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RESEARCH

# Who knows what 'healthy weight' looks like?

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**SUMMARY**
This study aimed to explore whether the general population is able to identify a healthy body mass index (BMI) and accurately perceive their own BMI using a visual scale. The results showed that overweight participants were significantly less likely to correctly identify their own BMI (38.9 per cent, $p<0.001$), compared to obese (88 per cent), or healthy weight (73 per cent) participants. Overweight participants were also most likely to incorrectly think that they are a healthy size (66.7 per cent, $p<0.001$) compared to 11.7 per cent of obese participants. The study results suggest that people who are overweight may require assistance to identify that they are overweight in order to begin to address the associated health issues.

**Key Words**
Overweight; obesity; self-perception; body mass index

## ABSTRACT

### Background

Obesity is a global epidemic. The World Health Organization (WHO) reports that worldwide obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults were overweight and had corresponding increases in well-recognised, associated chronic diseases.

### Aims

This study aimed to explore whether the general population is able to identify a healthy BMI and accurately perceive their own BMI using a visual scale.

### Method

A cross-sectional, population-based survey of 103 participants were shown a visual scale of computer-generated images representing different BMIs and asked to identify: (1) which images represented a healthy body weight; (2) which image best represented their body; and (3) whether they thought they were a healthy or unhealthy body size.

### Conclusion

Overweight participants were significantly less likely to correctly identify their own BMI on a visual scale (38.9 per cent, $p<0.001$), compared to participants who were obese (88 per cent) or healthy weight (73 per cent). This research suggests that people who are overweight may require assistance to identify that they are overweight, in order to begin to address the associated health issues.

## BACKGROUND

Obesity is a global epidemic. The World Health Organization (WHO) reports that worldwide obesity has nearly tripled since 1975; in 2016, more than 1.9 billion adults were overweight, and of these over 650 million were obese.[1] Excess body weight is a well-known risk factor associated with numerous chronic diseases and some malignancies.[2,3]

A recent study of over 19 million participants from 200 countries reported a mean BMI increase from 21.7 to 24.2 in men, and 22.1 to 24.4 in women over the span of years from 1975 to 2014.[4] This worldwide trend is also noticeable in the Australian population where the average BMI of the Australian population has steadily increased over the past 20 years.[5]

With an increasing prevalence of obesity, increased body size is now becoming proportionally 'normal'. Recent studies have shown there is a generational shift in body weight norms[6] with people trending towards a misperception that they are of a healthy weight, when in fact they are overweight. This finding was supported in an American study investigating size misperception among overweight and obese families, determining that 71 per cent of obese adults underestimated their size, compared with 8.6 per cent of healthy-weight adults.[7] Overweight children are also less likely to perceive themselves as overweight if they are exposed to overweight people in their immediate environment.[8]
Misperception of body size and the prevalence of overweight and obese members of the community impacts the public health approach to this global epidemic. A large European youth study demonstrated that there is a significant negative relationship between physical activity participation and BMI classification, which suggests that without intervention, overweight people are more likely to be sedentary by nature.[9] If overweight people do not identify themselves as being overweight, they are unlikely to intentionally participate in weight-reduction activities.

Recent Australian data suggest that one in four patients fail to recognise themselves as overweight, with general practitioners also underestimating the BMI of overweight patients in more than 35 per cent of cases.[10] While BMI is easy to calculate and obesity is easy to detect clinically, there appears to be significant barriers in the self-perception of being overweight and a lack of understanding of the associated health implications.

In this study we explored whether people are able to identify a healthy BMI and accurately identify their BMI from avatar depictions of different BMIs. We also investigated whether being overweight (25<BMI<30) or obese (BMI≥30) impacted participants' ability to identify whether or not they are a healthy body weight.

## METHOD

A cross-sectional survey with a convenience sample was conducted. Shoppers at a shopping mall in Western Melbourne, Victoria, were recruited by medical students manning a stand over a weekend in 2016. We anticipated that only 50 per cent of the participants would accurately identify their BMI from the avatars. Therefore, 100 participants were required to achieve 95 per cent confidence intervals to identify this proportion within a 10 per cent margin of error. Participants viewed avatars representing BMIs[11] ranging from 18–39 kg/m$^2$ and were invited to identify:

1. Which avatar best represented their body weight;
2. Which images represented the range of healthy body weight; and
3. Whether they considered their own weight to be healthy or unhealthy.

The researchers then measured each participant's height and weight and calculated the BMI for each. Demographic data were collected, including age, gender, education, and employment.

Ethics approval for this project was obtained from the University of Notre Dame Human Research and Ethics Committee (approval number 0150122S).

## RESULTS

The demography of the participants is presented in Table 1. Participants were considered broadly representative in age and gender to the local population.[5,12] Of the 103 participants, overweight participants were significantly less likely to correctly identify their own BMI on a visual scale (39 per cent, $p<0.001$) compared to participants who were obese (88 per cent) or "normal" weight (BMI $\leq$ 25) (73 per cent) (Table 2). There were no differences for age or gender.

**Table 1: Participants' demographic data**

| Characteristic | Participants |
|---|---|
| **Age** | |
| 18–30 | 28 (37%) |
| 31–40 | 34 (32%) |
| 41–50 | 14 (14%) |
| 51–65 | 18 (17%) |
| 65+ | 9 (8%) |
| **Gender** | |
| Female | 47 (46%) |
| Male | 56 (54%) |

**Table 2: Comparison of participants' visual perception of their own BMI with actual BMI measurements**

| Perceived BMI | Measured BMI | | | | |
|---|---|---|---|---|---|
| | Underweight | Normal Weight | Overweight | Obese | Total |
| Underweight | **1** | 3 | 0 | 0 | 4 |
| Normal | 0 | **36** | 12 | 0 | 48 |
| Overweight | 0 | 6 | **14** | 2 | 22 |
| Obese | 0 | 4 | 10 | **15** | 29 |
| Total | 1 | 49 | 36 | 17 | 103 |
| Fisher's exact | | | | | <0.001 |

*Numbers of participants correctly identifying a visual representation of their own BMI are in bold. Statistical significance was determined using Fisher's exact test.*

Overweight participants were also most likely to incorrectly identify themselves as a healthy weight (67 per cent, $p<0.001$), compared to 12 per cent of obese participants (Table 3). The majority (89 per cent) of normal weight participants accurately identified themselves as being a healthy weight.

**Table 3: Numbers of participants able to identify whether their perceived BMI is in the healthy weight range**

| Participants who think their size is: | Measured BMI | | | | |
|---|---|---|---|---|---|
| | Underweight | Normal Weight | Overweight | Obese | Total |
| Too small | **0** | 1 | 0 | 0 | 1 |
| Healthy | 1 | **44** | 24 | 2 | 71 |
| Too big | 0 | 4 | **12** | **15** | 31 |
| Total | 1 | 49 | 36 | 17 | 103 |
| Fisher's exact | | | | | <0.001 |

*Numbers of participants who were able to correctly identify that their BMI as underweight, healthy weight, overweight, or obese are in bold. Statistical significance was determined using Fisher's exact test.*

## DISCUSSION

The findings of this study suggest that respondents have a limited capacity to recognise themselves as overweight compared to those who are obese. The existing literature supports the hypothesis that people regard being overweight as the "new normal".[6,7] Our findings broadly concur with these findings. A similar Australian study[13] showed both healthy weight and overweight men were unable to correctly identify an overweight male body when shown virtual body images. A study on Australian adolescents[14] found that overweight adolescents were more likely to have inaccurate perceptions of their body weight, compared to normal-weight and obese adolescents.

Our data similarly suggest that the overweight population is more likely to have misperceptions about body size, being less likely to correctly visually identify their own BMI, and to believe they are of a healthy body size.

## CONCLUSION

This study suggests that the sample population was, in general, unable to recognise what overweight looks like, and the participants were unable to identify if they were overweight. Moreover, the study results suggest the overweight population is more likely to have misperceptions about body size, being less likely to correctly identify their own BMI visually, and to mistakenly consider themselves a healthy body size.

This has ramifications for both self-identifying overweight status and for goal setting. Our findings suggest patients need assistance to recognise when their weight places them at risk of morbidity. These risks need to be identified in order to make the necessary dietary and exercise changes to get them on track to a healthier lifestyle and improved health outcomes.

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## PEER REVIEW

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## CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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## ETHICS COMMITTEE APPROVAL

Reference Number: 015122S

This cross-sectional survey was conducted in an ethical and responsible manner with ethics approval from The University of Notre Dame and follows the principles of the Declaration of Helsinki.