Section: Physiology

Original Research Article

DECODING BIPE: THE IMPACT OF BODY DIMENSIONS ON BODY IMAGE PERCEPTION ERROR

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ABSTRACT

Background: The perception of body image, particularly among young adults, plays a pivotal role in shaping their life perspectives. The capability to quantify body perception could facilitate the development of interventions aimed at assisting this demographic.

Materials & Methods: An observational cross-sectional study was conducted with 266 volunteers aged 18-25. Participants' height and weight were recorded, and they completed a Google form on their cellphones. The form included the Body Image Assessment Scale–Body Dimensions (BIAS-BD) Scale. Body Surface Area (BSA) and Body Mass Index (BMI) were computed. Participants selected their Perceived, Desired, and Ideal Body Images from the BIAS-BD Scale's contour drawings. The Actual Body Image (ABI) was determined by correlating the participant's BMI to the BIAS-BD scale. A novel metric, Body Image Perception Error (BIPE), was calculated as the difference between Perceived and Actual Body Images, indicating underestimation, correct estimation, or overestimation of body image. Data were analyzed using Excel and DATA Tab software.

Results: Body images can be underestimated, accurately estimated, or overestimated. The Body Image Perception Error (BIPE), the difference between Perceived and Actual Body Images, helps identify factors contributing to these perceptual errors. As BMI and weight decrease, BIPE transitions from underestimation to accurate estimation to overestimation, suggesting thinner individuals overestimate their weight, while heavier ones underestimate it. The Actual Body Image (ABI) correlates with this finding. As BIPE transitions from underestimation to overestimation, the sizes of perceived, desired, and ideal body images increase, indicating that perception errors influence desired and ideal body images. As height increases in males, BIPE transitions from underestimation to overestimation, suggesting taller males perceive themselves to be larger than they are.

Conclusion: BIPE can be used to identify body image disorders, formulate public health interventions, and guide educational programs on body image.

Keywords: BIPE, BIAS-BD, Body Image Perception.

INTRODUCTION

Body image is a concept that encompasses one's beliefs, feelings, and actions regarding their physical appearance, size, and shape. It involves how one perceives themselves and their thoughts and emotions about their body.[1] "Body image," which is our mental depiction of our physical form, is shaped

by a variety of influences. It's associated with eating disorders and body dysmorphic disorder because of distorted perceptions.[2] Both men and women can experience body dissatisfaction and disturbances in body image which are linked to numerous mental health conditions.[3] Typically, men are concerned about their weight, while women often focus on their thinness.[4] Individuals with higher body image dissatisfaction often exhibit lower self-esteem, a correlation that is particularly pronounced among females.[5] When the perceived and ideal body images were compared on the contour drawing rating scale, it was observed that women were more dissatisfied than men and showed a preference for leaner figures.[6]

Quantifying Body image helps in assessing factors that may play a role in altering body perception. The Body Image Assessment Scale - Body Dimensions (BIAS-BD),[7] scale has been used in various studies to assess the perception of body image. One of the studies discusses about the influence of media messages that have been internalized, promoting ideal body shapes and lifestyles, on the connections between physical exercise, self-esteem, perceptions of one's physical self, and satisfaction with one's body image.[8] The scale has shown strong reliability and validity in its evaluations. The values for test-retest reliability were determined to be 0.86 for the actual perceived size, 0.72 for the ideal size, and 0.76 for body dissatisfaction. These figures suggest a significant degree of consistency in the scale's measurements over repeated tests. The concurrent validity, which is the agreement between the perceived size and the reported size, was found to be 0.761. This suggests a robust correlation between the measurements of the scale and the actual size of the body.[7]

Most of the studies regarding body image assessment have been in either school-going or adolescent age groups,[9,10,4,11] This study aimed to assess body image perception among the age group of 18 years to 25 years.

MATERIAL AND METHODS

After obtaining ethical clearance from the Organizational Ethics Committee, this observational and cross-sectional study was conducted at a medical college where students volunteered as subjects. Subjects were selected based on inclusion criteria, which included being in the age group of 18 to 25 years, having the ability to understand English, and being able to respond to queries in a Google form. Exclusion criteria included any subject unwilling to sign the consent form or complete the questionnaire. A convenient sample of 266 subjects was taken, consisting of 110 males and 156 females.

The height and weight of the subjects were recorded using a stadiometer with an attached weighing scale. The subjects then accessed and completed a Google form via their cell phones. Body Mass Index (BMI) was calculated using the formula, weight in kg / (height in meters)2 and Body Surface Area (BSA) was calculated using the Du Bois formula. The Google form contained the Body Image Assessment Scale–Body Dimensions (BIAS-BD) Scale.[7]

The Body Image Assessment Scale–Body Dimensions (BIAS-BD) Scale,[7] comprises contour drawings, 17 for each gender. These contours vary in BMI by 5% increments, ranging from 60% to 140% of the ideal BMI, with contour 9 representing the ideal BMI. For males, the ideal BMI, 60%, and 140% correspond to 27.8, 16.68, and 38.92 respectively. Similarly, for females, the ideal BMI, of 60%, and 140% are 28.2, 16.92, and 39.48 respectively.

In the Google Form, participants were presented with the appropriate set of contour drawings based on their gender. They were then prompted to select their Perceived Body Image (PBI), Desired Body Image (DBI), and Ideal Body Image (IBI).

The responses of the Google forms were collected in the Google Sheet. Subsequently, the data was analyzed using EXCEL and DATAtab software. Initially, the collected data was segregated into two tabs in an Excel sheet, one for males and the other for females. The Actual Body Image (ABI) was calculated by correlating the subject's BMI to the contour drawings of the BIAS-BD scale.

A novel entity called Body Image Perception Error (BIPE) was calculated, representing the difference between PBI and ABI (BIPE=PBI-ABI). BIPE reflects the error in perception of one's body image. BIPE could be negative, indicating an underestimation of body image; zero, indicating a correct estimation of body image; or positive, indicating an overestimation of body image.

As the value of BIPE (PBI-ABI) changes from negative to zero to positive, the perception error transitions from underestimation to correct estimation to overestimation.

RESULTS

The following charts indicate the relationship BIPE and different body images, BMI and body weight.

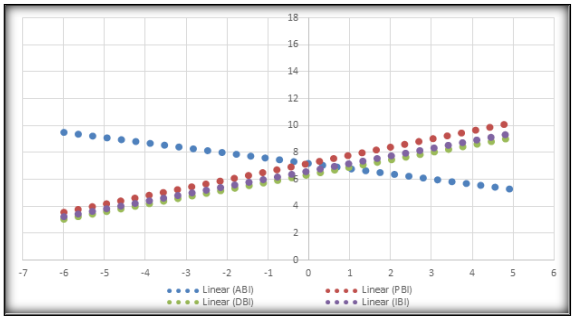

Figure 1: BIPE vs ABI, PBI, DBI & IBI in males

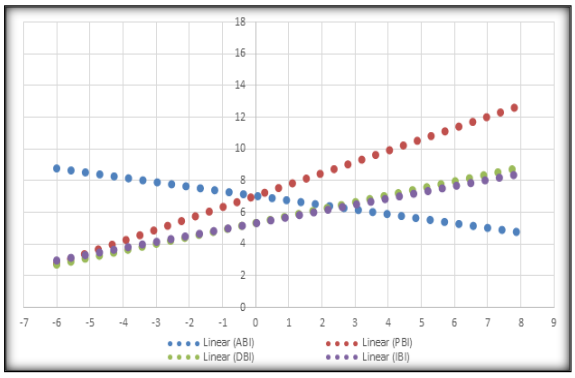

Figure 2: BIPE vs ABI, PBI, DBI & IBI in females

As seen from Graph 1 and Graph 2, in both genders, with BIPE on the x-axis, the trendline of ABI indicates an inverse correlation, while the trendlines of PBI, DBI, and IBI indicate a direct correlation.

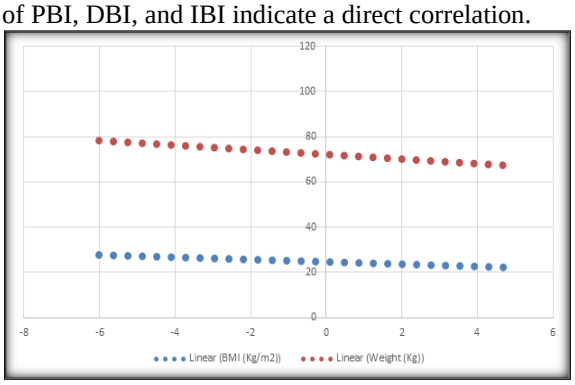

Figure 3: BIPE vs BMI and Weight in males

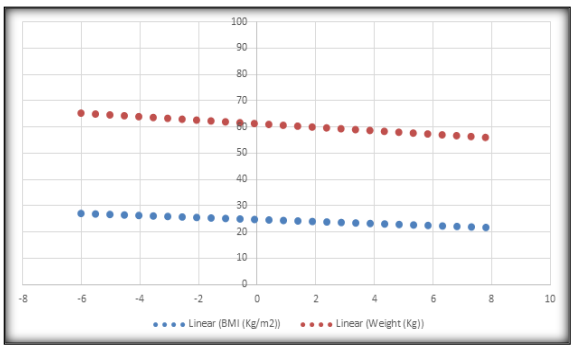

Figure 4: BIPE vs BMI and Weight in females

As seen from Graph 3 and Graph 4, in both genders, with BIPE on the x-axis, the trendlines of both BMI and weight indicate inverse correlations.

The demographic data, anthropometric data, and various chosen body images of the subjects are all mentioned in. [Table 1]

In males the body images are such that, PBI>ABI>DBI>IBI and in females it is PBI>ABI>IBI>DBI.

Table 1: Demographic, Anthropometric data and various body images

Parameter	Males (n=110)		Females (n=155)	
	Average	Standard Deviation	Average	Standard Deviation
Age (yrs)	20.9	1.25	20.58	1.17
Height (m)	1.71	0.06	1.57	0.07
Weight (kg)	72.2	13.38	60.65	11.38
BMI (kg/m^2)	24.57	4.48	24.49	4.51
BSA (m^2)	1.84	0.16	1.6	0.15
Actual Body Image(ABI)	7.16	3.18	6.83	3.17
Perceived Body Image(PBI)	7.23	3.41	7.58	3.63
Desired Body Image(DBI)	6.38	2.62	5.68	2.43
Ideal Body Image(IBI)	6.65	2.85	5.62	2.42

A simple linear regression analysis was conducted to examine the correlation between BIPE and the following parameters: height, weight, BMI, BSA, ABI, PBI, DBI, and IBI. These relationships have been indicated in the charts presented previously. All p-values less than 0.05 were considered significant. In the following tables, Pearson's correlation coefficient (r) is mentioned where significant p-values were achieved. [Table 2]

Table 2: Correlation of body image perception error (BIPE) with other parameters in both genders

Parameter	Pearson Coefficient (r) & p values	Body Image Perception Error (BIPE)	
		Males	Females
Height (m)	r	0.23	
	p value	0.017	
Weight (Kg)	r	-0.2	-0.16
	p value	0.036	0.044
BMI (kg/m^2)	r	-0.29	-0.23
	p value	0.002	0.003
BSA (m^2)	r		
	p value		
Actual Body Image (ABI)	r	-0.32	-0.25
	p value	0.001	0.002
Perceived Body Image (PBI)	r	0.46	0.53
	p value	0.0001	0.0001
Desirable Body Image (DBI)	r	0.54	0.49
	p value	0.0001	0.0001
Ideal Body Image (IBI)	r	0.51	0.44
	p value	0.0001	0.0001

* 'p' value < 0.05 is considered significant.
** Negative correlations are mentioned as negative 'r' and the values have been underlined.
*** Blank spaces indicate no significant correlation.

From the table given above, in males, height has a positive correlation with BIPE, while Body Surface Area (BSA) shows no significant correlation with BIPE in either gender.

DISCUSSION

The perception of body image is influenced by a variety of interconnected factors, resulting in a complex scenario. Our research reveals that body image can be either underestimated, accurately estimated, or overestimated. The Body Image Perception Error (BIPE), defined as the disparity between Perceived Body Image (PBI) and Actual Body Image (ABI), facilitates the identification of factors contributing to these perceptual errors.

A negative BIPE value, indicative of underestimation, arises when individuals perceive their body size to be smaller than it is. For instance, an individual with a healthy weight may perceive themselves as underweight. A zero BIPE value, signifying accurate estimation, occurs when individuals precisely perceive their body size, aligning with their actual body size. A positive BIPE value, representing overestimation, occurs when individuals perceive their body size to be larger than it is. For example, an individual with a healthy weight might regard themselves as overweight.

In both genders, as BMI and weight decrease, BIPE transitions from underestimation to accurate estimation to overestimation. This implies that thinner individuals tend to overestimate their weight, while heavier individuals tend to underestimate it. Bibiloni et al,[12] in their study deduced that, adults classified as overweight were prone to underestimating their body weight, yet they exhibited significant concerns regarding weight gain and were more inclined to report current engagement in dieting compared to individuals with lower body weight.

Kim et al,[10] have suggested that in schools with a higher average BMI, students were more likely to underestimate their weight status and less likely to overestimate it. Martynov et al,[13] in their study concluded that There's a contraction bias towards a reference value, leading to overestimation of weight for light people and height for short people, and underestimation for heavy and tall people which concurs with the finding of the present study.

This finding is substantiated by the actual body image(ABI) which is calculated from the BMIs attributed to each of the contour drawings on the BIAS-BD scale.[7] The ABI also indicates that thinner people overestimate, and heavier ones underestimate their weight.

As BIPE transitions from underestimation to overestimation, the sizes of perceived, desired, and ideal body images increase. This suggests that errors in body image perception also influence desired and ideal body images.

An intriguing observation regarding BIPE in males is that as height increases, BIPE transitions from underestimation to overestimation. This suggests that as height increases, the male perceives himself to be bigger in size than he really is. Rahman et al,[14] postulated that height is less significant in male body perceptions, with older participants being more concerned about stature. "Heightism" prejudice towards shorter men persists, implying that height is a factor in body perception.

CONCLUSION

The concept of BIPE can be used as a diagnostic tool in clinical settings to identify individuals with body image disorders, such as anorexia nervosa and body dysmorphic disorder. The inverse relationship between BMI and BIPE suggests that public health interventions need to be tailored to address the specific body image misconceptions prevalent among different weight categories. The influence of BIPE on desired and ideal body images underscores the need for interventions that promote a healthy body image and counter unrealistic body ideals propagated by media and societal norms. The research also has implications for educational settings. Schools and universities could incorporate education about body image, BIPE, and the factors influencing it into their health and wellness programs to promote a healthy body image among students.

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