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ORIGINAL RESEARCH

Patient factors associated with initiation of behavioral weight loss treatment: a prospective observational study in an integrated care setting

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Abstract

Low enrollment in behavioral weight loss treatments limits their impact. We aimed to identify factors associated with treatment initiation. The participants were outpatients ($n = 198$) at Veterans Affairs (VA) healthcare facilities who were referred to a free VA-based behavioral weight loss treatment. Participants were assessed on psychosocial factors potentially relevant to treatment initiation. Subsequent treatment initiation was determined via medical record review. Study participants were 77 % male, 60 % African American, and 54 % initiated treatment. In multivariable analyses, treatment initiation was associated with being single, higher anxiety, and patients' perceptions that referring provider supported their weight autonomy. Endorsement of treatment barriers was not associated with treatment initiation. Treatments offering in-person sessions and mood management components were rated as more preferred. Initiation of behavioral weight loss treatments may increase if patients believe that providers respect their weight control autonomy and if healthcare organizations offer treatments that match patients' preferences.

Keywords

Behavioral weight loss treatment, Treatment engagement, Provider communication

Implications

Practice: Healthcare providers should respect patient autonomy when discussing weight management and treatment options.

Policy: Healthcare systems should provide training to providers in communication styles that convey respect for patient autonomy and should consider offering evidence-based behavioral weight loss treatments with varying features to appeal to varying patient treatment preferences.

Research: Researchers should test the effects of offering treatments with differing characteristics on treatment initiation.

INTRODUCTION

Behavioral weight loss treatments have produced clinically significant losses of body weight, reductions in obesity-related comorbidities, and reductions in mortality [1, 2] and are thus recommended for all obese adults by the American Heart Association [3] and United States Preventive Services Task Force [4]. Increasingly, behavioral weight loss treatments are being offered at no or low cost by healthcare organizations [5, 6]. Although this expanded access offers substantial promise for increasing the reach of behavioral weight loss treatment, the potential of these programs to achieve population-level weight loss is diminished by the limited initial enrollment and high attrition that are observed in many weight loss treatments. Attrition from weight loss treatments has been the focus of considerable research attention [7], whereas less attention has been given to the first step in utilization: initiating treatment. Many patients with obesity are not seeking weight loss, and many of those who are trying to lose weight are not initiating empirically supported treatments in the first place [8, 9]. Of additional concern, certain populations may be less likely to use available treatments. Use of professional weight loss treatments for obesity is lower among men [10, 11], and some studies indicate lower initiation among racial/ethnic minorities, although findings are mixed [10–12].

Reasons for the relatively poor utilization of available treatments are not well understood, and only a few studies have examined barriers to weight loss treatment utilization or psychosocial factors that are associated with utilization [13, 14], and none of these studies have utilized prospective data collection or been conducted in settings where access to treatment is free. Nonetheless, existing research [13] and health behavior change theories including the Health Belief Model [15] and the Theory of Planned Behavior [16] suggest that factors that may impact weight loss treatment use include social norms about treatment use, beliefs about the benefits of the treatment, anxiety, barriers to treatment use, and self-efficacy for weight

loss. In addition to psychological factors, practical barriers such as transportation or cost can also interfere with initiating treatment [13, 14]. In integrated healthcare settings in which provider referral is an important pathway to treatment initiation, the interaction between the provider and patient at time of the treatment referral may also be important. Patients may be more likely to lose weight when their physicians communicate about their weight in a manner that is supportive of the patients' autonomy [17].

Features of the treatment may also influence initiation. Patients may differ in their preference for certain program features, including aspects related to treatment delivery (e.g., modality, frequency) as well as treatment content (e.g., greater focus on diet or physical activity). Patient preferences for different treatment features can guide decisions by stakeholders on which treatments to offer or types of treatments to develop. Treatments informed by these patient preferences may be more likely to be initiated by the target population.

The aims of the current study were to identify individual psychosocial factors and treatment initiation barriers that are associated with initiation of behavioral weight loss treatment following provider referral in an integrated care setting. A second aim of the current study is to identify patient preferences for different weight loss program features. This study was conducted in the Veterans Affairs (VA) Healthcare system. The VA is an excellent setting to examine these questions for several reasons. The VA offers a behavioral weight loss treatment, MOVE!, at no cost to patients. The MOVE! program is estimated to be initiated by approximately 10 % of eligible patients, which reflects higher participation in weight loss programs than is reported in the general population [8]. However, it is apparent that the vast majority (about 90 %) of veterans who are eligible are not participating. Additionally, a sizeable portion of the VA is made up of individuals who are underrepresented in weight loss treatments and in the weight loss literature, e.g., men and African Americans.

METHODS

Participants and recruitment

Participants were VA patients who were referred to MOVE! by their healthcare provider. Patients were included if they were referred from one medical center (Durham VA Medical center) or four VA community-based outpatient clinics located in Durham, Raleigh, Greenville, and Morehead City, North Carolina. At these and all VA clinics, clinical reminders are activated in the electronic medical record (EMR) once per year for each patient to prompt providers to assess their patient's weight, encourage weight loss if appropriate, and offer a referral to MOVE! if patient's BMI is $\geq$30 or $\geq$25 km/m^2 with an obesity-related comorbidity. Providers make a MOVE! referral by selecting this option within the electronic clinical reminder system.

Patients referred to MOVE! between February 2013 and January 2014 were identified and further assessed for study eligibility via EMR review. Initially, all patients referred were included in the cohort of potentially eligible patients, although later, we used a quasi-random process (i.e., selecting patients based on day of week of referral, with days alternating each week) to select approximately 50 % of referred patients to be included due to limited resources to contact participants. Patients were excluded if they were older than age 70. Performance measures for the MOVE! program do not include individuals over 70, due in part to controversial findings on the benefits of weight loss in individuals over this age. They were also excluded if they had previously attended a MOVE! session because we aimed to assess factors related to treatment initiation in a MOVE!-naïve sample. Within 1 week of their MOVE! referral, patients who were eligible after chart review were sent a recruitment letter that provided a toll-free number for them to call if they desired to opt-out of the study. Those who did not opt out were called by a research assistant to further evaluate interest and to verify a final eligibility criterion: that they had not yet started MOVE!. Participants were interviewed no later than 3 weeks after their opt-out letter had been mailed in order to minimize retrospective bias and to reduce the likelihood that they had already initiated MOVE!. An attempt was made to call all potential participants, but due to time constraints, some potential participants were not contacted, with selection based on how close they were to the end of their eligibility window. Informed consent was obtained verbally from all participants. All study procedures were approved by the Durham VA Institutional Review Board, including an exemption from written informed consent.

Procedures

During the telephone-based interview, participants were administered validated psychosocial measures and other questions developed for this study (described below). Participants self-reported sex, race, ethnicity, highest education achieved, financial security, occupational status, marital status, height, and weight. Telephone interviews typically lasted 25–35 min.

EMR review was conducted six or more months after the telephone interview to obtain the outcome variable and other variables of interest. The outcome variable, MOVE! initiation, was defined as attending at least one MOVE! session within 6 months of the date of MOVE! referral. MOVE! session attendance was determined by presence of a MOVE! progress note. We considered a 6-month time frame in order to capture individuals soon after the referral, when they are most likely to initiate treatment, yet to also provide sufficient time to enroll, given that some facilities had waits of up to 3 months before initiation was possible. Other data collected during the chart review included presence of a diagnosis of PTSD, clinically recorded height and weights, and the type of provider who referred the patient (e.g., primary care, mental health). Chart abstractions were conducted manually by two separate authors (MAM and LW). Twenty percent of charts were abstracted by both

reviewers, with results compared after completing the first 5 % and again after completing the next 5 %. After each comparison, differences were reconciled, and the abstracting protocol was revised to improve reliability. For the final 10 % of charts that were jointly abstracted, 100 % agreement was achieved on the primary outcome of MOVE! initiation (for other variables that were abstracted, agreement ranged from 95 to 100 %). While clinically obtained weight data was abstracted from the patients' charts, we have chosen to report BMI based on self-report weight because there was a greater percent of missing data from EMR. The self-report and chart review weights were highly intercorrelated ($r = .97$).

To investigate the representativeness of our study sample, we abstracted data from medical records on potentially eligible participants who did not consent to the study, including gender, age, race, ethnicity, and BMI. We also examined what proportion of those who did not participate in the study attended at least one MOVE! session between February 2013 and June 2014 (the entire recruitment period, plus 6 months).

Measures

Importance of weight loss, weight loss history, and patient-provider weight loss conversation–To assess importance of weight loss, participants were asked: "How important is it to you to control your weight" (0–*not very important*, 7–*very important*). To characterize participants' recent experiences with weight loss attempts, they were asked "Have you tried to lose weight in the last month?" (*Yes* or *No*). Finally, patients were asked who initiated the discussion about weight loss: themselves or their healthcare provider.

Treatment initiation intentions–We measured intentions to initiate weight loss treatment with a 5-item measure that is consistent with the methods of Ajzen [18] and has been used successfully in our previous study [19]. For this measure, semantic differential items allow participants to rate their intentions to initiate weight loss treatment on a scale from 1 to 7, with higher number reflecting greater intentions (*unlikely* to *likely*; *impossible* to *possible*; *definitely would not* to *definitely would*; *no chance* to *certain*; and *probably not* to *probably*).

Eating self-efficacy–Patients completed the 8-item Weight Efficacy Lifestyle Questionnaire-Short Form (WEL-SF), a measure of efficacy to control overeating [20]. Participants report confidence in their ability to resist overeating in a variety of different situations on a scale from 0 (*not confident*) to 10 (*very confident*). This shortened measure of the well-validated original Weight Efficacy Lifestyle Questionnaire correlates highly with the original measure ($r = .97$) [20].

Overall anxiety severity–The Overall Anxiety and Impairment Scale (OASIS) is a five-item measure of the severity of anxiety symptoms [21]. Responses are rated from 0 to 4, with higher values reflecting more frequent or extreme anxiety symptoms. It has strong reliability and evidence for validity across a range of anxiety disorders [22]. The anchors for the numbers differed for each question; as an example, one question asks "When you feel anxious, how intense or severe is your anxiety?" with response options "none" (0), "mild" (1), "moderate" (2), "severe" (3), or "extreme" (4).

Help seeking discomfort–Discomfort with help seeking as it relates to beliefs about autonomy was assessed using a subscale that was adapted from the Barriers to Help Seeking questionnaire [23]. Participants reported how important different factors would be (e.g., "I would think less of myself for needing help") in their decision to seek help for weight loss on a scale from 0 (*not at all important*) to 4 (*very important*). In adapting this scale, most questions were kept identical to the original scale, with only instructions changed to ask participants to apply the question to weight loss help seeking. The internal consistency for this subscale was $\alpha = 0.93$ in the original study, and the scores correlated as expected with related measures [23].

Provider support for autonomy–The Health Care Climate Questionnaire (HCCQ) is a six-item measure of patients' perception that their healthcare provider communicated with supportive respect for autonomy [23]. HCCQ was used in the current study to assess perceived respect for autonomy specifically with regard to the discussion about weight during the clinical encounter at which the MOVE! referral occurred. Respect for autonomy in this context refers to conveying to the patient that their perspective about their weight is valued and understood. Statements describing autonomous communication by the provider (e.g., "My healthcare provider listened to how I would like to do things regarding my weight" and "I feel that my healthcare provider gave me choices and options about changing my weight including not changing") were rated on a 1 (*not at all true*) to 7 (*very true*) scale. This measure has shown good reliability and validity [24].

Provider advocacy for MOVE!–Four items were developed for this study to evaluate the extent to which patients perceived that their providers supported and advocated for them to attend MOVE!, as evidenced by providing sufficient information about MOVE!, conveying enthusiasm about MOVE!, and recommending the patient to join MOVE!. Participants rated statements indicative of provider advocacy for MOVE! (e.g., "My provider was enthusiastic about MOVE!") on a scale from 1 (*not at all true*) to 7 (*very true*).

Perceived treatment efficacy–A five-item measure of perceived treatment efficacy was adapted from a previously developed measure, which had been used to measure perceived treatment efficacy for psychotherapy [25]. Items were adapted by substituting "MOVE!" in place of "therapy" and changing the outcomes queried about (e.g., original question "If you were to try this type of therapy, how effective would it be in treating your depression?" changed to "If you were to try MOVE!, how effective do you think it be in helping you lose weight?"). Items are rated on a scale from 1 to 7, with higher numbers reflecting greater perceptions of effectiveness. Internal consistency was strong with this measure in the original study, and scores correlated with other related measures [25].

Perceived social norms of using MOVE!–There are no standard, validated measures of social norms related to weight loss treatment use. However, a generally accepted approach to measuring social norms has been described by work from Ajzen and successfully used by other researchers [26, 27]. Accordingly, three items were developed for the current study to measure descriptive norms ("If they wanted to lose weight, most VA patients would join MOVE!") and injunctive norms of MOVE! use ("If I wanted to lose weight, most people who are important to me would recommend that I join a weight loss program like MOVE!" and "If I wanted to lose weight, most VA patients would be supportive of me using MOVE!"). Items were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

Perceived barriers to MOVE! Use–Participants rated to what extent each of a number of potential barriers would prevent them from attending the MOVE! program on a scale from 1 (*not at all likely to keep me from attending)* to 7 (*very likely to keep me from attending*). Barriers included practical/logistical barriers (e.g., transportation difficulties), as well as more cognitive/psychosocial barriers (e.g., concerns about the treatment). The list of barriers was developed for this study based on existing literature on barriers to weight-related treatment [13, 14, 28] and on the study authors' clinical and research experience.

Weight loss treatment preferences–A measure was developed for this study to identify preferences for a variety of potential features of weight loss programs. Participants were forced to choose their most preferred option among the two or three options provided for several treatment features, such as model of delivery, delivery format (individual versus group), and inclusion of a focus on mood management.

Analyses

Scale scores were computed by averaging items from each scale, with the exception of the measures of treatment barriers and treatment preference items. For these latter measures, each item represents a different construct and thus individual items were considered separately in analyses. For averaged scale scores, coefficient alphas were calculated to determine internal consistency reliability. Because the majority of participants rated most of the potential barriers as unlikely to be a barrier, responses for perceived barriers were dichotomized as either *not a potential barrier* (endorsed 1 on the rating scale, *not at all likely to keep me from attending*) or a *potential barrier* (endorsed >1 on the rating scale).

Differences between MOVE! initiators and non-initiators on demographic factors and psychosocial variables, including treatment barriers, were examined using independent *t* tests for continuous outcome variables that were normally distributed, Wilcoxon rank sum test for continuous variables that were non-normally distributed, and chi-square tests for discrete variables. Statistical tests were two-sided with $p < .05$ criteria for statistical significance. In order to identify unique predictors of treatment initiation, a multivariable logistic regression analysis was conducted with the outcome of MOVE! initiation. Predictor variables were explanatory variables of interest (demographics and psychosocial factors) that were significantly associated with treatment initiation ($p < .05$) in bivariate analyses. Descriptive data are presented for treatment preferences. Statistical analyses were performed on SAS Version 9.2 (Cary, NC).

RESULTS

Demographics and baseline characteristics

We examined for eligibility 629 unique patients who were referred to MOVE!. Nine of these patients were referred to MOVE! twice during the recruitment window, and each referral was considered separately. Thus, 638 total referrals were considered for eligibility. We excluded at chart review 57 referrals who had previously used MOVE! and 26 referrals who were older than age 70. One participant was excluded due to an error in transcribing his medical record number. We sent recruitment letters to the remaining 554 referrals who were eligible at chart review. Two referred patients proactively called the toll-free number provided to them in recruitment letters in order to request no further study contact. Due to time constraints, no attempt was made to contact 124 referrals. Of the 428 referrals for whom a contact attempt was made, 158 were unable to be reached, 43 declined participation when we called them, and 29 were determined to be ineligible. Thus, 198 unique participants were consented (46.3 % of those to whom calls were made).

Comparison of the 198 consented participants to the 431 individuals who did not participate showed no difference in age ($p = 0.53$), BMI ($p = 1.00$), gender ($p = .64$), race ($p = .85$), or ethnicity ($p = .72$). Among potentially eligible individuals who did not participate, 53.5 % attended MOVE! within the timeframe examined as determined via EMR review.

Table 1 presents frequencies and means for demographic and clinical variables at baseline among all 198 consented participants. One hundred seven participants initiated MOVE! (54.0 %). Bivariate analyses comparing initiators and non-initiators on these variables showed that treatment initiators were more likely than non-initiators to be obese class I, to be single, to not work full-time, and to have a PTSD diagnosis.

Psychosocial characteristics

Table 2 presents means and standard deviations for psychosocial variables overall and according to treatment initiation status. Bivariate analyses indicate that treatment initiators had greater overall anxiety and greater perceptions of provider support for autonomy compared to non-initiators.

Multivariable prediction of treatment initiation

In multivariable analyses, factors significantly associated with treatment initiation were being single,

Table 1 | Study participant characteristics by treatment initiation status

	Overall (n = 198)[a]	Treatment initiators[b] (n = 107)	Non-treatment initiators[b] (n = 91)	p value[c]
Sex, n (%)				0.14
Male	153 (77.3)	87 (56.9)	66 (43.1)	
Female	45 (22.7)	20 (44.4)	25 (55.6)	
Age, mean (SD)	54.1 (11.5)	55.0 (11.1)	53.0 (11.9)	0.20[d]
Race, n (%)				0.30
African American	119 (60.1)	65 (54.6)	54 (45.4)	
White	73 (36.9)	37 (50.7)	36 (49.3)	
Other/undisclosed	6 (3.0)	5 (83.3)	1 (16.7)	
BMI, n (%)[e]				0.04
Overweight/normal (BMI <30)[f]	30 (15.2)	19 (63.3)	11 (36.7)	
Obese class I (BMI 30–34.9)	76 (38.4)	47 (61.8)	29 (38.2)	
Obese class II and III (BMI > 35)	92 (46.5)	41 (44.6)	51 (55.4)	
Marital status, n (%)				0.03
Married/partnered	96 (49.5)	44 (45.8)	52 (54.2)	
Single	98 (50.5)	60 (61.2)	38 (38.8)	
Education, n (%)				0.64
High School or lower	55 (28.2)	31 (56.4)	24 (43.6)	
Some college or tech school	97 (49.7)	49 (50.5)	48 (49.5)	
Bachelor's degree or higher	43 (22.1)	25 (58.1)	18 (41.9)	
Work status, n (%)				0.01
Work full time	41 (20.9)	15 (36.6)	26 (63.4)	
Other	155 (79.1)	90 (58.1)	65 (41.9)	
Tobacco use, n (%)				0.46
Yes	41 (21.0)	20 (48.8)	21 (51.2)	
No	154 (79.0)	85 (55.2)	69 (44.8)	
Financial security, n (%)				0.40
Low	66 (34.6)	38 (57.6)	28 (42.4)	
High	125 (65.4)	64 (51.2)	61 (48.8)	
Attempted weight loss in past month, n (%)				0.16
Yes	152 (76.8)	78 (51.3)	74 (48.7)	
No	46 (23.2)	29 (63.0)	17 (37.0)	
PTSD diagnosis, n (%)				0.02
Yes	60 (30.3)	40 (66.7)	20 (33.3)	
No	138 (69.7)	67 (48.6)	71 (51.4)	
Referring provider type, n (%)				0.29
Primary care	153 (77.3)	81 (52.9)	72 (47.1)	
Mental health	18 (9.1)	9 (50.0)	9 (50.0)	
Nutrition	11(5.6)	9 (81.8)	2 (18.2)	
Other	16 (8.1)	8 (50.0)	8 (50.0)	
Initiated weight discussion, n (%)				0.99
Patient initiated	97 (53.6)	53 (54.6)	44 (45.4)	
Provider initiated	84 (46.4)	46 (54.8)	38 (45.2)	

SD standard deviation, *PTSD* posttraumatic stress disorder

[a] % listed is among percent answering question. Four subjects missing marital status, 3 missing education, 2 missing work status, 3 missing tobacco use, 7 missing financial security, 17 missing initiated weight discussion

[b] The percentages presented are the percent of subjects in a given category (e.g., male) who are initiators/non-initiators

[c] p value is for independent samples t-tests except where noted otherwise

[d] p value is for a Wilcox rank sum test

[e] BMI is based on self-reported weight

[f] Two participants self-reported BMI <25 (24.3 and 24.7) and were combined with overweight participants

Table 2 | Psychosocial characteristics at baseline and by treatment initiation status

Characteristics (possible range)	Alpha	All participants, M(SD) (n = 198)	Treatment Initiators, M (SD) (n = 107)	Non-treatment initiators, M (SD) (n = 91)	p value[a]
Weight loss importance (0–7)	–	6.4 (1.1)	6.4 (1.2)	6.5 (0.9)	0.38[b]
Treatment initiation intentions (1–7)	0.89	6.5 (0.8)	6.5 (0.8)	6.4 (0.9)	0.92[b]
Eating self-efficacy (0–10)	0.85	6.7 (1.9)	6.8 (1.9)	6.6 (1.9)	0.39
Overall anxiety (0–4)	0.88	1.7 (1.0)	1.9 (1.0)	1.5 (1.0)	0.01
Help seeking discomfort (0–4)	0.89	1.8 (1.1)	1.8 (1.1)	1.8 (1.2)	0.92
Perceived provider autonomy support (1–7)	0.93	5.7 (1.8)	5.9 (1.6)	5.4 (1.9)	0.05
Provider MOVE! advocacy (1–7)	0.84	5.6 (1.7)	5.8 (1.4)	5.3 (1.9)	0.16[b]
Perceived treatment efficacy (1–7)	0.92	6.1 (1.1)	6.2 (0.8)	6.0 (1.3)	0.32[b]
Social norms (1–7)	0.70	6.0 (1.2)	6.0 (1.2)	5.9 (1.2)	0.79[b]

[a] p value is for independent samples t tests except where noted otherwise

[b] p value is for a Wilcox rank sum test

having higher overall anxiety, and perceiving greater provider support for weight control autonomy (Table 3).

Treatment barriers

Table 4 shows rates of endorsement for each potential treatment initiation barrier. Overall, rates of endorsement of barriers were low. No statistically significant differences were found in endorsement of barriers by treatment initiation status.

Weight loss treatment preferences

Reported preferences for different treatment features are provided in Table 5. Several features were preferred with approximately similar frequency, including delivery format (group vs one-on-one), use of mobile technology (use of an app vs no app use), rapidness of behavior change (small and gradual change vs big and immediate change), and type of diet plan (reduced calorie vs low fat vs low carbohydrate). However, participants showed a clear preference for other treatment features, including heterogeneous gender makeup of groups (vs homogenous gender makeup), inclusion of mood management features (vs no mood management features), weekly group meeting frequency (vs every other week or monthly meetings), in-person delivery modality (vs telephone or internet delivery), and focus on both diet and physical activity (vs diet or physical activity focus only). We conducted post hoc exploratory analyses of gender differences in preference for heterogeneous gendered groups. Men were significantly more likely to report a preference for mixed gender groups (85 %) compared to male only groups (15 %), whereas women were similarly likely to report a preference for mixed gender groups (54 %) as for women only groups (46 %), X^2 (1) = 18.4, $p < .0001$.

Table 3 | Multivariable logistic regression results for treatment initiation[a]

	Odds ratio (CI)	p value
BMI		
Overweight	Reference	
Class I obese	1.0 (0.3, 2.8)	0.96
Class II obese	0.5 (0.2, 1.3)	0.14
Marital status		
Married/partnered	Reference	
Single	2.0 (1.0, 3.7)	0.04
Work status		
Working full-time	Reference	
Not working full-time	2.1 (1.0, 4.7)	0.07
PTSD		
No PTSD diagnosis	Reference	
PTSD diagnosis	1.3 (0.6, 2.9)	0.46
Anxiety	1.4 (1.0, 2.0)	0.04
Provider support for autonomy	1.2 (1.0, 1.5)	0.05

1 = initiated MOVE!, 0 = did not initiate MOVE; n = 179. Likelihood ratio. Chi-square X^2 (7, n = 179) = 25.7; p = 0.0006

[a] Logistic model predicted for odds of MOVE! initiation

Table 4 | Endorsement of barriers to treatment use ($n = 198$)[a]

	Endorsed as barriers, *n* (%)
Group meeting format	90 (45.5)
Cost of transportation	80 (40.6)
Work timing conflict	67 (35.8)
Distance to VA	70 (35.4)
Program recommendations will be undesirable to me	62 (31.8)
I will be unable to achieve program recommendations	55 (28.1)
Transportation difficulties	41 (20.7)
Weight not serious enough	37 (18.7)
Using or planning to use another program	34 (18.6)
Lack of time	35 (17 .7)
Parenting timing conflict	31 (16.1)
Lack of support	31 (15.7)
Bad feelings towards VA	31 (15.7)
Embarrassing to discuss weight	29 (14.7)
Not interested in weight loss	25 (12.6)

[a] Missing data: 11 missing work timing conflict, 5 missing parenting timing conflict, 1 missing cost of transportation, 1 missing lack of support, 1 missing bad feelings towards VA, 2 missing unable to achieve program recommendations, 3 missing program recommendations will be undesirable, 15 missing using or planning to use another program

Table 5 | Preferences for behavioral weight loss treatment features

	Overall
Format, *n* (%)	
Group	79 (42.0)
One-on-one	109 (58.0)
Group gender make-up, *n* (%)	
Heterogeneous	136 (78.6)
Homogenous	37 (21.4)
Mobile technology, *n* (%)	
Use of an app	107 (57.8)
No app use	78 (42.2)
Mood management, *n* (%)	
Mood management included	134 (69.8)
No mood management	58 (30.2)
Rapidness of behavior change, *n* (%)	
Small and gradual	114 (58.8)
Big and immediate	80 (41.2)
Diet plan, *n* (%)	
Reduced calorie	56 (32.2)
Low-fat	65 (37.4)
Low-carbohydrate	54 (30.4)
Session frequency, *n* (%)	
Once per week	101(51.5)
Every other week	58 (29.6)
Once per month	37 (18.9)
Delivery modality, *n* (%)	
In-person	132 (68.8)
By telephone	29 (15.1)
By internet	31 (16.1)
Balance of diet/physical activity, *n* (%)	
Diet only	19 (9.9)
Physical activity only	6 (3.1)
Diet and physical activity equally	168 (87.0)

Total for each question differs as a result of different patterns of missing data. % is based on the total number who responded. Missing data: 10 missing from format, 25 missing from gender make-up, 13 missing from mobile technology, 6 missing from mood management, 4 missing from rapidness of change, 24 missing from diet plan, 2 missing from session frequency, 6 missing from delivery modality, and 6 missing from balance of diet/physical activity

DISCUSSION

In order for behavioral weight loss treatments to be impactful at a population level, they must be used by a significant portion of the affected population. Existing data indicates that most individuals who have access to treatment or are recommended for treatment do not take the first step of initiating treatment, and little is currently known about why that is. We addressed this gap by examining prospective predictors of initiating behavioral weight loss treatment in a VA setting, where treatment is offered for free to patients and a large portion of the population is underrepresented in behavioral weight loss treatments. Our results show that patients were more likely to use treatment if they were single, had higher anxiety, and perceived greater support for autonomy from their providers.

The association between treatment initiation and patients' perceptions that providers were supportive of their weight-related autonomy highlight the importance of patients feeling that their provider is interested in and understands their perspective with regard to weight. This finding is consistent with past research documenting the benefits of patient-provider communication characterized by supportive autonomy [17]. Because the current study measured patients' perceptions of providers and not the patient-provider conversation itself, we do not know what communications are contributing to patients feeling that their autonomy is being supported. Future research examining the specific content of these conversations could further aid in helping providers increase patient uptake of weight loss treatment.

Past studies suggest that anxiety disorders are associated with greater utilization of a variety of healthcare services [29, 30]. Patients who reported higher overall anxiety in this study may have more health anxiety or concern about their weight, motivating treatment use.

In a VA setting where healthcare services are relatively accessible, it is also possible that many patients with elevated anxiety have had previous experience with mental health services, and thus have increased comfort with attending behavioral group treatments, the predominant format of MOVE! counseling.

We also found that being single was associated with treatment initiation in multivariable analyses. The reasons for this are unclear. However, single individuals may have a greater desire for social interaction, which is available in the MOVE! program, may feel they need more assistance because they have limited social support, or may have more schedule flexibility. Additionally, they may be more motivated for weight loss due to reasons related to appearance or romantic motivations. Although more research is needed on reasons for these differences, offering classes at times outside of typical work hours and remote treatment options could make treatment initiation and sustained use easier for individuals who have family obligations.

Although endorsement of barriers was not associated with treatment initiation, the limited portion of the sample who endorsed any barriers likely limited our ability to detect effects. Given that few individuals endorsed many of the practical/logistic variables presented, participants may have underestimated the barriers they might face at the time of the interview, which occurred prior to them making an effort to initiate weight loss treatment. Although the prospective nature of this research design is a strength of this study, it would also be valuable to ask patients who did not attend treatment which barriers arose after more time passed since referral.

We asked patients to report their preference for various features of weight loss treatment. Such information could be useful for healthcare stakeholders who are selecting types of treatments to offer and to individuals working to develop new treatments that are more appealing to patients. Some features were clearly preferred, including inclusion of mood management components, a focus on both diet and physical activity, groups with heterogeneous gender, and an in-person format. Preference for these features should be confirmed in future studies and likely differs across populations, but these findings suggest that offering programs with these features may improve treatment uptake. The finding that most patients preferred in-person treatment is particularly interesting to consider in light of the movement in many settings to offer remotely delivered treatments in the VA. However, this sample may be biased toward preference for in-person treatment given that it was a sample that was referred to a treatment that is predominantly offered in an in-person format. For many of the other features examined, preferences were closely divided. The diversity of preferences suggests that greater treatment uptake may occur if greater variety of treatments were offered. Future research should attempt to determine what treatment features promote greater treatment uptake.

One limitation of this study is that it focuses on patients who were referred to treatment, who may differ from patients who were not referred. Future studies should examine predictors of treatment use among a broader group of individuals, including those who were not referred to treatment. This study is also limited in its use of some measures that are not validated or are adaptations of validated scales. The generalizability of this study may be limited, given the VA setting. However, the unique features of this VA setting, including the large male and African American population and the availability of free weight loss treatment, are also significant strengths of this study. The current study focused on predicting initiation of treatment. Additional research is needed to test theoretically relevant constructs that may predict attrition from weight loss treatments, particularly those delivered in an integrated care setting such as the VA.

In summary, the current study identified factors that are prospectively associated with initiation of weight loss treatment, including being single, having higher anxiety, and perceiving the healthcare provider as providing support for autonomy regarding weight. The latter factor may be a particularly useful target for intervening to increase patient engagement in weight loss treatment. Given the diversity of preferences for different features of treatment, it may also be useful to offer multiple treatments with different features in order to increase treatment uptake.

Compliance with ethical standards The findings reported have not been previously published and the manuscript is not being simultaneously submitted elsewhere.Portions of this data have previously been presented at the Annual Meeting of the Society for Behavioral Medicine in 2015. The authors have full control of all primary data and agree to allow the journal to review data if requested.

Ethics statement: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Human and animal rights:

This article does not contain any studies with animals performed by any of the authors. Informed consent: Informed consent was obtained from all individual participants included in the study. This study was approved by the Durham VA Institutional Review Board.

Conflicts of interest: The authors declare that they have no conflicts of interest.

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