

# Weight-Related Beliefs and Patient-Directed Assumptions Among Preclinical Medical Students: An Item-Level Cross-Sectional Study

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## Research Article

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## Abstract

## Background

Weight-related beliefs among medical trainees may shape clinical expectations, communication, and care for patients with higher body weight. This study characterized selected self-oriented, general, and patient-directed weight-related beliefs among preclinical medical students and examined associations with participant characteristics.

## Methods

An anonymous cross-sectional survey was administered to first- and second-year students at one United States medical school. Participants rated 10 statements on a five-point Likert scale. Item-level responses were summarized descriptively. Associations with gender, year of training, self-rated physical fitness, and eating habits were examined using Mann-Whitney U tests and Spearman correlations. The Benjamini-Hochberg procedure controlled the false discovery rate across 40 exploratory comparisons.

## Results

Among 165 participants (approximate response rate, 45.8%), 86.1% agreed that gaining 20 pounds would worsen their self-perception. Although 66.1% disagreed that body mass index accurately assesses obesity and only 23.0% attributed weight to personal control regardless of genetic or environmental influences, 52.1% perceived patients with obesity as more difficult to treat, 42.4% expected poorer adherence, 41.2% supported weight-management counseling regardless of visit reason, and 29.1% associated higher body weight with lower health literacy. Six associations remained significant after false-discovery-rate adjustment, primarily involving gender and self-rated fitness or eating habits; none differed by year of training.

## Conclusions

Responses consistent with a multifactorial view of obesity coexisted with generalized assumptions about individual patients. Medical education should connect obesity science with individualized clinical reasoning, patient-centered communication, and explicit examination of weight-based assumptions.

## Introduction

Weight bias comprises negative attitudes, stereotypes, and assumptions based on body weight or size, whereas weight stigma refers to the social devaluation, discriminatory treatment, and structural disadvantage that may follow from those attitudes<sup>1</sup>. In health care, weight-related assumptions may shape expectations about adherence, intelligence, motivation, and personal responsibility, with consequences for communication, clinical judgment, and quality of care. Patients who experience or anticipate weight-based judgment report psychological distress, reduced trust, delayed or avoided care, and lower engagement with preventive and therapeutic services<sup>2–4</sup>. Some also describe having symptoms attributed to weight without adequate evaluation of alternative explanations or receiving unsolicited weight-management counseling during visits unrelated to weight<sup>3,4</sup>. Weight bias is therefore both a medical education concern and a public health issue with implications for health equity.

Weight-related attitudes are evident early in medical training. In a national study of 4,732 first-year medical students, approximately 74% demonstrated an implicit preference for thin individuals and 67% demonstrated explicit weight bias<sup>5</sup>. Other work has shown that students may be unaware of indirectly measured anti-fat associations<sup>6</sup>, and similar patterns have been reported among health professions students internationally<sup>7</sup>. These findings also underscore an important measurement distinction: implicit bias is typically assessed using indirect, reaction-time-based tasks, whereas self-report questionnaires capture consciously reported beliefs and attitudes.

Medical education may either challenge or reinforce weight-related attitudes. Longitudinal evidence suggests that implicit and explicit bias can follow different trajectories during training<sup>8</sup>, while faculty role-modeling and the hidden curriculum may shape how students communicate with patients of higher weight<sup>9,9</sup>. At the same time, obesity education remains inconsistent across medical schools, and many graduates are perceived as inadequately prepared to provide evidence-based, respectful care to these patients<sup>10,11</sup>. Competency frameworks increasingly emphasize the multifactorial determinants of obesity, evidence-based management, professionalism, and patient-centered communication<sup>1,12</sup>, but factual knowledge alone may not address assumptions about individual patients.

Self-reported beliefs may be more clinically informative when examined at the item level. Self-oriented beliefs concern personal body image and the anticipated social consequences of weight change. General beliefs concern weight controllability, the relationship between weight and health, and social norms surrounding weight loss. Patient-directed beliefs concern adherence, health literacy, treatment difficulty, BMI, and whether weight should be raised during a clinical encounter. These beliefs may have different origins and consequences and can be obscured when combined into a single aggregate score. Communication guidance further recommends establishing the clinical relevance of weight, asking permission before initiating discussion, avoiding behavioral assumptions based on body size, and using terminology aligned with patient preferences<sup>13,14</sup>.

This study therefore aimed to characterize endorsement of selected self-oriented, general, and patient-directed weight-related beliefs among first- and second-year medical students at a medical school in West Texas, where obesity-related chronic disease is common<sup>15</sup>. Exploratory secondary aims were to examine associations with selected participant characteristics, compare first- and second-year students, and identify beliefs that may represent targets for undergraduate medical education.

## Methods

### Study Design and Setting

This anonymous cross-sectional survey was conducted at Texas Tech University Health Sciences Center, School of Medicine in Lubbock, Texas, from February 19 through March 11, 2024. The study focused on students in the preclinical phase of training.

### Participants and Recruitment

All enrolled first- and second-year medical students were eligible to participate (estimated eligible population, approximately 360 students). The electronic survey was distributed through the institution's student omnibus survey and direct class email communication, with reminders during the survey period. Participation was voluntary, and one response per student was permitted. An optional prize drawing was administered through a separate, unlinked form to preserve the anonymity of survey responses.

### Survey Instrument

The survey included demographic and student-characteristic items and 10 statements addressing weight-related beliefs. The study team developed or adapted the statements after reviewing the Anti-Fat Attitudes Questionnaire<sup>16</sup>, Project Implicit weight-related materials<sup>17</sup>, and clinically oriented literature. The items were not administered as a complete validated instrument, and no reaction-time-based Implicit Association Test was used. Responses were recorded on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Because the resulting item set was not a validated scale, individual items were the primary outcomes.

For exploratory presentation, the items were organized post hoc according to content and target into two self-oriented, three general, and five patient-directed clinical beliefs. These categories were used only to structure presentation and interpretation and were not treated as validated subscales. The complete item wording and response distributions are presented in Table 2.

### Statistical Analysis

For each item, responses were summarized using the mean and standard deviation, median and interquartile range, and the full five-category distribution. For descriptive presentation, ratings were additionally grouped as disagreement (1 or 2), neutral (3), and agreement (4 or 5). Grouped responses were not used for inferential testing, and neutral responses were not classified as evidence of weight bias.

Internal consistency was evaluated only to determine whether aggregation within the post hoc categories was defensible. The association between the two self-oriented items was assessed using Spearman correlation and the Spearman-Brown coefficient. Internal consistency of the three general and five patient-directed items was assessed using Cronbach's alpha. Because the categories were post hoc and reliability was limited, no category-level scores were used as primary or inferential outcomes.

Because individual item responses were ordinal, nonparametric methods were used. Differences between first- and second-year students and between respondents identifying as men and women were assessed using Mann-Whitney U tests. Rank-biserial correlations were reported as effect sizes, with direction indicated by group medians. Respondents identifying outside the man/woman categories were retained in descriptive and item-level analyses but were not included in the two-group gender comparison because the subgroup was too small for a stable inferential estimate. Associations with self-rated physical fitness and eating habits were assessed using Spearman rank correlations.

To limit multiplicity, the primary exploratory association family was limited to 40 tests: each of the 10 items was evaluated in relation to gender, year of training, self-rated physical fitness, and self-rated eating habits. The Benjamini-Hochberg procedure controlled the false discovery rate across these 40 comparisons<sup>18</sup>. Both unadjusted and adjusted P values were calculated; adjusted  $P < .05$  defined statistical significance after multiplicity correction. Tests were two-sided, and effect sizes were reported with P values. Race and ethnicity, LGBTQ+ identity, traditional or nontraditional student status, age, academic self-assessment, and sleep duration were summarized descriptively. LGBTQ+ identity was not included in the inferential family because only 19 respondents identified as LGBTQ+ and no subgroup hypothesis had been specified; the remaining characteristics were excluded because of small or heterogeneous categories and to avoid an excessively broad exploratory test family.

All participants who completed the 10 weight-related items were included in item-level descriptive and internal-consistency analyses. Missing values were not imputed; each association analysis used all observations available for the variables involved. The manuscript was prepared with reference to the STROBE reporting recommendations for cross-sectional studies.

# Ethics

The Texas Tech University Health Sciences Center Institutional Review Board determined the study to be exempt from further review (IRB-FY2024-136). The survey introduction described the study, voluntary participation, and confidentiality; submission of the survey constituted informed consent. No direct identifiers were collected.

# Results

## Participant Characteristics

A total of 165 eligible students completed all 10 weight-related items and were included in the item-level analyses, corresponding to an approximate response rate of 45.8%. The sample included 98 first-year students (59.4%) and 67 second-year students (40.6%). Gender data were available for 164 participants: 83 identified as women, 79 as men, and 2 as nonbinary or gender nonconforming; one response was missing. Nineteen participants (11.5%) identified as LGBTQ+, and 92 (55.8%) identified as nontraditional medical students (defined as those taking at least 1 gap year between undergraduate and graduate education). Complete participant characteristics and variable-specific denominators are presented in Table 1.

## Item-Level Endorsement

The strongest endorsement was self-oriented: 86.1% agreed or strongly agreed that gaining 20 pounds would worsen their self-perception, and 40.0% believed that being thin would provide greater professional or personal opportunities. Among general beliefs, 47.9% agreed that weight reflects overall health, 23.0% believed that individuals control their weight regardless of genetic or environmental influences, while 46% disagreed or strongly disagreed, and 17.6% considered it appropriate to comment when another person had lost weight.

Patient-directed responses were heterogeneous. More than half (52.1%) perceived patients with obesity as more challenging to treat with only 22.4% disagreeing or strongly disagreeing, and 42.4% expected people with overweight or obesity to be less adherent to medical advice (only 27.9% disagreed or strongly). Moreover, 41.2% supported offering weight-management advice regardless of the reason for the encounter, and 29.1% associated higher body weight with lower health literacy. Only 14.5% agreed that BMI accurately assesses obesity, whereas 66.1% disagreed or strongly disagreed. Full response distributions are presented in Table 2 and visualized in Fig. 1.

## Internal Consistency

The two self-oriented items were weakly correlated (Spearman rho = .25; P = .001; Spearman-Brown coefficient = .40). Cronbach's alpha was .64 for the three general items and .69 for the five patient-directed items. These findings did not support treating the post hoc categories as established subscales; individual items remained the primary outcomes.

## Associations with Participant Characteristics

Six of the 40 exploratory associations remained significant after false-discovery-rate adjustment (Table 3). Women reported greater agreement than men that gaining 20 pounds would worsen self-perception (median, 5 vs 4; rank-biserial r = .27; adjusted P = .009). Men reported greater agreement that commenting on another person's weight loss is appropriate (median, 3 vs 2; r = .32; adjusted P = .005), that individuals control weight regardless of genetic or environmental influences (median, 3 vs 2; r = .42; adjusted P < .001), and that patients with obesity are more challenging to treat (median, 4 vs 3; r = .31; adjusted P = .005).

Higher self-rated physical fitness was associated with stronger endorsement of the belief that people with overweight or obesity are less adherent to medical advice (Spearman rho = .25; adjusted P = .012; n = 164). More favorable self-rated eating habits were associated with the belief that higher body weight indicates lower health literacy (rho = .22; adjusted P = .025; n = 165). Both correlations were small and not statistically significant for physical fitness, but trended toward significance with the adjusted P value. No item-level differences between first- and second-year students remained significant after adjustment (all adjusted P > = .079). Complete results for all 40 comparisons are provided in Supplementary Table S1.

## Discussion

This study identifies a clinically relevant separation between responses consistent with a contemporary, multifactorial view of obesity and assumptions applied to individual patients. Many students rejected BMI as an accurate standalone assessment and did not attribute body weight solely to personal control, yet substantial proportions anticipated poorer adherence, lower health literacy, greater treatment difficulty, or a need to initiate weight counseling irrespective of the presenting concern. The study's principal contribution is therefore not simply confirmation that weight-related bias exists among medical trainees, but the item-level demonstration that obesity-related understanding and individualized patient judgment may develop unevenly.

Aggregate measures are useful for estimating overall implicit or explicit bias, but they can obscure beliefs with different origins and clinical consequences<sup>5-7</sup>. In this cohort, responses compatible with the multifactorial chronic-disease model of obesity coexisted with inferences about motivation, comprehension, and treatment participation. The BMI and personal-control items are not validated knowledge measures, and disagreement could reflect education, experience, public discourse, or item interpretation. Nevertheless, the pattern suggests partial uptake of contemporary obesity

concepts without equivalent integration into person-level clinical reasoning. Students may understand that obesity cannot be reduced to willpower while still using body size as a cue for how a particular patient will behave or engage with care. Obesity education that emphasizes mechanisms without comparable attention to attribution, stigma, and communication may therefore correct causal misconceptions while leaving clinically consequential expectations intact<sup>1,10–12</sup>.

The self-oriented findings place those expectations within a broader social context. More than four-fifths of participants anticipated worse self-perception after weight gain, and 40.0% viewed thinness as socially or professionally advantageous. These responses do not establish prejudice toward patients, but they indicate that body size already carries meanings related to discipline, competence, attractiveness, status, and professional acceptability among future physicians. Medical students are not neutral observers of these values; the standards applied to patients may be related to those applied to themselves.

The association pattern is consistent with this possibility. Women more strongly endorsed adverse self-perception after weight gain, whereas men more strongly endorsed personal control, commenting on weight loss, and treatment difficulty. Students with more favorable self-ratings of fitness or eating habits were also somewhat more likely to endorse selected assumptions about adherence or health literacy. These effects were exploratory and small, but they connect self-evaluation with patient evaluation through a possible shared framework of discipline and responsibility. Favorable health self-assessment may become a reference point against which patients are judged, while strong self-directed weight concerns may reflect the same cultural system without necessarily reducing patient-directed assumptions. The item-level approach makes this distinction visible without treating either pattern as a fixed gender characteristic or a causal pathway.

The patient-directed items identify plausible routes through which such expectations could affect care. Anticipated nonadherence may influence which options are offered, how thoroughly they are explained, or whether poor outcomes are attributed to treatment limitations or patient motivation. Assuming lower health literacy may similarly alter communication before the patient's actual understanding is assessed. These beliefs can operate as cognitive priors, shaping the encounter before individualized evidence is available. Prior research indicates that weight-related attitudes and faculty role-modeling can influence patient-centered communication with patients of higher weight<sup>2,9</sup>. Although this study did not measure behavior, it identifies specific assumptions that could mediate those effects.

Support for weight-management counseling regardless of visit reason further illustrates the tension between preventive intent and patient-centered care. A desire to address health risk may be well intentioned, but routinely redirecting an unrelated encounter toward weight can displace the patient's agenda and contribute to diagnostic overshadowing when symptoms are attributed to body size before alternative explanations are adequately evaluated<sup>3,4</sup>. The educational objective is not to discourage appropriate counseling, but to establish clinical relevance, seek permission, and connect discussion to the patient's goals<sup>13,14</sup>.

The perception that patients with obesity are more difficult to treat requires particular consideration. Obesity care may involve genuine clinical and structural complexity, including multimorbidity, medication considerations, procedural constraints, inadequate equipment, limited access to treatment, and systems that do not adequately accommodate larger bodies. Recognizing those barriers is not inherently stigmatizing. The concern arises when difficulty associated with the condition or care system is transferred onto the patient and interpreted as deficient motivation, cooperation, or adherence. Because the item did not specify the source of difficulty, the present data cannot distinguish these interpretations. Its endorsement by more than half of the sample nevertheless shows that the concept of "difficulty" is prominent in students' understanding of obesity care and should be addressed explicitly during training.

No item-level differences between first- and second-year students remained significant after multiplicity correction. This cross-sectional comparison of separate cohorts cannot determine whether education changes attitudes longitudinally, but it indicates that one additional year of preclinical training was not associated with substantial differences in the measured responses. Considered with the separation between obesity concepts and patient judgments, the finding argues against medical exposure alone correcting socially acquired beliefs. Formal instruction, faculty role-modeling, and clinical experiences may all shape weight-related attitudes<sup>8,9</sup>. Curricula should therefore introduce this content early and integrate obesity science with clinical attribution, patient-centered communication, and opportunities to apply knowledge in individualized encounters. Patient narratives, standardized-patient exercises, reflection, and direct feedback may be especially useful; existing interventions suggest that attitudes and communication-related outcomes can improve, although reinforcement may be needed<sup>19–23</sup>.

The study has several strengths. Item-level analysis preserved clinically meaningful differences that would have been obscured by an aggregate score, avoided classifying participants as biased or unbiased using an arbitrary cutoff, and distinguished self-reported beliefs from reaction-time-based implicit measures. The analysis also reported effect sizes and controlled the false discovery rate across a clearly defined exploratory family. Important limitations include the voluntary, single-institution, cross-sectional design; potential nonresponse and social-desirability bias; use of selected and adapted rather than fully validated items; and ambiguity in statements concerning BMI, overall health, and treatment difficulty. The study did not assess participants' body size, weight history, prior obesity education, or clinical behavior. The small LGBTQ+ subgroup limited the precision and generalizability of subgroup inference. The post hoc conceptual categories were not independently validated and should be regarded only as an organizational framework, with individual items remaining the primary outcomes.

Future multicenter longitudinal studies should determine whether these beliefs change during clerkships and residency and whether they predict communication, diagnostic reasoning, or treatment decisions. Measures should distinguish obesity-related knowledge, perceived clinical complexity,

personal-responsibility beliefs, self-oriented weight concerns, and stereotyped expectations of individual patients. Linking these constructs to standardized-patient performance and patient-reported experiences would clarify which beliefs are most likely to influence care and which educational approaches produce sustained improvement.

## Conclusion

Preclinical medical students demonstrated responses compatible with a multifactorial view of obesity while continuing to endorse generalized assumptions about adherence, health literacy, treatment difficulty, and weight counseling. This separation between how students conceptualize obesity and how they may judge individual patients is the study's central contribution and may be obscured by aggregate bias measures. Medical education should therefore connect obesity science with individualized clinical reasoning, patient-centered communication, and explicit examination of weight-based assumptions.

## Declarations

## Ethics approval and consent to participate:

The Texas Tech University Health Sciences Center Institutional Review Board determined the study to be exempt from further review (IRB-FY2024-136). Survey submission constituted informed consent.

### Conflict of interest disclosure:

The authors declare that there is no conflict of interest.

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## Author Contribution

N.M., E.R.B., M.T.B., A.S.K., and R.Y. contributed equally to the conception and design of the study, data collection, data analysis and interpretation, and preparation of the manuscript. J.M.D. served as the principal investigator, provided overall supervision and guidance throughout the project, and critically reviewed and edited the manuscript from the principal investigator perspective. All authors reviewed and approved the final manuscript and agree to be accountable for the work.

## Data Availability

The de-identified participant-level data generated and analyzed during the current study are available from the corresponding author upon reasonable request, subject to applicable institutional and ethical requirements.

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## Tables

**Table 1. Participant characteristics of preclinical medical student respondents (N = 165).** Participant demographic and self-reported characteristics are presented with variable-specific denominators where data were missing.

| Characteristic                             | Value       | Notes              |
|--------------------------------------------|-------------|--------------------|
| Medical school year                        |             |                    |
| MS1                                        | 98 (59.4)   |                    |
| MS2                                        | 67 (40.6)   |                    |
| Age, years                                 |             | n = 164            |
| 18-20                                      | 1 (0.6)     |                    |
| 21-23                                      | 58 (35.4)   |                    |
| 24-26                                      | 74 (45.1)   |                    |
| 27-30                                      | 22 (13.4)   |                    |
| 31-35                                      | 4 (2.4)     |                    |
| 36-40                                      | 5 (3.0)     |                    |
| Missing                                    | 1           |                    |
| Gender identity                            |             | n = 164            |
| Woman                                      | 83 (50.6)   |                    |
| Man                                        | 79 (48.2)   |                    |
| Nonbinary                                  | 1 (0.6)     |                    |
| Genderqueer/gender nonconforming           | 1 (0.6)     |                    |
| Missing                                    | 1           |                    |
| LGBTQ+ identity                            |             |                    |
| Yes                                        | 19 (11.5)   |                    |
| No                                         | 146 (88.5)  |                    |
| Traditional medical student status         |             |                    |
| Traditional                                | 73 (44.2)   |                    |
| Nontraditional                             | 92 (55.8)   |                    |
| Race and ethnicity                         |             |                    |
| White only                                 | 85 (51.5)   |                    |
| Asian only                                 | 37 (22.4)   |                    |
| Hispanic or Latino only                    | 15 (9.1)    |                    |
| Black or African American only             | 7 (4.2)     |                    |
| Middle Eastern or North African only       | 2 (1.2)     |                    |
| Multiple racial or ethnic identities       | 16 (9.7)    |                    |
| Choose not to disclose                     | 2 (1.2)     |                    |
| Missing                                    | 1           |                    |
| Average sleep duration                     |             |                    |
| 4-6 hours                                  | 38 (23.0)   |                    |
| 7-9 hours                                  | 126 (76.4)  |                    |
| 10 hours or more                           | 1 (0.6)     |                    |
| Self-rated physical fitness, mean (SD)     | 3.27 (0.83) | n = 164; scale 1-5 |
| Self-rated eating habits, mean (SD)        | 3.32 (0.74) | n = 165; scale 1-5 |
| Self-rated academic performance, mean (SD) | 3.92 (0.78) | n = 165; scale 1-5 |

**Table 2. Distribution of responses to the 10 weight-related belief items.** Responses were recorded on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Percentages reflect the distribution of responses among the 165 participants.

| Item | Conceptual category | Statement                                                                          | Mean (SD)   | Median (IQR) | Strongly disagree n (%) | Disagree n (%) | Neutral n (%) | Agree n (%) | Strongly agree n (%) | Agree/strongly agree n (%) |
|------|---------------------|------------------------------------------------------------------------------------|-------------|--------------|-------------------------|----------------|---------------|-------------|----------------------|----------------------------|
| 1    | Self-oriented       | Gaining 20 pounds would worsen self-perception                                     | 4.33 (0.94) | 5 (4-5)      | 3 (1.8)                 | 8 (4.8)        | 12 (7.3)      | 50 (30.3)   | 92 (55.8)            | 142 (86.1)                 |
| 2    | Self-oriented       | Being thin provides more professional or personal opportunities                    | 3.16 (1.18) | 3 (2-4)      | 13 (7.9)                | 39 (23.6)      | 47 (28.5)     | 41 (24.8)   | 25 (15.2)            | 66 (40.0)                  |
| 3    | General             | Weight reflects overall health status                                              | 3.38 (0.95) | 3 (3-4)      | 4 (2.4)                 | 25 (15.2)      | 57 (34.5)     | 62 (37.6)   | 17 (10.3)            | 79 (47.9)                  |
| 4    | General             | Appropriate to comment on noticed weight loss                                      | 2.44 (1.11) | 2 (2-3)      | 38 (23.0)               | 52 (31.5)      | 46 (27.9)     | 22 (13.3)   | 7 (4.2)              | 29 (17.6)                  |
| 5    | General             | Individuals control weight regardless of genetic or environmental factors          | 2.67 (1.08) | 3 (2-3)      | 24 (14.5)               | 52 (31.5)      | 51 (30.9)     | 30 (18.2)   | 8 (4.8)              | 38 (23.0)                  |
| 6    | Patient-directed    | Individuals with overweight or obesity are less likely to adhere to medical advice | 3.30 (1.09) | 3 (2-4)      | 3 (1.8)                 | 43 (26.1)      | 49 (29.7)     | 42 (25.5)   | 28 (17.0)            | 70 (42.4)                  |
| 7    | Patient-directed    | Patients with overweight are likely to have lower health literacy                  | 2.81 (1.02) | 3 (2-4)      | 15 (9.1)                | 54 (32.7)      | 48 (29.1)     | 43 (26.1)   | 5 (3.0)              | 48 (29.1)                  |
| 8    | Patient-directed    | Offer weight-management advice regardless of visit reason                          | 3.11 (1.09) | 3 (2-4)      | 10 (6.1)                | 45 (27.3)      | 42 (25.5)     | 53 (32.1)   | 15 (9.1)             | 68 (41.2)                  |
| 9    | Patient-directed    | BMI accurately assesses obesity                                                    | 2.22 (1.03) | 2 (1-3)      | 45 (27.3)               | 64 (38.8)      | 32 (19.4)     | 22 (13.3)   | 2 (1.2)              | 24 (14.5)                  |
| 10   | Patient-directed    | Patients with obesity are more challenging to treat                                | 3.42 (1.08) | 4 (3-4)      | 6 (3.6)                 | 31 (18.8)      | 42 (25.5)     | 59 (35.8)   | 27 (16.4)            | 86 (52.1)                  |

**Table 3. Item-level associations remaining significant after false-discovery-rate adjustment.** Associations shown are those that remained statistically significant after Benjamini-Hochberg adjustment across the 40 exploratory comparisons. Mann-Whitney U comparisons are summarized using rank-biserial correlations, and continuous-variable associations using Spearman rho.

| Category         | Item                                                                               | Predictor/comparison        | n   | Test statistic | Effect estimate         | Direction                     | Unadjusted P | FDR-adjusted P |
|------------------|------------------------------------------------------------------------------------|-----------------------------|-----|----------------|-------------------------|-------------------------------|--------------|----------------|
| Self-oriented    | Gaining 20 pounds would worsen self-perception                                     | Gender (men vs women)       | 162 | U = 2394.5     | r <sub>rb</sub> = -.270 | Women higher (men 4; women 5) | <.001        | .009           |
| General          | Appropriate to comment on noticed weight loss                                      | Gender (men vs women)       | 162 | U = 4327.0     | r <sub>rb</sub> = .320  | Men higher (men 3; women 2)   | <.001        | .005           |
| General          | Individuals control weight regardless of genetic or environmental factors          | Gender (men vs women)       | 162 | U = 4646.0     | r <sub>rb</sub> = .417  | Men higher (men 3; women 2)   | <.001        | <.001          |
| Patient-directed | Individuals with overweight or obesity are less likely to adhere to medical advice | Self-rated physical fitness | 164 | rho = .247     | rho = .247              | Positive association          | .001         | .012           |
| Patient-directed | Patients with overweight are likely to have lower health literacy                  | Self-rated eating habits    | 165 | rho = .225     | rho = .225              | Positive association          | .004         | .025           |
| Patient-directed | Patients with obesity are more challenging to treat                                | Gender (men vs women)       | 162 | U = 4300.5     | r <sub>rb</sub> = .312  | Men higher (men 4; women 3)   | <.001        | .005           |

**Table 4. Complete results for the 40 exploratory item-level association analyses.** The table reports all prespecified item-by-characteristic comparisons, including effect estimates, unadjusted P values, and Benjamini-Hochberg false-discovery-rate-adjusted P values.

| Item | Category      | Statement                                                       | Predictor/comparison        | n   | Test / statistic                  | Effect estimate         | Direction                    | Unadjusted P | FDR-adjusted P | Significant after FDR |
|------|---------------|-----------------------------------------------------------------|-----------------------------|-----|-----------------------------------|-------------------------|------------------------------|--------------|----------------|-----------------------|
| 1    | Self-oriented | Gaining 20 pounds would worsen self-perception                  | Gender (men vs women)       | 162 | Mann-Whitney U; U = 2394.5        | r <sub>rb</sub> = -.270 | Women higher; median 4 vs 5  | <.001        | .009           | Yes                   |
| 1    | Self-oriented | Gaining 20 pounds would worsen self-perception                  | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3565.0        | r <sub>rb</sub> = .086  | MS1 higher; median 5 vs 4    | .296         | .443           | No                    |
| 1    | Self-oriented | Gaining 20 pounds would worsen self-perception                  | Self-rated physical fitness | 164 | Spearman correlation; rho = -.125 | rho = -.125             | Negative                     | .109         | .208           | No                    |
| 1    | Self-oriented | Gaining 20 pounds would worsen self-perception                  | Self-rated eating habits    | 165 | Spearman correlation; rho = -.054 | rho = -.054             | Negative                     | .488         | .650           | No                    |
| 2    | Self-oriented | Being thin provides more professional or personal opportunities | Gender (men vs women)       | 162 | Mann-Whitney U; U = 3159.5        | r <sub>rb</sub> = -.036 | Equal medians; median 3 vs 3 | .683         | .790           | No                    |
| 2    | Self-oriented | Being thin provides more professional or personal opportunities | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3878.0        | r <sub>rb</sub> = .181  | Equal medians; median 3 vs 3 | .042         | .144           | No                    |
| 2    | Self-oriented | Being thin provides more professional or personal opportunities | Self-rated physical fitness | 164 | Spearman correlation; rho = -.127 | rho = -.127             | Negative                     | .104         | .208           | No                    |
| 2    | Self-oriented | Being thin provides more professional or personal opportunities | Self-rated eating habits    | 165 | Spearman correlation; rho = -.155 | rho = -.155             | Negative                     | .047         | .144           | No                    |
| 3    | General       | Weight reflects overall health status                           | Gender (men vs women)       | 162 | Mann-Whitney U; U = 3871.0        | r <sub>rb</sub> = .181  | Men higher; median 4 vs 3    | .037         | .144           | No                    |
| 3    | General       | Weight reflects overall health status                           | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3129.5        | r <sub>rb</sub> = -.047 | Equal medians; median 3 vs 3 | .593         | .741           | No                    |
| 3    | General       | Weight reflects overall health status                           | Self-rated physical fitness | 164 | Spearman correlation; rho = .142  | rho = .142              | Positive                     | .069         | .173           | No                    |
| 3    | General       | Weight reflects overall health status                           | Self-rated eating habits    | 165 | Spearman correlation; rho = .017  | rho = .017              | Positive                     | .830         | .895           | No                    |
| 4    | General       | Appropriate to comment on noticed weight loss                   | Gender (men vs women)       | 162 | Mann-Whitney U; U = 4327.0        | r <sub>rb</sub> = .320  | Men higher; median 3 vs 2    | <.001        | .005           | Yes                   |
| 4    | General       | Appropriate to comment on noticed weight loss                   | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3191.0        | r <sub>rb</sub> = -.028 | Equal medians; median 2 vs 2 | .753         | .837           | No                    |
| 4    | General       | Appropriate to comment on noticed weight loss                   | Self-rated physical fitness | 164 | Spearman correlation; rho = .039  | rho = .039              | Positive                     | .617         | .748           | No                    |

| Item | Category         | Statement                                                                          | Predictor/comparison        | n   | Test / statistic                  | Effect estimate | Direction                    | Unadjusted P | FDR-adjusted P | Significant after FDR |
|------|------------------|------------------------------------------------------------------------------------|-----------------------------|-----|-----------------------------------|-----------------|------------------------------|--------------|----------------|-----------------------|
| 4    | General          | Appropriate to comment on noticed weight loss                                      | Self-rated eating habits    | 165 | Spearman correlation; rho = -.074 | rho = -.074     | Negative                     | .345         | .493           | No                    |
| 5    | General          | Individuals control weight regardless of genetic or environmental factors          | Gender (men vs women)       | 162 | Mann-Whitney U; U = 4646.0        | r_rb = .417     | Men higher; median 3 vs 2    | <.001        | <.001          | Yes                   |
| 5    | General          | Individuals control weight regardless of genetic or environmental factors          | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3227.5        | r_rb = -.017    | Equal medians; median 3 vs 3 | .850         | .895           | No                    |
| 5    | General          | Individuals control weight regardless of genetic or environmental factors          | Self-rated physical fitness | 164 | Spearman correlation; rho = .156  | rho = .156      | Positive                     | .046         | .144           | No                    |
| 5    | General          | Individuals control weight regardless of genetic or environmental factors          | Self-rated eating habits    | 165 | Spearman correlation; rho = .104  | rho = .104      | Positive                     | .185         | .308           | No                    |
| 6    | Patient-directed | Individuals with overweight or obesity are less likely to adhere to medical advice | Gender (men vs women)       | 162 | Mann-Whitney U; U = 3502.5        | r_rb = .068     | Equal medians; median 3 vs 3 | .439         | .605           | No                    |
| 6    | Patient-directed | Individuals with overweight or obesity are less likely to adhere to medical advice | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3980.5        | r_rb = .212     | MS1 higher; median 4 vs 3    | .017         | .079           | No                    |
| 6    | Patient-directed | Individuals with overweight or obesity are less likely to adhere to medical advice | Self-rated physical fitness | 164 | Spearman correlation; rho = .247  | rho = .247      | Positive                     | .001         | .012           | Yes                   |
| 6    | Patient-directed | Individuals with overweight or obesity are less likely to adhere to medical advice | Self-rated eating habits    | 165 | Spearman correlation; rho = -.087 | rho = -.087     | Negative                     | .267         | .427           | No                    |
| 7    | Patient-directed | Patients with overweight are likely to have lower health literacy                  | Gender (men vs women)       | 162 | Mann-Whitney U; U = 3669.5        | r_rb = .119     | Equal medians; median 3 vs 3 | .173         | .301           | No                    |
| 7    | Patient-directed | Patients with overweight are likely to have lower health literacy                  | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3398.5        | r_rb = .035     | Equal medians; median 3 vs 3 | .691         | .790           | No                    |

| Item | Category         | Statement                                                         | Predictor/comparison        | n   | Test / statistic                  | Effect estimate | Direction                    | Unadjusted P | FDR-adjusted P | Significant after FDR |
|------|------------------|-------------------------------------------------------------------|-----------------------------|-----|-----------------------------------|-----------------|------------------------------|--------------|----------------|-----------------------|
| 7    | Patient-directed | Patients with overweight are likely to have lower health literacy | Self-rated physical fitness | 164 | Spearman correlation; rho = .203  | rho = .203      | Positive                     | .009         | .052           | No                    |
| 7    | Patient-directed | Patients with overweight are likely to have lower health literacy | Self-rated eating habits    | 165 | Spearman correlation; rho = .225  | rho = .225      | Positive                     | .004         | .025           | Yes                   |
| 8    | Patient-directed | Offer weight-management advice regardless of visit reason         | Gender (men vs women)       | 162 | Mann-Whitney U; U = 3960.0        | r_rb = .208     | Equal medians; median 3 vs 3 | .018         | .079           | No                    |
| 8    | Patient-directed | Offer weight-management advice regardless of visit reason         | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 3122.0        | r_rb = -.049    | Equal medians; median 3 vs 3 | .581         | .741           | No                    |
| 8    | Patient-directed | Offer weight-management advice regardless of visit reason         | Self-rated physical fitness | 164 | Spearman correlation; rho = .143  | rho = .143      | Positive                     | .068         | .173           | No                    |
| 8    | Patient-directed | Offer weight-management advice regardless of visit reason         | Self-rated eating habits    | 165 | Spearman correlation; rho = .113  | rho = .113      | Positive                     | .147         | .268           | No                    |
| 9    | Patient-directed | BMI accurately assesses obesity                                   | Gender (men vs women)       | 162 | Mann-Whitney U; U = 3786.5        | r_rb = .155     | Equal medians; median 2 vs 2 | .075         | .176           | No                    |
| 9    | Patient-directed | BMI accurately assesses obesity                                   | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 2803.0        | r_rb = -.146    | Equal medians; median 2 vs 2 | .096         | .208           | No                    |
| 9    | Patient-directed | BMI accurately assesses obesity                                   | Self-rated physical fitness | 164 | Spearman correlation; rho = -.003 | rho = -.003     | Negative                     | .974         | .974           | No                    |
| 9    | Patient-directed | BMI accurately assesses obesity                                   | Self-rated eating habits    | 165 | Spearman correlation; rho = .012  | rho = .012      | Positive                     | .876         | .898           | No                    |
| 10   | Patient-directed | Patients with obesity are more challenging to treat               | Gender (men vs women)       | 162 | Mann-Whitney U; U = 4300.5        | r_rb = .312     | Men higher; median 4 vs 3    | <.001        | .005           | Yes                   |
| 10   | Patient-directed | Patients with obesity are more challenging to treat               | Year (MS1 vs MS2)           | 165 | Mann-Whitney U; U = 2981.0        | r_rb = -.092    | MS2 higher; median 3 vs 4    | .299         | .443           | No                    |
| 10   | Patient-directed | Patients with obesity are more challenging to treat               | Self-rated physical fitness | 164 | Spearman correlation; rho = .127  | rho = .127      | Positive                     | .104         | .208           | No                    |
| 10   | Patient-directed | Patients with obesity are more challenging to treat               | Self-rated eating habits    | 165 | Spearman correlation; rho = .145  | rho = .145      | Positive                     | .063         | .173           | No                    |

All tests were two-sided. The Benjamini-Hochberg false discovery rate was controlled across the full family of 40 comparisons. Binary gender comparisons included 79 men and 83 women (n = 162); year comparisons included all 165 participants; fitness correlations included 164 participants; eating-habit correlations included all 165 participants.

Figures

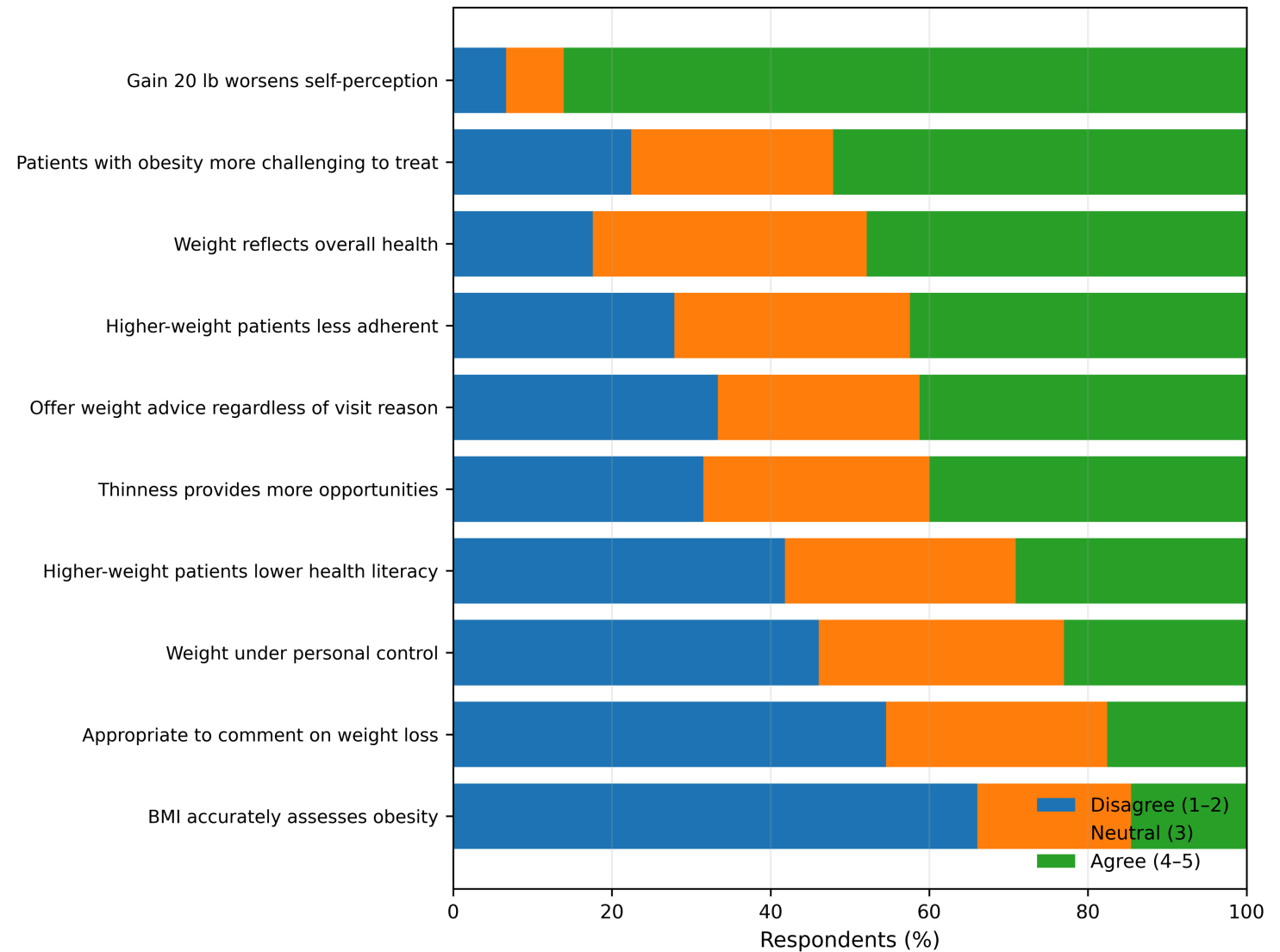


**Figure 1**

**Distribution of responses to weight-related belief items.** Horizontal stacked bars show the percentage of respondents who disagreed (ratings 1-2), were neutral (rating 3), or agreed (ratings 4-5) with each item.

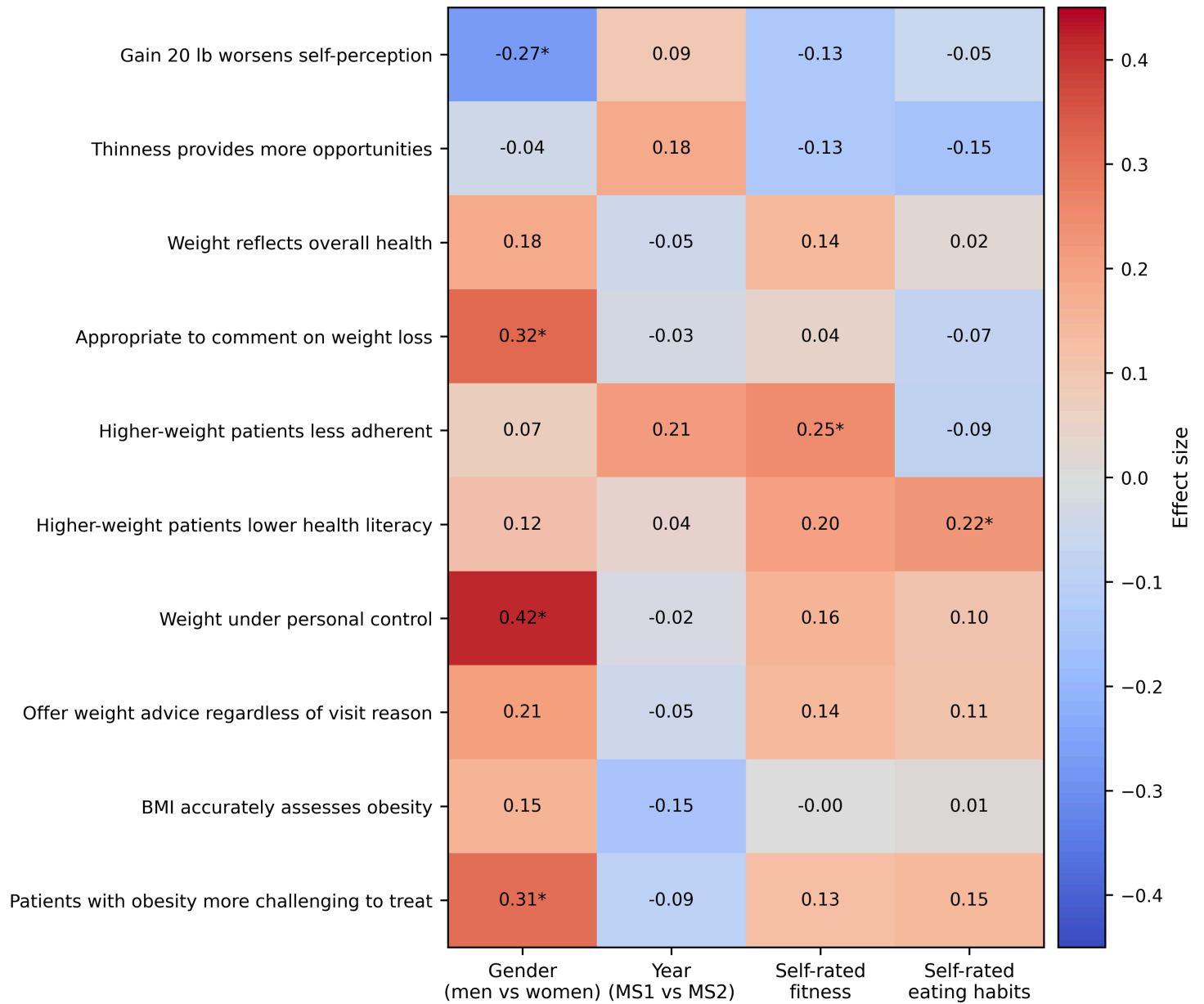


Figure 2

**Effect sizes across the 40 exploratory item-level associations.** Cells display rank-biserial correlations for Mann-Whitney U comparisons or Spearman rho for continuous-variable associations; asterisks indicate associations that remained significant after Benjamini-Hochberg false-discovery-rate adjustment across the 40 comparisons.