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Percent weight reduction required to achieve minimal clinically important improvements in health-related quality of life among African Americans: A secondary analysis of the fit body and soul study

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ABSTRACT

Objective: To calculate the percent weight reduction required to achieve minimal clinically important improvement (MCII) in health-related quality of life (HRQOL).
Design: Secondary data analysis from the longitudinal cohort of a single-blinded, cluster-randomized community trial to test the efficacy of the faith-based adaptation of the Diabetes Prevention Program.
Setting: African-American churches.
Participants: This study included 472 congregants with a body mass index of ≥25 and fasting plasma glucose < 126 mg/dl.
Main outcome measure: Percent weight reduction required to achieve the MCII in HRQOL measured by two instruments, SF-12 and EQ-5D, one year following baseline.
Analysis: The percent weight reduction required to achieve established MCII in SF-12 Physical Component Summary (PCS), SF-12 Mental Component Summary (MCS), and EQ-5D Health Status (HS) at one-year follow-up were calculated using fitted linear regression models. In addition to models for the total sample, we generated models, stratified by baseline BMI, PCS, and HS, to calculate the percent weight reduction required to achieve MCII in HRQOL for those most in need of weight reduction and those in need of improved HRQOL.
Results: The percent weight reduction was a significant predictor of improvement in the SF-12PCS and the EQ-5DHS but not SF-12MCS. To achieve a MCII in SF-12PCS and EQ-5DHS, 18% and 30% weight reductions were required, respectively. A smaller percent weight reduction was required when the baseline BMI was ≥40.
Conclusions and implications: Improvements in HRQOL among African-American congregants seeking weight reduction required more than the 3–5% weight reduction associated with improvements in physical health.

1. Introduction

Obesity remains a prevalent health problem. Among African Americans in the United States, over 76% of Non-Hispanic Black adults have a body mass index (BMI) above the recommended range (Flegal, Carroll, Kit, & Ogden, 2012). Obesity has long been associated with poor health-related quality of life (HRQOL) (Anandacoomarasamy et al., 2009; Doll, Petersen, & Stewart-Brown, 2000; Fontaine & Barofsky, 2001; Forhan & Gill, 2013; Jia & Lubetkin, 2010; Kolotkin, Meter, & Williams, 2001). While the burden of obesity has increased over time with African-Americans bearing the largest burden (Jia & Lubetkin, 2010), reports of HRQOL among African Americans have been mixed. African-American women report better HRQOL than their White counterparts (Kolotkin, Crosby, & Williams, 2002; White, O'Neil, Kolotkin, & Byrne, 2004). Overweight African Americans report better HRQOL than underweight and obese African Americans (Bentley et al., 2011). A number of factors have been proposed to explain the mixed findings related to HRQOL among African Americans. Cultural differences and perception of body weight may be contributing factors (Kumanyika, Wilson, & Guilford-Davenport, 1993; McDonough et al., 2013). In addition, many variables including age, gender, education, employment or income, marriage, history of smoking, and chronic disease have been associated with HRQOL (Huisingh-Scheetz, Bilir, Rush, Burnet, & Dale, 2013). Although other factors may affect HRQOL, evidence suggests that obesity has a major influence on HRQOL (Anandacoomarasamy et al., 2009; Doll et al., 2000; Fontaine & Barofsky, 2001; Forhan & Gill, 2013; Jia & Lubetkin, 2010; Kolotkin et al., 2001).

While improved physical function is associated with a 3% to 5% weight reduction, it is not clear what percentage of weight reduction

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is required to achieve a meaningful benefit or minimal clinically important improvement (MCII) in HRQOL among African Americans (Jensen et al., 2014; Magkos et al., 2016). In a recent meta-analysis, HRQOL rarely improved without weight reduction (Warkentin, Das, Majumdar, Johnson and Padwal, 2014; Warkentin, Majumdar, et al., 2014). The meta-analysis did not address race/ethnicity (Warkentin, Das, et al., 2014; Warkentin, Majumdar, et al., 2014). The Obesity Society recognized the need and called for additional research related to race and improvements in quality of life with weight reduction (Jensen et al., 2014). About the same time, Canadian researchers reported that a 23% weight reduction was required to achieve a MCII in HRQOL among a primarily White (92%) sample seeking surgical intervention for weight reduction (Warkentin, Das, et al., 2014; Warkentin, Majumdar, et al., 2014). Therefore, the purpose of this study was to calculate the percent weight reduction required to achieve a MCII in HRQOL among African-American congregants seeking weight reduction in the Fit Body & Soul study using two measures of HRQOL: 1) SF-12 and 2) EQ-5D.

2. Methods

Using secondary data, we calculated the percent weight reduction required to achieve established MCII in HRQOL at one-year follow-up among a cohort of African American congregants seeking diabetes prevention via weight reduction in the Fit Body & Soul study. We examined baseline data from Fit Body & Soul, the parent study, including demographic, anthropometric, and metabolic data as well as data from self-administered questionnaires, including HRQOL. Anthropometric, metabolic, and HRQOL data were collected again at 12 weeks and 1 year. Methods of the Fit Body & Soul study are reported elsewhere in detail. Briefly, the Fit Body & Soul study was a single-blinded, cluster randomized, community trial designed to test the efficacy of the faith-based adaptation of Group Lifestyle Balance, which was modified from the Diabetes Prevention Program, as compared to a health education program, among non-diabetic African Americans; the primary outcome was weight reduction (Sattin et al., 2016; Williams et al., 2013). Participants were recruited from 20 urban and rural churches in the Augusta, GA area. Baseline data were collected from October 2009 to March 2012; the final follow-up data collections were completed in March 2013. All participants gave informed consent. The Augusta University Institutional Review Board approved the study.

2.1. Inclusion and exclusion criteria

Briefly, participants from the Fit Body & Soul study included those who: 1) were between the ages of 21 and 64 years; 2) self-identified as African-American; 3) had a BMI ≥ 25; and 4) were planning to remain in the community for at least one year. We excluded participants with a fasting plasma glucose (FPG) ≥ 126 mg/dl or glycosylated hemoglobin (A1C) ≥ 7% and those who had medical contraindications to physical activity, physical conditions or medications that might impact glucose metabolism, behaviors that may interfere with participation, and diseases that would limit life span. For this analysis, we included only those with complete data for anthropometric, metabolic, and HRQOL measures; thus, our sample included 472 of the original 604 Fit Body & Soul study participants (78%). Participants with complete data were older (47 ± 10.5 vs 44 ± 12.1 years of age) and had higher baseline scores on the EQ-5D HS (79 ± 14.8 vs 75 ± 17.2) when compared to those with incomplete data ($p < 0.05$).

2.2. Data collection and measures

At the baseline Fit Body & Soul visit, data collectors obtained background data, anthropometric data, and data from self-administered questionnaires. Background data included age, gender, education, marital status, employment status, history of smoking 100 or more cigarettes, alcohol consumption in the last 30 days, and knowledge of a parent having type 2 diabetes. In addition, laboratory specialists collected blood samples to determine diabetic status (FPG ≥ 126 mg/dl or A1C ≥ 7%). The basic protocol is presented elsewhere in detail (Sattin et al., 2016; Williams et al., 2013). However, procedures for data collection related to obesity and HRQOL are highlighted here.

2.2.1. Health-related quality of life

Health-related quality of life was measured with the SF-12 and EuroQuality of Life (EQ-5D). Version 2 of the SF-12 (SF-12v2®), a self-administered 12-item instrument, was used in this study and has been validated in a wide variety of populations (Ware, Kosinski, Turner-Bowker, & Gandek, 2002). The instrument covers eight domains: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and, mental health. We followed the Norm-Based Scoring protocol for the SF-12v2® to compute the eight scale scores and the two summary measure scores (Physical Component Summary and the Mental Component Summary). For this analysis, the Physical Component Summary (PCS) and the Mental Component Summary (MCS) scores were used. The SF-12 has the advantage of being shorter than the SF-36 and been shown to be highly correlated with SF-36 for all BMI groups (Wee, Davis, & Hamel, 2008). However, the PCS of SF-12 was better at explaining differences in HRQOL among persons with various BMIs than the PCS of SF-36 (Wee et al., 2008). We defined the minimal clinically important improvement (MCII) in both PCS and MCS to be a value of 5, consistent with Warkentin, Majumdar, et al. (2014).

In addition to the SF-12, we used the EQ-5D (EuroQOL Group, 1990). The EQ-5D is a brief, self-administered instrument that evaluates five single-item health dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each item has response options of "no problems, some problems, extreme problems". The EQ-5D also includes an overall health status (HS) question measured using a visual analog scale (VAS) which is a vertical, graduated (0–100 points) "thermometer," with 100 representing "best imaginable health state" at the top and 0 representing "worst imaginable health state" at the bottom. For this analysis, only this final item on the EQ-5D, the VAS, was used. We defined the minimal clinically important improvement (MCII) in HS to be a value of 10, consistent with Warkentin, Majumdar, et al. (2014).

2.2.2. Anthropometric data

We used three measures of obesity, body mass index (BMI), waist circumference (WC) and waist-to-height ratio (WHt Ratio). Data collectors measured weight (in kilograms) and height (in centimeters) using the Seca 703 high-capacity digital scale fitted with the Seca 220 height rod. BMI was calculated as weight in kilograms divided by height in meters squared. Data collectors measured waist circumference (WC) using the Gulick II tape measure touching the skin mid-point between the lowest palpable rib and the iliac crest. WC was recorded to the nearest tenth of a centimeter. WHt Ratio was calculated as waist circumference in centimeters divided by height in centimeters.

2.3. Statistical analysis

Initially, we characterized the sample using descriptive statistics. Linear regression was used to model improvement in HRQOL measures as a function of the percent weight reduction from baseline to one-year follow-up. We then adjusted for age, gender, baseline BMI, baseline A1C, and group assignment (Fit Body & Soul treatment or health education comparison) using multiple regression. Final models included only statistically significant explanatory variables ($p < 0.05$). Then, to be consistent with Warkentin, Majumdar, et al. (2014) adjustments were made for age, gender, and baseline BMI. The percent weight reduction coefficients from each of the linear regression models were used to calculate the percent weight reduction required to achieve established minimal clinically important improvement in SF-12 Physical Component