MedCrave
Step into the World of Research
Advances in Obesity Weight Management & Control

Mini Review

Open Access
CrossMark

The use of a 3D avatar to determine the association between actual and perceived body mass index

Abstract

Introduction: Literature surrounding body image, body composition and Body Mass Index (BMI) have shown that when participant use visual impressions, they can often lead to a false sense of weight status. Therefore, the main objectives of this investigation was to determine participants BMI and to establish the correlation between actual and perceived BMI.

Method: *n*=32 female participants ($\bar{x}\pm s$; body mass=70.1±13.6 kg, stretched stature=172.4±8.1 cm) were recruited. A computer generated (Unity Player) 3D Avatar rotated 360^0 and permitted a visual slide from an underweight to average to obese continuum. Stretched stature (m) and body mass (kg) was taken and values used to calculate BMI (kg/m^2). *P* value was set at (*P*<0.001) and a Paired *t*-Test was used to test for the difference and Pearson's Correlation Coefficient was used to test for the strength of the association between the actual and perceived BMI.

Results: Perceived BMI ranged from 16.5 – 32.5 ($\bar{x}$ 23.5±4.1), whereas the actual BMI ranged from 17.7 – 31.3 ($\bar{x}$ 24.3±3.7). A Paired *t*-test and Pearson's Correlation Coefficient found values ranged from -5.3 and 8.6 ($\bar{x}$ - 0.2±2.5) and a value of *t*=0.81 and r=0.68 suggesting a significant difference between actual and perceived BMI (P<0.001).

Discussion: This investigation reports that perceived BMI was higher than the participants actual BMI and that the use of visual impressions led to a false sense of weight status.

Recommendations: Further research is necessary to investigate the reasons behind these perceived versus actual differences and the creation of a 3D Avatar for male participants and younger populations would be beneficial.

Keywords: body mass index, 3D avatar, perceptions, weight status

Volume 10 Issue 1 - 2020

Claire Mills, Kate Cooling
School of Sport and Exercise, University of Gloucestershire, UK

Correspondence: Claire Mills, School of Sport and Exercise, University of Gloucestershire, Oxstalls Campus, Gloucester, GL2 9HW, UK, Tel +44 (0)1242 715156, Fax +44 (0)1242 715222, Email clairem@glos.ac.uk

Received: January 03, 2020 | **Published:** January 23, 2020

Abbreviations: BMI, body mass index; PBI, perceived body image

Introduction

Literature surrounding body image, body composition and Body Mass Index (BMI) have shown that there is a significant under-diagnosis for adults being overweight.[1,2] For instance, a study by Madrigal H, et al.,[3] incorporated both perceived body image (PBI) and measured BMI and reported that there has been an underestimation of BMI through PBI, thus demonstrating that when participant use visual impressions, they can often lead to a false sense of weight status.[4] This highlights the need for an improvement in the diagnosis of overweightness.[5,6] Therefore, the main objectives of this investigation was to determine participants BMI, investigate participants perceived BMI and finally to establish the correlation between actual and perceived. BMI.

Method

Research involved *n*=32 female participants ($\bar{x}\pm s$; body mass=70.1±13.6 kg, stretched stature=172.4±8.1cm) were recruited from the same University. Participants were all over 18, and were selected through a non-probability sampling method using the convenient sampling technique. Informed consent was given and they were aware of their right to withdraw. A quantitative research design was adopted alongside the use of a computer generated 'Avatar'. The Avatar contained a 3D image of a woman that rotated 360^o and could visually slide from an underweight to average to obese continuum (Figure 1). The software had two preselected settings to note, (i) 'research' which allowed participants to plot where they perceive themselves, using a scale (1-10), and (ii) 'education' which split the scale into pre-calculated BMI divisions. For this investigation it was necessary that the participants used to 'research' setting so they were not aware of the BMI scale.

Figure 1 3D Avatar illustrating the underweight-average-obese continuum (anterior).

After the participants have plotted themselves (using scale of 1-10), the researcher noted the value, then switched to the 'education' setting to establish actual BMI. Finally the researcher gathered the participants stretched stature (m) and body mass (kg) using

International Society for the Advancement of Kinanthropometry[7] conventions and then calculated BMI using the formula (BMI=kg/m^2).[8] Once all the data had been collected, the results were converted into a Microsoft Excel Spreadsheet, to allow for descriptive statistical analysis. *P* value was set at (*P*<0.001) and was used to establish the association between the actual and perceived BMI. Paired *t*-test was used to test for the difference and Pearson's Correlation Coefficient was used to test for the strength of the association between the actual and perceived BMI.

Results

Results indicated that perceived BMI ranged from 16.5 –32.5 with an average of 16.5 (±4.1), whereas the actual BMI ranged from 17.7–31.3 with an average of 24.3 (±3.7). *P* value was set at (*P*<0.001) and found that a significance difference exists between the actual and perceived BMI (P< 0.003) (Figure 2).

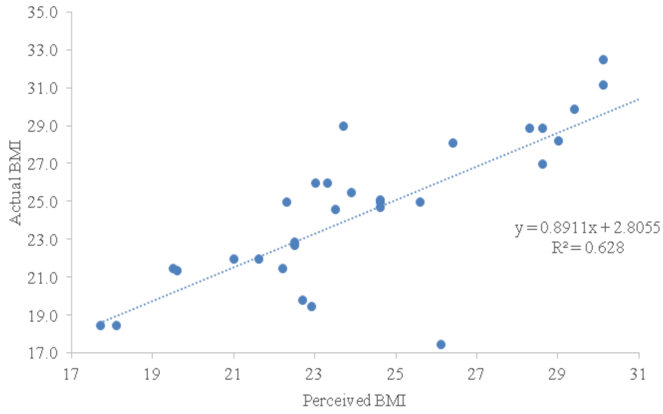

Figure 2 Perceived BMI versus Actual BMI.

A Paired *t*-test and Pearson's Correlation Coefficient was used to test for the difference between the actual and perceived BMI and the strength of the association between the actual and perceived BMI respectively and indicated a value of t=0.81 and r=0.68 suggesting a significant difference. The differences between the actual and perceived BMI values ranged from -5.3 and 8.6 with an average of -0.2 (±2.5).

Discussion

This investigation had found that it contradicts findings from Madrigal et al.,[3] where there was often an underestimation of perceived BMI within females, whereas it is in agreement with research conducted by Caccamese et al.,[4] who also discovered that the use of visual impressions often led to a false sense of weight status. These results suggest that perceived BMI was higher than the participants actual BMI, however, further research is necessary to investigate the reasons behind these perceived versus actual differences.

Acknowledgements

None.

Conflicts of interest

Author declares there is no Conflict of interests.

Funding

None.

References

1. Mills CD, Cooling K. *Self-Perceived versus actual Body Mass Index using a 3D Avatar*. In: Circle Conference: 16th International Conference for Consumer Behaviour and Retailing Research, 25-26 April, University of Gloucestershire. 2019. 43 p.
2. Lemay C, Cashman S, Savageau J, et al. Underdiagnosis of Obesity at a Community Health Center. *American Board of Family Practice.* 2003;16(1):14–21.
3. Madrigal H, Sánchez-Villegas A, Martínez-González M, et al. Underestimation of body mass index through perceived body image as compared to self-reported body mass index in the European Union. *Public Health*. 2000;114(6):468–473.
4. Caccamese SM, Kolodner K, Wright SM. Comparing patient and physician perception of weight status with body mass index. *The American Journal of Medicine.* 2002;112(8):662–666.
5. Kuczmarski R, Kuczmarski M, Roche A. 2000 CDC Growth Charts. *Topics in Clinical Nutrition*. 2002;17(2):15–26.
6. Perrin E, Flower K, Ammerman A. Body mass index charts: Useful yet underused. *The Journal Of Pediatrics*. 2004;144(4):455–460.
7. ISAK (International Society for the Advancement of Kinanthropometry). International Standards for Anthropometric Assessment. Sydney: National Library of Australia; 2001.
8. National Health Service. BMI Healthy Weight Calculator. 2019.