

Motivational Interviewing and Physical Activity Outcomes in African American Adults: A Systematic Review of Randomized Controlled Trials

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Abstract Although the benefits of physical activity are well-known, African American participation is disproportionately low in conjunction with higher rates of obesity and several cardiovascular disease risk factors compared to their non-Hispanic White counterparts. This review was conducted to explore evidence and gaps for the impact of motivational interviewing on physical activity outcomes in African Americans. A modified Cochrane method of systematic reviews was used to search relevant research databases (PsycINFO, PubMed/MEDLINE, and SPORTDiscus, Science Citation Index Expanded Social Sciences Citation Index). Relevant articles were reviewed and eliminated in title/abstract and full-text tiers based upon inclusion/exclusion criteria. Of 182 articles, seven randomized controlled trials met the inclusion criteria and were retained for this review. Only one study showed motivational interviewing to have a significant impact on physical activity outcomes, and several studies showed significant impact on other secondary health-related outcomes (nutrition/dietary intake, body weight/body mass index, cardiovascular/aerobic fitness, motivation, glucose/HBA1C levels, medication adherence, smoking cessation, and improvement in quality of life). This review does not support the use of motivational interviewing to significantly improve physical activity outcomes in African Americans and future studies should conduct more motivational interviewing training and fidelity tests to ensure motivational interviewing-consistent skills as well as conduct more sessions in-person.

Keywords: African Americans, exercise, health outcomes, behavior change, motivational interviewing

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1. Introduction

Although physical inactivity has received recognition as a national and global health epidemic, physical activity rates in the U.S. remain insufficient. Overall, merely 54.2% of the U.S. adult population are meeting the national guidelines for aerobic activity, and only 3.6% are meeting the aerobic and muscle-strengthening national guidelines [1]. Furthermore, it has been reported that African Americans acquire physical activity and meet national recommendations at a disproportionately lower rate compared to non-Hispanic Whites. Specifically, 50.3% of African Americans are not meeting the guidelines for either aerobic or muscle-strengthening activities in contrast to 38.9% of non-Hispanic Whites. Despite this information, both African American men and women are consistently underrepresented in the literature surrounding physical activity promotion.

Regular participation in physical activity reduces the risks and/or symptoms of several cardiovascular disease

risk factors including obesity, hyperlipidemia, diabetes, and hypertension, as well as, reduces the risk of musculoskeletal issues, some cancers, and all-cause mortality [2,3]. Physical inactivity is one of the several modifiable risk factors for cardiovascular disease, an umbrella term that can refer to several heart-related conditions including heart disease [4]. Heart disease is the leading cause of death in the U.S., and the chances of developing heart disease especially for African Americans is increased [5]. Other modifiable risk factors that can contribute to cardiovascular disease include obesity, diabetes, hypertension, hyperlipidemia, and smoking [3,4]. Of these risk factors African Americans have the highest prevalence rates of obesity in the U.S [6], and the highest prevalence rates of hypertension in the world [5]. Additionally, African Americans are 60.0% more likely to be diagnosed with diabetes and twice as likely than their non-Hispanic White counterparts to die from diabetes [7]. Given these overwhelming statistics surrounding the African American community, methods to address these health disparities are warranted.

One proposed method to increase physical activity in African Americans has been to incorporate motivational interviewing (MI). MI is a person-centered communication skillset and strategies developed by William R. Miller and Stephen Rollnick in 1983 based upon the idea that no person is completely unmotivated [8]. Originally, this method was developed for the treatment of alcoholism and other addictive behaviors, but has disseminated to other health behaviors such as diabetes management, dietary habits, and hypertension control. The “spirit of MI” entails person-centered collaboration between the practitioner and the individual in which ideas for how to change, preferences, and values of the person are evoked rather than him/her receiving explicit directions, advice, and decision making from the practitioner. This skillset empowers the individual and promotes autonomy in their own decision-making process to change their behavior based upon their own intrinsic motivation [8].

As for the practitioner, MI requires one to project a very caring attitude, be empathetic to the person’s circumstances, be an active listener, and elicit change talk from the individual. Change talk is the action of the person mentioning or discussing their desire or need to make a change in their behavior, and if guided correctly by the practitioner, it can lead to successful long-term engagement with their target behavior [8]. In addition, due to its complexity and varied person-centered nature, the use of MI requires an evidence-based level and type of training to be delivered and received effectively. Therefore, it is vital for interventionists to undergo adequate, evidence-based MI training [9,10], and for the MI sessions themselves to be video- or audio-recorded in order to assess for fidelity and MI consistency.

In both African American men and women, a lack of motivation has been reported as a barrier to participating in physical activity [11,12,13,14]. In effort to address this common barrier, there have been several studies that have included the use of MI to promote physical activity in African Americans [15-21] however, there has been contradicting results in this population. Although there have been previous systematic reviews and/or meta-analyses to assess the effectiveness of using MI to promote physical activity, each of those reviews focused on a specific chronic health condition [22,23] or a special population [24] rather than exclusively African Americans regardless of having a chronic condition or not. Given the observation of the mixed results of MI in African Americans and physical activity, a review of the literature assessing the impact of MI in randomized controlled trials on physical activity outcomes in African Americans is warranted. Therefore, the purpose of this current study is to systematically review and report evidence and gaps for the impact of MI on physical activity outcomes in African American men and women. Additionally, this review will discuss implications for research and for practice when incorporating MI into physical activity interventions with African Americans.

2. Methods

A modified Cochrane method for systematic reviews was implemented to search and summarize evidence from relevant studies to identify current evidence and gaps in

the literature regarding the impact of MI on physical activity outcomes in African Americans. The modified Cochrane method has been used in other published reviews [25,26,27]. A comprehensive search was completed by the primary investigator in March of 2021 within the databases PsycINFO, PubMed/MEDLINE, and SPORTDiscus via EBSCO interface, as well as SCI-Expanded (Science Citation Index Expanded) and SSCI (Social Sciences Citation Index) via Web of Science. Search terms were entered into each of the databases in the following manner: ‘motivational interview*’ AND ‘physical activity’ OR ‘exercise’ OR ‘physical fitness’ OR ‘activity level’ OR ‘physical exertion’ AND ‘African American*’ OR ‘Black*’. To ensure all relevant articles were captured, the authors also completed a hand search in case articles were omitted from the initial search attempt.

The inclusion criteria for the retained articles were as follows: results specifically for African American adults, the use of MI as a primary intervention method by itself or as a primary component of an intervention structure, physical activity as a primary or secondary outcome, conducted both pre- and post-intervention physical activity measurements, used a randomized control trial study design, published in the English language, and peer reviewed. Articles or studies that were qualitative, dissertations, reviews, rationale studies, or did not report results for physical activity specifically for African Americans were excluded.

After the initial and hand search of articles was completed, the primary investigator exported all articles to an Endnote database for further assessment in which duplicate articles were removed. In effort to retain articles that met the inclusion/exclusion criteria, a first round of elimination was completed based upon article titles. Next, abstracts underwent further review to evaluate whether they met the requirement to undergo a full-text review. Articles that were eligible for full-text review were critically evaluated for retention by the primary investigator and two other investigators, and where there was not agreement on the retain/reject decision, the three investigators discussed these until a consensus was achieved.

2.1. Data Extraction

A full-text data extraction form was created and utilized to organize study characteristics, participants’ characteristics, and study outcomes. For study characteristics, extracted details were related to the study’s protocol, experimental and comparator groups, frequency, duration, interventionist type, MI session info (e.g., who delivered MI, MI training, frequency and length of sessions, type of encounter), MI fidelity assessments, and significant primary and secondary outcomes. Extracted details pertaining to the participants included number of subjects, age, gender, attrition rates, and special inclusion criteria. Lastly, data extracted related to study outcomes included details of the impact of MI on physical activity and other secondary outcomes in the retained articles.

2.2. Assessment of Methodological Quality

To ensure each study was completed with a sufficient level of rigor, an assessment of the methodological quality

of the retained studies was conducted. The primary investigator specifically used the Cochrane Risk of Bias tool to evaluate the studies based upon six domains (random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting). Within each domain, studies were rated as high risk, low risk, or unclear risk of bias.

3. Results

Initial search efforts yielded a total of 181 articles. Hand-searching added an additional article for a total of 182. After duplicates were removed, a total of 110 articles' titles and abstracts were reviewed resulting in 25 articles to undergo a full-text review. After applying inclusion/exclusion criteria, a total of seven studies remained. Details of the literature search and rejection rationale can be found in the PRISMA trial flow diagram in Figure 1.

3.1. Study Characteristics

Table 1 provides a summary of the retained studies' characteristics, study description, and results for primary and secondary outcomes. Of the seven retained studies, there were a total of 1786 participants (79% women) with three of the seven studies exclusively including women

[15,20,21]. The mean age was 52.8 ± 9.9 years (range 44.3 ± 11.6 - 64.2 ± 11.2 years) and attrition rates ranging from 3-52%. Several of the studies had specific inclusion criteria such as type 2 diabetes mellitus diagnosis [16], peripheral artery disease diagnosis [17], hypertension diagnosis and current smoker [18], and being a breast cancer survivor [20].

Each of the seven retained studies were randomized control trials, however, it is noteworthy to highlight that one study intended to have a randomized control trial study design, however, five of the 62 participants in the control group were assigned due to lack of transportation or childcare [16]. Studies also varied in length ranging from 3-18 months. Reported targeted outcomes included physical activity [15-21] nutrition/dietary intake [15,18,19,20], change in weight or body mass index [15,16,20,21] cardiovascular or aerobic fitness [20,21], motivation [15,17], glucose/HbA1C levels [16], medication adherence [16], smoking cessation [18], and improvement in quality of life [17]. Physical activity outcomes were assessed using various methods. Objective measurements included the use of pedometers or accelerometers [18,20,21], adherence to ≥ 150 minutes/week of moderate physical activity measured by accelerometers [16], or a 6-minute walk test [17]. Subjective measurements included the use of the CHAMPS self-report survey [15,19,21], and the International Physical Activity Questionnaire-short [20].

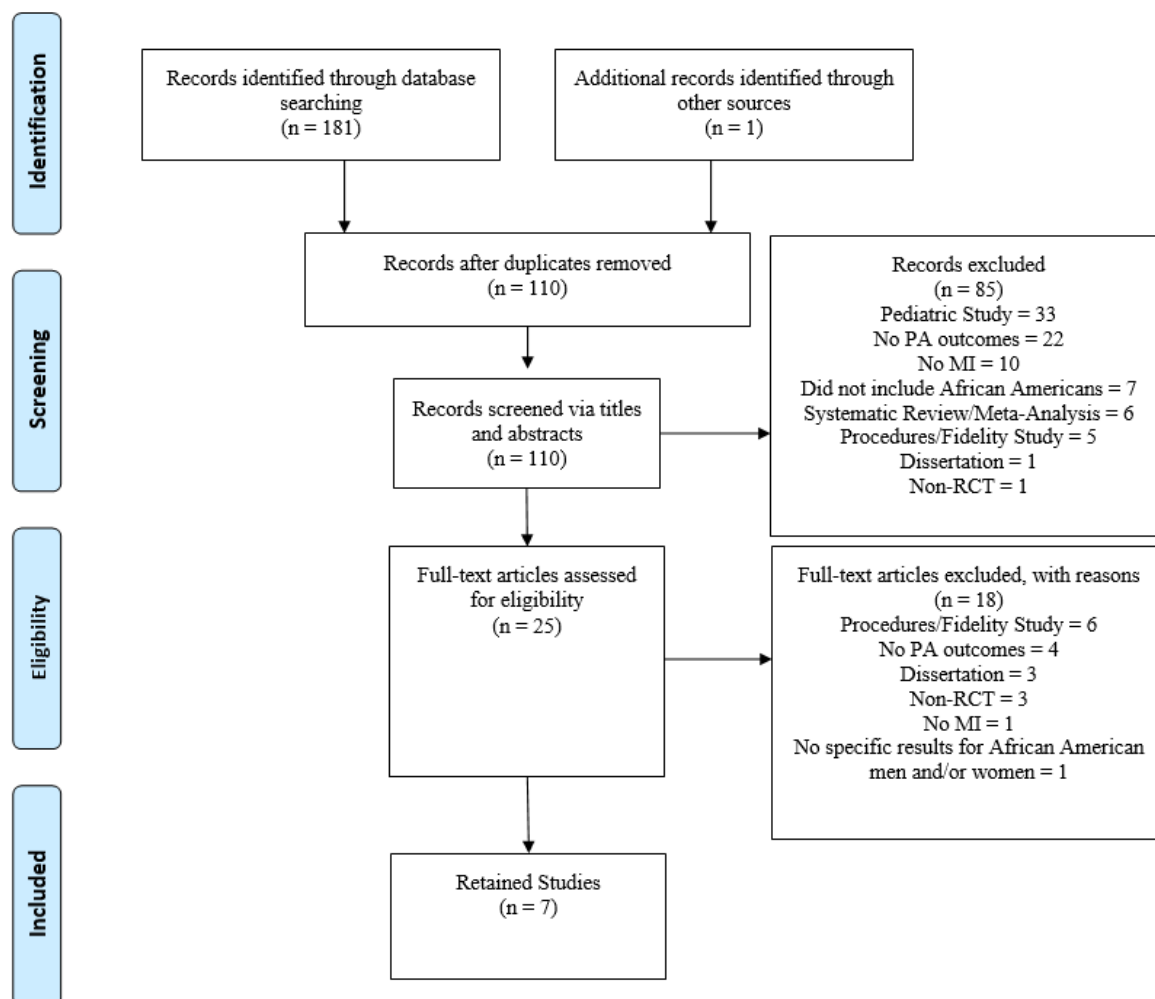


Figure 1. PRISMA trial flow diagram

Table 1. Characteristics of Retained Studies

	Sample Description	Study Length	Interventionist	Study Description	Primary Outcomes	Secondary Outcomes
Befort et al., 2008	44 AA women M Age: 44.3 ± 11.6 years	16 weeks	Doctoral clinical psychology student	Both: Weekly 90-min group weight loss program I (n = 21): 4, 30-min mixed (2 in-person, 2 telephone) ind. MI sessions (weeks 0, 3, 8, and 13) C (n = 23): 4, 30-min ind. HE sessions (weeks 0, 3, 8, and 13)	No sig. difference in PA in I or C or b/t I & C	Sig. ↓ in daily kcals, fat calcs, body weight, and motivation for I & C; sig. ↑ in F&V intake for I & C; no sig. differences in above outcomes b/t I & C
Chlebowy et al., 2015	62 AAs with T2DM (65.0% women) M Age: 53.7 ± 11.2 years	3 months	Registered nurse	I (n = 26): 4-6, 45-60-min biweekly MI sessions C (n = 36): Standard care from clinic	Sig. ↑ in PA adherence (adhering to 150 min of moderate PA ≥80% of the time) in I compared to C Sig. ↑ in walking distance in I2 (PACE) compared to I1 (MI) & C at 12 months; no sig. differences in walking distance in either I1 or I2 compared to C at 6 months or 12 months	Sig. ↓ in glucose and BMI for I; no sig. differences in HBA1C, medication adherence, or glucose monitoring b/t I & C
Collins et al., 2019	174 AAs with PAD (74.0% women) M Age: 64.2 ± 11.2 years	12 months	Master-level counselor	I1 (n = 57): MI biweekly 3 months, then monthly 3 months +1 instructional walking session I2 (n = 57): PACE biweekly 3 months, then monthly 3 months + 1 instructional walking session C (n = 60): Standard PAD educational material	No statistical differences in quality of life b/t I1, I2, or C; no results reported for intrinsic-extrinsic motivation	
Hyman et al., 2007	281 AAs with hypertension and smokers (67.0% women) M Age: 53.3 ± 6.0	18 months	Health educator	All: Clinic sessions/6 months to discuss 3 behaviors: sodium reduction, smoking cessation, and increasing PA I1 (n = 92): 7, 15-min MI telephone sessions (at 2, 4, 6, 8, 12, 16, 20 weeks/6 months), behavior changes discussed simultaneously I2 (n = 96): 7, 15-min MI telephone sessions (at 2, 4, 6, 8, 12, 16, 20 weeks/six months), behavior changes discussed in sequences (1 behavior/6 months) C (n = 93): Education materials related to 3 behaviors I1 (n = 335): Culturally-targeted, self-help PA and nutrition educational materials	No sig. differences in PA at 6-, 12-, or 18-months b/t I1, I2, or C	Sig. ↓ in sodium intake at 6 months in I1; no sig. differences in smoking cessation at 6, 12, or 18 months or sodium intake at 12 or 18 months
Resnicow et al., 2005	906 AA's (76.2 % women) M Age: 46.3 ± 13.3	12 months	Masters/doctoral-level psychology student	I2 (n = 304): 4 MI telephone sessions (weeks 4, 12, 26, 40) + culturally-targeted, self-help PA and nutrition educational materials C (n = 267): Standard PA and nutrition educational materials I (n = 15): 6, 15-min, biweekly MI telephone sessions and 90-min in-person group sessions using socio/culturally-tailored education materials (related to PA and diet) + a PA session; ind. sessions with interventionist C (n = 16): Standard health materials for cancer survivors Both: 6, 2-hour group meetings (overcoming barriers to PA and role modeling)	Sig. ↑ in PA in both I1 and I2 compared to C; no sig. differences in PA b/t I1 and I2	Sig. ↑ in F&V intake in I2 (MI) compared to I1 & C
Sheppard et al., 2015	31 AA women breast cancer survivors M Age: 54.7 ± 9.8	12 weeks	Certified survivor coach	Both: 6, 2-hour group meetings (overcoming barriers to PA and role modeling)	No sig differences in PA b/t I and C	No sig differences in diet, CVD fitness, weight, BMI, or waist-to-hip ratios b/t I & C
Wilbur et al., 2016	288 AA women M Age: 53.1 ± 6.5	48 weeks	Facilitator	I1 (n = 96): 10 MI personal telephone calls (8 in first 24 weeks, 2 in last 24 weeks) I2 (n = 97): 10 MI automated telephone calls (8 in first 24 weeks, 2 in last 24 weeks) C (n = 95): No MI	↑ in steps/day and self-reported PA in I1, I2, and C (not sig.); no sig. differences in above outcomes b/t I1, I2, or C	No sig. differences in aerobic fitness, weight, BMI, or waist circumference b/t I1, I2, & C

Note: AA: African American, BMI: body mass index, CVD: cardiovascular, C: control group, F&V: fruit and vegetables, HE: health education/educator, HBA1C: hemoglobin A1C, Ind: individual, I: intervention group, Min: minute, MI: motivational interviewing, PACE: patient-centered assessment and counseling for exercise, PAD: peripheral artery disease, PA: physical activity, TTM: transtheoretical model, T2DM: type 2 diabetes mellitus, Sig: significant.

3.2. MI Session Structure

All MI sessions were conducted individually, however sessions differed greatly between studies based upon frequency, duration, delivery mode, and type of interventionist. Amongst the seven retained studies, MI sessions ranged in frequency from 4-10 sessions (over 3-18 months) and approximately 15-60 minutes in duration per session. Three studies did not report MI session duration [17,19,21]. The type of interventionist that delivered the MI sessions varied vastly and included masters or doctoral psychology students [15,19], master-level counselors [17], registered nurses [16], health educators [18], a certified survivor coach [20], and one study reported utilizing a facilitator [21].

The delivery of MI differed between the studies in which two studies delivered MI in-person [16,17], four studies delivered sessions via telephone [18,19,20,21], and one study utilized an alternating combination of both telephone and in-person delivery modes for MI sessions [15]. In the study conducted by Wilbur et al., the telephone delivery method varied by intervention group with one group receiving personal MI calls while the alternative group received automated MI telephone calls [21].

3.3. MI Training and Intervention Fidelity Assessment

Five of the seven retained articles [15,16,17,19,20] stated their interventionist received some form of training prior to delivering MI sessions, however, only three of those provided details of the training [15,16,19]. The remaining two studies did not mention MI training [18,21]. Training regimens differed across the three studies that provided details but were described as two-day sessions or 12-16-hours of training [15,16,19], relying on videotapes, MI readings, simulated counseling sessions [15], and 12 hours of ongoing supervision and feedback [19]. Other studies simply mentioned receiving an overview of MI training [20] or receiving training specifically from a MI network trained educator [17].

Additionally, four studies reported using various MI fidelity assessment methods such as the Motivational Interviewing Treatment Integrity Scale [16], OnePass [17], the Revised Global Scales: Motivational Interviewing Integrity [21], and audiotaping [15,16,17,21]. However, only one study reported the outcomes of the fidelity assessments. Chlebowy et al. reported satisfactory fidelity scores using the Motivational Interviewing Treatment Integrity Scale with interventionists demonstrating 100% MI adherent behaviors in 89% of the recordings that were assessed.

3.4. The Impact of MI on Physical Activity Outcomes

In five of the retained studies, the impact of MI on physical activity was the primary outcome [17,18,19,20,21], while the remaining two studies focused on physical activity as an intermediate outcome [15,16]. Within these studies, the examination of the impact of MI on physical activity produced mixed outcomes. Only two of the retained studies reported an increase in physical activity in the MI experimental groups compared to the

standard care control groups [16,19]. In one instance, the use of biweekly, 45-60-minute MI sessions over a three-month timespan was able to increase the frequency of adhering to physical activity goals (150 minutes/week) in African Americans with type 2 diabetes mellitus [16]. In another case, although the MI experimental group had a post-intervention statistically significant increase in physical activity from baseline compared to the control group who received educational materials only, the results of the MI group did not significantly differ from the second experimental group that received culturally relevant self-help educational materials [19]. Therefore, the authors concluded that the addition of MI to self-help, culturally targeted nutrition and physical activity educational materials did not further the increase of physical activity outcomes.

Two studies reported that although the MI experimental groups showed an increase in physical activity, the results did not reach a level of statistical significance nor did they differ from the control groups [18,21]. In the remaining studies, the MI experimental group did not demonstrate an increase in physical activity in African American men or women [15,17,20].

3.5. Impact of MI on Secondary Outcomes

As mentioned in a previous section, each of the retained studies targeted other health outcomes in addition to physical activity. Since the impact of MI on physical activity is the primary focus of this systematic review, all other outcomes will be referred to as secondary outcomes. These secondary outcomes included nutrition/dietary intake [15,18,19,20], change in body weight or body mass index [15,16,20,21], cardiovascular or aerobic fitness [20,21], motivation [15,17], glucose/HbA1C levels [16], medication adherence [16], smoking cessation [18], and improvement in quality of life [17]. Two of the four studies assessing changes in nutrition/dietary intake showed statistically significant improvements in their experimental groups that received MI sessions compared to the control groups [18,19]. Participants in the study by Hyman et al., received seven 15-minute MI sessions over 18 months, and although the results for sodium intake reduction were significant at six months, they were not sustained by the end of the study. Resnicow and colleagues offered four MI telephone sessions over 12 months and saw a statistically significant increase in fruit and vegetable intake in their MI experimental group.

As for body weight/body mass index, MI intervention demonstrated impact in a study by Chlebowy et al., in which body mass index decreased significantly compared to the control group [16]. Befort and colleagues reported a significant decrease in body weight post-intervention in both the MI experimental and control groups, however there were no significant difference reported between the two groups [15]. In this same study, a significant decrease in motivation was found in both the MI experimental group and control group with no difference in between the two groups. Lastly, a significant decrease in glucose was seen in participants who received MI sessions in the same study by Chlebowy et al. [16]. As for the other secondary outcomes, no statistical differences occurred in either the experimental or control groups.

Table 2. Methodological quality assessment using the Cochrane Risk of Bias tool

Source	Selection Bias		Performance Bias	Detection Bias	Attrition Bias	Reporting Bias
	Random Sequence	Allocation	Blinding of participants	Blinding of outcome	Incomplete	Selective
	Generation	Concealment	& personnel	assessment	outcome data	Reporting
Befort et al., 2008	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Chlebowy et al., 2015	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Collins et al., 2019	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Hyman et al., 2007	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Resnicow et al., 2005	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk
Sheppard et al., 2015	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk
Wilbur et al., 2016	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk

3.6. Assessment of Methodological Quality

Table 2 presents the methodological quality of ratings for the seven retained studies, evaluated in terms of risk of bias using the Cochrane Risk of Bias tool. The tool was designed for use with randomized controlled trials and assesses risk of bias across several domains. The domain, Allocation Concealment, produced the most “unclear risk” judgements due to lack of explicit descriptions of how randomization methods were concealed or blinded from participants and researchers. Overall, the other five domains met the criteria for “low risk”.

4. Discussion

The primary purpose of this review was to evaluate and synthesize the results of the use and impact of MI on physical activity outcomes in African American men and women. In addition, the impact of MI on secondary health outcomes was assessed and results for each of these will be used to make implications for future studies using MI in African Americans. Based upon the systematic analysis of the seven retained studies in this review, the results suggest that the addition of MI does not demonstrate increased physical activity participation in African Americans. This conclusion is supported by merely one of the seven randomized control trials showing an increase in physical activity in the MI experimental group compared to an alternative experimental and/or control groups. These results should be tempered by the small number of studies, heterogeneity of the studies, lack of consistent interventionist training, and lack of consistent fidelity checks. However, these results are also consistent with another systematic review that explored the effectiveness of MI on dietary and physical activity behaviors that also concluded MI did not demonstrate the potential to significantly impact physical activity behaviors in adults (primarily women) [28].

4.1. Characteristics of Studies Reporting Significant Impact of MI

Of the seven retained studies, the study conducted by Chlebowy and colleagues was the only study that reported a significant impact of physical activity outcomes with the use of MI. MI session duration was a distinct characteristic of this study in which they reported the longest duration (45-60 minutes) of the retained studies and was also one of the two studies that conducted all sessions (4-6 sessions) in-person by a RN [16]. Additionally, the interventionist of this study received 12

hours of MI training, and physical activity was measured objectively increasing the accuracy of the results compared to self-reported data [29]. Lastly, this was the only study of four that conducted fidelity assessments and reported the outcomes. Scores indicated that the interventionists demonstrated both high proficiency and MI consistency in the MI sessions that were assessed. Scores were 4.0 or greater in 100% of assessed recordings for MI Global Spirit and interventionists demonstrated 100% MI adherent behaviors in 89% of the assessments [16].

In a weight loss study conducted in white and African American women by West et al., MI session structure was similar to Chlebowy et al., in that participants were offered five in-person MI sessions that each lasted approximately 45 minutes [30]. Although African American women had greater weight loss in the MI experimental group compared to the control group at six and 12 months, results were not sustained after MI sessions ceased. This was contrary to the results produced by white women in the MI experimental group indicating that although this type of MI session structure may be effective during the intervention, it may not result in sustained behavior change post-intervention for African Americans.

As for secondary outcomes, MI demonstrated impact for significantly improving nutrition/dietary intake [18,19] as well as body mass index and glucose levels [16]. Hyman and colleagues reported a reduction in sodium intake in their experimental group that received group educational sessions and individual MI telephone sessions (7, 15-minute telephone calls every six months) delivered by a health educator discussing behavior change for three behaviors simultaneously (sodium reduction, increased physical activity, and smoking cessation). However, it is important to note although sodium reduction was seen at six months, this behavior change was not sustained in this group, as there were no significant differences at 12- or 18-month follow-up [18]. Also, MI training details were not mentioned, and fidelity tests were not conducted in this study, therefore it is difficult to evaluate if the intervention was MI consistent.

In addition, Resnicow and colleagues were able to significantly increase fruit and vegetable intake in their MI experimental group who received four MI sessions via telephone over 12 months from master or doctoral-level psychology students [19]. Despite no MI fidelity assessments being conducted, the interventionists did receive 16 hours of MI training and 12 additional hours of supervision. Lastly, Chlebowy et al., was able to decrease body mass index and glucose levels in their MI experimental group [16]. Results of these studies indicate

that MI may be more efficacious in changing nutrition and dietary behaviors than physical activity behaviors in this population. These results are again consistent with the results from the systematic review by Hollis et al. [28].

4.2. Characteristics of Studies Reporting No Significant Impact of MI

While some studies showed increases in physical activity outcomes, the results either did not reach statistical significance or did not differ significantly from the control or alternative experimental group. Specifically, both studies conducted by Hyman et al., and Wilbur et al., showed increases in steps per day in both of their experimental MI groups, however the differences did not statistically differ from the control groups. Both of Hyman et al., and Wilbur et al., were comparable in study duration (12 and 18 months), MI sessions (7 and 10 telephone calls), and neither mentioned any MI training led by their health educator or facilitator, respectfully. The increases in steps per day could have been driven by the fact that they were wearing and were aware of their physical activity trackers rather than the inclusion of MI. Research has shown that the awareness of wearing of a physical activity tracker, referred to as reactivity, may cause an influx in steps per day in participants [31]. Resnicow and colleagues reported an increase in self-reported physical activity; however, the addition of MI to the self-help, culturally relevant educational materials did not further increase physical activity outcomes above to the alternative experimental group [19].

Similarly, for nutrition/dietary behaviors and weight, the Befort et al., study efforts resulted in decreases in daily kcals, calories from fat, and weight and an increase in fruit and vegetable intake; however, no statistical difference was observed between the MI experimental and control group. MI was delivered by a doctoral clinical psychology student who received training via MI training text, videotapes, a 2-day MI training session, and participated in simulated counseling sessions. MI sessions were delivered to the participants once a month for four months both in-person (two sessions) and by telephone (two sessions).

Of the three studies that reported no statistical difference in their MI experimental groups compared to the control groups, two of the studies delivered MI sessions bi-weekly over 12 weeks, plus monthly for three months [17]. Sheppard et al. administered six, 15-minute telephone calls and Collins et al. delivered nine in-person sessions but did not mention MI session duration. Neither of the studies included details of the training regimen for their interventionist, who were a masters-level counselor and a certified survivor coach, respectfully [17,20]. The training level of the interventionist could be a factor in distinguishing successful versus unsuccessful impacts of MI on physical activity outcomes.

In the study conducted by Befort et al., despite their four 30-minute MI sessions, two delivered in-person and two via telephone over 16 weeks, there were no statistically significant increases in physical activity in their MI group compared to the health education group. Authors stated that post-treatment data collection indicated that 79% of the participants had experienced a

major life event within the past four months of the study adding additional life stressors during that time, which could have attributed to their lack of differences from baseline to post-study [15].

Previous studies in the literature utilized MI in African American populations in which the results showed that the participants preferred a more explicative approach to their health in contrast to the MI person-centered approach [17,32]. In the study by Collins et al., in African American patients with peripheral artery disease, the experimental group that received Patient-Centered Assessment and Counseling for Exercise walked significantly longer distances than the MI and control groups in the 6-minute walk test. Patient-Centered Assessment and Counseling for Exercise is a more practitioner-driven method to encourage patients to increase their physical activity by attempting to impact their determinants of health such as social support, self-efficacy, perceived barriers to physical activity, and awareness of benefits of physical activity [33]. This didactic approach seemed to be more efficacious than MI's more person-centered style for African Americans.

Additionally, in a study that conducted focus groups in African American women with type 2 diabetes, participants were asked their impressions of two videos that depicted a MI consultation and a non-MI consultation [32]. Participants perceived the MI consultation to have value in good communication and providing a comfortable environment. The participants also expressed main concerns that the interaction was too person-centered, and that it is the provider's role to provide most of the information rather than the person. However, the participants viewed the non-MI consultation as impersonal and heavily dominated by the provider. Therefore, the results of this study support person-centeredness and suggest that methods of each of the consultations should be tailored to the person to elicit the best individual response with African American women [32]. More research identifying the best approach is necessary.

Lastly, of the seven retained studies within this review, four of the studies administered MI via telephone [18,19,20,21] and one delivered two of four sessions via telephone [15]. In-person MI sessions have shown to be more advantageous compared to MI telephone calls due to the exposure to non-verbal cues from the practitioner/interventionist such as eye contact, facial expressions, head nods, etc. [8], which have shown to strengthen a conversation. These cues can be just as important as verbal communication as it lets the patient know that the practitioner/interventionist is actively listening without distraction which can strengthen a conversation. Future research should identify if in-person, teleconference, or telephone calls is more effective in regards to African American outcomes.

5. Limitations

Although the methods of this systematic review were conducted with rigor and in a valid and reliable manner, there are still limitations that should be addressed. First, due to the study's inclusion and exclusion criteria, it is possible that quality experimental studies were omitted

due to study design (non-randomized controlled trials), lack of peer-reviewing, or written in a non-English. Second, many of the studies included in this review lacked pertinent details regarding MI sessions duration, training, and fidelity, making it difficult to analyze and interpret the results to draw a more precise conclusion of the utility of MI on physical activity outcomes in African Americans. Third, some of the retained studies collected self-reported data increasing the chances of recall bias for several of the primary and secondary outcomes which could affect the accuracy of the effect of MI on those targeted outcomes. Lastly, it is important to recognize that this review consisted of primarily women in their 50's and therefore results may not be generalizable to African American males or young African Americans.

6. Future Implications

It is imperative for future studies incorporating MI to increase physical activity outcomes in African Americans to provide adequate MI training for their interventionists. A description of the training methods in the study is vital to ensure that MI sessions are being conducted in a valid manner using proper MI-consistent methods. It has been shown that using MI-consistent skills can increase the chances of better outcomes, and in contrast, the use of more MI-inconsistent skills could lead to poorer outcomes [34]. MI-consistent skills should also be confirmed by MI fidelity assessments to ensure the validity and integrity of sessions. MI session frequency and duration of this review produced heterogenous results making it difficult to pinpoint the most effective volume of MI necessary to result in positive and sustained outcomes; therefore, future studies should include explicit detail related to MI sessions. Both frequency and duration of MI sessions is of high importance to conclude the best dosage to produce the greatest results.

Future studies and the literature surrounding MI in African Americans would tremendously benefit from increased knowledge about the perceptions of the use of MI in African Americans. Although Miller et al., provided useful information opposing the strong reliance on person-centered information from focused groups in African American women [32], a deeper examination surrounding this topic would further researcher's knowledge on how to adapt MI skills for the African American population. Differences between delivery methods (in-person versus telephone) should also be explored to see if there's a preference or better outcome between the two within this population. Moreover, studies should report results separately for the impact of MI between men and women, as there may be gender differences or preferences. Also, the average age of the African American adults in this review was 52.8 ± 9.9 years of age supporting the need for more MI use to promote positive physical activity outcomes in the young adult African American population as there may be differences in the reception of MI amongst age populations.

Lastly, only one of the retained studies in this review reported conducting in-person physical activity sessions [20]. Results of an intervention conducted by Spector et al., showed promising results in the utility of MI in which

both moderate-to-vigorous physical activity (objective and self-reported measures) and cardiorespiratory fitness improved significantly in a single-armed, home-based aerobic and muscle-strengthening study [35]. In this study, African American women breast cancer survivors received weekly telephone MI sessions by a MI-trained nurse researcher who incorporated the "spirit of MI" across 16 weeks of the study. This may suggest an increase of studies to conduct physical activity interventions in conjunction with simultaneous MI sessions to examine if this combination could amplify physical activity outcomes.

7. Conclusion

The low rates of physical activity and high rates of cardiovascular disease risk factors in the African American population drives the need to identify effective methods to increase motivation and sustainability for physical activity. MI has been shown to be efficacious in several populations to positively impact behavioral changes. The results of this review are inconclusive and do not provide sufficient evidence to support the use of MI to increase physical activity in African American adults. Future studies should consider more in-depth MI training for their interventionists, conducting MI fidelity assessments, conducting more in-person sessions, and longer session and study durations.

Statement of Competing Interests

The authors of this study declare no conflict of interests.

List of Abbreviations

MI: Motivational Interviewing

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