Father-Daughter		Father-Son	
	P	r	P	R	p	R	P	r
Maranao	< 0.0001	0.509	0.0004	0.447	0.0004	0.365	< 0.0001	0.571
Cebuano	0.0203	0.301	0.0061	0.347	0.0166	0.344	0.0090	0.341
Boholano	0.7460	0.087	0.0685	0.670	0.0359	0.559	0.3053	0.511
Chavacano	0.0165	0.723	0.0456	0.744	0.2300	0.416	0.5321	0.734
Bicolano	0.0001	0.791	0.0110	0.980	0.0070	0.705	0.0023	0.920
Ilocano	0.3402	0.290	0.4174	0.282	0.7038	0.136	0.8833	-0.069
Ilonggo	0.8193	0.045	0.8630	0.045	0.8100	0.044	0.0040	0.648
Butuanon	0.1673	-0.830	0.0618	-0.828	0.1391	0.697	0.0876	0.612

\*yellow-colored numbers = significant correlation  
pink-colored numbers = positive correlation

The p- and r- values for the Verbal Aggression were determined through the analysis of the respondents' answers for the Buss-Perry AQ questions of numbers 4, 6, 14, 21, and 27. Table 8 shows the p- and r- values of each of the four pairs of each cultural group with respect to Verbal Aggression, another subtype of aggression. The Maranao group has one pair that is positively correlated, the other three has low correlation. One pair in Cebuano group and three pairs in Ilonggo group have low correlations. Two pairs in the Bicolano group and one pair in the Butuanon group have positive correlations. The Boholano, Chavacano, and the Ilocano have no pair that is correlated.

**Table 8:** P- and r-values of the Cultural Groups with Respect to Verbal Aggression.

	Mother-Daughter		Mother-Son		Father-Daughter		Father-Son	
	P	r	P	R	p	R	P	r
Maranao	<0.0001	0.476	0.0028	0.364	0.0001	0.405	< 0.0001	0.501
Cebuano	0.1985	0.169	0.2461	0.149	0.0323	0.307	0.2714	0.151
Boholano	0.3226	0.269	0.1847	0.527	0.9256	-0.029	0.5614	0.325
Chavacano	0.6028	0.189	0.1142	0.654	0.7957	-0.092	0.9390	0.041
Bicolano	0.9425	0.020	0.0128	0.868	0.0538	0.573	0.0143	0.801
Ilocano	0.8831	0.049	0.5754	0.167	0.4172	0.275	0.2196	-0.454
Ilonggo	0.0026	0.453	0.0234	0.431	0.0074	0.417	0.0073	0.498
Butuanon	0.1629	0.853	0.9455	-0.049	0.9002	0.064	0.0311	0.706

\*yellow-colored numbers = significant correlation  
pink-colored numbers = positive correlation

Table 9 shows the p- and r- values of the correlation analysis of each of the 4 pairs of each cultural group with respect to Verbal Aggression, which were determined through the analysis of the respondents' answers for questions 2, 5, 8, 11, 13, 16, 22, 25, and 29 of the Buss-Perry AQ. All the four pairs in the Maranao group are correlated, but only one showed a positive correlation. In the Cebuano group, all the four pairs have low correlations. Three pairs of the Boholano group, two pairs of the Bicolano group, and one pair of the Ilocano and Butuanon groups have positive correlation. Two pairs of the Ilonggo group showed low correlations. The Chavacano group showed no pair which is correlated.

**Table 9:** P- and r-values of the Cultural Groups with Respect to Physical Aggression.

	Mother-Daughter		Mother-Son		Father-Daughter		Father-Son	
	P	r	P	R	p	R	P	r
Maranao	< 0.0001	0.642	0.0323	0.261	< 0.0001	0.452	0.0003	0.418
Cebuano	0.0016	0.396	0.0336	0.272	0.0177	0.328	0.0003	0.457
Boholano	0.0062	0.623	0.0109	0.827	0.0005	0.772	0.4970	0.361
Chavacano	0.0833	0.584	0.1024	0.662	0.3575	0.329	0.3280	0.439
Bicolano	0.0021	0.690	0.0771	0.582	0.4503	0.243	0.0261	0.703
Ilocano	0.1545	0.426	0.2338	0.393	0.0265	0.665	0.7079	-0.151
Ilonggo	0.6329	0.079	0.9493	0.012	0.0027	0.467	0.0272	0.420
Butuanon	0.9188	0.114	0.8535	0.095	0.8737	0.121	0.0017	0.892

\*yellow-colored numbers = significant correlation

pink-colored numbers = positive correlation

As shown in the tables above, the result yielded r-values closer to 1 but not equal to 1. This indicates that the relationship of the aggression between a parent to an offspring is also influenced by environmental factors. The closer the r-values to 1 imply lesser environmental influence. With some pairs having r-values close to 1, it is safe to say that genetics has an impact to the aggressive behaviour of the people in Mindanao.

Several other studies have been conducted in the past that implicate that genetics is an important component in the aggressive behaviour of people.

A study was conducted utilizing a Dutch family suggested that genetics influence aggression. In the study, they found a point mutation in the structural gene for monoamine oxidase A (MAOA), a neurochemical in the brain, which they associated with aggressive criminal behaviour among a number of males in that family. These males were reported to have selective MAOA deficiency, which can lead to decreased concentrations of 5-hydroxyindole-3-acetic acid (5-HIAA) in cerebrospinal fluid. Evidence suggests that low concentrations of 5-HIAA can be associated with impulsive aggression (Jones, 2005).

Also, some studies have linked aggression to low levels of serotonin. Decreased serotonin function has consistently been shown to be highly correlated with aggression across a number of different experimental studies (Brown, 1994).

As shown in the obtained results, aggressive behaviour, even though have genetic basis, is still clearly affected by environmental factors. As mentioned above, one of the factors influencing the aggressive behaviour of the people are the cultures they are practicing because culture defines how the people live. Furthermore, high stress environments can cause individuals to act out with high amounts of aggression. An environment with a high presence of violent and aggressive behaviour, such as some parts of Mindanao, not only creates these high levels of stress, but also reinforces violence as an acceptable social behaviour (Cox, 2001).

In general, this study has found out that aggression among the different cultural groups in Mindanao is affected by both genetic and environmental factors in all of the four types of aggression. Furthermore, there is a variability of aggressive behaviour among some of the cultural groups here in Mindanao.

**Conclusion:**

Mindanao, Philippines is commonly depicted as one of the least, if not the least peaceful part of the country. Violence in Mindanao is usually associated with the aggressive behaviour of its people. With its high ethnic diversity, the violence could not be pinpointed to a single cultural group in Mindanao. Thus, this study was conducted to determine the variability and heritability of aggressive behaviour among the selected cultural groups in Mindanao.

The 240 family respondents of the study came from eight cultural groups namely; Maranao, Cebuano, Boholano, Ilocano, Ilonggo, Bicolano, Chavacano and Butuanon. Among the respondents, the largest group was the Maranao (25 %) while the smallest group was the Bicolano (5.8%).

Through the ANOVA and Box plot analysis, it was determined that among the different cultural groups, the most hostile and physically aggressive were the Ilonggos and the Maranaos. This could be associated with the culture being practice by the two groups. The Ilonggos were known to express their emotions, love and anger, without reservations while the Maranaos were known to easily resort to violence in order to protect their family honour. This cultural influence is an environmental factor to human aggression.

Heritability of aggressive behaviour was also determined in this study using correlation analysis. It was shown that due to some positive correlations between the pairs (mother-daughter, mother-son, father-daughter, father-son), aggressive behaviour indeed have genetic basis, as also demonstrated in the previous studies stating that some neurotransmitters (e.g. serotonin) affects human aggression.

However, in the correlation analysis, some pairs showed low or no correlation, indicating environmental factors (e.g. culture) on human aggression.

Thus, aggressive behaviour could vary from one cultural group to the other. Also, human aggression could either be influenced by genetics or by environment.

For future research, a study of the aggressive behaviour among more varied cultural groups (i.e. groups found on the different parts of the country) is strongly recommended. Also, large scale of samples is recommended for a less margin of error. Another strong recommendation is a twin study of aggressive behaviour to determine the certainty of the genetic basis of human aggression.

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