

Assessing explicit weight bias among Australian healthcare students: Suitability of the Beliefs About Obese Persons Scale (BAOP) and the Antifat Attitudes Questionnaire (AFA)

Ravisha S. Jayawickrama^{1*}, Briony Hill^{2,1}, Moira O'Connor¹, Stuart W. Flint^{3,4}, Erik Hemmingsson,⁵
& Blake J. Lawrence^{1,6}

¹ School of Population Health, Curtin University, Western Australia, Australia

² Health and Social Care Unit, School of Public Health and Preventative Medicine, Monash University, Victoria, Australia

³ School of Psychology, University of Leeds, Yorkshire, United Kingdom

⁴ Scaled Insights, Nexus, University of Leeds, Yorkshire, United Kingdom

⁵ Swedish School of Sport and Health Sciences, Stockholm, Sweden

⁶ Enable Institute for Health Research, Curtin University, WA, Australia

***Corresponding author:** Ravisha S. Jayawickrama, School of Population Health, Curtin University, Kent Street, Bentley, WA 6102, Australia. Telephone: +61 413 384 257 Email: ravisha.jayawickrama@postgrad.curtin.edu.au

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Positionality Statement

We are mindful that our identities can influence our approach to research conduct. We wish to provide the reader with information about our backgrounds. With respect to gender, when the manuscript was drafted, three authors self-identified as women, and three authors as men. With respect to ethnicity, one author self-identified as Southeast Asian, three as Australian, and two as European.

Declaration of interests

SWF reports research grants and support for attending meetings from UK National Institute for Health Research, Public Health England, UK Office of Health Improvement & Disparities, UK Doncaster Council, West Yorkshire Combined Authority, Novo Nordisk, Johnson & Johnson, University of Leeds UK, the UK Royal College of General Practitioners, UK Parliament, UK Safefood, and Diabetes Ireland Congress and Exhibition, as well as an unpaid leadership role at Obesity UK. EH reports receiving royalty fees for a book published on the topic of weight stigma. All declared interests relate outside the submitted manuscript. RSJ, BH, MO, and BJL declare no competing interests.

CRediT Statement

Ravisha S. Jayawickrama: Conceptualization, methodology, formal analysis, investigation, data curation, writing – original draft, review & editing, visualization, project administration. **Briony Hill:** writing – review & editing, supervision. **Moira O'Connor:** conceptualization, writing – review & editing, supervision. **Stuart W. Flint:** writing – review & editing. **Erik Hemmingsson:** writing –

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Data Availability: de-identified participant data will be made available upon request to author RSJ for non-commercial purposes to individuals associated with academic or public research and health institutions.

Abstract

Background The aim of this study was to examine the suitability of the Beliefs About Obese Persons Scale (BAOP) and Antifat Attitudes Questionnaire (AFA) among Australian healthcare students. Specifically, we explored the factor structures of the two scales, their psychometric properties including internal consistency and convergent validity, and whether they were impacted by social desirability bias.

Methods Students studying healthcare courses at Australian universities ($N = 900$) responded to an online survey and completed the BAOP, AFA, 13-item Short Form Marlowe-Crowne Social Desirability Scale (MCSDS), Empathy for Obese Patients, and Confidence in Clinical Interaction with Obese Patients scales. Confirmatory factor analyses (CFAs), Pearson's correlations, and linear regressions were conducted to examine the factor structures of the BAOP and AFA, examine their convergent validity, and whether scores on these scales were associated with socially desirable responding.

Results Confirmatory Factor Analyses confirmed the originally proposed factor structures of the BAOP (1 factor) and AFA (3 factors) and supported a relatively good model fit. Support for convergent validity of the two measures was shown when correlated with each other and the Empathy for Obese Patients and Confidence in Clinical Interaction with Obese Patients scales. The BAOP was not associated with socially desirable responding ($p > 0.5$). In contrast, all subscales of the AFA were associated with socially desirable responding ($p < 0.5$); as AFA scores increased, participants were less likely to respond in a socially desirable manner.

Conclusion The BAOP and AFA are considerably suitable measures to assess explicit weight bias among Australian healthcare students.

Keywords: Explicit Weight Bias, BAOP, AFA, Measures of Weight Bias, Healthcare Students

Clinical Impact Statement

Our findings indicate that the Beliefs About Obese Persons Scale (BAOP) and Antifat Attitudes Questionnaire (AFA) are considerably suitable measures to assess explicit weight bias among Australian healthcare students. Our findings support the continued assessment of explicit weight bias among healthcare students in order to quantify this construct within this population. Quantifying the extent to which explicit weight bias is present among healthcare students may assist in the development of novel weight bias reduction interventions to reduce students' exhibited weight bias, with the goal of enabling future healthcare professionals to provide equitable treatment to people living with overweight or obesity.

Introduction

The prevalence of overweight and obesity is projected to rise, with 23% of the global and 35% of the Australian adult population to be living with obesity by 2025 (Hays et al., 2017; World Obesity Federation, 2022). An implication of this increase in prevalence is that most patients of future healthcare professionals will be living with overweight or obesity. University students studying healthcare courses represent the next generation of healthcare professionals, with research reporting that healthcare students and trainees exhibit weight biased attitudes and beliefs (Alberga et al., 2016; Robinson et al., 2014). Weight bias is defined as holding negative beliefs, attitudes, judgements and assumptions about people living with overweight or obesity (Washington, 2011). Weight-biased beliefs and attitudes can be explicit (overt and controllable) or implicit (covert and consciously uncontrollable) (Alberga et al., 2016; Phelan et al., 2015) and often develop from misconceptions and stereotypes that people with excess adiposity are disgusting, worthless, lazy, and lacking in self-discipline (Puhl & Heuer, 2010; Vartanian et al., 2013).

Both explicit and implicit weight biases are exhibited by healthcare students across a variety of disciplines including medical, psychology, dietetic, nursing, public health, and marriage and family therapy (Blanton et al., 2016; George et al., 2019; Phelan et al., 2021; Waller et al., 2012). Similarly, physician associate, clinical psychology, and psychiatric residency students were demonstrated to report feelings of frustration and pessimism when treating patients living with obesity (Puhl et al., 2014). Experiencing weight bias in a clinical setting reduces an individual's willingness to participate in the healthcare system, whereby they delay or avoid care, cancel appointments, and engage in 'doctor shopping', which are associated with worse health outcomes and quality of life (Drury et al., 2002; Gudzone et al. 2019; Olson et al., 1994). Weight bias exhibited by healthcare students may continue into their future practice, potentially impeding the provision of impartial care for people living with overweight or obesity, paralleling the weight bias displayed by qualified healthcare practitioners (Lawrence et al., 2021). Therefore, quantifying the weight bias exhibited by healthcare students is an important first step in understanding weight biases amongst future healthcare

professionals and indeed, to address these biases before healthcare students and trainees qualify as professionals.

Latent constructs such as weight biased attitudes and beliefs, are most frequently measured using self-report questionnaires. Measures that assess explicit weight bias towards people living with overweight or obesity among various populations have been in existence for the past 44 years (Lacroix et al., 2017). Within this time, there has been a proliferation of measures of explicit weight bias. For example, Lacroix and colleagues (2017) identified 40 self-report measures of weight bias in their systematic review of the psychometric properties of self-report weight bias questionnaires. Comparatively, implicit weight bias is assessed largely via reaction time tasks such as the Implicit Association Test (IAT) (Greenwald et al., 1998), or Implicit Relational Assessment Procedure (IRAP) (Barnes-Holmes et al., 2006). Some explicit measures, such as an unnamed measure of children's beliefs about the controllability of obesity (Anesbury & Tiggemann, 2000), the Nutrition, Exercise and Weight Management Attitudes Scale (NEW) (Ip et al., 2013), and the Expectations Questionnaire (Greenleaf et al., 2005) have been designed specifically to assess weight bias among certain populations (youth, healthcare professionals, and physical educators respectively) (Anesbury & Tiggemann, 2000; Ip et al., 2013; Greenleaf et al., 2005). However, to our knowledge, no scales have been designed specifically to assess weight bias among healthcare students across all healthcare disciplines. With the absence of such a measure, researchers aspiring to examine explicit weight bias among healthcare students must select an existing measure or develop their own.

Developing a novel measure with methodological rigour is time-consuming and resource intensive, whereas, selecting an existing measure may reduce time and resource expenditure. However, many existing measures of explicit weight bias have been found to be psychometrically unsound (Lacroix et al., 2017). For instance, Lacroix and colleagues (2017) found that out of 40 self-report measures, only 20 reported the underlying theoretical guidance of scale construction, and only 17 measures had their underlying factor structure examined. Content validity, convergent validity, structural validity, discriminant validity, and sensitivity to change were addressed in only 24, 26, 17, 10, and 17 measures respectively, and only three measures reported a positive test-retest reliability score (Lacroix et al., 2017). Psychometrically sound scales are crucial to quantify explicit weight bias

accurately among diverse populations (Boateng et al., 2018). Lawrence and colleagues (2021) suggest that the variability of weight bias exhibited by practising healthcare professionals may (at least partly) be a result of the distinct questionnaires used to assess the construct. This may also hold true for healthcare students. While many studies have found the presence of explicit weight bias among healthcare students (Allnutt et al., 2022; Phelan et al., 2021; Puhl et al., 2014; Werkhoven, 2020), others have found an overall positive attitude towards people living with obesity (O'Donoghue et al., 2021), neutral attitudes toward patients living with obesity (Poon & Tarrant, 2009), or no association between the advice given to patients living with obesity and attitudes towards obesity (Nicholls et al., 2016). Although a combination of measures and methodologies, which may overlap between the aforementioned studies, may be used to assess weight bias among healthcare students, it is unclear whether the differences reported are due to actual differences in the exhibited weight bias or methodologies including the instruments used to measure bias (Lawrence et al., 2021).

The majority of studies that examined weight bias among healthcare students have been conducted in the United States (Phelan et al., 2021; Puhl et al., 2014) with weight bias among Australian healthcare students rarely being investigated (Robinson et al., 2014; Werkhoven, 2017; Werkhoven, 2020). One study, by Robinson et al. (2014) examined both explicit and implicit weight bias among students across 11 disciplines at an individual university ($N = 292$). Robinson et al. (2014) administered the Antifat Attitudes Questionnaire (AFA) (Crandall, 1994) to assess explicit weight bias; however, the underlying structure of the scale and its psychometric properties (with the exception of internal consistency) were not investigated. Similarly, Werkhoven (2017) administered the AFA to a sample of Australian healthcare students ($N = 82$) and found that healthcare (vs. non-healthcare) students exhibited more dislike towards people living with overweight or obesity. Once more, the underlying structure of the measure and its psychometric properties were not examined.

Additionally, as weight bias is a sensitive topic, students may respond in a socially desirable manner, which may lead to under- or over-reporting of negative or positive beliefs and attitudes. The impact of social desirability on explicit weight bias has been studied with mixed findings. For instance, Lynagh and colleagues (2015) found a moderate tendency for Australian health and physical education student teachers to respond in a socially desirable manner to measures of explicit weight

bias, while Yamaoka and Stapleton (2016) found no association between measures of explicit weight bias and social desirability among a mixed population sample (which included Australian education and high school students). The aforementioned findings suggest that Australian student samples may respond to measures of explicit weight bias in a more socially acceptable manner (underreport negative and overreport positive attitudes and beliefs about people living with overweight or obesity). However, to our knowledge, social desirability bias on measures of explicit weight bias among Australian healthcare students has not been previously investigated.

Given the lack of suitable measures of explicit weight bias in healthcare students in general coupled with the potential tendency of Australian healthcare students to respond in socially desirable ways to such measures, this study aimed to examine the suitability of two measures of explicit weight bias among Australian healthcare students. Specifically, we aimed to: (a) confirm the factor structures of the Beliefs About Obese Persons scale (BAOP) (Allison et al., 1991) and AFA; (b) examine psychometric properties of the two measures including internal consistency and convergent validity; and (c) examine whether the two measures were associated with socially desirable responding.

The BAOP and AFA were selected based on the systematic review of psychometric properties of self-report measures of weight bias conducted by Lacroix et al. (2017). Findings indicated that the AFA met 7 out of the 8 investigated criteria, including internal consistency, theoretical clarity, content validity, structural validity, convergent validity, discriminant validity, and sensitivity to change (failing to meet test-retest reliability). The BAOP only met 4 out of 8 criteria (internal consistency, theoretical clarity, content validity, and convergent validity). However, a measure that assessed attitudes and a measure that assessed beliefs was considered crucial to comprehensively investigate weight bias among Australian healthcare students, as both beliefs and attitudes may influence behaviour (Fishbein, 1966). Additionally, measures that were specifically designed for use with healthcare professionals (often for individual professions) were considered (e.g., the Obesity Perception Survey, NEW, The Antifat Attitudes Test (AFAT), and study-specific measures such as Perceived Weight Bias in Healthcare, Attitudes Toward Obese Patients, and Perceptions of Treatment Compliance and Success of Obese Patients) (Akman et al., 2010; Ip et al., 2013; Lewis et al., 1997; Puhl et al., 2014); but were deemed unsuitable for use with students across diverse healthcare

disciplines, or due to their extended length and low psychometric properties (Lacroix et al., 2017).

Throughout this study, we used non-stigmatising terms where possible; however, some terms (particularly relating to the measures used, e.g., Beliefs About Obese Persons) have been retained for clarity and accuracy.

Methods

Participants

Data for this study were extracted from a larger study that examined weight bias among Australian healthcare students and the factors that may be associated with students' exhibited bias (Anonymised reference). Participants were recruited through social media, snowball and convenience sampling, and university contact. Initially, 1815 students who self-reported as studying healthcare courses (undergraduate and postgraduate) at Australian universities took part in the study. Exclusion criteria (see *Anonymised reference* for details) resulted in a final sample of 900 students. Students were from 39 universities, primarily women (79.8%), studying at an undergraduate level (80.7%), had a mean age of 24.18 years ($SD = 7.60$), and a mean BMI (calculated with students' self-reported heights and weights) of 24.20kg/m^2 ($SD = 5.45$). Further demographic characteristics are shown in Table 1 contained in the supplementary materials.

Measures

Students completed four validated measures including the BAOP which assessed beliefs about the causes and controllability of obesity (Allison et al., 1991), the AFA which assessed attitudes towards people living with overweight or obesity (Crandall, 1994), the 13-item Short Form Marlow-Crowne Social Desirability Scale (MCSDS) which assessed the tendency to respond to the above measures in a socially desirable manner (Reynolds, 1982), and the Empathy for Obese Patients and Confidence in Clinical Interaction with Obese Patients scales that assessed empathy towards and confidence to interact with patients living with overweight or obesity (Kushner et al., 2014). Higher scores on each measure indicated a stronger belief that individuals living with obesity are able to control their weight (Allison et al., 1991), stronger negative attitudes (Crandall, 1994), more socially desirable responses (Reynolds, 1982), and more empathy towards and confidence to interact with

patients living with obesity (Kushner et al., 2014). Refer to section 2 of the supplementary materials for a detailed description of each measure.

Procedure

Students accessed an online survey hosted on QualtricsTM (2023) by clicking a link contained in the recruitment materials. Students were presented with the information form and indicated their consent to participate by clicking 'Agree'. Students who agreed to participate completed the demographic questions followed by the MCSDS. Students then completed the BAOP, AFA, Empathy for Obese Patients and Confidence in Clinical Interaction with Obese Patients scales in a randomised manner following the completion of a computerised task to assess implicit weight bias (not included in this study). To reduce participants' recognition of the intent to assess their weight bias, the BAOP and AFA were presented at the end of the survey. At the end of the survey, a debrief message was presented, and participants could opt to enter into a draw to win one of ten \$50 AUD gift cards. This study was approved by the Human Research Ethics Committee (HREC) at *Anonymised University* (HREC2021-0740).

Statistical Analyses

Data were analysed with the Statistical Package for Social Sciences (SPSS, V. 28) (IBM Corp, 2021) and SPSS Amos (V. 28) (Arbuckle, 2021). Descriptive statistics were calculated to describe the sample and two Confirmatory Factor Analyses (CFAs) were conducted to examine the factor structures of the BAOP and AFA. The cut-off point for each fit index was determined by values frequently reported in the literature (Hooper et al., 2008). Pearson's correlations were then computed to examine the convergent validity of the measures and four linear regressions were performed to examine whether responses on the BAOP and AFA were influenced by social desirability. The internal consistency of the measures were examined via reliability analyses.

Data Availability: de-identified participant data will be made available upon request to author *** for non-commercial purposes to individuals associated with academic or public research and health institutions.

Results

Descriptive Statistics

Mean scores for each outcome measure are shown in Table 2 contained in the supplementary materials. Higher scores on each measure represent lower weight controllability beliefs (BAOP) (Allison et al., 1991), stronger negative attitudes (AFA) (Crandall, 1994), and a higher tendency to respond in a socially acceptable manner (MCSDS) (Reynolds, 1982). Scores indicate that students generally believed that obesity is personally controllable. Students also exhibited dislike towards people living with overweight or obesity, were fearful of gaining weight, and believed that people living with overweight or obesity lacked willpower. The mean MCSDS score indicated a tendency to respond to the outcome measures in a socially desirable manner.

Confirmatory Factor Analyses (CFAs)

Goodness of fit statistics indicated that the data fit the proposed one-factor model of the BAOP and the three-factor model of the AFA, confirming their unidimensional and multidimensional structures. Fit indices also indicated a relatively ‘good’ model fit for both the BAOP and AFA. Goodness of fit indices for each measure can be found below in Table 1, and path diagrams are shown in Figures 1 and 2.

[Insert Table 1 Here]

[Insert Figure 1 Here]

[Insert Figure 2 Here]

Internal Consistency

Reliability testing for the current sample revealed Cronbach’s α of .74 for the BAOP, and .86 for Dislike, .86 for Fear of Fat and .78 for Willpower subscales of the AFA. Values revealed

‘acceptable’ (BAOP) to ‘good’ (AFA) internal consistency, indicating the measures were reliable for use with the current sample.

Convergent Validity

Pearson’s correlations between the BAOP, AFA, Empathy for Obese Patients and Confidence in Clinical Interaction with Obese Patients scales are shown below in Table 2. The significant negative correlations between the BAOP and each AFA subscale indicate that a greater belief that individuals were not able to control their weight was associated with less negative attitudes, supporting convergent validity of the two measures.

Correlations also show that greater empathy for patients living with overweight or obesity was associated with less negative attitudes, and a greater belief that individuals were not able to control their weight. Furthermore, confidence in clinical interactions with people living with overweight or obesity was associated with less dislike and fear of fat, but a greater belief that individuals living with overweight or obesity were able to control their weight, and more attribution of the causes of obesity to willpower. These correlations provide further support for convergent validity of the BAOP and AFA.

[Insert Table 2 Here]

Linear Regressions

Table 3 below shows the main linear regression output information for each regression model. It can be seen that the BAOP was not associated with socially desirable responding. The AFA was associated with social desirability bias. Although small in effect size, as AFA scores increased, socially desirable responding decreased.

[Insert Table 3 Here]

Discussion

Findings from the confirmatory factor analyses supported the originally proposed factor structures of the BAOP and AFA in our sample of Australian healthcare students. The 8-item BAOP contained one factor (beliefs about the causes and controllability of obesity) pertaining to its unidimensional structure. Several previous studies that aimed to validate translated versions of the BAOP found similar results. Dedeli and colleagues (2014) confirmed the unidimensionality of the Turkish version of the BAOP ($N = 302$), and Tsai et al. (2019) confirmed the unidimensionality of the BAOP among Hong Kong and Taiwanese university students ($N = 400$ and $N = 307$ respectively). Findings also supported a relatively good model fit of the BAOP; however, the low factor loadings may suggest a revision of the scale is needed. The results demonstrated that a Cronbach's alpha of .79 could be obtained by excluding items 1, 2, 7, and 8. Nevertheless, the good model fit suggests that these items should be retained, establishing the suitability of the measure to assess beliefs about the causes and controllability of obesity among Australian healthcare students.

The 13-item AFA contained three subscales (Dislike, Fear of Fat, and Willpower) pertaining to its multidimensional structure. The current study findings also supported a relatively good model fit, indicating the consistency of the AFA model with the data. This finding is supported by previous studies that have found similar results, confirming the three-factor structure of the AFA in both Spanish ($N = 1248$) and Greek samples ($N = 642$) (Macho et al., 2022; Argyrides et al., 2023). However, several studies have also found differing results. Rodríguez-Gázquez and colleagues (2020) confirmed the three-factor structure of the AFA (untranslated) among a sample of Spanish nursing students ($N = 578$); but found the 'Dislike' factor to contain six items instead of seven, totalling the scale items to 12. Ambwani (2005) administered the AFA (untranslated) to independent samples of Indian ($N = 226$) and Euro-American university students ($N = 266$) and examined the factor structure of the measure via a multigroup confirmatory factor analysis. One-factor, three-factor, and four-factor solutions were tested, and it was found that the four-factor solution was a better fit compared to the others. Items 5, 6, 9 and 10 were identified as 'dislike of people living with overweight or obesity', 1, 2, and 3 as 'fear of weight gain', 4, 7, and 8 as 'controllability of weight', and 11, 12 and 13 as 'interactions with people living with overweight or obesity' (Ambwani, 2005). Differing results to the findings of this study as identified by the above research may warrant further investigation of the

structure of the AFA, particularly as a 12-item, in place of the 13-item scale was found as fitting among a sample of Spanish health trainees (Rodríguez-Gázquez et al., 2020). The findings above indicate that overall, the AFA is indeed a relatively suitable measure to assess weight bias among Australian healthcare students. However, the paucity of research confirming the factor structures of untranslated versions of both the BAOP and AFA among samples of healthcare students and the general public, limiting the comparison of the current study findings with further samples.

In addition to examining the factor structures, psychometric properties of the BAOP and AFA including reliability and validity provided further insights into the suitability of the measures. The internal consistency of the BAOP for the current sample was acceptable (Cronbach's $\alpha = .74$). Previous studies have reported differing results, though the current Cronbach's α value was within the range reported in other samples. For instance, Molloy et al. (2016) reported internal consistencies ranging from questionable to acceptable among samples of psychology graduate (Cronbach's $\alpha = .65$, $N = 52$) and undergraduate (Cronbach's $\alpha = .79$, $N = 72$) students. Pratt et al. (2016) reported a somewhat questionable internal consistency (Cronbach's $\alpha = .62$) among a sample of marriage and family therapy students ($N = 162$). Whilst Darling and Atav (2019) reported an acceptable internal consistency (Cronbach's $\alpha = .73$) among a sample of nursing, education, and social work students ($N = 526$). Current findings also supported convergent validity of the BAOP; however, findings are to be interpreted with caution. Although the Empathy for Obese Patients and Confidence in Clinical Interaction with Obese Patients scales assess the construct of weight bias, they were designed to assess beliefs and confidence when interacting with patients living with overweight or obesity, rather than in general (Kushner et al., 2014). Therefore, current findings may not accurately represent the validity of the BAOP. Perhaps future studies could administer item-total matched similar measures to accurately assess the convergent validity of the BAOP.

The internal consistencies of the AFA subscales for the current sample ranged from acceptable to good (Cronbach's $\alpha = .86$ for Dislike, .86 for Fear of Fat and .78 for Willpower subscales), with several previous studies reporting similar results. For example, Pratt et al. (2016) reported internal consistencies ranging from acceptable to good (Cronbach's $\alpha = .88$, .87, and .71 for

the Dislike, Fear of Fat and Willpower subscales respectively) among a sample of marriage and family therapy students ($N = 162$). Phelan et al. (2021) reported acceptable internal consistencies (Cronbach's $\alpha = .79, .77$, and $.71$ the Dislike, Fear of Fat and Willpower subscales respectively) among a sample of medical students ($N = 111$). Finally, Robinson and colleagues (2014) reported internal consistencies ranging from acceptable to good (Cronbach's $\alpha = .88, .88$, and $.72$ the Dislike, Fear of Fat and Willpower subscales respectively) among a sample of Australian health and non-healthcare students ($N = 479$). Current study findings also supported convergent validity of the AFA; however, the limitation and recommendation discussed above (regarding the validity of the BAOP) also apply to the AFA.

This sample of Australian healthcare students exhibited low to high levels of explicit weight bias as measured by the BAOP and AFA subscales; the extent to which explicit and implicit weight bias is present among Australian healthcare students and the factors that may be associated with students' weight bias have been discussed elsewhere (*Anonymised reference*). The current study also aimed to examine whether the BAOP and AFA were subjected to socially desirable responding. Findings showed that the BAOP was not subjected to socially desirable responding among the current sample of healthcare students. Using the original 33-item MCSDS, Puhl et al. (2005) found similar results among a sample of undergraduate psychology students ($N = 60$), with no significant correlation between the BAOP and socially desirable responding. Results of the current study indicate that the current sample of Australian healthcare students responded to beliefs about the causes and controllability of obesity without overreporting positive beliefs. However, non-significant, as weight-biased beliefs improved, socially desirable responding increased; contrarily suggesting that the BAOP may be associated with the tendency to overreport more positive views, requiring further investigation.

Despite their small effects, the tendency to respond in a socially desirable manner was negatively associated with the AFA subscales. As AFA Dislike, Fear of Fat and Willpower subscale scores increased, representing stronger weight bias, participants' socially desirable responding decreased. Given weight bias is a sensitive topic, the converse was expected; socially desirable responding to increase as AFA scores decreased. Yamaoka and Stapleton (2016) also found that

MCSDS scores were not significantly (or positively) associated with AFA and BAOP scores.

Although non-significant, the results showed that as negative attitudes increased (AFA), socially desirable responding decreased, and a stronger belief that people living with overweight or obesity were not able to control their own weight (BAOP) was associated with an increase in socially desirable responding (in line with current findings) (Yamaoka & Stapleton, 2016). The current sample of healthcare students may have presumed that negative beliefs and attitudes towards people living with overweight or obesity are the norm. Weight bias has been described as a socially acceptable form of discrimination; the last acceptable form of prejudice (Ewing, 2019; Puhl & Heuer, 2010). Given the occurrence of weight bias in multiple domains of life including in the workplace, media, school, healthcare, public, intimate relationships, and health campaigns (Alberga et al., 2016), it becomes unavoidable for students to suppress themselves from exposure to negative attitudes and beliefs. Hence, the deeply ingrained nature of weight bias may have prompted students to respond to the measures without overreporting positivity due to the societal ‘acceptability’ of weight bias (Puhl & Heuer, 2010). Precise reasons why social desirability decreased as negative attitudes increased are unclear. More research is warranted to support valid conclusions, given the paucity of research examining the association between the BAOP and AFA, and socially desirable responding.

Overall findings from this study suggest that the BAOP and AFA are relatively suitable measures to assess explicit weight bias among Australian healthcare students. Despite this, attention should be paid to several areas of interest. The BAOP and AFA were developed several decades ago and may be viewed as outdated. The wording of the measures such as the use of ‘obese people’ (BAOP), ‘fat people’ and ‘fat’ (AFA) may be considered inappropriate. Extensive literature published in recent years has encouraged individuals, researchers, and professionals to use people-first language, such as ‘people living with overweight or obesity’ in place of ‘obese people’ in an effort to eliminate weight bias (Kirk et al., 2022; Palad & Stanford, 2018). Lacroix and colleagues (2017) found that only three out of 40 measures of explicit weight bias used people-first language. With the absence of a suitable measure to assess both weight-biased attitudes and beliefs among healthcare students in general, researchers must endeavour to create such a measure that reflect current developments in weight bias research. The balance between assessing weight bias and inducing weight bias must also

be considered. For example, item 2 of the AFA states ‘I don’t have many friends that are fat’ (Crandall, 1994). The term ‘friends that are fat’ may inadvertently induce weight bias. Brochu and Esses (2011) found that participants rated silhouettes with the label ‘fat’ more negatively compared with silhouettes with the label ‘overweight’. Replacing the term with ‘friends who are living with overweight or obesity’ may reflect current research developments; however, may not accurately capture a student’s weight bias. Quantifying students’ weight bias is an important leading step in developing interventions to ameliorate weight bias. Though future research is needed to examine whether using people-first language will be efficacious in accurately capturing students’ weight bias. Using bias terms in line with negative attitudes and beliefs may better capture bias, compared to using only people-first language which may be more acceptable, but may lead to capturing less negative attitudes and beliefs.

The current study utilised measures that assessed the beliefs of, and attitudes towards overweight and obesity which is a strength of the study; including measures of beliefs and attitudes are imperative, as an individual’s beliefs may influence attitudes, which may then potentially influence their behaviour (Fishbein, 1966). Several limitations must also be considered. As this study was an arm of a larger study, the use of convenient comparison measures may have been unable to capture the convergent validity of the BAOP and AFA accurately. It is recommended that future studies use more fitting measures to assess validity (e.g., a measure unrelated to weight bias to assess discriminant validity) and other psychometric properties. Furthermore, exploratory factor analyses (EFAs) were not conducted prior to running the CFAs. A-priori sample size calculations for EFAs revealed that a larger sample of at least 700 was required for the BAOP (Soper, 2021). Conducting EFAs on the same sample would have required the sample to be divided, reducing the sample size required to run the CFA. Therefore, it is recommended that future studies include large sample sizes to explore the underlying structures of the measures in depth (EFAs) prior to confirming their structures (CFAs). Finally, replacing ‘25 pounds’ with ‘25 kilograms’ on item 9 of the AFA may have prompted participants to interpret the item incorrectly. It is recommended that future research be mindful when converting values between different units of measurement (e.g., convert ‘25 pounds’ to ‘11 kilograms’).

Conclusion

To our knowledge, this is the first study within the weight bias literature to examine the suitability of the BAOP and AFA to assess weight bias among Australian healthcare students. We found that the BAOP and AFA fit their originally proposed factor structures and demonstrated good internal consistency. Overall, our findings support the continued use of the BAOP and AFA to assess weight bias among Australian healthcare students; however, novel measures must be developed to reflect the current progression of weight bias research.

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