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J Health Care Poor Underserved. 2010 May ; 21(2): 617–628. doi:10.1353/hpu.0.0319.**Screening, Referral, and Participation in a Weight Management Program Implemented in Five CHCs****Daniel Clark, PhD, Lisa Chrysler, MS, Anthony Perkins, MS, Nicole R. Keith, PhD, Deanna R. Willis, MD, Greg Abernathy, MD, and Faye Smith, MA****Abstract**

Community health centers have the potential to lessen obesity. We conducted a retrospective evaluation of a quality improvement program that included electronic body mass index (BMI) screening with provider referral to an in-clinic lifestyle behavior change counselor with weekly nutrition and exercise classes. There were 26,661 adult patients seen across five community health centers operating the weight management program. There were 23,593 (88%) adult patients screened, and 12,487 (53%) of these patients were overweight or obese (BMI ≥ 25). Forty percent received a provider referral, 15.6% had program contact, and 2.1% had more than 10 program contacts. A mean weight loss of seven pounds was observed among those patients with more than 10 program contacts. No significant weight change was observed in patients with less contact. Achieving public health impact from guideline recommended approaches to CHC-based weight management will require considerable improvement in patient and provider participation.

Keywords

Obesity; weight management; primary care; behavior change

Obesity is among the most significant public health problems in the U.S. today.¹ Between 1987 and 2001, obesity alone accounted for 27% of the inflation- and population-adjusted rise in health care spending.² Only type-2 diabetes (DM2) (38%) and heart disease (41%) accounted for more, and both are obesity-related conditions.

There have been some important research developments regarding weight management over the last decade. First, modest weight loss is associated with very meaningful reductions in DM2 risk. Data from the Diabetes Prevention Program (DPP) trial showed that a 42% reduction in the risk of DM2 was achieved by a seven-pound weight loss.³ Second, this clinically meaningful level of weight loss has been achieved consistently in recent randomized trials that provide the U.S. Preventive Services Task Force recommended two or more patient-program contacts per month.^{4,5} Importantly, individual and group formats appear equally effective. Third, structured, effective, and complementary models for patient-program contact have emerged in the form of the Five As model of behavior change counseling⁶ and motivational interviewing (MI).^{5,7,8} Fourth, as part of a broader program,

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provider-patient communication has been shown to increase program participation. In a recent trial of a clinic-based weight management program, increased discussion between patients and providers was noted by patients as the most valuable component of the intervention.⁹

In this report, we present outcomes of the Take Charge Lite (TCL) weight management program, which was designed to incorporate each of the above efficacious elements, and to facilitate clinic, provider, and patient participation.¹⁰ For development and evaluation of TCL, we used the Reach, Efficacy, Adoption, Implementation, and Maintenance (RE-AIM) translational research model. This model highlights the need for adoption and implementation of programs that have both efficacy and reach.¹¹ The adoption, implementation, and maintenance components of RE-AIM may occur at the organizational or individual level. In the case of TCL, both patients and providers are important individual-level actors.

While we were able to design for intervention components shown in the literature to have some efficacy, less information was available on how best to maximize reach. Reach is the proportion of the target population exposed to the intervention and the representativeness of those exposed. Reach is a critical indicator of the potential impact of a program (reach x efficacy=impact). Unfortunately, reach is often difficult to determine from randomized trials.¹²

Reach can be improved through adoption and implementation. Unfortunately, due to high competing demands and time and resource constraints, primary care rates of adoption and implementation of preventive care recommendations in practice have been low.¹³ One suggested solution is to have PCPs use less than one minute to refer patients to lifestyle programs where the contact can take place.¹⁴ Elements of this approach were tested in the Robert Wood Johnson Prescription for Health (RWJ-P4H) program studies.¹⁵ Elements tested were automated screening,¹⁶ electronic facilitation of PCP referral, bridging primary care and community resources,¹⁷ and creating a health educator role within primary care.¹⁸ All of these elements were incorporated in TCL to maximize the adoption and implementation of primary-care based weight management.

Take Charge Lite was implemented in urban community health centers (CHCs). Community health centers provide or coordinate services for all members of their catchment areas regardless of ability to pay.^{19,20} With a focus on the components of the RE-AIM model, we report the percent of adult patients successfully screened for overweight or obesity, the percent of positive screens that received a PCP referral, the percent of referred patients with TCL contact, the number of contacts, and the association between number of contacts and weight loss.

Methods

Overview

This is a retrospective evaluation of a primary care-based, weight management program. Take Charge Lite is an ongoing quality improvement project that was developed to respond

to needs identified by PCPs and clinic administrators. In designing the program, existing guidelines and recent scientific literature were reviewed, and focus groups and interviews were conducted with providers and patients at the implementation sites to arrive at a community-accepted, guideline-recommended program. In initial interviews it was clear that CHC providers and staff were overwhelmed and would not be able to provide consistent services for weight management. Staff was therefore not relied upon for implementation of any component. Providers were initially given a five-minute presentation at a regular staff meeting, and information was posted at computer workstations. Providers receive monthly reports on the number of patients referred and the amount of program contact those patients are achieving.

Electronic screen and referral—Electronic review of medical records is used to determine age and BMI eligibility. Each positive screen (i.e., age 18 and BMI 25 or more) results in an electronic eligibility reminder that PCPs see at the time they are writing all other orders (prescription, referral, and procedure orders are done electronically), which generally occurs just after a patient visit and before the patient has checked out. With a single keystroke, providers generate a TCL referral that prints in the form of a prescription along with a letter explaining the program. Patients who were eligible but did not receive a referral at a particular visit, are still in the system for provider reminders and may receive a referral at the next visit.

Counseling—The Five A's of behavior change counseling (i.e., *advise, assess, agree, assist, arrange*)^{21,22} are represented in the TCL components. The program consists of: 1) electronic screening, eligibility reminders to providers, and TCL referral (*advise*), 2) survey *assessment*, 3) initial TCL “coach” (i.e., lifestyle counselor) visit for behavior change counseling and further *assessment* and *agreement* of goals, 4) ongoing TCL coach *assistance*, and 5) *arrangement* of resources and support.

Within three days of receiving a TCL referral, patients who have not yet made an appointment are called by a coach. At the first TCL appointment, a coach conducts and reviews an *assessment* with patients to reach an *agreement* on individual goals. The TCL coaches at two CHCs with many Spanish-speaking patients are bilingual. Spanish-speaking patients from other CHC sites can visit these bilingual coaches. At all sites, materials are available in both English and Spanish.

Coaches are trained in Behavior Change Counseling (BCC), which is a brief form of motivational interviewing (MI) for the time-limited primary care setting.²³ Within three months of initial training, BCC sessions of each coach are taped, evaluated, and used for training.²⁴ In general, counseling is focused on self-monitoring, confidence, and motivation in healthy lifestyle practices. Healthy lifestyle practices include methods to achieve nutrition modification (i.e., reduction in portion sizes, overall calorie, and/or fat intake), incorporating physical activity into activities of daily living, and increased participation in structured exercise programs. Patients with conditions that might require specific nutritional advice (e.g., DM2) receive a recommendation to see the CHC nutritionist. Coaches transmit this recommendation to the nutritionist.

Contact—Consistent with the U.S. Preventive Services Task Force (USPSTF)²⁵ recommendations, TCL's objective is to *assist* patients through counseling and support a minimum of two times per month. *Arrangement* of resources is carried out by coaches using a web-based tracking system to record all contacts with patients, as well as patient preferences for follow-up contact type (e.g., telephone, face-to-face, group) and frequency. The tracking system daily provides coaches with a list of patients to be contacted, indicating the purpose of the needed contact as well. There are many forms of contact available, and patients can choose any or all, including one-on-one counseling (either face-to-face or telephone), support groups, education classes, exercise classes, walking groups, and weigh-ins. These are all free and run by the TCL staff. Coaches also identify and arrange participation in existing programs throughout the community.

Data and measures—Five CHCs were used for the analyses reported below. These CHCs are staffed with anywhere from six to 11 full- and part-time PCPs (i.e., general internal medicine, family practice, and nurse practitioners), as well as temporary internal medicine residents. One CHC began the program April 3, 2006, three other clinics began April 2, 2007, and one clinic started August 4, 2007. The data used are from these start times to November 18, 2008. There were two sources of electronic medical records data used in this report. First, data were retrieved from the electronic Regenstrief Medical Records System (RMRS), which contains information from all outpatient visits, including encounter form data such as ethnicity, age, BMI, height and weight, PCP orders and referrals, diagnoses, and prescriptions.²⁶ Second, data were retrieved from the TCL web-based tracking system.

The RMRS-retrieved data included height, weight, ethnicity, age, BMI, major chronic illness diagnoses, depression, any psychiatric illness, substance use, and pregnancy. Common, weight-related diagnoses were identified from problem lists and lab values. Indicator variables for patient diagnoses included in our analyses were hypertension, diabetes, congestive heart failure, coronary artery disease, arthritis, and chronic obstructive pulmonary disease. Major depression and mental illness (primarily bipolar disorder and schizophrenia) were also included. Indicator variables for pregnancy within one year of current visit, substance abuse, including alcohol abuse and controlled substance abuse, and tobacco use were created. Substance abuse and tobacco use were based on data ever included in a patient's medical record and may or may not reflect the patient's status at the time of data collection.

Coaches entered data into the TCL tracking system when they had a contact with a patient and provided details of that contact. Amount of contact was determined by counting contacts with a coach recorded in the web-tracking system. All forms of contact were counted, with the exception of telephone reminder calls. Based on frequency data, contact was coded into the following categories; 1) no contact and no TCL referral (n=7,453), 2) TCL referral but no TCL contact (n=3,086), 3) one to five contacts (n=1,352), 4) six to 10 contacts (n=335), and 5) more than 10 contacts (n=261). As a quality improvement program, time-structured weight measures do not occur. Weight change analyses were only possible among patients who had at least two body weight measures recorded in their medical records during the period. Weights were available in the medical records from either or both CHC visits or TCL visits.

All sites used the Detecto 8430 scale. Patients who used walkers or weighed over 400 pounds were weighed using the Scale-Tronix 6702. Primary Care Center (PCC) staff was trained in the use of the scale by the TCL program director, including BMI calculation. Even so, CHC visit data sometimes consist of a body weight value only. In this case, BMI was determined by using the most recently available adult height. Body mass index calculated in this manner was only used when a recorded BMI was not available. Body mass index, including calculated BMI, was available in the electronic medical records for 88.4% of patients. We have coded BMI into four categories common in current practice; overweight (25–29.9), class I obesity (30–34.9), class II obesity (35–39.9), and class III obesity (40 or over). Weight change was computed as first recorded weight minus last recorded weight, which could have occurred any time during the observation period. First weight was always the weight at the time of referral. To be included in the weight change analysis, a subject had to have a last weight that was a minimum of 90 days after the first weight. There were 5,865 TCL eligible patients who had at least two weights 90 or more days apart.

Analyses—Analyses of deidentified medical records data were approved by the Indiana University/Purdue University–Indianapolis Institutional Review Board. Characteristics of patients with and without a TCL referral and of patients with and without two or more weight values during the implementation periods were compared using t-tests for difference between means and chi-squared tests for categorical measures. Our primary objectives for this report were: 1) percent screened, 2) percent referred, 3) patient-program contact, 4) weight change, and 5) the association between contact and weight change, adjusting for covariates. Unadjusted proportions and means were determined to meet objectives 1 through 4. In exploring the relationship between program contact and weight change we controlled for all variables shown in Table 1, as well as number of days between referral and end of observation period, using ordinary least squares regression. The sample size for this model was 5,865 (those with two or more weights). To assess the influence of outliers, we ran all models with weight change for each subject truncated to plus or minus 40 pounds. This did not change the pattern of findings but the amount of weight change was reduced by about 15%.

We report results from data combined for all five CHCs, but replicated the results in each CHC separately to determine whether findings based on the aggregated data held true of each individual CHC.

Results

Eighty-eight percent of patients with visits in the implementation period were successfully screened for overweight or obesity and 12,487 (53%) of these patients screened positive. Among those overweight or obese, 5,034 (40.3%) received a TCL referral from their PCP and 7,453 did not. Table 1 compares characteristics of those referred and those not. Those referred tended to be older, were more likely female, were less likely to have a history of tobacco use or substance abuse, and were more likely to have arthritis, hypertension, or diabetes. Those referred had a mean BMI of almost 39, compared with 32.4 for the non-referred group.

Among patients who screened positive for overweight or obesity, 1,948 (15.6%) had at least one TCL contact. Figure 1 shows the distribution of TCL contact among those referred. Note that just 2.1% had more than 10 program contacts.

Although not shown, demographic and chronic illness measures for the patient groups that did (n=5,865) and did not (n=6,622) have two weight values over the implementation period indicate that the latter group was older on average, more likely female, European American, and had a slightly higher BMI and more chronic illness.

Unadjusted weight change was close to zero for those with no referral (+0.10 pounds), referral only (+0.11 pounds), or one to five program contacts (-0.69 pounds). Weight loss averaged 1.1 pounds for those with six to 10 contacts and 7.1 pounds among those with more than 10 contacts. Table 2 shows weight loss by referral and level of contact, adjusting for the demographic, chronic illness, and BMI covariates shown in Table 1, as well as time between first and last weight. Among patients with a referral only and among patients with one to five TCL contacts, there was a mean 2-pound weight gain relative to patients who did not receive a referral. Patients with six to 10 contacts showed no weight change, while patients with more than 10 contacts lost an average of 5 pounds.

Each of the five CHCs had different coaches, providers, and patients. Nonetheless, in data not shown, screening, referral, and contact rates within each individual CHC were very consistent with the overall results. The pattern of weight change by referral and contact level was also very consistent in each CHC with that based on the combined analyses shown above.

Conclusions

The TCL weight management program achieved high screening and relatively high referral rates. Randomized trials of electronic screening and ordering of preventive services²⁶ suggest that the use of electronic reminders and ordering is critical to achieving high implementation. The screening rate in the TCL program was 88.4%, and the PCP referral rate was just over 40%. Similar programs within the RWJ-P4H program achieved screening rates of 50% to 80%, but PCP referral rates of just 2%¹⁸ to 12%.^{6,16} Relatively speaking then, 40% is a high rate of referral. However, with point-of-care reminders and a simple keystroke ordering system, we had anticipated even higher ordering rates. We are uncertain why almost 60% of age- and BMI-eligible patients did not receive a referral. Through patient and provider interviews, we are finding that referral represents both provider implementation and patient adoption, because PCPs report that they rarely make referrals without a patient's expressed interest getting one. We are currently evaluating strategies to increase patient-provider discussion regarding weight. Overall, provider implementation needs improvement for primary care-based preventive care programs to have public health impact.

Confidence in our weight loss analysis is limited due to the design of this study. Patients who achieved more than 10 program contacts lost an average of 7.1 pounds in unadjusted analyses. This compares with 7 pounds over 12 months and 8 pounds over 18 months

achieved in similar lifestyle interventions tested in randomized controlled trials.^{5,27} These interventions, however, provided between 30 and 36 contacts. Among 98 (1% of all eligible) patients with more than 20 TCL contacts, mean weight loss was 9.7 pounds (not shown).

Few (2.1%) eligible patients had program contact sufficient to achieve a clinically meaningful weight loss. At these participation levels, very high screening and referral rates are needed to have significant public health impact. Identifying ways to improve provider implementation and patient adoption is critical to achieving public health goals through clinic-based lifestyle weight management. Improving the efficacy of such programs is of course important, but increasing mean weight loss from 7 pounds to 10 pounds, for example, will have limited impact if reach remains low. Substantially more attention and resources are needed in the study of reach in clinic-based weight management programs, particularly among disadvantaged populations.

There are many limitations to this report. Take Charge Lite is a quality improvement project, the protocol is not fixed, and there has been no randomization. Our capacity for reach evaluation at the sites of this report was due to the existence of the electronic RMRS, but the reliance on those data is also a limitation. Body weight values came from the RMRS at baseline and either the RMRS or TCL for subsequent values, and we only had a second weight value for those who came in for another clinic or TCL visit during the observation period. Patients were not randomized and the association between program contact and weight change could be due to self-selection. We note that trials randomizing to level of contact have consistently demonstrated this is not the only explanation for the relationship between contact and weight loss.

Although implemented in CHCs of one health system, for several reasons the results reported here have some generalizability. First, we found similar results across five CHCs with independent providers, patients, and program personnel. Second, the intervention content was not unique but rather was developed to be consistent with best recommended practice. Third, the ethnically diverse, socioeconomically disadvantaged patient population is typical of CHC populations. Finally, due to our design, what we have reported is based on all adults with at least one visit to the CHCs in the implementation periods.

Of the reach, efficacy, adoption, implementation, and maintenance elements of the RE-AIM translation research framework,¹¹ we were best able to address reach, patient adoption, and provider implementation. Efficacy is represented in our weight change data, but there are serious limitations to those data as we have discussed. Adoption refers to the clinic sites. Adoption has now occurred in all but one of the eight CHCs of the target health system, but adoption dates have varied, primarily due to space availability. With the exception of PCP referrals, implementation of program components was carried out by dedicated TCL staff. We are certain that had we relied on existing CHC staff and resources, adoption and implementation would be considerably lower. Thus, adoption and implementation of the TCL program requires, in addition to clinic space, access to funds for the support of a coach. Coaches had two- or four-year degrees, primarily in health or exercise science. At the reported implementation and adoption rates, one coach has been able to manage a CHC with 8,000 adult patients per year. Dividing the coach salary by this number of patients works out

to just \$5 per patient, but \$25 per TCL-referred patient, and \$64 per TCL-contacted patient. If the cut for successful treatment is more than 10 contacts, the coach salary cost is \$476 per successfully-treated patient.

Maintenance refers to longevity of the program and its effect over time. The chief executive officer of the health system has publicly stated that she is committed to maintaining TCL services beyond the timeline of the current foundation award. Long-term maintenance, however, will require improvements in reach and patient-program contact, while reducing resource use. As noted, we are evaluating strategies to facilitate further provider-to-patient communication, reduce or eliminate the need for clinic space, increase the frequency of patient contacts using information technology, increase the percentage of coach services that are provided in a group format, and build patient-to-patient support networks.

For clinic-based lifestyle weight management programs to be widely adopted and implemented, programs must have a low reliance on clinic staff and resources. However, such programs must also meet a base level of reach and efficacy to have public health impact. At present, meeting this base level of reach and efficacy seems to require program-patient contacts of the intensity recommended by the USPSTF. Electronic contact may not work as a substitute for human contact. A very recent trial showed that frequent electronic contact was not more effective than no contact.^{28,29} Referring patients to existing, community-based services transfers the costs from the clinic to the community or patient. Most such services require payment and this will result in very low reach within low-income populations served by CHCs. Thus, building and testing solutions to the opposing requirements of minimal resource use and frequent program-patient contact seems critical to achieving relevant public health goals through CHCs.

Notes

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Biography

Daniel Clark is a medical sociologist with a focus on health promotion among older adults and socioeconomically disadvantaged populations. **Lisa Chrysler** is director of the Take Charge Lite weight management program for Wishard Health Services. **Anthony Perkins** is a biostatistician with expertise in web-based data tracking and longitudinal data management and analysis. **Nicole Keith** is an exercise physiologist with a primary interest in health promotion through physical fitness. **Deanna Willis** is a family practitioner and director of quality improvement for Indiana University Medical Group. **Gregory Abernathy** is a Regenstrief programmer who implements the display of care reminders in an electronic format. **Faye Smith** is manager of the Regenstrief Data manager group and has 15 years of experience managing and analyzing electronic medical records.

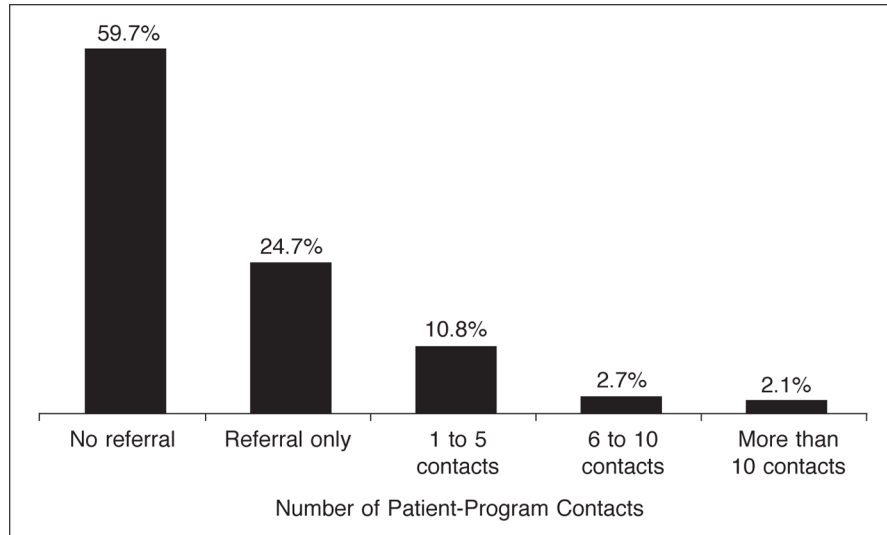


Figure 1. Distribution of PCP referral and patient-program contact in five community health centers (N=12,487).

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Table 1

DEMOGRAPHIC CHARACTERISTICS, BODY MASS INDEX (BMI), SUBSTANCE USE, PREGNANCY IN PAST ONE YEAR, PSYCHIATRIC ILLNESS, AND PREVALENT WEIGHT-RELATED CHRONIC ILLNESSES FOR TAKE CHARGE LITE (TCL) ELIGIBLE PATIENTS WHO RECEIVED A REFERRAL AND DID NOT

	All TCL Eligible (n=12,487)	Referral (n=5,034)	No referral (n=7,453)	p-Value
Demographic characteristics(%)				
Mean age (SD)	43.3 (15.0)	44.3 (13.3)	42.7 (16.0)	.001
Female	71.2	77.0	66.8	.001
Other race/ethnicity	2.8	2.1	3.2	.001
Hispanic-American	19.8	18.2	20.9	
African-American	43.6	45.9	42.1	
European-American	33.8	33.9	33.8	
Any pregnancy in the past one year	4.7	2.7	5.9	.001
Weight and BMI				
Mean weight (SD)	209.1 (59.9)	231.6 (61.2)	194.4 (46.7)	.001
Mean BMI (SD)	34.7 (8.6)	38.7 (9.2)	32.4 (7.2)	.001
Substance Use (%)				
Tobacco use	33.4	30.7	35.2	.001
Any substance abuse	8.6	6.3	10.1	.001
Psychiatric diagnoses (%)				
Any psychiatric illness	10.8	10.8	10.7	.953
Major diagnoses (%)				
Arthritis	15.2	17.8	13.4	.001
Congestive heart failure	6.5	6.4	6.6	.796
Chronic obstructive pulmonary disease	19.2	20.9	18.1	.001
Type 2 Diabetes	26.0	30.6	22.9	.001
Hypertension	63.9	71.2	58.9	.001
Myocardial infarction	9.9	9.7	10.0	.625
Depression	29.5	33.5	26.8	.001

BMI = body mass index

SD = standard deviation

TCL = Take Charge Lite

Table 2

WEIGHT LOSS REGRESSED ON TCL-PATIENT CONTACT, ADJUSTING FOR TIME BETWEEN FIRST AND LAST WEIGHT, BODY MASS INDEX (BMI), DEMOGRAPHIC CHARACTERISTICS, SMOKING, SUBSTANCE ABUSE, PREGNANCY IN PAST ONE YEAR, PSYCHIATRIC ILLNESS, AND PREVALENT WEIGHT-RELATED CHRONIC ILLNESSES AMONG TCL ELIGIBLE PATIENTS (n=5,865)

Variable	Parameter Estimate	Standard Error	p-value
Pregnancy in past one year	0.57	1.01	.574
Time between first and last weight	-0.004	0.001	.001
TCL contact			
More than ten TCL contacts	-4.92	1.16	.001
Six to ten TCL contacts	0.76	1.08	.482
One to five TCL contacts	2.01	0.69	.004
TCL Referral but no contact	2.01	0.63	.002
No TCL referral	reference		
Demographic characteristics			
Age	-0.14	0.02	.001
Female	-0.15	0.54	.786
Other race/ethnicity	-0.38	1.46	.795
Hispanic-American	-1.69	0.73	.020
African-American	0.82	0.52	.120
European-American	0.00	.	
Body Mass Index			
BMI 40 or more	-5.83	0.70	.001
BMI 35 to 40	-2.54	0.69	.001
BMI 30 to 35	-2.25	0.58	.001
BMI 25 to 30	reference		
Substance use			
Smoking history	-1.02	0.51	.043
Substance abuse	-1.02	0.85	.230
Psychiatric illness			
Depression diagnosis	-0.55	0.51	.286
Any psychiatric diagnosis	1.31	0.67	.052
Chronic illness diagnoses			
Arthritis	-0.28	0.62	.656
Congestive heart failure	0.021	0.85	.980
Chronic obstructive pulmonary disease	0.23	0.55	.684
Type 2 diabetes	0.84	0.52	.107
Hypertension	-0.10	0.63	.870
Myocardial infarction	0.25	0.72	.735
Intercept	-9.60	1.17	.001
Model R-square 0.04			

BMI = Body Mass Index

TCL = Take Charge Lite

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