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Facial Width-Height Ratio (fWHR): A Cue to Financial Success Among Male Traders in Sub-Saharan Africa

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Abstract

Background: Facial width-to-height ratio (fWHR) is a stable facial structure, and several studies investigated the predictive effects of fWHR on individual traits and behaviors. There is a dearth of data regarding the relationship between fWHR and success in business in terms of income level. The aim of this study was to correlate fWHR with monthly income of traders at kantin kwari market of Kano State.

Materials and method: The participants were selected using simple random sampling technique with their consent and their Bio-data (age, sex, marital status, educational achievement, assets and other properties) and monthly income status were enquired for and recorded appropriately. The statistical analysis was performed using SPSS version 20. A Pearson's correlation was carried out on the entire study population as well as based on the number of children, and number of wives.

Results: A significant inverse association between fWHR and income level among participants with $\leq$ 2 children was obtained (r= -0.29, P= 0.035).

Conclusion: The number of children a participant has, is a moderator for the relationship between fWHR and monthly income and higher value for fWHR predicted lower monthly income.

Key words: Face, Anthropometry, Income, Association, sub-Saharan Africa

Introduction

Some facial measurements or traits have been considered as social cues for behavioural traits such as dominance, aggressiveness as well as anger(1,2). There are evidences supporting a link between upper facial height (UFH), and some human characteristics (behaviour and sex) and it is a potential target of selection during evolution (3). Faces with smaller upper height have more bite force, a trait that may play a crucial role in survival and the upper height can discriminate between males and females reliably(4,5,6). Facial width-to-height ratio (fWHR) is one of the stable facial features that have been investigated in relation to the traits and behaviours of individuals (7,8). This ratio is calculated by taking the distance from one zygon to the other and dividing it by facial height (6,9,10). The fWHR is in the upper face (11,12,7), and is associated also with human characteristics (similar to UFH) such as aggressiveness, trustworthiness, dominance, risk taking, social expressions and power (8,10). And since male faces with higher fWHR are more likely to be judged as untrustworthy, dominant, more powerful, competent and be more likely to take risks to get money and other resources (10,13). It is very likely that such individuals (with higher fWHR) may be more successful in business than those with lower fWHR.

Any positive findings from this study may

broaden our understanding of the association between fWHR and some behavioural traits that propel for success in the context of monthly income. Thus, the aim of the current study was to measure the fWHR and correlate it with the monthly income of traders at Kantin Kwari market of Kano State.**Materials and methods**

The study was designed as an observational cross-sectional study. Before the beginning of the study, an ethical clearance was obtained from the Faculty committee on Ethics since the study involved human subjects. A total of 93 all male study participants were recruited using the simple random technique and were informed that the participation is voluntary, and any participant could withdraw his participation at any given time if he so wished. The contents of the study information sheet were described to the participants and informed consent was obtained. The participants were traders in Kantin Kwari market of Kano State that were physically fit and free from any facial deformity as well as any obvious psychological problems (conscious in time, space, and position). Biodata of the participants including their marital status, number of children, number of wives, educational achievement, spectrum of assets/properties as well as the facial measurements (fWHR) readings were measured and recorded. The facial width-to-height ratio was determined from the vernier calliper measurements for facial height and width. The upper height dimension spans the middle third of the face from the glabella to the sub-nasal region, while the breadth spans between the zygomatic prominence on either side of the face.

Study location

Kano State is in northern Nigeria, with a population of about 20 million, which was created on May 27, 1967 from part of the Northern Region. It is called the commercial city of Nigeria, known for its sprawling markets for several centuries. It has attracted traders and buyers from across Nigeria and west Africa's Sahel region and still holds its place as the north's leading commercial hub.

One of Kano's more widely recognized trade spots is the Kwari Market, Kantin Kwari Market is the biggest textile market not only in West Africa but in the entire African continent, thus it receives numerous visitors from within and outside Kano metropolis on a daily basis with increased potential for wealth creation. According to our survey, minimum of 10,000 customers enter in or out of the market per hour per day with over 10, 000 traders both small, medium, and large scale. The traders or the customers come from different ethnic groups of Nigeria, neighbouring countries (e.g., Niger, Ghana, Burkina Faso, Togo, Mali etc) and other countries (e.g., China, India etc). This market is in Fagge local government area of Kano State. It consists of people of different dealers and retailers from ethnicity for example: Nigerians, Nigeriens, Togolese, Chinese, Indians, and many different ethnicities, but the predominant people are Hausa people from the Northern Nigeria.

Materials

The regular Vernier caliper was used to measure (in millimetres) the facial width as well as the facial height of the study participants. The instrument has a measuring accuracy of 0.001mm.

Statistical analysis

The SPSS software version 22 IBM was used for the analyses, and the minimum, maximum, mean, and standard deviation (SD) of all the variables (facial height, width and facial width-to-height ratio) were obtained. The association between the fWHR and monthly income was determined using Pearson's correlation and the evaluation was categorized based on key features of social status such as number of wives and number of children. The value of $P \leq 0.05$ was considered statistically significant.

Results

Table 1 shows the minimum and maximum dimensions for facial width as 103.00 mm and 148.00 mm respectively, with the mean of 126.93 mm±9.65. The minimum and maximum measurements for facial height, were 60.32mm and 98.42mm respectively, with the mean of 77.77±6.51mm. The facial width-Height ratio minimum and maximum were 1.17 and 2.05 respectively with the mean of 1.64±0.17mm. Similarly, the minimum income per month was 200000 naira, the maximum was 50,000,000 naira and the mean income was N9,450,549.45 ± 1,102,3312.40. The minimum age of participants was 20 years, while the maximum was 71 years with the mean of 36.50 ±12.85 years. The minimum measurement of fWHR was 1.17 while the maximum 2.05 with the mean measurement of 1.64±0.17mm. The mean number of children per participants was 3, while the mean number of wives per participant was 1.

Table 1: Facial width, facial height, and facial width-to-height ratio (fWHR) of the study participants (n = 93)

	Min	Max	Mean	Std. Dev
Age (years)	20.00	71.00	36.50	12.85
FWHR	1.17	2.05	1.64	.16818
facial width (mm)	103.34	148.82	126.93	9.65
Facial HT (mm)	60.32	98.42	77.77	6.51
Income (Naira)/month	200000.00	50000000.00	9450549.45	11023312.40
Number of children	0.00	23.00	3	**5**
Number of wives	0.00	4.00	1	1

The correlation between quantitative variables of income and fWHR was not statistically significant (r = -0.17, P = 0.109) when the analysis was carried out for the entire sample population.

When the evaluation was carried out based on the number of children each participant had, the result indicated that participants with fewer children ($\leq$ 2 children) n = 52, had a statistically significant correlation between their monthly income and fWHR (r= -0.29, P= 0.035) and the relationship was that higher income was significantly correlated with lower values of the fWHR ratio (i.e traders with longer face do better in business than those with shorter face).

The association between monthly income and fWHR was not statistically significant in participants with children $\geq$ 2 children, for participants that are single or married (P> 0.05).

The stepwise multivariate regression analysis was conducted, beginning with INCOM as the dependent variable and fWHR as the independent variable. Although there was extremely weak positive relationship between INCOM & fWHR (model 1), this was not significant (**Table 2**). However, when the INCOM was regressed against all the variable without fWHR, the model the explanation of the variation increased to 31.3% but still statistically insignificant (**Table 2**, model 2). Interestingly, when all the predictors were incorporated into the analysis including fWHR, the model was found to be the best, and explained 35.8% of the variation with a statistical significance (P<0.001) as seen in **Table 2** (model 2). Also, there was very weak and insignificant correlation (P>0.05) between monthly income and each of the predictor variable, except for Income and NOC (number of children) as seen in **Table 3**.

Table 2: Model summary of the dependent and predictor variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F	P-Value
1= a. Predictors: (Constants, FWHR) b. Dependent variable: INCOM	.174[a]	.030	.020	10810357.735	1.244	2.852	.095[b]
2= a. Predictors: (Constants, NOC, MS, Age, NOW) b. Dependent variable: INCOM	.560[a]	.313	.282	9252895.700	1.815	.560[a]	.313
3= a. Predictors: (Constants, FWHR, NOC, MS, Age, NOW) b. Dependent variable: INCOM	.598[a]	.358	.321	8997346.989	1.746	9.697	.000[b]

Table 3: Coefficients of the predictor variables and the level of significance of each in the model

Coefficients [a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	25111316.570	9919173.389		2.532	.013	5395885.395	44826747.745
FWHR	-14065936.981	5709252.967	-.216	-2.464	.016	-25413695.460	-2718178.501
Age	91278.409	119818.631	.106	.762	.448	-146874.095	329430.912
MS	794901.538	3231132.653	.033	.246	.806	-5627324.482	7217127.557
NOW	-1168899.056	2617187.336	-.092	-.447	.656	-6370842.279	4033044.167
NOC	1262794.885	464266.451	.547	2.720	.008	340015.042	2185574.728

a. Dependent Variable: INCOM

Discussion

In the current study, the participants were male because traditionally and religiously, women in the Northern part of Nigeria do not participate in open business where they will be intermingling with their male counterpart. The participants had a very wide differences in their monthly income, family size (number of children and wives) as well as values for fWHR. Most (52) of the study participants had lower fWHR values compared to the mean score for the study and most of them also had monthly income that was below the mean value for the study. Although the correlation between fWHR and income was not statistically significant, the finding suggests that individuals with a shorter facial height but longer facial width (i.e., lower fWHR) are very likely not aggressive in vigorously pursuing the business, and not likely also in taking risk to invest more in the business. This is in keeping with the study of some authors (13,10), where they reported that individuals with higher fWHR were more likely to be judged as untrustworthy, dominant, more powerful, competent and more likely to take risks to get money and other resources (13,10). The findings of the current study, although weak and insignificant, agrees with the previous studies that reported individuals with high values of fWHR as successful, powerful and putatively rich (10,14) and achieve better negotiation outcomes in business (15). It is logical to also argue that such individuals with lower fWHR are more likely to be duped in the business since they may be less powerful, less dominant, and incompetent when they indulge in business. Similarly, somebody trustworthy may likely have trust in others and so he may be a scapegoat for dupers in business.

Interestingly, correlation between lower fWHR and monthly income of participants that have less than or equal to two children was statistically but negatively significant.

The significant association between higher monthly income with smaller fWHR ratio among participants with less than or equal to two children in the current study, suggests that the sensitivity of the association becomes heightened based on the number of children. Heightening of the sensitivity of a relationship between fWHR and behavioural traits (violence and aggression) among young youths and not the elderly has also been reported (16,17). This feature is described as a moderative effect and hence having few numbers of children have a moderative influence on the relationship between fWHR ratio and monthly income. Metanalysis conducted by some authors suggested that fWHR predicted success in business significantly with a relatively narrow confidence interval levels that neither age nor nationality moderated the relationship (7). The key differences between the finding in the current study and in the previous literature appears to be that the literature reports evaluated for success in business which was defined as the ability to negotiate using illegitimate approaches including cheating and not as monthly income (9). When a study that assessed success in business as an ability to negotiate legitimately was added to the

meta-analytic evaluation, the significant relationship between fWHR and business success that was reported in the literature was lost (18). Thus, since cheating is an antisocial behaviour, and positive association existed between business success (negotiation capacity using illegitimate approaches) and fWHR, higher fWHR predicts antisocial behaviour and personality (including psychopathy, Machiavellianism, and narcissism) (19). Although the behavioural traits of the study participants in the current study was not evaluated, nevertheless, the finding in the current study may putatively imply that the majority of them are unlikely to portray an antisocial behaviour such as cheating, because many of them have low fWHR and monthly income as compared to their counterpart.

An earlier study had evaluated the relationship between fWHR and aggressive behaviour in the context of participants with low income level and reported that the relationship was both robust and statistically significant (20). Thus, income level was a key moderator of the relationship between fWHR and aggressive behaviour. The detailed evaluation of the role of income as a predictor of fWHR or a moderator of the association between aggressive behaviour and fWHR may be necessary since income level is central to analytic perspectives.

Persons of high-status including income are believed to be less aggressive probably because the costs of aggression appear to supersede any benefits from aggression (20) and thus, they have more to lose from aggression and its consequences (19).

There is a need for a larger longitudinal study that could evaluate numerous hypothesis as to moderating, mediating, and confounding effects of various covariates in the evaluation of the association between fWHR and behavioural traits including income level. The large study could also finalize the argument regarding sexual dimorphism in fWHR ratio although not included in the present study specifically because business in our markets is purely men's business.

Conclusion

Although there was significant association between the fWHR and monthly income in the study population of businessmen domiciled in Kantin Kwari Market of Kano state Nigeria, this association was moderated by the number of children the study participant had. Again, the association was inverse and was again weak, possibly because of small sample size. It is possible that the association may be stronger if large sample size were to be used. From the previous and this study, the fWHR undoubtedly contributes to the prediction of one's business success but the contribution is much stronger in combination with other influencers. We recommend inclusion of other bio factors that may influence business success (e.g., 2D:4D ratio, masculinity-femininity and others) and large sample size in future similar studies.

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