

Variations in Somatotypes in Young Adults in College of Health Sciences, South East Nigeria

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DOI: <https://doi.org/10.51584/IJRIAS.2026.110400163>

Received: 20 April 2026; Accepted: 25 April 2026; Published: 16 May 2026

ABSTRACT

There is increasing concern over body image dissatisfaction, unhealthy dietary patterns, and sedentary lifestyles among university students despite the growing emphasis on fitness and wellness. This study investigated variations in somatotypes among young adults in the College of Health Sciences, Nnewi. Somatotype classifications which categorize individuals based on their physical build into three primary types- ectomorph, mesomorph and endomorph provide valuable insights into body composition and health. A cross-sectional survey design was adopted, involving structured questionnaires and anthropometric assessments of 400 students aged 18–25 years. The mean age of participants was 20.71 years, with a female predominance (56.00%). Results revealed significant gender-based differences in anthropometric indices. Male participants exhibited higher mean values in weight (75.50 kg), height (178.21 cm), waist width (80.93 cm), and hip circumference (96.86 cm) compared to females ($p < 0.05$). Somatotype analysis showed that 68.75% of respondents displayed endomorphy, 42.50% mesomorphy and 50.00% ectomorphy, indicating a predominance of balanced body types within the population. Males were significantly more mesomorphic (6.00) than females (3.60), while females exhibited higher endomorphic (4.30) and ectomorphic (2.90) components ($p < 0.05$). These findings highlight notable gender-related variations in somatotype distribution and underline the influence of lifestyle, and diet, on body composition and self-perception.

Key words: Somatotrophs, Young Adults, Variations, College of Health Sciences.

INTRODUCTION

A person's physique is more than just how they look. It illustrates how lifestyle, diet, environment, and genetic factors are all integrated. These are all put together in the word somatotype which divides physique into three components: ectomorphs, mesomorphs and endomorphs. Somatotypes refer to the classification of human body types into three main categories based on physical features which consists of bone structure, muscle mass and body proportions. The concept of somatotypes was developed by William H Sheldon an American psychologist in the 1940s. Somatotype describes the physical characteristics of the human body and allows a definition of body type through the analysis of metric characters, it is based on the definition of three components: endomorphy, mesomorphy and ectomorph, referable, respectively, to relative fatness, to the musculoskeletal component, and to linearity (R Buffa, 2005). Individuals with dominance of the endomorphic component are heavier and fatter than mesomorphs and ectomorphs, mesomorphs have a greater relative development of the musculoskeletal component, while ectomorphs present low fat mass and body weight (Bolonchuk et al., 2000). Somatotyping has been used in many populations in recent decades to understand body composition variations and to establish a connection between morphology and lifestyle, athletic performance, and health. Individuals with dominance of the endomorphic component are heavier and fatter than mesomorphs and ectomorphs, mesomorphs have a greater relative development of the musculoskeletal component, while ectomorphs present low fat mass and body weight (Bolonchuk et al., 2000). Young adults are individuals in the transitional stage between adolescence and adulthood, spanning the ages of 18-25 years. Young adults are individuals who are no longer in their teenage years but haven't reached middle age. They are typically between 18 and 25, a transitional

period where they pursue independence, education, careers and identity formation. This stage involves exploring relationships and taking on adult responsibilities. Some define young adulthood as the period between 18 and mid-20s, while others extend it to 18-30 or even 18-35 (Michelle Chan, M.A., LMFT, 2024).

Biologically and psychologically, young adulthood is fundamentally a period of maturation and change, although the degree of change may seem less striking than the changes that occurred during childhood and adolescence. As just one example, the physical changes of the transition from childhood into adolescence are transformative, with bodies growing in dramatic bursts and taking on secondary sex characteristics as puberty unfolds. As young people move from adolescence into adulthood, physical changes continue to occur, but they are more gradual. Individuals begin the steady weight gain that will characterize adulthood, but these changes are not as discontinuous as they are at the beginning of adolescence (Cole, 2003; Zagorsky and Smith, 2011). College is an educational institution that provides higher education and specialized training in various fields. Some universities may have constituent colleges or departments, which are separate entities within the university structure, offering specific programs of study. Universities are often larger than colleges, with more students, faculty and resources. In general, colleges are smaller education institutions when compared to universities. The number of courses offered is limited, and study programmes take between 2-4 years to complete (Robert S. Balan, 2022). These people might exhibit distinct patterns of dietary habits, academic stress, and physical activity, which could have an impact on somatotype in ways that are different from those of both general populations and athletic cohorts. Identifying at-risk physiques, providing baseline morphology reference data, and supporting health promotion initiatives like targeted physical activity or dietary interventions are all made possible by mapping the somatotype distribution in this group. The aim of this study was to determine the variations in the somatotypes of young adults in a tertiary institution South-East Nigeria

METHODOLOGY

The sample size was calculated using the formula of Yamene (2016).

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size to be estimated

1 = constant

e = level of significance or limit of tolerable error which is set at 0.05

N = total population of students in college of health sciences, Nnewi

$$n = \frac{4,182,032}{1 + 4,182,032(0.05)^2} = 399.96 \text{ which was approximated to } 400$$

A total of 400 participants were recruited for the study.

To be eligible for the study, participants had to be between 18-25 years old, be enrolled as a student in the college of health sciences, Nnewi, be willing to provide informed consent and be physically present on campus during the data collection period.

Participants were excluded from the study if they had physical disability that prevented them from participating in the anthropometric measurements, were pregnant or breastfeeding or had a medical condition that affected their body composition or physical activity level.

Somatotype Classification

Sheldon's somatotype classification system categorizes individuals into three main body types:

1. **Ectomorph:** Ectomorph is made up of a slender, fragile and delicate body build with a low muscle mass and a high metabolism.

2. **Mesomorph:** Mesomorph is made up of a muscular, athletic and well-proportioned body build with a high muscle mass and a medium metabolism.
3. **Endomorph:** Endomorph is made up of a rounded, soft and curved body build with a high body fat percentage and a low metabolism.

Data collection Procedure:

Participants were approached in their classrooms, hostels, fields and invited to participate in the study. Those who agreed to participate were asked to provide informed consent and complete a questionnaire. (The tables showing the results of questionnaire, was presented as appendix.) The physique of participants were compared with a template to determine whether the fit into any of the somatotypes, also with the characteristics explained in Sheldon’s somatotype classification system. Data analysis was done to systematically evaluate and interpret the collected data. Basic measurements of height and weight of the participants were also measured and documented. The data collected for this study was analyzed using both descriptive and inferential statistical methods; **Frequencies and percentages;** were used to describe the demographic characteristics (age, sex, and ethnicity) of the participants. **Chi-square test;** was used to determine the association between somatotype categories and demographic characteristics (age, sex and ethnicity).

RESULTS

Table 1: Sociodemographic variables of Respondents

n=400

Variable	Frequency	Percent (%)
Age		
18-19	110	25.0
20-21	173	43.2
22-23	101	25.3
24-25	26	6.5
Mean (SD)	20.77(1.73)	
Gender		
Male	119	29.7
Female	281	70.3
Ethnicity		
Igbo	373	93.3
Hausa	3	0.7
Yoruba	9	2.3
Others	15	3.7
Department		
Anatomy	184	46.0
Physiology	27	6.8

Med Lab	27	6.8
Med Rehab	27	6.8
EHS	27	6.8
Nursing	27	6.8
Medicine and Surgery	27	6.8
Radiography	27	6.8
HND	27	6.8
Level		
200	80	20.0
300	80	20.0
400	160	40.0
500	80	20.0
Marital Status		
Single	397	99.2
Married	3	0.8

The socio-demographic characteristics of the respondents showed that most of the subjects were female (70.3%), of Igbo ethnicity(93.3%), aged between 20 and 23 years (68.5%). The respondents were mainly 400level, BSc Anatomy students and majority(99.2%) were single.

Figure 1: Somatotype Variations of Participants n=400

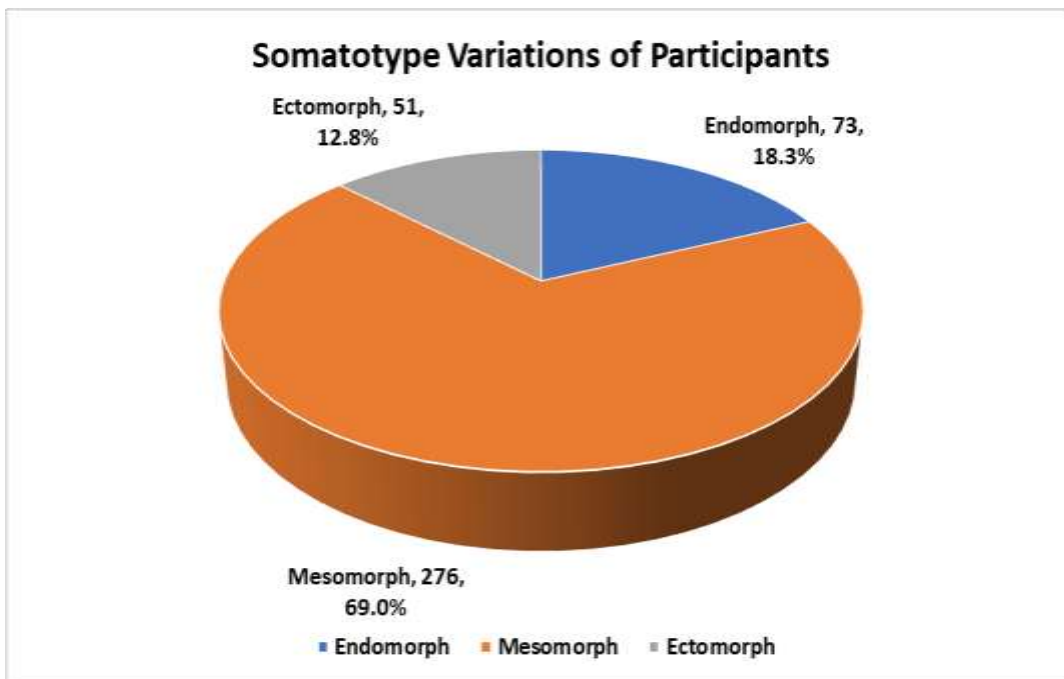


Figure 1; showed that more than half of the subjects(69%) were mesomorphs, while the least somatotype type among the subjects studied was ectomorph (12.8%).

Figure 2: Distribution of Dominant Somatotypes by Gender Among Respondents

n=400

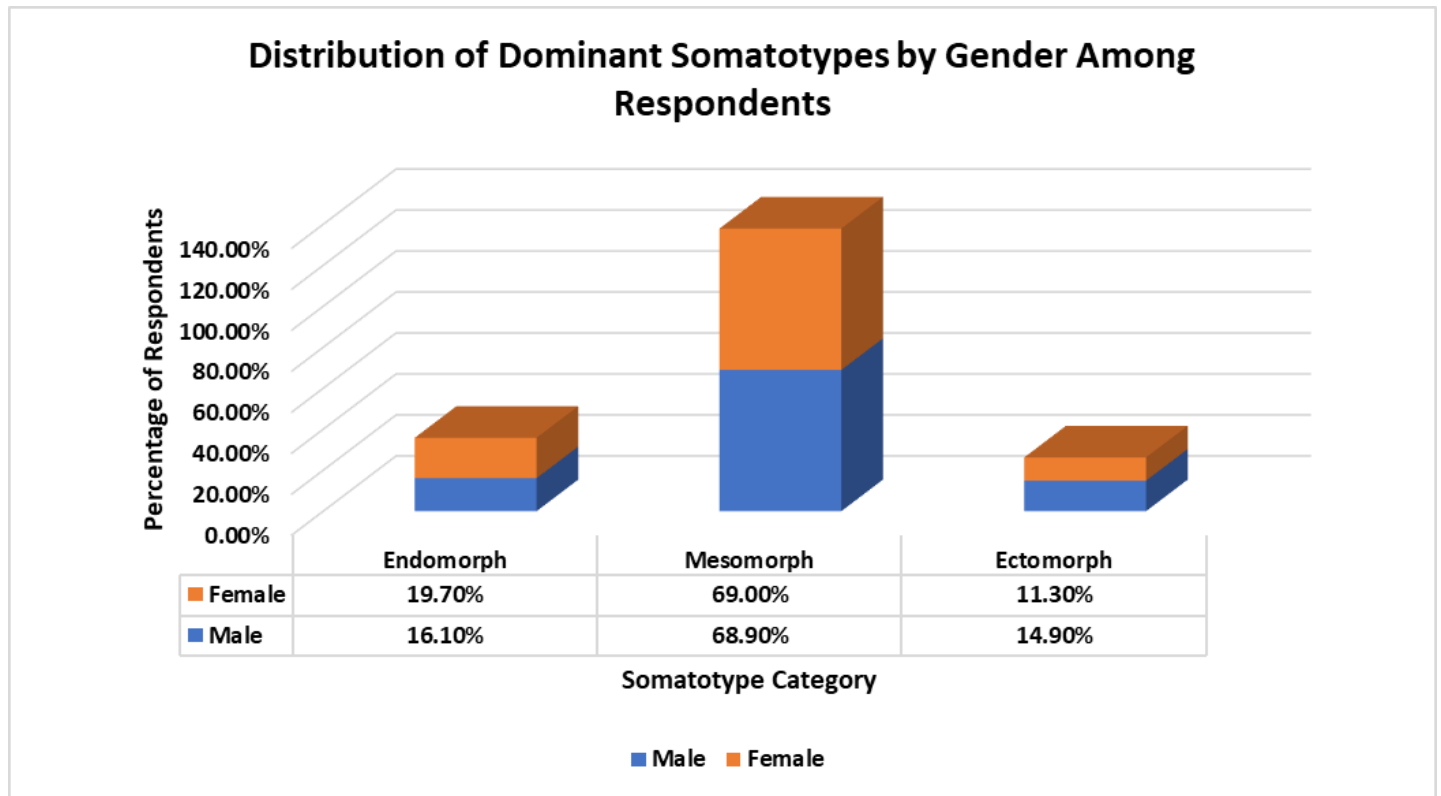


Figure 2 also showed that the dominant somatotypes was Mesomorph; male (68.90%) and female (69.00%)

Table 2: Relationship between Somatotype and Sociodemographic Characteristics

n=400

Variable	Somatotype			X ² value	P value
	Endomorph Freq (%)	Mesomorph Freq (%)	Ectomorph Freq (%)		
Age				10.564	0.103
18-19	18(18.0)	64(64.0)	18(18.0)		
20-21	23(13.3)	129(74.6)	21(12.1)		
22-23	26(25.7)	66(65.3)	9(8.9)		
24-25	6(23.1)	17(65.4)	3(11.5)		
Gender				1.635	0.442
Male	26(16.1)	111(68.9)	24(14.9)		
Female	47(19.7)	165(69.0)	27(11.3)		
Ethnicity				3.577	0.734
Igbo	68(18.2)	259(69.4)	46(12.3)		
Hausa	1(33.3)	2(66.7)	0(0.0)		



Yoruba	2(22.2)	6(66.7)	1(11.1)		
Others	2(13.3)	9(60.0)	4(26.7)		
Department				18.576	0.291
Anatomy	36(19.6)	119(64.7)	29(15.8)		
Physiology	7(25.9)	18(66.7)	2(7.4)		
Med Lab	2(7.4)	19(70.4)	6(22.2)		
Med Rehab	3(11.1)	24(88.9)	0(0.0)		
EHS	7(25.9)	16(59.3)	4(14.8)		
Nursing	4(14.8)	21(77.8)	2(7.4)		
Medicine and Surgery	5(18.5)	18(66.7)	4(14.8)		
Radiography	3(11.1)	21(77.8)	3(11.1)		
HND	6(22.2)	20(74.1)	1(3.7)		
Level				5.447	0.488
200	14(17.5)	52(65.0)	14(17.5)		
300	16(20.0)	59(73.8)	5(6.3)		
400	27(16.9)	110(68.8)	23(14.4)		
500	16(20.0)	55(68.8)	9(11.3)		

There was no noted statistically significant relationship($P < 0.05$), between the somatotype and the sociodemographic characteristics of age, gender, ethnicity, department, or level of study.

Table3: Relationship between Somatotype and Lifestyle/Physical Factors n=400

Variable	Somatotype			X ² value	P value
	Endomorph Freq (%)	Mesomorph Freq (%)	Ectomorph Freq (%)		
How often do you exercise?				8.342	0.214
Never	20(16.7)	91(75.8)	9(7.5)		
1-2 times a week	12(15.0)	52(65.0)	16(20.0)		
3-4 times a week	16(20.0)	53(66.3)	11(13.8)		
Daily	25(20.8)	80(66.7)	15(12.5)		
How long is the exercise duration?				8.342	0.214

<15 minutes	25(20.8)	80(66.7)	15(12.5)		
15-30 minutes	20(16.7)	91(75.8)	9(7.5)		
31-60 minutes	12(15.0)	52(65.0)	16(20.0)		
>60 minutes	16(20.0)	53(66.3)	11(13.8)		
How good is your sleep patterns?				8.550	0.200
Very good	0(0.0)	0(0.0)	0(0.0)		
Good	9(22.5)	30(75.0)	1(2.5)		
Neutral	14(17.5)	55(68.8)	11(13.8)		
Poor	32(20.0)	111(69.4)	17(10.6)		
Very poor	18(15.0)	80(66.7)	22(18.3)		
How do you feel about your body size, shape and appearance?				8.342	0.214
Very satisfied	25(20.8)	80(66.7)	15(12.5)		
Satisfied	20(16.7)	91(75.8)	9(7.5)		
Neutral	12(15.0)	52(65.0)	16(20.0)		
Dissatisfied	16(20.0)	53(66.3)	11(13.8)		
Very dissatisfied	0(0.0)	0(0.0)	0(0.0)		

There was also no noted statistically significant relationship($P<0.05$), between somatotypes and life style or physical factors of exercise, and sleep patterns.

DISCUSSION

There is growing concern around body image dissatisfaction, poor lifestyle behaviors, and irregular dietary patterns among young adults, particularly university students, despite increasing awareness of wellness and fitness globally (Obafemi et al., 2022). Promoting healthy dietary habits, regular physical activity, and positive body image awareness within university settings may help improve students' overall health and psychological well-being. Understanding these variations can inform health and fitness programs and promote better health outcomes among young adults in College of Health Sciences, Nnewi.

The largest group of respondents, 167 (41.75%), were aged 20–21 years, followed by 105 (26.25%) aged 18–19 years, 104 (26.00%) aged 22–23 years, and 24 (6.00%) aged 24–25 years. The mean age was calculated to be 20.71 years. The majority of respondents were female (56.00%), while males accounted for 44.00%. A large portion of the population identified as Igbo (93.75%), reflecting the ethnic distribution of the institutional setting. Findings revealed significant gender-based anthropometric variations. Male respondents had higher mean values in weight (75.50 kg), height (178.21 cm), waist width (80.93 cm), and hip circumference (96.86 cm) compared to females, whose mean values were lower across all indices ($p<0.05$). These differences are consistent with established gender-specific body composition trends reported in previous research (Ekezie et al., 2021).

With regard to body perception, 207 (51.75%) of respondents stated that body fat was the most prominent feature they noticed in the mirror, while 122 (30.50%) noticed muscles, and 71 (17.75%) focused on their bones. About 181 (45.25%) described their body shape as pear-shaped (wider hips than shoulders), while 122 (30.50%) identified as hourglass-shaped and 97 (24.25%) as straight-shaped. These perceptions are consistent with global findings on young adults' self-perceived body types (Martins et al., 2020).

When students were asked about their ability to gain or lose weight, 186 (46.50%) stated they could do both easily, while 113 (28.25%) struggled to gain weight or muscle. Similarly, 222 (55.50%) reported that they gained fat easily when inactive. These results suggest that students are acutely aware of their metabolic responses and associate inactivity with body composition changes, as supported by Onyegbule et al. (2023).

The majority of respondents (47.75%) reported consuming three meals daily, while 51.75% admitted to skipping meals. Breakfast was not consistently consumed; 32.50% took it occasionally, and 15.25% did not eat it at all. Junk or processed food intake was high, with 241 (60.25%) eating such food weekly and 122 (30.50%) daily. Healthy foods and fruits were only consumed daily by 86 (21.50%), while nearly half (46.25%) did so weekly. These dietary patterns align with findings from studies showing irregular and convenience-based eating habits among university students (Aliyu et al., 2022).

In terms of sleep quality, only 19.50% rated their sleep as very good, while 34.50% described it as poor or very poor. Poor sleep patterns have been linked to increased emotional stress and reduced academic performance in students (Nwankwo et al., 2023).

A good portion of respondents (31.00%) engaged in exercise 3–4 times per week, and 21.75% reported daily activity. However, 19.25% never exercised. The duration of physical activity varied, with 33.25% exercising for 31–60 minutes per session, and 24.75% exceeding 60 minutes.

24.50% of respondents were very satisfied with their body, and 23.75% were satisfied. A significant portion (35.25%) were neutral, while 16.50% reported dissatisfaction. This indicates a considerable level of body image concern, even among active individuals. Prior studies have shown that dissatisfaction can persist irrespective of weight status or health behaviors (Okonkwo & Adebayo, 2021).

Regarding media influence, 41.75% of students felt pressured to meet media body standards. Additionally, 23.50% acknowledged that social media and TV influenced their eating patterns. This supports the growing evidence that exposure to idealized images can distort self-perception and promote disordered eating (Adegbite & Lawal, 2022).

Substance use among respondents was low, with 77.50% never consuming alcohol or smoking. This is encouraging and may reflect cultural and institutional norms discouraging such behaviors. Only 13.75% reported monthly consumption, and 1.50% reported daily use.

Lastly, 27.25% of students reported having mixed body types in their family, while 22.25% noted their families were mostly round or full-bodied. A significant number (23.50%) were unsure about their family body trends, suggesting a possible gap in family health communication or awareness.

The majority of respondents, 275 (68.75%), exhibited moderate endomorphy, indicating average levels of body fat. This was followed by 75 (18.75%) with high fatness and 50 (12.50%) with low fatness. In terms of muscularity, the largest group, 170 (42.50%), fell into the high mesomorphy category, closely followed by 160 (40.00%) with moderate muscularity, and 70 (17.50%) with low muscularity. Regarding ectomorphy, 200 (50.00%) of respondents were in the moderate leanness range, 150 (37.50%) in the low leanness range, and 50 (12.50%) were identified as highly ectomorphic. These distributions indicate a population largely balanced between mesomorphic and endomorphic traits, with fewer individuals at the ectomorphic extreme.

Significant sex-based differences in somatotype components were observed. Females had a higher mean endomorphy score (4.30) than males (3.40), suggesting greater fat accumulation in females. Conversely, males had significantly higher mesomorphy (6.00) compared to females (3.60), highlighting greater muscularity.

Females also recorded a higher ectomorphy score (2.90) than males (2.30), indicating relatively leaner frames. These differences were statistically significant ($p < 0.05$).

The gender-based somatotype differences observed in this study align with recent anthropometric research. A large-scale post-pandemic study by Martins and Tavares (2023) found that university-aged females consistently displayed higher endomorphic and ectomorphic profiles compared to males, who scored significantly higher in mesomorphy. Similarly, Obasi et al. (2022) reported that male students in Nigerian tertiary institutions demonstrated stronger mesomorphic characteristics, while females were more endomorphic, reinforcing biological and lifestyle-related distinctions in body composition.

In addition, a regional study by Sharma et al. (2021) on South Asian young adults reported a dominant mesomorphic-ectomorph profile among males and endomorphic-mesomorph among females, consistent with the patterns observed in this sample. These profiles were associated with moderate physical activity levels and standard university diets, further validating the present results.

Moreover, the predominance of moderate somatotype ranges (i.e., moderate fatness, muscularity, and leanness) in this study reflects a general, non-athletic population, which contrasts with the findings from performance-based cohorts. For example, Mielgo-Ayuso et al. (2022) identified a higher prevalence of high mesomorphy and low endomorphy among elite male athletes, while female athletes displayed more balanced meso-ectomorphic profiles. The absence of such extremes in the current study indicates limited exposure to structured athletic training, a finding supported by previous non-athlete university population research (Lima et al., 2021).

RECOMMENDATION

Targeted health promotion campaigns should be implemented within tertiary institutions to educate students on realistic body image expectations, emphasizing self-acceptance and reducing media-induced appearance pressure. These campaigns should address both males and females and promote psychological well-being alongside physical health.

CONCLUSION

There was significant sexual dimorphism in anthropometric parameters, with males showing higher mean values than females across height, weight, waist, and hip circumference. This showed a variation in body types across the genders in the endomorphic, ectomorphic and mesomorphic body types of students.

Conflict of Interest

The authors of this manuscript declare no conflict of interest

Funding

The research work did not receive any external funds nor grants. The research was self sponsored.

ACKNOWLEDGEMENT

Authors acknowledge the Department of Anatomy, Faculty of Basic Medical Sciences Nnewi, for providing some of the equipment and enabling environment for the research work.

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APPENDIX

Table 1: Physical Assessment for Variations in Body Types

n=400

Variable	Freq	Percent (%)
When you look in the mirror, which feature stands out most in your body?		
Body fat	178	44.4
Bones (Collarbone, wrists)	111	27.8
Muscles	111	27.8
How do your shoulders compare to your hips?		
My shoulders and hips are about the same width.	167	41.7
My shoulders are narrower than my hips.	33	8.3
My shoulders are wider than my hips.	200	50.0



Does your body shape look most like any of these?		
A straight shape (like a pencil)	80	20.0
Curvy with a narrow waist (like an hourglass)	160	40.0
Wider hips than shoulders (like a pear)	160	40.0
Wrap your thumb and middle finger around your other wrist. What do you notice?		
There's a gap between them.	1	0.3
They just barely touch.	1	0.3
They overlap easily.	1	0.3
Missing	397	99.1
How does your body usually respond to weight changes?		
I can gain and lose weight easily.	1	0.3
I find it hard to gain weight or muscle.	1	0.3
I gain weight easily and find it hard to lose.	1	0.3
Missing	397	99.1
If you stop exercising for a few months, what usually happens to your body?		
I get softer and and gain fat easily.	140	35.0
I lose muscle and strength quickly.	140	35.0
My body stays mostly the same.	120	30.0
After eating foods like pasta or pizza, how do you feel?		
I feel good, but my belly feels full or tight	160	40.0
I feel normal, no change.	120	30.0
I feel tired or bloated afterward.	120	30.0
How would you describe your body's bone structure?		
Large build	200	50.0
Medium build	120	30.0
Small build	80	20.0

Table 2: Dietary Habits and Sleep Patterns

n=400

Variable	Freq	Percent (%)
How many meals do you eat a day?		



1	80	20.0
2	120	30.0
3	80	20.0
More than 3	40	10.0
How often do you eat breakfasts?		
Very often	40	10.0
Sometimes	120	30.0
Rarely	120	30.0
Not at all	120	30.0
How often do you consume junks or processed foods?		
Daily	40	10.0
Weekly	160	40.0
Monthly	80	20.0
Rarely	40	10.0
Never	80	20.0
How often do you eat healthy foods and fruits?		
Daily	120	30.0
Weekly	120	30.0
Monthly	80	20.0
Rarely	40	10.0
Never	40	10.0
Do you skip meals?		
Yes	200	50.0
No	200	50.0
How good is your sleep patterns?		
Very good	0	0.0
Good	40	10.0

Neutral	80	20.0
Poor	160	40.0
Very poor	120	30.0

Table 3: Physical Activities/Lifestyle and Health Factors and Perceptions n=400

Variable	Freq	Percent (%)
How often do you exercise?		
Never	120	30.0
1-2 times a week	120	30.0
3-4 times a week	80	20.0
Daily	80	20.0
How long is the exercise duration?		
<15 minutes	120	30.0
15-30 minutes	120	30.0
31-60 minutes	80	20.0
>60 minutes	80	20.0
How do you feel about your body size, shape and appearance?		
Very satisfied	120	30.0
Satisfied	120	30.0
Neutral	80	20.0
Dissatisfied	80	20.0
Very dissatisfied	0	0.0
Do you feel pressure to look like certain body types you see in the media?		
Strongly pressured	120	30.0
Somewhat pressured	120	30.0
Not very pressured	80	20.0
Not at all pressured	80	20.0
Has seeing content on social media or TV affected how you eat?		



Strongly agree	120	30.0
Agree	120	30.0
Neutral	80	20.0
Disagree	80	20.0
Strongly disagree	0	0.0
How often do you smoke or drink alcohol?		
Daily	120	30.0
Few times a week	120	30.0
Weekly	80	20.0
Monthly	80	20.0
Never	0	0.0
Do most people in your family have a similar body type?		
Mostly slim	120	30.0
Mostly muscular	120	30.0
Mostly round or full	80	20.0
Mixed body types	80	20.0
I'm not sure	0	0.0

>10.5	108	27.0
Mean (SD)	9.93(1.26)	
BMI		
<18.5	60	15.0
18.5-24.9	270	67.5
25-29.9	70	17.5

Table 4: Somatotype of Participants

n=400

Variable	Freq	Percent (%)
Endomorphy (Relative Fatness)		



Low (0.5-2.4)	0	0.0
Moderate (2.5-5.0)	391	97.8
High (5.1-7.0)	7	1.8
Very high (>7.0)	2	0.4
Mesomorphy (Musculoskeletal Robustness)		
Low (0.5-2.4)	38	9.5
Moderate (2.5-5.0)	141	35.3
High (5.1-7.0)	122	30.4
Very high (>7.0)	99	24.8
Ectomorphy (Linearity)		
Low (0.5-2.4)	173	43.3
Moderate (2.5-5.0)	201	50.2
High (5.1-7.0)	20	5.0
Very high (>7.0)	6	1.5