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Integrative health care services utilization as a function of body mass index: A BraveNet practice-based research network study

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ABSTRACT

Background: Obesity is a significant public health issue with no consensus regarding optimal medical management. Integrative medicine (IM) may help to fill this gap.
Objectives: (1) To characterize the sociodemographics, psychosocial functioning, health behaviors, and current medical conditions across BMI classifications in patients seeking IM; and (2) to examine how patients' reasons for seeking IM care, treatment goals, services sought, and services provided differ based on BMI.
Methods: Survey data were collected from patients seeking care at nine BraveNet IM centers. Sociodemographics, psychosocial health, lifestyle behaviors, and reasons for seeking specific IM services were compared across BMI categories using Chi-square test, Fisher's exact test, or one-way analysis of variance. Logistical regression was used to compare reasons for seeking IM care, treatment goals, and services sought and provided across BMI categories.
Results: 2015 patients were included in this study; 300 (14.9%) were obese and 580 (28.8%) were overweight. Obese patients were more likely to be non-White, unmarried, and uninsured, and have lower education, lower income, and at least one chronic disease ($p < 0.05$). They also had the lowest rates of aerobic activity (67.4% exercise $< 3\times$/week, $p < 0.01$), and greater depression (CESD-10 score 10.1 ± 6.6, $p < 0.01$), stress (PSS score 6.3 ± 3.5, $p < 0.01$), fatigue (avg 5.5 ± 2.4 on scale 1–10, $p < 0.01$), and pain (avg 3.6 ± 2.5 on scale 1–10, $p < 0.01$). Obese patients were more likely to seek manipulative/body-based services (OR = 1.46, 95% CI = 1.10–1.93, $p < 0.05$) and to seek and receive energy therapies (seek: OR = 1.49, 95% CI = 1.07–2.07; receive: OR = 2.56, 95% CI = 1.28–5.10), but less likely to seek IM care for greater compatibility with their beliefs and culture (OR = 0.72, 95% CI = 0.53–0.97). There were no significant differences between BMI categories for IM treatment goals.
Conclusion: Obese adults seeking IM care may represent a unique patient population with potential unmet health needs. IM may provide approaches to more effectively address the multifaceted complexities of obesity.

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What is known?

Despite a focus on the prevention and management of obesity, its prevalence and associated morbidity and mortality remain high. Some complementary and alternative approaches have been shown to successfully address obesity. However, little is known about the broader relationship between obese body mass index and use of integrative medicine (IM).

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What this paper adds?

This study suggests that obese individuals represent a unique subset of patients who may seek IM care for health care needs that are not being addressed fully by conventional obesity management approaches. Obese adults were less likely to seek IM care because it was more compatible with their beliefs or culture, and more likely to seek body-based and energy therapies, such as Reiki and therapeutic touch. These therapies may address comorbidities of obesity, such as pain and mood disorders. Findings lay the foundation for better understanding how IM may be utilized to stem the rising tide of obesity in the U.S.

1. Introduction

The prevalence of obesity in the United States has become a serious health threat in recent decades. Now one of the most important and fastest growing avoidable risk factors for morbidity and mortality, obesity increases an individual's risk for coronary heart disease, type II diabetes, various cancers, hypertension, high cholesterol, stroke, and infertility [1–3]. High body mass index (BMI) is the 4th leading cause of death, playing a role in up to one out of every five deaths in the U.S. [2,4,5]. Based on a healthy BMI of 18.5 to <25 kg/m^2, 34.9% of all Americans are currently obese (BMI ≥ 30 kg/m^2), and an additional 33.6% are overweight (BMI 25 to <30 kg/m^2) [6].

Despite the significance of obesity for population health and healthcare expenditures, there is no consensus regarding what is the optimal treatment. Medical management includes the spectrum of diet, exercise, behavioral modification, and adjuvant pharmacotherapy, which all have good short-term success, but in most patients results are not sustained long-term [7]. Surgical treatment, on the other hand, has high, long-term success rates, but the vast majority of patients (>95%) do not pursue this option [7]. Studies suggest that the "best" clinical outcomes occur with comprehensive obesity management from a multidisciplinary team, which is consistent with the characterization of obesity as a multifactorial disease with contributing demographic, psychosocial, behavioral, environmental, and genomic risk factors [8,9]. Unfortunately, the availability of such care is limited. In fact, Nguyen and colleagues [7] argue that effective, non-invasive medical approaches to obesity management remain an unmet need for clinically obese patients.

Given the critical need for effective, non-surgical therapies for obesity, integrative medicine (IM) may be poised to fill this important gap, because it "focuses on the whole person and makes use of all appropriate, evidence-based therapeutic approaches, healthcare professionals, and disciplines to achieve optimal health and healing" [10]. IM integrates the best of all available complementary and alternative (CAM) therapies with conventional care to treat patients individualistically and holistically. A number of CAM therapies have demonstrated some success in clinical obesity management. For example, Chinese herbal medicine and acupuncture have been shown to be equally or more effective than lifestyle modifications and existing pharmacotherapies in reducing body weight, with fewer reported adverse side effects [11,12]. There is emerging evidence that pain, a common symptom associated with obesity, can be managed with mind-body therapies, acupuncture, and various body-based therapies, such as massage [13,14]. Mindfulness-based interventions when combined with lifestyle education have improved treatment of obesity-related eating behaviors, such as binge eating and eating in response to external signals [15,16].

Despite the potential of IM to fill important gaps in obesity management, limited research has examined the relationship between BMI and use of IM. One study found that adults with higher BMIs were no more likely to use CAM therapies than normal weight adults in the general population [17]. However, this study did not look at the use of CAM therapies in the broader context of IM, such as whether there are differences in the specific services used within IM to address obesity, reasons obese patients seek IM care compared to non-obese patients, and expectations of IM care by people in different BMI categories. Such information may allow for future tailoring of IM strategies for more effective management of weight, especially in the obese population. Having a better understanding of the relationship between BMI and use of IM also can help to direct future research on how IM may contribute to fill the unmet care needs in the prevention and management of obesity and its comorbidities.

The purpose of this study was to: (1) characterize the sociodemographic characteristics, psychosocial functioning, health behaviors, and current medical conditions across BMI classifications in patients seeking IM; and (2) examine how patient reasons for seeking IM care, patient treatment goals, services sought, and services provided differ based on BMI. We used data from the Bravewell Integrative Medicine Research Network (BraveNet) registry database, which obtained data from patients receiving care at leading integrative medicine centers from around the US [18].

2. Materials and methods

2.1. Subjects and design

BraveNet is a practice-based research network of 19 leading IM centers around the U.S. collaborating in clinical outcomes research to increase the knowledge and evidence-base of IM. The mission of BraveNet is to evaluate IM approaches through cross-sectional and longitudinal collection of data on patient characteristics, utilization patterns, safety, effectiveness, and costs [18–22].

Our study included data from the original 9 BraveNet sites, which were participating in BraveNet at the time of data collection. See Fig. 1. Each site collected both provider and self-reported data on patient characteristics and utilization of IM services via the BraveNet Survey, available in both English and Spanish.

The BraveNet Survey was designed to better understand patients seeking care at IM centers, in terms of demographics, presenting symptoms, health conditions, type of care sought, expectations for treatment, quality of life, mood, stress, and lifestyle factors. Patient surveys were completed within 2 weeks of the patient's visit and took approximately 15–30 min. Clinic providers documented medical conditions treated and services provided. Eligible participants included individuals who were 18 years and older, presented for care to 1 of the 9 IM clinics participating in the survey at the time, and were either English or Spanish literate. All patients consented to participate in the survey and participation was voluntary. All sites and the coordinating center received IRB approval.

For the present study, we analyzed data from all patients who were seen by a physician (MD or DO) as part of their care from January 2008 to May 2011. Patients could have also received care from one or more allied health providers (e.g., massage therapists, mental health professionals, acupuncturists, etc.), but they must have been seen by a physician to be included in the analysis. We restricted the analysis in this manner, because we were interested in how these data might inform management of obesity in general healthcare settings where physicians and advanced practice providers manage patient care.

2.2. Variables and measures

Body mass index (BMI) was our measure of comparison, calculated as weight in kilograms divided by height in meters

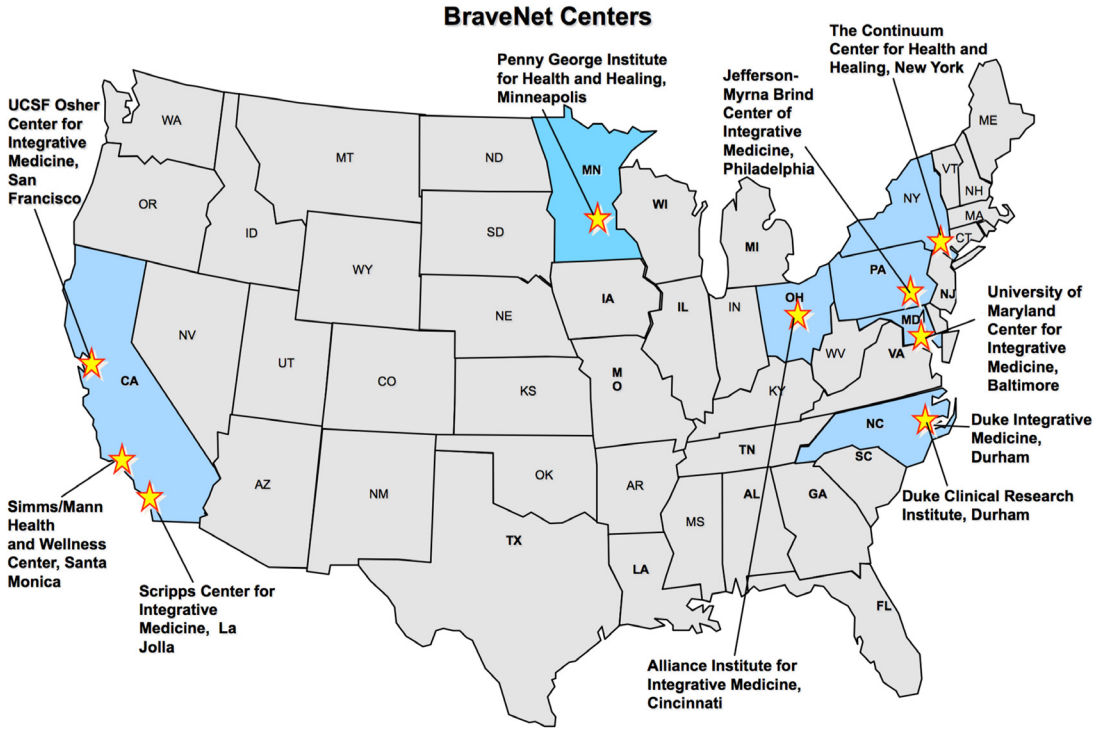

Fig. 1. BraveNet Centers.

squared using self-reported heights and weights. We categorized patients into nationally defined weight categories: (1) normal or underweight (BMI < 25 kg/m^2); (2) overweight (25 kg/m^2 to <30 kg/m^2); and (3) obese (≥ 30 kg/m^2) [2].

Sociodemographic variables included were gender, race/ethnicity (White, Black, Hispanic, Asian, and other), education (no high school degree, high school degree or equivalent, beyond high school but no bachelor's degree, and college degree or higher), marital status (married or cohabitating, divorced or separated, widowed, and never married), annual household income ($<$\$20 K, \$20 K to \$50 K, $>$\$50 K to \$100 K, $>$\$100 K to \$150 K, and $>$\$150 K), and insurance type (private or managed care, Medicare, Medicaid, and no insurance).

Reasons for seeking IM care and goals of IM care were measured using a 5-point Likert scale on items generated by the Steering Committee of BraveNet and included: (1) receive objective medical advice on non-conventional approaches; (2) more compatible with beliefs and culture; (3) receive care in safe, healing environment; (4) more time with physician; (5) maximize health regardless of whether the illness is curable; (6) more input into health care decisions; (7) not satisfied with current health care; (8) improve health and wellness now to prevent future problems; (9) try new options for health care; (10) acknowledges connection between mind, body, spirit and community; (11) recommended by someone the patient knows and trusts; and (12) receive care from a multidisciplinary team. Goals of IM care included: (1) improve family and social relationships; (2) improve physical well-being; (3) improve sleep pattern; (4) improve leisure activities, including exercise; (5) obtain information on ways to improve health; (6) improve enjoyment of life; (7) perform normal work at home and outside the home; (8) address spirituality as an aspect of care; (9) improve mood; and (10) decrease pain.

Type of health condition(s) that the patient wanted to address at the IM visit were self-reported and documented categorically as general health, disease prevention, chronic pain, new condition, or chronic condition.

Level of physical activity was measured categorically as aerobic, muscular strengthening, and stretching in days per week on which the participant invested at least 20, 20, and 15 min, respectively.

Pain, fatigue, and quality of sleep over the last month were measured using 11-point numerical rating scales (NRS) ranging from 0 to 10. Worst and average pain were measured as 0 = no pain and 10 = worst pain imaginable experienced. Fatigue was measured as overall level of fatigue with 0 = no fatigue and 10 = worst fatigue. Quality of sleep was measured on a 10-point scale as how rested respondents felt in the first hour after waking after an adequate amount of sleep with 0 = not rested at all and 10 = very rested.

Quality of life was assessed using the Short Form 12 (SF-12), a 12-question survey that explores eight health components – four in physical functioning, which comprise the physical component score (PCS) and four in mental functioning, which comprise the mental component score (MCS). Both component scores have been normalized to the US population with a mean score of 50 and a standard deviation of 10 [23].

Depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D) [24]. CES-D is a self-report 10-item screening test that measures depressed mood, feelings of guilt, worthlessness and helplessness, psychomotor retardation, loss of appetite, and sleep difficulties during the past week. Responses are used to calculate a summary score, ranging from 0 to 30. Higher scores indicate greater symptoms, and a cut-off score of 11 indicates "significant" or "mild" symptoms of depression.

Stress was assessed using the Perceived Stress Scale (PSS), a well-known, reliable and valid 4-item questionnaire that evaluates the responders' perceptions about their level of stress and their ability to cope with stress over the last month. Participants responded to questions using a 5-point scale to indicate the degree to which each item best reflects their thoughts and feelings [25].

Our *primary outcomes* of interest included types of IM services sought and received (Table 1). Patients reported IM health services sought via the BraveNet Survey. Providers reported IM health

Table 1
IM service categories.

Category	Specific services
Alternative medical systems	Acupuncture
	Ayurveda
	Chinese medicine
	Folk Medicine
	Homeopathic treatment
	Naturopathy
Mind/body interventions	Biofeedback
	Deep breathing exercises
	Expressive arts therapy
	Guided imagery
	Hypnosis
	Meditation
	Mind-body (general/other)
	Prayer
	Progressive relaxation
	Psychotherapy
	Self-help group
	Tai Chi
	Yoga
Biologically based therapies	Diet-based therapies
	Megavitamin therapy
	Nonvitamin, nonmineral, natural products (e.g., herbs)
	Nutrition
Manipulative and body-based methods	Chiropractic
	Craniosacral therapy
	Exercise consultation
	Fitness consult/training
	Massage
	Osteopathy
	Rolfing
Energy therapies	Energy healing/Reiki
	Healing touch
	Qi Gong
Additional therapies	Chelation therapy
	IM consultation
	Preventive care
	Other

services received by a patient via the BraveNet Provider Form, a component of the BraveNet Survey. As previously described, [18] these forms included descriptions of therapeutic services that the original BraveNet Steering Committee agreed upon by consensus, drawing from seminal papers in the field and the National Health Interview Survey (NHIS) CAM survey definitions [26].

2.3. Data analysis

Statistical comparisons between the three categorical BMI groups were performed. Continuous variables were reported as means (standard deviation) and compared between groups using a one-way analysis of variance. Categorical variables were presented as frequencies and percentages and compared between groups using Chi-square test or Fisher's exact test when appropriate. The primary analysis assessing whether outcome variables were associated with BMI categories was performed using logistic regression utilizing the generalized link function for nominal outcomes. The results of the logistic regression were presented as odds ratios (95% confidence intervals). A two-sided alpha of 0.05 was deemed to be statistically significant. All analyses were done in SAS (version 9.4) and JMP Pro (version 12).

3. Results

A total of 4182 patients were recruited for the primary BraveNet study. Of these, 2015 patients (51.1%) were seen by a physician, had BMI data, and were included in the data analysis. The majority of patients were female (72.4%), White (85.4%), had attended some college or more (76.4%), married (60.6%), had an annual household income greater than $50 K (71.5%), and had private or managed care insurance (73.2%).

3.1. Sociodemographics

Table 2 presents the sociodemographic characteristics of patients by BMI category. Overall, 43.7% of adults in our sample were overweight (28.8%) or obese (14.9%). Compared to under/normal weight patients, a larger proportion of obese patients were non-White ($p < 0.01$), had lower than a college level of education ($p < 0.01$), were not married ($p < 0.01$), had lower income ($p < 0.01$), were uninsured or on Medicaid ($p < 0.05$), and had at least one chronic disease ($p < 0.05$). Compared to men, females had a higher prevalence of obesity (15.2% vs. 14.4%) but lower prevalence of being overweight (23.3% vs. 41.2%, $p < 0.01$; results not shown). Asians had the lowest prevalence of obesity in this sample (5.3%), while African Americans had the highest prevalence (36.6%) ($p < 0.01$). Overweight patients were the least likely to have private or managed care insurance (68.4%) and most likely to be insured by Medicare (24.8%) ($p < 0.05$).

3.2. Health behavior and psychosocial measures

Significant differences were observed across BMI categories in health behaviors and psychosocial measures (Table 2). Obese patients had the lowest rates of aerobic exercise ($p < 0.01$), muscular strengthening ($p < 0.01$), and stretching ($p < 0.01$) compared to overweight and normal weight patients. There were no significant differences between BMI categories for the reported number of drinks per day or current use of tobacco.

On average, obese patients scored lower than under/normal weight and overweight patients on the physical component ($p < 0.01$) of the SF-12 quality of life measure; there was no significant difference found on the mental component. Compared to under/normal weight and overweight patients, obese patients also had higher scores on average for depression symptoms ($p < 0.01$) and perceived stress ($p < 0.01$), and also reported greater fatigue ($p < 0.01$), average pain ($p < 0.01$), and worst pain ($p < 0.01$) levels.

3.3. Reasons for seeking care at an IM center and goals of IM care

The top reasons for seeking care at an IM Center overall were to: (1) improve health and wellness now to prevent future problems; (2) try new options for health care, (3) maximize health regardless of whether the illness is curable, (4) receive objective medical advice on non-conventional approaches, and (5) acknowledge connection between mind, body, spirit and community (Table 3). Compared to under/normal weight patients, obese patients were less likely to seek care at an IM center because it was more compatible with their beliefs and culture (odds ratio, OR 0.70; 95% confidence interval, CI 0.54, 0.93) or because they wanted to receive care in a safe, healing environment (OR 0.72; 95% CI 0.53, 0.97). Compared to under/normal weight patients, overweight patients were less likely to seek care at an IM center in order to receive objective medical advice on non-conventional approaches (OR 0.71; CI 0.55, 0.92). There were no significant differences in reasons for seeking IM care between obese and overweight patients.

The top goals of IM care were to: (1) improve physical well-being, (2) improve enjoyment of life, and (3) obtain information on ways to improve health (Table 3). There were no significant differences between BMI categories for goals of IM care.

Table 2
Sociodemographic, health behaviors, and psychosocial characteristics of sample by BMI category, *n* (%).

	Overall sample	Under/normal weight	Overweight	Obese
BMI (kg/m^2)		<25.0	25.0 to <30.0	≥30.0
Sample size	2015 (100.0)	1135 (56.3)	580 (28.8)	300 (14.9)
Gender**				
Male	548 (27.2)	243 (21.4)	226 (39.0)	79 (26.3)
Female	1458 (72.4)	887 (78.2)	350 (60.3)	221 (73.7)
Missing	9 (0.4)	5 (0.4)	4 (0.7)	0 (0.0)
Race**				
White	1695 (84.1)	977 (86.1)	487 (84.0)	231 (77.0)
Black	93 (4.6)	29 (2.6)	30 (5.2)	34 (11.3)
Asian	76 (3.8)	56 (4.9)	16 (2.8)	4 (1.3)
Hispanic	43 (2.1)	19 (1.7)	13 (2.2)	11 (3.7)
Other[a]	59 (2.9)	30 (2.6)	18 (3.1)	11 (3.7)
Missing	49 (2.4)	24 (2.1)	16 (2.8)	9 (3.0)
Education**				
No high school (HS)	29 (1.4)	10 (0.9)	12 (2.1)	7 (2.3)
High school equivalent	109 (5.4)	52 (4.6)	29 (5.0)	28 (9.3)
Beyond HS, no bachelor's degree	333 (16.5)	180 (15.9)	90 (15.5)	63 (21.0)
College degree or higher	1539 (76.4)	892 (78.6)	446 (76.9)	201 (67.0)
Missing	5 (0.3)	1 (0.1)	3 (0.5)	1 (0.3)
Marriage status**				
Married or cohabitating	1221 (60.6)	685 (60.4)	373 (64.3)	163 (54.3)
Divorced or separated	236 (11.7)	113 (10.0)	74 (12.8)	49 (16.3)
Widowed	102 (5.1)	53 (4.7)	31 (5.3)	18 (6.0)
Never married	443 (22.0)	277 (24.4)	97 (16.7)	69 (23.0)
Missing	13 (0.6)	7 (0.6)	5 (0.9)	1 (0.3)
Annual household income**				
<$20 K	147 (7.3)	70 (6.2)	48 (8.3)	29 (9.7)
$20–$50 K	301 (14.9)	161 (14.2)	78 (13.4)	62 (20.7)
>$50–$100 K	535 (26.5)	291 (25.6)	153 (26.4)	91 (30.3)
>$100–$150 K	382 (19.0)	218 (19.2)	107 (18.4)	57 (19.0)
>$150 K	523 (26.0)	319 (28.1)	160 (27.6)	44 (14.7)
Missing	127 (6.3)	76 (6.7)	34 (5.9)	17 (5.7)
Primary insurance*				
Private or managed care	1474 (73.2)	863 (76.0)	397 (68.4)	214 (71.3)
Medicare	438 (21.7)	223 (19.6)	144 (24.8)	71 (23.7)
Medicaid	14 (0.7)	7 (0.6)	4 (0.7)	3 (1.0)
No insurance	45 (2.2)	17 (1.5)	17 (2.9)	11 (3.7)
Missing	44 (2.2)	25 (2.2)	18 (3.1)	1 (0.3)
Health condition to be addressed				
Chronic disease*	627 (31.1)	336 (29.6)	180 (31.0)	111 (37.0)
New condition	439 (21.8)	261 (23.0)	124 (21.4)	54 (18.0)
General well-being	28 (1.4)	16 (1.4)	8 (1.4)	4 (1.3)
Health behaviors				
Aerobic exercise ≥3×/wk**	904 (45.8)	539 (48.5)	270 (47.7)	97 (32.6)
Muscular strengthening ≥3×/wk**	465 (23.1)	294 (25.9)	128 (22.1)	43 (14.3)
Stretching ≥3×/wk**	683 (33.9)	433 (38.2)	188 (32.4)	62 (20.7)
Currently uses tobacco	122 (6.2)	63 (5.6)	36 (6.3)	23 (7.7)
Avg # drinks daily (mean ± SD)	1.2 ± 1.2	1.1 ± 1.4	1.3 ± 1.3	1.1 ± 1.2
Psychosocial characteristics (mean ± SD)				
MCS score	44.2 ± 11.3	43.9 ± 10.8	45.1 ± 11.8	43.6 ± 12.11
PCS score**	44.2 ± 10.1	44.9 ± 9.8	44.1 ± 10.3	42.6 ± 10.6
PSS score**	5.8 ± 3.3	5.8 ± 3.2	5.6 ± 3.3	6.3 ± 3.5
CESD-10 score**	8.7 ± 6.1	8.4 ± 5.9	8.5 ± 6.1	10.1 ± 6.6
Quality of sleep	5.9 ± 2.6	5.9 ± 2.6	6.0 ± 2.6	5.6 ± 2.6
Worst pain scale**	4.8 ± 3.1	4.6 ± 3.1	4.8 ± 3.1	5.2 ± 3.1
Average pain scale**	3.2 ± 2.5	3.1 ± 2.5	3.2 ± 2.4	3.6 ± 2.5
Fatigue scale**	4.9 ± 2.4	4.8 ± 2.4	4.7 ± 2.4	5.5 ± 2.4

MCS, Mental Component Score from Quality of Life SF-12 Health Survey; PCS, physical component score from the Quality of Life SF-12 Health Survey; PSS, Perceived Stress Scale; CESD-10, Center for Epidemiologic Studies Depression Scale.

[a] Other = American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, Multiracial, and Other.

* $p < 0.05$.

** $p < 0.01$.

3.4. BMI as a predictor of IM services sought and services received

After controlling for age, gender, race, educational level, household income, insurance status, and chronic disease status, BMI was a moderate predictor of IM services sought and a weak predictor of IM services received at the visit studied (Fig. 2). Obese patients were more likely to seek manipulative/body-based services and energy therapies compared to overweight patients (OR 1.48; 95% CI 1.09, 2.00 for body-based services | OR 1.60; 95% CI 1.11, 2.30 for energy therapies) and compared to normal/underweight patients (OR 1.46; 95% CI 1.10, 1.93 for body-based services | OR 1.49; 95% CI 1.07, 2.07 for energy therapies). More specifically, obese patients were more likely to seek chiropractic care (OR 2.04; 95% CI 1.34, 3.13) and energy healing/Reiki (OR 1.64; 95% CI 1.07, 2.53) compared to overweight patients, and were more likely to seek chiropractic care (OR 1.72; 95% CI 1.18, 2.49), diet-based therapies (OR 1.45; 95% CI 1.07, 1.96), and exercise consultation (OR 1.46; 95% CI 1.04, 2.05) compared to under/normal weight patients.

Table 3
Reasons for seeking and goals of IM care by BMI category.

	Rated as quite a lot or extremely important, *n* (%)				OW vs. U/N odds ratio	OB vs. U/N odds ratio	OB vs. OW odds ratio
	Overall	U/N	OW	OB			
Reasons for seeking IM care							
Improve health and wellness now to prevent future problems	1661 (85.4)	935 (85.9)	478 (84.9)	248 (84.6)	1.00 (0.72–1.38)	0.76 (0.51–1.12)	0.76 (0.49–1.17)
Try new options for health care	1531 (79.1)	877 (80.5)	416 (75.1)	238 (81.5)	0.83 (0.63–1.10)	1.03 (0.71–1.48)	1.24 (0.84–1.82)
Maximize health regardless of whether the illness is curable	1447 (75.9)	812 (76.0)	418 (76.0)	217 (75.1)	1.03 (0.78–1.35)	0.77 (0.55–1.07)	0.75 (0.52–1.08)
Receive objective medical advice on non-conventional approaches*	1420 (74.0)	844 (77.9)	371 (67.8)	205 (71.4)	**0.71 (0.55 – 0.92)**	0.74 (0.54–1.03)	1.04 (0.74–1.47)
Acknowledges connection between mind, body, spirit, and community	1403 (73.1)	818 (75.3)	377 (68.9)	208 (72.7)	0.90 (0.69–1.16)	0.88 (0.63–1.22)	0.98 (0.69–1.39)
Receive care in a safe, healing environment*	1335 (69.9)	779 (72.3)	367 (66.6)	189 (67.0)	0.89 (0.69–1.13)	**0.72 (0.53–0.97)**	0.81 (0.58–1.12)
More compatible with my beliefs and culture*	889 (47.4)	534 (50.1)	236 (44.4)	119 (43.1)	0.86 (0.69–1.07)	**0.70 (0.54–0.93)**	0.82 (0.61–1.10)
Not satisfied with current health care	706 (38.4)	398 (38.5)	206 (39.2)	102 (36.8)	1.11 (0.89–1.37)	0.88 (0.67–1.16)	0.80 (0.59–1.07)
Goals of IM care							
Improve physical well-being	1684 (86.0)	942 (85.6)	493 (87.4)	249 (84.7)	1.20(0.86–1.66)	0.84 (0.57–1.24)	0.71 (0.46–1.09)
Improve enjoyment of life	1457 (76.9)	798 (74.9)	429 (78.7)	230 (81.0)	1.12 (0.86–1.46)	1.22 (0.86–1.74)	1.09 (0.74–1.60)
Obtain information on ways to improve health	1288 (67.9)	738 (69.1)	360 (66.4)	190 (66.4)	0.91 (0.72–1.16)	0.82 (0.61–1.10)	0.90 (0.65–1.24)
Improve leisure activities, including exercise	1109 (59.8)	599 (58.0)	336 (62.5)	174 (61.3)	1.18 (0.94–1.48)	1.07 (0.80–1.42)	0.91 (0.66–1.24)
Improve mood	1064 (57.0)	593 (56.8)	294 (54.8)	177 (62.1)	0.97 (0.77–1.21)	1.14 (0.85–1.52)	1.18 (0.87–1.61)
Decrease pain	1003 (54.0)	564 (54.0)	279 (52.2)	160 (57.6)	0.94 (0.75–1.17)	1.08 (0.81–1.44)	1.15 (0.85–1.57)

U/N, under/normal weight; OW, overweight; OB, obese.
* $p < 0.05$.
Bold values represent reasons for seeking IM care or goals of IM care that were different between BMI categories with 95% confidence. There was no significant difference found across BMI categories for the following reasons for seeking care (more time with physician, more input into health care decisions, recommended by someone the patient knows and trusts, and receive care from a multidisciplinary team) and goals of IM care (improve family and social relationship, improve sleep pattern, perform normal work at home and outside the home, address spirituality as an aspect of care). Results not shown in Table 3.

(Results not shown). There were no significant differences between overweight and under/normal weight patients in IM services sought.

For IM services received, obese patients were 2.6 times more likely to receive energy therapies, such as energy healing, Reiki, healing touch and qigong, compared to overweight patients (OR 2.56; 95% CI 1.28, 5.10).

4. Discussion

Given that two thirds of US adults are overweight or obese, significant efforts have been made to identify the best prevention and management strategies [27–31]. Among adults seeking IM care at participating BraveNet centers, obese individuals represented a unique subset of patients who may seek IM care for health care needs that are not being addressed fully by conventional obesity management approaches. Although there were no significant differences in goals of care across BMI categories, obese adults were less likely to seek IM care because it was more compatible with their beliefs or culture, and were also more likely to seek body-based and energy therapies, such as Reiki and therapeutic touch.

Obese adults may seek IM care to find therapies that focus on more than just weight loss, and this may be true for both pain and mental health concerns. Obesity negatively impacts the musculoskeletal system via mechanical stress from excessive weight, increased inflammation, and psychological stress, which can lead to increased pain and chronic pain conditions, such as low back pain and osteoarthritis [32–34]. On average, obese individuals in our study had the highest pain scores, highest stress scores, and lowest physical quality of life scores. Pain is a common reason that obese individuals seek care and is the top reason that adults use IM [18,19,21,34–36]. Weight loss via diet and exercise may provide symptomatic relief of pain in obese patients in the long-term, but does not provide immediate relief in the way that IM therapies such as chiropractic care and energy healing do [35,37,38].

Relatedly, energy therapies are useful in reducing stress and improving mental health. Recent data show that 43% of adults with depression were obese, and adults with depression were more likely to be obese [39]. Obesity also has been shown to increase the risk of onset of depression [40], and compared to underweight/normal and overweight patients, obese patients in our study had greater depressive symptoms. While psychosocial interventions are recommended in typical obesity management, there frequently is not time to comprehensively address these issues in primary care. Moreover, many physicians do not recommend IM therapies such as Reiki therapy or qigong, both of which have been shown to reduce psychological symptoms in the immediate and long-term [41,42].

Despite the potential benefits of IM therapies in obesity management, adults with obesity may use many of the complementary components of IM (e.g., individual therapies) at lower rates than normal-weight individuals [17]. Only 14.9% of adults seeking IM care in our sample were obese, whereas obese adults account for 34.9% of the U.S. population. Given the cross-sectional nature of our study, it is possible that the lower rate of obesity is linked to IM treatment already received, but prospective studies are required to evaluate this. More likely, the lower use of IM observed among obese adults is due to multiple factors, including a lack of awareness or skepticism of IM services, satisfaction with conventional management strategies, or additional costs of IM treatment, because many therapies are not covered by insurance [43]. Patients' perceived loci of control may also vary by BMI and impact the use of specific IM services. The IM services more frequently received by our obese patients are more practitioner-delivered and may allow for patients to take a more passive role.

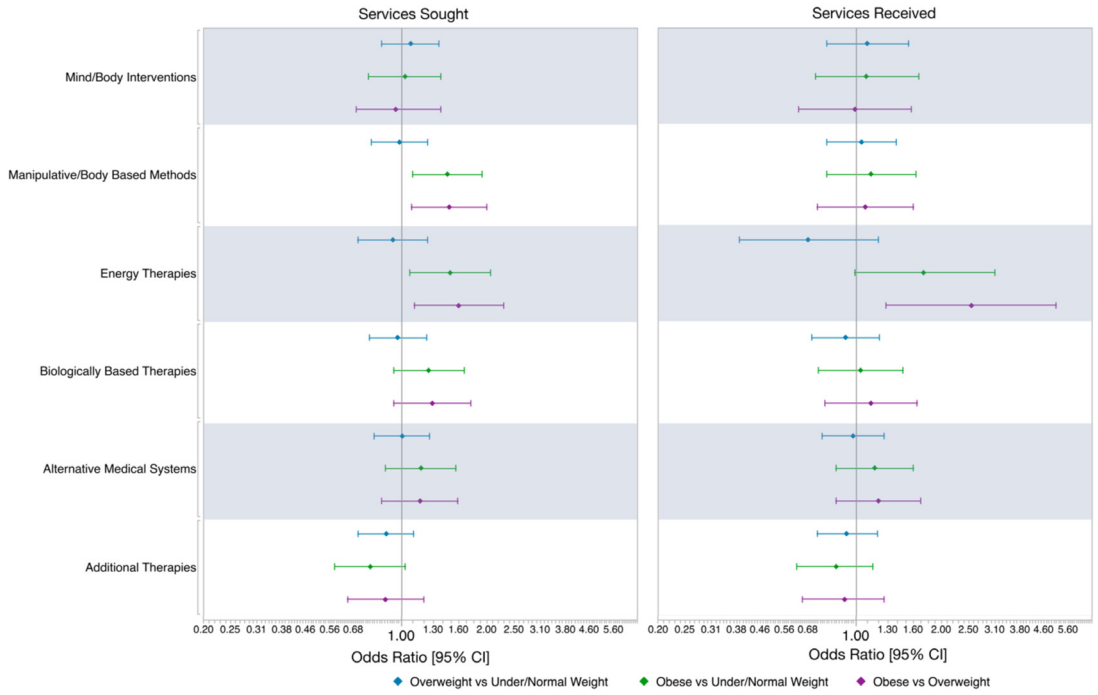

Fig. 2. BMI as a predictor of IM services sought and received.
The odds ratios and 95% confidence intervals for three comparisons by BMI category (overweight vs. under/normal weight, obese vs. under/normal weight, and obese vs. overweight) for IM services sought and IM services received are shown.

We did not investigate patients' loci of control, nor assess barriers to or reasons for not seeking specific modalities of IM care, though these are important areas for future research.

There are several potential limitations of our study. First, our sample consists of adults who sought IM services from an integrative medicine center affiliated with an academic health institution; the sample may not be representative of the broader adult population seeking IM care. Second, the sample was skewed to White females with higher than national averages for household income and educational levels. Thus, the sample is not representative of the US population as a whole. Third, the cross-sectional nature of the study makes it impossible to ascertain directionality of the findings. Fourth, the specific reasons that patients did not receive sought IM services (e.g., specific services were unavailable at a center, physician did not recommend treatment, patient declined treatment) were not captured via the BraveNet survey. Each center offered a unique panel of IM services; thus some services may not have been available at all centers. Future studies would benefit from interviewing both physicians and patients to better understand how treatment decisions were made. However, given the lack of these data for this secondary analysis, we were unable to adjust for such factors in our analyses. Finally, the prevalence of overweight/obesity in our sample was low and thus likely does not represent all obese or overweight adults in the U.S.

5. Conclusion

Our research shows that obese adults receiving care at BraveNet IM centers are a unique patient cohort compared to overweight, normal, and underweight adults, with distinct motivations for seeking IM care and greater likelihood of seeking body-based and energy therapies that may address unmet health needs. Our findings provide an enhanced understanding of the reasons for seeking IM care, goals of IM care, IM services desired, and patterns of IM use by adults with obesity. They also serve as a framework to help better understand the particular healthcare expectations and needs of this population. Future research should explore whether incorporation of IM therapies in obesity management strategies is feasible in primary care and weight-loss programs, and if doing so results in significant clinical improvements for obese adults. Additional research also should determine if IM care, compared to conventional care, better addresses the healthcare needs of obese adults addressed and which interventions are most effective. Obesity still remains a significant public health threat, however, IM may provide additional tools and approaches to more effectively tackle the multifaceted complexities of obesity.

Authors contributions

Nancy Y. Yang, Geoffrey S. Ginsburg and Leigh Ann Simmons designed the current study, whereas Ruth Q. Wolever, Rowena J. Dolor and Donald I. Abrams designed the BraveNet data and were responsible for acquiring the data. The data were analyzed by Nancy Y. Yang and Rhonda Roberts, who along with Ruth Q. Wolever, Adam Perlman, Geoffrey S. Ginsburg and Leigh Ann Simmons interpreted the data. The manuscript was drafted by Nancy Y. Yang, Ruth Q. Wolever, Rhonda Roberts and Leigh Ann Simmons, and revised by Nancy Y. Yang, Ruth Q. Wolever, and Leigh Ann Simmons in association with Adam Perlman, Rowena J. Dolor, Donald I. Abrams, and Geoffrey S. Ginsburg.

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