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Self-Help Obesity Prevention Program in Stokvels: A Social Media Intervention

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Abstract. Recent studies such as the South African National Health and Nutrition Examination Survey (SANHANES) indicate rates of overweight (26%) and obesity (41%) among the black South African female population, which represents a major public health threat. Social groups can be empowered as a channel for behaviour change. One group, the Stokvel, a private credit union in which black South Africans pool their money, offers a distinctive opportunity for capacity building and obesity prevention interventions. The Self-Help Obesity Prevention Program in Stokvels (SHOPPS) will offer a wellness program comprising a healthy diet, increased physical activity (PA), and a self-help cognitive-behavioral intervention for black South African women in Stokvels. Mobile phones and evidence-based, Web-based weight control programs are promising approaches for obesity prevention and SHOPPS will demonstrate their potential in conjunction with social support activities. This paper describes the SHOPPS conceptual framework, methods, protocol, and intervention strategy using digital media.

1 Introduction

The global obesity epidemic is an urgent public health problem [1]. Recent population-based obesity prevention efforts have applied an ecological model of health, which represents best practice [2]. Mobile health (mHealth) technologies are a new level of social ecology to affect obesity risk factors [3-4]. The current paper reports on a research protocol for a new study, the Self-Help Obesity Prevention Program in Stokvels (SHOPPS) intervention.

In September 2011, the United Nations (UN) resolution 65-238 called for new NCD prevention efforts [5]. South Africa's Strategic Plan for the Prevention and Control of NCDs 2013-17 specifically calls out NCDs as a threat to the country's health and health care in the next two decades [6]. Evidence of what interventions work and capacity building in local organizations and populations is needed to combat NCDs in South Africa.

The practice of unhealthy lifestyle behaviors such as inactivity, poor diet, stress, and overweight/obesity in black South African adult women, who represent a majority of *Stokvel* members nationwide, are detrimental to their

own health and communities, families and social groups. [7-8]. BMI values of black women indicate that 25 % are overweight (BMI = 25-29.9), 40.7% are obese (BMI>= 30), or 65.7% combined based on recent South African Health and Examination Survey (SANHANES) data [9]. This is a substantial increase from the 56.2% observed in a 2003 national survey [10]. Some 10.2% of black women were hypertensive; 24.9% had abnormal serum cholesterol; 45.4% had abnormal HDL-cholesterol values; 29.5% had abnormal LDL cholesterol values; 19.4% had abnormal triglycerides and 8.2% had HbA1c values above 6.5%. Obesity and sequalae (e.g., type 2 diabetes) have negative effects on adult South African's health [11-12].

Numerous studies have shown that health promotion in community and social group settings can improve adults' morale, health, fitness and dietary intake [13-14]. One reason for this may be that within-group social dynamics (e.g., support, mutual accountability, friendly competition) help group members to achieve personal or group health goals [15]. *Stokvels* have been defined by the president of the South African National Stokvel Association (SANSA), Andrew Lukhele as: "a type of credit union in which a group of people enter into an agreement to contribute a fixed amount of money to a common pool weekly, fortnightly or monthly" [16]. As social groups focused on finance and investments, the *Stokvels* offer social support for obesity reduction, supported by a technology intervention. Thus a wellness program for *Stokvel* members comprising a healthy diet, increased physical activity (PA), and a self-help cognitive-behavioral intervention may reduce or prevent obesity risk behaviors, and related chronic NCDs, as advocated by the World Health Organization (WHO) [17-18].

The *Self-Help Obesity Prevention Program in Stokvels (SHOPPS),* focuses squarely on the new NCD prevention priority in a country at ground zero for the global epidemic. *SHOPPS* will use the innovative approach of working with female-only *Stokvels* in the Johannesburg area through mobile and Web technology to promote healthy eating and active living (HEAL) and weight loss.

This paper describes the *SHOPPS* conceptual framework, methods, protocol, and intervention strategy using digital media. *SHOPPS* will use mobile and Internet technologies to provide cognitive-behavioral feedback to promote HEAL. The primary outcome of interest is weight loss of 5% among *SHOPPS* participants compared to control. We will conduct a cluster randomized controlled trial (RCT) of *SHOPPS*. Participants will get detailed, tailored feedback on nutrition and PA through their mobile phones and online regarding how to overcome barriers to HEAL behavior change in their community, and help to track progress in managing their weight. Tailoring

will occur through customized text messaging and online feedback based on individual progress. This will include making a personal resolution to lose 5% of their body weight, the target for this intervention, and will include a financial incentive for the *Stokvel* group (group reward if each member reaches her individual goal). Participants will use the Website to track personal progress and receive tailored feedback. We posit that increased engagement with the program, feedback, and creation of a program 'brand identity' to represent a 'trusted friend and advisor' will promote HEAL behaviors [19-20]. *SHOPPS* is based on Cognitive-Behavioral Therapy (CBT) [21-22], and Social Cognitive Theory (SCT) [23]. Outcomes include changes in HEAL behaviors and weight loss.

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Mobile phones are poised to be a powerful tool to promote health in South Africa. As reported by the United Nations Foundation (2009), Project Masiluleke in South Africa reaches up to one million people each day with HIV prevention, testing and treatment information [32]. Some mHealth studies on weight loss, nutrition and PA promotion in developed countries have shown promise. Patrick and colleagues (2009) found, that compared to control, SMS and Multimedia Message Service (MMS) participants adjusted average weight loss was 1.97 kg greater [33]. Hurling and colleagues (2007) found that an Internet and mHealth intervention among overweight adults that included reminders produced over 2 hours more PA per week compared to adults with no access [34]. Joo and colleagues (2007) found that weekly text messages about diet and PA behavior promoted weight loss [35]. Our use of SMS in *SHOPPS* is significant in that it will extend the evidence base in mHealth and obesity prevention to developing countries [36].

2 Methods

We will evaluate *SHOPPS* in a cluster RCT. A total of 22 *Stokvels* (average 20 members per *Stokvel*) will be randomized to a *SHOPPS* treatment group

and a control group (11 *Stokvels* in each). *Stokvel* members in both conditions will receive *SHOPPS* plus standard printed South African Department of Health (DOH) information on nutrition, PA and wellness. Participants assigned to the control group will receive the DOH information only. We will recruit *Stokvels* based on: 1) comparable size (15-25 members), 2) located in the Johannesburg metro area, and 3) all black African female members.

Additionally, the protocol requires that all individual participants have BMI of >25 kg/m^2 (i.e., overweight or obese). The goal is to maximize internal validity rather than external validity. As the *Stokvel* is the sampling unit, all members of a group will be in one study condition. We will include all members of a *Stokvel* that meets group criteria *in the intervention activities*. However, investigators will separately analyze those members who meet minimum individual BMI criteria for outcome evaluation purposes. This will enable full group participation by all members, but maintain intent-to-treat principles for analysis.

Aim 1: Conduct formative research with African women to tailor *SHOPPS* to the target population. Hypothesis (H) 1.1: Participants will have positive message receptivity to *SHOPPS* on validated scale [37]. Aim 2: Conduct a 6-month cluster RCT of *SHOPPS* in Johannesburg area *Stokvels*. H2.1: Compared to control, *SHOPPS* participants lose 5% more weight after 6 months. H2.2: *SHOPPS* brand equity will mediate intervention effects on HEAL and weight loss outcomes.

There are three sources of data for the cluster RCT: 1) Anthropometric data collected through onsite physical examinations; 2) self-report through an in-person questionnaire at baseline and after 6 months and 3) online recording of weight status and participation in intervention activities (eg, providing shopping lists). Note that the research team will test for serostatus, and HIV-positive women will be eligible. We anticipate that any HIV-positive women will have already begun HIV treatment before any possible wasting (weight loss) and *Stokvel* participation.

To ensure comparability and sufficient numbers of participants, the research team will only sample from Johannesburg *Stokvels*. The research team has a list of Johannesburg registered *Stokvels* from the South African National Stokvels Assocation (SANSA), which provides background information on these groups. Only *Stokvels* meeting inclusion criteria will be included. This will ensure relative homogeneity of *Stokvel* group environments.

The research team has calculated the required sample size for analysis of covariance in a cluster-randomized trial [38]. We set the two-sided significance level at 0.05 and power at 0.80. We assume a baseline mean (SD) of weight of 75 (18.0) kg. These are based upon figures from the recent

SAHANES [9], with minor adjustments reflecting the exclusion from our analyis of women with BMI<25 kg/m^2. We assume an intraclass correlation coefficient of 0.02 and refusal and attrition of 10%, and we estimate that the typical number of eligible women per *Stokvel* will be 13 (based on the 65.7% national average overweight/obesity among black African women and 20 members per *Stokvel*). Based upon temporal stability estimates [39-40], the six-month stability of weight will be 0.85. Finally, following previous studies, we seek to detect a 5.0% weight loss among treatment participants [41]. Thus the required baseline sample size is 131 participants, or 11 *Stokvels* averaging 13 members. This is similar to other web-based weight-loss studies [42].

Before the recruitment, the research team will visit each sampled *Stokvel* at their monthly meeting in person in the Johannesburg metro area and ensures that all group members fully agree to terms of the study and signs a written agreement to participate (part of the IRB protocol). Next the research team will conduct a second visit to the *Stokvel* at their subsequent monthly meeting, conduct group orientation of all members, describe the study using a pre-developed script, and recruit members. An initial 24-hour dietary intake recall will be done at this time, on a weekday. This will be conducted as a fun event with refreshments. At the second visit, the baseline assessment, including all instruments and a second 24-hour dietary intake recall, will be done, all on a weekend day. After the baseline interview, all participants will receive the SA DOH basic dietary guidelines printed brochure, a $5 equivalent gift card, and a t-shirt. Then the intervention will begin and *SHOPPS* participants will receive password-protected access to the Website. After 6 months, the team will follow up using same procedures and participants will receive another $5 gift card.

After six months, the research team will return to each *Stokvel* and administer the follow up assessments. We will administer a physical exam, as in the baseline assessment. The interviews will include a supplemental module of questions on intervention exposure and reactions with the two treatment groups. The supplemental module will be used to measure self-reported dosage of *SHOPPS* received and satisfaction/preferences for specific intervention components. All interviews will be conducted in person by the investigators. To ensure retention, we will contact a representative of the *Stokvel* by phone, e-mail, and text one week before follow-up. Participants will be tracked via unique case ID for confidentiality.

3 Discussion

SHOPPS will be tailored both to the individual's HEAL and weight loss goals and to their success or specific needs as they progress. Tailoring will be based on a) individual response to keywords through the mProve texting platform (based on an algorithm programmed by mProve that triggers individually tailored feedback texts) and b) information provided by participants , and goal progress captured through the *SHOPPS* Website.

The Website includes detailed information, self-help advice, and progress monitoring tools on diet, PA, and weight status. The program includes a Cognitive Behavioral Therapy (CBT) component to assist the participant in adopting positive behaviors in order to follow the program successfully. The Website comprises the following sections of information: 1) Health benefits of weight loss; 2) explanation of a reasonable body weight and what it comprises; 3) methods of changing current eating and PA behaviors; 4) a healthy eating plan which can be individualized; 5) a PA guide; 6) weight loss strategies; 7) maintaining weight loss and a PA program; 8) weight, diet and PA self-monitoring tools. Participants will be required to monitor their weight status and record this on a weekly basis. The Website also includes weekly activities which the participant follows in order to engage actively with every aspect of the program. The website will also link to numerous other wellness Websites, including those dealing with stress and tension. As the participants follow the program from week 1 through to week 26, they will receive feedback on physical activity and weight status. We hypothesize they will become engaged in *SHOPPS* and build brand equity, which mediates weight status and other outcomes.

Texts will be delivered through a platform that supports interactive SMS using a content management system that delivers texts. The *SHOPPS* protocol will be an application on the platform that captures keyword responses to texts received and includes an algorithm that calculates a tailored *SHOPPS* text response based on the participants' history. The research team will design a branching tree structure of tailored texts to be delivered based on participant response. For example, if a participant has a history of replying to keywords for physical activity texts, they may receive in-depth suggestions for convenient daily exercise options in the local community on weekdays and weekends. Thus the SHOPPS protocol will provide tailored text feedback and complement tailored website feedback on progress.

We will use a "group contest" approach with a prize equal to the annual contribution for a member of the *Stokvel* if all overweight (BMI>25) group members reach the outcome of 5% weight loss. Based on information

provided by SANSA, an average *Stokvel* member in Johannesburg contributes approximately $200USD equivalent (R2400 in South African Rand) to the group each year. If each overweight member of the group meets the goal of 5% weight loss, the research team will deposit $200USD into the group's collective *Stokvel* account, proportionally increasing the value of each member's share of the account. The contribution will only be made if every overweight group member meets her goal, providing added incentive for achievement of intervention goals according to behavioral economic theory [43-44]. All members will benefit from the incentive, including those who were not overweight at baseline, as it is a group benefit.

4 Conclusion

The study will build capacity in mobile health in South Africa with University and community partners, extend the evidence on use of digital technology for weight loss, and reach women at high risk of obesity and NCDs. It is highly scalable, and if shown to be efficacious, will provide a basis for social group based obesity interventions using digital media with other high risk populations in South Africa and other low and middle income countries.

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