J Community Health (2016) 41:368–375
DOI 10.1007/s10900-015-0106-1

ORIGINAL PAPER

# The Perceived and Actual Physical Activity Behaviors of African American Women

**Fern J. Webb[1] · Jagdish Khubchandani[2] · Liane Hannah[1] · Michelle Doldren[3] · Jevetta Stanford[1]**

Published online: 20 October 2015


**Abstract** Lack of physical activity is a leading contributor to obesity in the US. The unusually high rates of obesity in African-American (AA) women corroborate with lack of recommended levels of exercise in this population. The purpose of this study was to describe exercise behaviors and intention to change using the stages of change (SOC) model in a sample of AA women. A population-based observational study was conducted with 292 AA women in Florida. Outcome variables were engaging in aerobic, strength-based, and stretching exercise. More than half (61.25 %) did not engage in strength-based exercise, more than a third (37.7 %) did not engage in aerobic exercise, and a little less than half (45.9 %) did not participate in stretching exercise. SOC was the main independent variable. Women in action and maintenance SOC were significantly more likely to engage in aerobic exercise (OR 16.1, 95 % CI 7.09–25.7), strength-based exercise (OR 15.4, 95 % CI 6.58–22.7), and stretching exercise (OR 3.80, 95 % CI 1.91–7.52). The SOC is reflective of actual exercise behavior in AA women. A large number of AA women do not engage in regular recommended levels of exercise. Understanding SOC can be essential to developing culturally appropriate and motivation matched interventions for improving AA women's exercise habits.

✉ Jagdish Khubchandani
jkhubchandan@bsu.edu

[1] University of Florida, Jacksonville, FL 32208, USA

[2] Ball State University, Muncie, IN 47306, USA

[3] Nova Southeastern University, Fort Lauderdale, FL 33328, USA

**Keywords** African-American women · Exercise · Behavior · Stages of change

Obesity rates have more than doubled in US adults in the last three decades [1]. While recent estimates suggest that overall rates plateaued or even declined among some groups, obesity is widespread and continues to be a leading public health problem [1, 2]. More than two-thirds of US adults are overweight or obese [2]. In general, rates of overweight and obesity are higher in African-American adult women than any other racial or ethnic group. Recent national data show that 82.0 % of Black women are overweight or obese compared to 77.2 % of Hispanic women and 63.2 % of White women [2]. In addition, over half of Black women are obese (compared to 37.1 % of Black men and 32.8 % of White women) [2].

Prevention of obesity is a major public health issue and lack of physical activity and exercise are known to be important determinates of obesity [3]. Despite the numerous benefits of physical activity and exercise and the recent recommendations by major health organizations, in 2014, less than half of women in the US reported regular participation in moderate or vigorous physical activity as recommended by health organizations with lower prevalence found among Black women [4]. Reasons why African-American women fail to be physically active or exercise continue to be explored although it is evident that African-American women participate significantly less often than other ethnic/racial group or gender [5, 6]. In fact, 2008–2010 data show that 51.3 % of African-American women participated in some level of aerobic exercises and 16.1 % who participated in some level of strength exercises compared to 66.1 % of White women who participated in some level of aerobic exercises and 26.2 % who participated in some level of strength exercises, respectively [7].

The search for more evidence on the factors that influence physical activity engagement in African-American women to subsequently inform intervention development continues. Developing interventions to improve physical activity will require identifying theories that inform understanding of African-American women's perceptions of various exercise behaviors and intention to engage in those behaviors.

The stages of change (SOC) construct of the transtheoretical model (TTM) has been used extensively to guide interventions to modify unhealthy behaviors [8]. According to the SOC, health behavior change involves progression through five stages: (1) precontemplation representing no intention of changing behavior in the foreseeable future (defined as the next 6 months); (2) contemplation representing an intention to change within the next 6 months; (3) preparation representing an intention to change within the immediate future (defined as the next month); (4) action representing that a behavior change has been made within the past 6 months; and (5) maintenance representing changes made and sustained for 6 months or longer [8].

The SOC construct of the TTM has been found to be successful in developing effective interventions for tobacco use prevention [8]. The model has also been used to explain and modify obesogenic behaviors like unhealthy diet (especially with African-American women) [9, 10]. However, SOC has not been adequately tested with African-American women in relation to their exercise behaviors. Understanding African-American women's perception of their stage of physical activity and actual exercise behavior could provide important insight for continual intervention developments. For example, a recent study found that for some dietary behaviors, African-American women in action and maintenance SOC were less likely to eat healthy compared to women in contemplation or preparation SOC. The perception of being in a stage was not always consistent with actual behaviors regarding diet [9]. On the contrary, little is known about exercise habits among African-American women and the association of exercise habits with intention to change. Thus, the purpose of this study was to examine the association between SOC and exercise habits in a sample of African-American women.

## Methods

### Participants and Study Design

This cross-sectional population based study was approved by the University of Florida Institutional Review Board-03. African-American research assistants recruited women living in four urban environments throughout Florida. Information about the study was distributed at churches, daycares, grocery stores, hair salons and sorority meetings in four major towns of Florida, US (i.e. Fort Lauderdale, Jacksonville, Miami, and Tampa, and at the four collaborating universities). Information about the study was also posted on community and university websites, and shared throughout the authors' professional, social, and personal networks. An a priori power analysis for external validity of the results was conducted.

Based on an eligible population of approximately 1.4 million adult African-American women in Florida, and a 75/25 split with regard to the practice of interest (i.e. assuming that less than a fourth of all participants would be engaging in healthy eating), it was determined that a sample of 289 adult African-American women would be needed to make inferences to the total population with a sampling error of $\pm 5$ %, at the 95 % confidence level [11]. A total of 350 women agreed to participate in the study and 292 women met inclusion criteria (being African-American, $\geq 18$ years of age, and living in Florida).

### Instrument, Variables, and Measures

A questionnaire with face validity was developed for this study based on a comprehensive literature review on African-American women's exercise habits and SOC. The questionnaire was developed using items from the behavioral risk factor surveillance system (BRFSS) survey, a national household assessment about lifestyle and behavior. African-American women from the community ($n = 9$) and three (3) survey research and public health experts, ages 18–60 years old, reviewed the questionnaire to ensure content validity. Questions were reworded, condensed, or deleted as a result of reviewers' feedback. The final questionnaire consisted of 90 items assessing health behaviors, health status, overall health views, SOC for health behaviors, and socio-demographic factors.

#### *Readiness to Change Physical Activity*

Readiness to change exercise habits was measured by the statement "Indicate how ready you are to make the changes or improvements in your health in the following areas: be physically active." Responses were "haven't thought about changing (precontemplation)", "plan a change in the next 6 months (contemplation)", "plan to change this month (preparation)", "recently started doing this (action)" and "do this [practice] regularly [last 6 months] (maintenance)". The SOC questions were modeled from Prochaska and Velicer's TTM and Sutton's single-item measure guidelines to increase validity [12, 13].

*Current Physical Activity*

Physical activity was assessed using three items: aerobic exercise—"How many days per week do you take part in some type of aerobic exercise of at least 20–30 min duration (fitness walking, cycling, jogging, swimming, aerobic dance, active sports)? Responses were 'none', '1', '2', '3', '4', '5', '6' or '7 days'. Strength exercises were assessed by asking "How many times per week do you do strength-building exercises such as sit ups, pushups, or use weight training equipment?" Responses were 'None", 'Once per week' '<Twice per week', or 'Three or more times'. Stretching exercises were assessed by asking "How many times per week do you do stretching exercises to improve flexibility of your back, neck, shoulders, and legs?" Responses were 'None', 'Once per week' '<Twice per week', or 'Three or more times'.

*Healthy Eating Index*

Given the association between diet and physical activity, a healthy eating index was created to control confounding. Thus, the healthy index ranged from 0 to 6, resulting from a 'Yes' response to each of the following: eating breakfast every day; seldom or never eating unhealthy snacks; seldom or never adding salt to foods; eating ≥4 fruits and vegetables per day; eating only low fat foods; and eating only whole grain products.

*Family Disease History*

Ranging from 0 to 8, family disease history was determined by summing 'Yes' responses to having any of the following disease conditions in the family: breast cancer; colorectal cancer; coronary heart disease, heart attack, or coronary surgery; depression; diabetes; high blood pressure, high blood cholesterol; thyroid disease.

*Personal Disease History*

Ranging from 0 to 12, personal disease history was determined by summing 'Yes' responses to having any of the following disease conditions: asthma; bowel polyps or inflammatory bowel disease; cancer; chronic bronchitis or emphysema; coronary heart disease, congestive heart failure, angina, heart attack, or heart surgery; depression; diabetes; high blood pressure; sciatica or chronic back problems; stroke; thyroid disease.

### Data Analysis

For the purpose of this study, physical activity, SOC to be physically active, age, family and personal health history, BMI, education, income, marital status, a measure for healthy eating and socio-demographic factors were included in analyses. Data were analyzed using SAS version 9.13. Data were tested for normality, and analyzed using nonparametric tests of Chi square statistics and logistic regression. Logistic regression was used to analyze associations between each exercise practice (dependent variable) and SOC (independent variable), controlling for socio-demographic characteristics and health status. Significance levels were assumed a priori at $p < .05$ for all analyses.

Each exercise practice was separately modeled as the dependent variable and dichotomized as 'yes'/'no' (for aerobic exercise, strength exercise, stretching exercise) where participating in aerobic exercise, strength exercise or stretching exercise for ≥1 day per week was coded as 'Yes'; those reporting 'None' was coded as 'No'.

SOC was dichotomized into precontemplation, contemplation and preparation as the referent group, and action and maintenance as the comparison group. Age, BMI, family and personal disease history, and healthy eating index were included as continuous variables while education, income and marital status were included as categorical variables. Education was dichotomized into 'bachelors/masters/doctorate' versus 'high school or less'. Marital status was dichotomized as 'married' versus 'others' comprised of single, divorced, separated and widowed.

## Results

### Background and Demographic Characteristics

A total of 292 African-American women participated. Table 1 shows demographic characteristics of respondents. Overall, the average age was 36.4 years with more than half having at least a Bachelor's Degree. Almost a fifth (24 %) of respondents earned between $30–$49 K and 45.6 % were never married. The healthy eating index, on average was 1.93 where 83.8 % reported ≤3 healthy eating habits. Regarding general health status, the average BMI was 27.5 while 85.9 % of respondents report having a family history of 1–4 chronic diseases. On the other hand, 55.9 % of respondents report having none of the listed disease conditions.

### Exercise Practices Among Study Participants

Table 2 shows the percent of respondents who report participating in aerobic-, strength- and stretching- exercises. While more than a third (37.7 %) reported not participating in any aerobic exercise each week, 12.8 % report participating in aerobic activity ≥5 days each week. Regarding

**Table 1** Participant demographics

| | Overall % |
|---|---|
| Average age: n = 292, mean [SD] | 36.4 [12.2] |
| Education/highest degree earned, n = 287 | |
| None | 0.35 |
| GED | 1.40 |
| HS diploma | 30.31 |
| Bachelor's degree | 32.40 |
| Master's degree | 15.68 |
| Doctorate | 3.48 |
| Other | 16.38 |
| Household income, n = 281 | |
| <10,000 | 8.19 |
| 10,000–19,999 | 6.05 |
| 20,000–29,999 | 13.17 |
| 30,000–49,999 | 24.20 |
| 50,000–74,999 | 17.08 |
| 75,000–99,999 | 9.96 |
| 100,000–129,999 | 3.56 |
| 130,000–149,999 | 0.70 |
| 150,000+ | 2.14 |
| Unknown | 4.27 |
| Refused | 10.68 |
| Marital status, n = 287 | |
| Single (never married) | 45.6 |
| Married | 39.7 |
| Divorced | 11.5 |
| Widowed | 2.10 |
| Separated | 1.10 |
| Healthy eating index, n = 283, mean [SD] | 1.93 [1.54] |
| 0 | 20.9 |
| 1 | 23.3 |
| 2 | 21.6 |
| 3 | 18.0 |
| 4 | 9.5 |
| 5 | 4.9 |
| 6 | 1.8 |
| Health status | |
| Body mass index, n = 277, mean [SD] | 27.48 [6.33] |
| Family disease history, n = 263 | |
| 0 (no disease) | 6.51 |
| 1 | 18.2 |
| 2 | 26.0 |
| 3 | 27.7 |
| 4 | 14.0 |
| 5 | 5.14 |
| ≥6 | 2.40 |
| Personal disease history, n = 263 | |
| 0 (no disease) | 55.9 |
| 1 | 27.0 |
| 2 | 10.3 |
| 3 | 4.18 |
| 4 | 2.66 |

strength based exercises, the majority (61.2 %) of respondents report not participating in any type of strength based exercises each week. In addition, a plurality (46 %) of respondents reported that they do not participate in any stretching exercises.

### Association of Self-Reported Exercise Habits with Stage of Change

Table 3 shows the bivariate associations between self-reported exercise habits and SOC. Those who were in the action and maintenance SOC were significantly more likely to participate in aerobic exercises ($p < .0001$), strength based exercises ($p < .0001$) and stretching exercises ($p < .0001$) compared to those in other SOC. Interestingly, women in the contemplation SOC, compared to women in the preparation SOC, participated *more* in aerobic exercises (18.8 vs. 15.6 %), strength based exercises (5.66 vs. 3.45 %) and stretching exercises (15.1 vs. 8.77 %), respectively.

We conducted a multivariate logistic regression analysis and the results are reported in Table 4 which shows odds ratios (ORs), adjusted ORs (AORs) and confidence intervals (CIs) for the association between actual exercise activities and SOC for becoming physically active while adjusting for covariates. While adjusting for covariates, women who were in the maintenance and action SOC were 16.1 times (CI 7.09–25.7) more likely to participate in aerobic exercises compared to women in other SOCs. Furthermore, women who were in the maintenance and action SOC were significantly more likely to participate in strength-based (AOR 15.4; CI 6.58–22.7) and stretching (AOR 3.80; CI 1.91–7.52) exercises compared to women in other SOCs. No other covariate, except healthy diet index, was associated with any type of physical activity or exercise; the healthy diet index (AOR 1.23; CI 1.55–1.97) was significantly associated only with stretching exercises.

## Discussion

A major finding of this study is that 62 % of women fail to participate in aerobic exercise for 3 or more days per week. Additionally, 61 % of women do not participate in any kind of strength exercises while 46 % do not participate in

**Table 2** Exercise practices among study participants

| Percent (%) | N (%)<br>292 (100) |
|---|---|
| *Aerobic exercises, n = 289* | |
| How many days per week do you take part in some type of aerobic exercise at least 20–30 min duration (fitness walking, cycling, jogging, swimming, aerobic dance, active sports)? | |
| 7 days | 5 (1.72) |
| 6 days | 6 (2.08) |
| 5 days | 26 (9.00) |
| 4 days | 20 (6.95) |
| 3 days | 53 (18.33) |
| 2 days | 37 (12.80) |
| 1 day | 33 (11.42) |
| 0 days | 109 (37.7) |
| *Strength exercises, n = 289* | |
| How many times per week do you do strength-building exercises such as sit ups, pushups, or use weight training equipment? | |
| Three or more times per week | 39 (13.49) |
| Twice per week | 35 (12.11) |
| Once per week | 38 (13.15) |
| None | 177 (61.25) |
| *Stretching exercises, n = 287* | |
| How many times per week do you do stretching exercises to improve flexibility of your back, neck, shoulders, and legs? | |
| Three or more times per week | 59 (20.56) |
| Twice per week | 38 (13.24) |
| Once per week | 58 (20.21) |
| None | 132 (45.99) |

**Table 3** Bivariate analysis examining association of self-reported exercise habits with stage of change

| | Precontemplation n (%) | Contemplation n (%) | Preparation n (%) | Action n (%) | Maintenance n (%) | Chi square; *p* value |
|---|---|---|---|---|---|---|
| Aerobic exercise, n = 274 | | | | | | |
| ≥2 days | 2 (18.2) | 10 (18.8) | 9 (15.6) | 56 (65.1) | 64 (96.9) | <.0001 |
| 1 day | 1 (9.10) | 4 (7.55) | 10 (17.2) | 14 (16.3) | 1 (1.52) | |
| 0 days | 8 (72.7) | 39 (73.6) | 39 (67.2) | 16 (18.6) | 1 (1.52) | |
| Strength based exercises, n = 274 | | | | | | |
| ≥2 times per week | 1 (9.09) | 3 (5.66) | 2 (3.45) | 40 (46.5) | 35 (53.0) | <.0001 |
| Once per week | 3 (27.3) | 3 (5.66) | 4 (6.90) | 15 (14.4) | 11 (16.7) | |
| None | 7 (63.6) | 47 (88.7) | 52 (89.7) | 31 (36.0) | 20 (30.3) | |
| Stretching exercises, n = 272 | | | | | | |
| ≥2 times per week | 3 (27.3) | 8 (15.1) | 5 (8.77) | 30 (35.3) | 46 (69.7) | <.0001 |
| Once per week | 4 (36.4) | 8 (15.1) | 13 (22.8) | 20 (23.5) | 11 (16.7) | |
| None | 4 (36.4) | 37 (69.8) | 39 (68.4) | 35 (41.2) | 9 (13.6) | |

* % may not total 100 due to rounding

any kind of stretching exercises each week. This is important given that the Center for Disease Control and Prevention (CDC) recommends for adults to participate in a combination of 150 min a week of moderate-intensity aerobic activity and 2 or more days a week of muscle-strengthening activity [14]. Having so few women participate in daily physical activity may significantly hinder efforts to reduce individual health disparities.

We also found that, while controlling for covariates, women in maintenance/action SOC for becoming physically active were significantly more likely to engage in exercise activities. These findings seem to support the

**Table 4** Logistic regression analysis to estimate the association between self-reported stages of change to become physical active and actual exercise practices

| | Aerobic exercises | | Strength-based exercises | | Stretching exercises | |
|---|---|---|---|---|---|---|
| | OR (95 % CI) | AOR (95 % CI) | OR (95 % CI) | AOR (95 % CI) | OR (95 % CI) | AOR (95 % CI) |
| Stages of change for becoming physically active | | | | | | |
| Maintenance/action versus | 18.9 (10–35.7) | 16.1 (7.09–25.7) | 15.4 (10.2–18.9) | 15.4 (6.58–22.7) | 4.7 (2.83–7.94) | 3.8 (1.91–7.52) |
| Precontemplation/contemplation/preparation | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Age | 1.02 (1.00–1.05) | 0.99 (0.95–1.03) | 0.98 (0.97–1.00) | 0.95 (0.91–0.99) | 0.99 (0.97–1.01) | 0.96 (0.92–0.99) |
| Education | | | | | | |
| Bachelors/masters/doctorate | 1.35 (0.82–2.21) | 1.04 (0.47–2.29) | 1.54 (0.94–2.52) | 1.81 (0.83–3.92) | 0.97 (0.60–1.57) | 1.14 (0.58–2.28) |
| ≤High School | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Income | | | | | | |
| ≥$50,000 | 1.76 (1.01–3.08) | 1.95 (0.78–4.90) | 1.34 (0.79–2.28) | 1.33 (0.57–3.09) | 0.58 (0.34–0.98) | 0.51 (0.24–1.07) |
| ≤$49,000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Marital status | | | | | | |
| Married | 0.90 (0.55–1.47) | 0.68 (0.27–1.71) | 0.79 (0.48–1.29) | 0.75 (0.34–1.65) | 0.77 (0.48–1.24) | 1.35 (0.66–2.75) |
| Others (single/divorced/widowed) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Healthy diet index | 1.49 (1.24–1.79) | 1.31 (0.97–1.78) | 1.16 (0.99–1.36) | 1.12 (0.86–1.45) | 1.18 (1.01–1.38) | 1.23 (1.97–1.55) |
| Body mass index | 1.02 (0.98–1.06) | 1.05 (0.99–1.11) | 0.97 (0.93–1.01) | 1.02 (0.96–1.08) | 0.98 (0.94–1.02) | 0.99 (0.95–1.04) |
| Family disease history | 0.98 (0.83–1.16) | 0.99 (0.75–1.32) | 0.82 (0.69–0.98) | 0.93 (0.71–1.22) | 0.89 (0.75–1.05) | 0.94 (0.75–1.19) |
| Personal disease history | 0.96 (0.78–1.18) | 0.92 (0.65–1.29) | 0.67 (0.50–0.89) | 0.66 (0.42–1.02) | 0.83 (0.66–1.05) | 0.88 (0.67–1.15) |

*OR* odds ratios and *AOR* adjusted odds rations with 95 % confidence intervals. This table reports association of perceived stage of change with actual exercise behaviors. Variables: exercise habits modeled as dichotomous outcome variables (Yes vs. No) and stage of change (maintenance/action vs. precontemplation/contemplation/preparation) modeled as dichotomous predictor variables. Age, body mass index, family and personal disease history were entered as continuous covariate. Education, income, and marital status were categorical covariates

hypothesis that one's SOC for becoming physically active is consistent and reflective with one's actual practice of being physically active. A study by Garber et al. [15] supports our findings in part where being a female and African-American was significantly associated with lower levels of physical activity and being in precontemplation or contemplation stage for exercise. Interestingly, lack of physical activity in African-American women seems to be a longitudinal phenomenon. Another study of adult African-American women found that women who were inactive during adolescence were 6 times more likely than other women to be in an early stage of change in physical activity (precontemplation or contemplation stage). Whereas, women who were self-motivated to be physically active and had support of friends and family were more likely than other women to be in maintenance stage of activity [16]. This corroborates with published evidence where it has been reported that African-American females misperceive their weight, have higher rates of obesity, and have lower levels of physical activity since early adolescence. Therefore, interventions should be planned in communities for African-American women starting at a younger age [17–19].

We also found that women with higher healthy diet indices were significantly more likely to participate in stretching exercises although no differences were found between healthy diet indices and aerobic or strength exercises. The finding that healthy diet index, for the most part, is not associated with physical activity is contrary to other findings showing that healthy eating and physical activity are significantly associated [20].

Our results also indicate that actual disease conditions or knowledge of family's disease and conditions may not readily influence women's decisions to participate in any kind of exercise. This is important since many health promotion programs, previously modeled from the Health Belief Model supports theories that knowing of one's or family members' illnesses increases the likelihood to engage in healthier behaviors [15, 21].

Our findings appear generalizable to African-American, especially those in the South since the study recruited African-American women throughout Florida, regardless of sociodemographic factors or socioeconomic statuses. However, our sample may be unique since it arguably represents a middle class group of African-American women, who are underrepresented in research. For example, 52 % of our participants had at least a Bachelor's Degree compared to 8.6 % of African-American women in the United States, in 2010 [22]. In addition, 58 % of participants reported incomes $\geq$\$30 K, which further represents a middle-class group of African-American women, a group typically underrepresented in health research studies.

Interestingly, a recent report from the CDC indicates that those who have higher socioeconomic statuses tend to have better health behaviors [23]. However, a study by Gaston et al. [24] found that African-American women of lower socioeconomic status had higher levels of exercise than African-American women of higher socioeconomic status. On the other hand, our findings are more consistent with those of Komar-Samardzija's [25] study reporting that African-American women, regardless of status, struggle with consistently participating in physical activity. The fact that this was a convenient sample of middle-class African-American women living throughout Florida may have resulted in a sample more likely to be aware of, and eager to change health behaviors. However, this would intuitively result in a group of women reporting *higher levels* of physical activity, which we did not observe.

While we believe our findings contribute new information to an understudied phenomenon in African-American women, there are limitations. For example, one potential limitation includes the fact that all data are self-reported. Several studies reported that African American women were more likely to underestimate their weight [17, 26, 27], which could be explained by the idea of wanting to be more socially desirable or accepted. Furthermore, physical activity/exercise practices could also be overestimated, which would be consistent with other findings [28]. However, that would further support our findings that few African-American women participate in aerobic, strength and stretching exercises per national recommendations.

Another potential limitation is that we did not seek to measure the underlying mechanisms for participants and given the cross-sectional study design, did not measure any movement throughout the various SOC. Also, as our study was observational, cause and effect relationships could not be established.

## Conclusions

In conclusion, we found that a large number of African-American women fail to participate in regular exercise and level of physical activity is strongly associated with SOC for exercise. Results of our study provide key leverage points for practitioners to develop interventions matched with the profile of African-American women in communities. Our study indicates that distinct profiles exist within African-American women who are physically active and those who are not. For example, it might be possible that women in precontemplation or contemplation lack knowledge about exercise recommendations, lack support to engage in exercise, or may face substantial barriers to engaging in exercise. For this group the appropriate interventions should help women move from precontemplation to preparation and action by use of appropriate processes of change (e.g. awareness and consciousness rising) and by

increasing self-efficacy. In contrast, women who already engage in recommended levels of exercise may require more sophisticated interventions to ensure that they continue to engage in such healthy behaviors. These stage matched interventions have been found to be effective and can be implemented at multiple levels (interpersonal, social, organizational, or community based). The first step is to correctly identify women in different stages of change for exercise and subsequently, motivation matched interventions should be implemented.

**Acknowledgments** This study was funded by the University of Florida Faculty Dean's Fund Grant.

## References

1. Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among US adults, 1999–2008. *Journal of the American Medical Association, 303*, 235–241.
2. Ogden, C., Carroll, M., Kit, B., & Flegal, K. (2014). Prevalence of childhood and adult obesity in the United States, 2011–2012. *Journal of the American Medical Association, 311*, 806–814.
3. Haapanen, N., Miilunpalo, S., Pasanen, M., Oja, P., & Vuori, I. (2007). Association between leisure time physical activity and 10-year body mass change among working-aged men and women. *International Journal of Obesity Related Metabolic Disorders, 21*, 288–296.
4. Centers for Disease Control and Prevention. (2014). *Behavioral risk factor surveillance system survey data*. Atlanta, GA: USDHHS, CDC.
5. Lee, R., Mama, S., Medina, A., Ho, A., & Adamus, H. (2012). Neighborhood factors influence physical activity among African American and Hispanic or Latina women. *Health & Place, 18*, 63–70.
6. Versey, H. (2014). Centering perspectives on black women, hair politics, and physical activity. *American Journal of Public Health, 104*, 810–815.
7. Centers for Disease Control and Prevention, US Department of Health and Human Services, Health Behaviors of Adults: United States, 2008–2010. (2015). Vitals and Health Statistics Series 10, Number 257, pp. 50 and 54. Retrieved September 25, 2015, from http://www.cdc.gov/nchs/data/series/sr_10/sr10_257.pdf
8. Prochaska, J. (2008). Decision making in the transtheoretical model of behavior change. *Medical Decision Making, 28*, 845–849.
9. Webb, F., Khubchandani, J., Doldren, M., Balls-Berry, J., Blanchard, S., Hannah, L., et al. (2014). African American women's eating habits and intention to change: A Pilot study. *Journal of Racial and Ethnic Health Disparities, 1*, 199–206.
10. Henry, H., Reimer, K., Smith, C., & Reicks, M. (2006). Associations of decisional balance, processes of change, and self-efficacy with stages of change for increased fruit and vegetable intake among low-income, African-American mothers. *Journal of the American Dietetic Association, 106*, 841–849.
11. Price, J. H., Dake, J. A., Murnan, J., Dimmig, J., & Akpanudo, S. (2005). Power analysis in survey research: Importance and use for health educators. *American Journal of Health Education, 34*, 202–207.
12. Prochaska, J., & Velicer, W. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*, 38–48.
13. Sutton, S. (2008). The transtheoretical model. Retrieved September 24, 2015, from http://cancercontrol.cancer.gov/brp/constructs/stages/st2.html
14. Centers for Disease Control and Prevention Division of Nutrition, Physical Activity, and Obesity. (2015). How much physical activity do adults need? Retrieved September 25, 2015, from http://www.cdc.gov/physicallactivity/basics/adults/index.htm
15. Garber, C. E., Allsworth, J. E., Marcus, B. H., Hesser, J., & Lapane, K. L. (2008). Correlates of the stages of change for physical activity in a population survey. *American Journal of Public Health, 98*, 897–904.
16. Felton, G. M., Ott, A., & Jeter, C. (2000). Physical activity stages of change in African American women: Implications for nurse practitioners. *Nurse Practitioner Forum, 11*, 116–123.
17. Fan, M., Jin, Y., & Khubchandani, J. (2014). Overweight misperception among adolescents in the United States. *Journal of Pediatric Nursing, 29*(6), 536–546.
18. Price, J. H., Khubchandani, J., McKinney, M., & Braun, R. (2013). Racial/ethnic disparities in chronic diseases of youths and access to health care in the United States. *BioMed Research International*, 2013, Article ID: 787616. doi:10.1155/2013/787616.
19. Stanford, J., Khubchandani, J., Webb, F., Lee, J., Doldren, M., & Rathore, M. (2015). Teacher and friend social support: Association with body weight in African-American adolescent females. *Journal of Racial and Ethnic Health Disparities, 2*(3), 358–364.
20. Johns, D., Hartmann-Boyce, J., Jebb, S., & Aveyard, P. (2014). Diet or exercise interventions vs combined behavioral weight management programs: A systematic review and meta-analysis of direct comparisons. *Journal of the Academy of Nutrition and Dietetics, 114*, 1557–1568.
21. Tehrani, J. F., Nikpour, S., Kazemi, E. H., Sanaie, N., & Panahi, S. (2014). The effect of education based on health belief model on health beliefs of women and urinary tract infection. *International Journal of Community Based Nursing and Midwifery, 2*(1), 2–11.
22. Guerra, M. (2013). The State of African American Women in the United States. Retrieved September 24, 2015, from https://www.americanprogress.org/wp-content/uploads/2013/11/SOW-factsheet-AA.pdf
23. Centers for Disease Control and Prevention. Press Release: Higher education and income levels keys to better health, according to annual report on nation's health. Retrieved September 24, 2015, from http://www.cdc.gov/media/releases/2012/p0516_higher_education.html
24. Gaston, M., Porter, G., & Thomas, V. (2011). Paradoxes in obesity with mid-life African American women. *Journal of the National Medical Association, 103*(1), 17–25.
25. Komar-Samardzija, M., Braun, L., Keithley, J., & Quinn, L. (2012). Factors associated with physical activity levels in African American women with Type 2 diabetes. *Journal of the American Academy of Nurse Practitioners, 24*, 209–217.
26. Malpede, C., Greene, L., Fitzpatrick, S., Jefferson, W., Shewchuk, R., Baskin, M., & Ard, J. (2007). Racial influences associated with weight-related beliefs in African American and Caucasian women. *Ethnicity and Disease, 17*, 1–5.
27. Lynch, E., & Kane, J. (2014). Body size perception among African American women. *Journal of Nutrition Education and Behavior, 46*, 412–417.
28. Walsh, M., Hunter, G., Sirikul, B., & Gower, B. (2004). Comparison of self-reported with objectively assessed energy expenditure in black and white women before and after weight loss. *American Journal of Clinical Nutrition, 79*, 1013–1019.