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Culturally-appropriate, family- and community-based physical activity and healthy eating Intervention for african-american middle school-aged girls: A feasibility pilot

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Culturally-appropriate, family- and community-based physical activity and healthy eating Intervention for african-american middle school-aged girls: A feasibility pilot

Cover Page Footnote

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Over the past three decades, the prevalence of overweight has increased among American adults and children, with the highest increases among African-American females (Flegal, Carroll, Ogden, & Curtin, 2010; C. Ogden & Carroll, 2010; C. L. Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). In 2012, 42.5% of African-American girls ages 12-19 years were overweight or obese, which is 11.5% higher than their white counterparts (C. L. Ogden, Carroll, Kit, & Flegal, 2014). The high prevalence of overweight in African-American girls is concerning because childhood obesity is predictive of obesity in adulthood (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997), as evidenced by the fact that 82% of African-American women are overweight or obese (C. L. Ogden et al., 2014).

Linked with overweight/obesity are three critical health behaviors: physical activity (PA), diet, and sedentary behavior. National data indicate that less than half of African-American girls are meeting national PA recommendations for youth, and they often engage in more sedentary behavior than girls in other racial/ethnic subgroups (Eaton et al., 2012; Whitt-Glover et al., 2009). Additionally, African-American girls are more likely than other adolescents to consume 30% or more of their total energy from fat (Neumark-Sztainer, Story, Hannan, & Croll, 2002). Compared to same-age, same-sex peers, African-American girls are less likely to report eating fruits, vegetables, or breakfast (Eaton et al., 2012). Overweight/obesity status and obesity-related health behaviors (i.e., physical inactivity, poor nutrition, sedentary behavior) have been associated with adverse health outcomes (DHHS, 2000). Therefore, effective strategies that positively impact obesity-related behaviors are critical to reverse the obesity trend among African-American girls.

Interventions unique to African-American culture may be more effective than broader, more general interventions for addressing obesity and related health concerns (Kumanyika et al., 2007; Whitt-Glover et al., 2014). A recent meta-analysis found that culturally appropriate strategies have a greater effect than traditional, non-culturally adapted strategies on intervention changes (effect size = 0.46), better treatment outcomes are related to the level of cultural appropriateness, and samples of single minority ethnic groups have yielded some of the most successful implementation outcomes (Smith, Rodriguez, & Bernal, 2011). Culturally appropriate strategies can effectively address surface-level and/or deeper, structural factors that are unique to the targeted group (Baskin, Odoms-Young, Kumanyika, & Ard, 2009; Resnicow & Braithwaite, 2001). Surface-level strategies can be as simple as paralleling intervention materials and messages with characteristics of the targeted group (e.g., same race instructors, print materials with same race models) to enhance feasibility, with structural level factors incorporating core cultural values; social norms; and psychological, environmental, and historical factors into intervention components to enhance program impact (Baskin et al., 2009; Resnicow & Braithwaite, 2001). Structural level adaptation for an intervention targeting African-American girls could include incorporating key contextual issues relevant to African-American communities, such as communalism and commitment to family, to explore a family's influence on girl's activity and food choices. Both surface and structural level adaptations are critical for developing culturally appropriate interventions.

Studies among adults and children have suggested that engaging and involving family members in obesity prevention interventions may have more potential for long-term behavior change due to the nature of family dynamics (Kumanyika et al., 2009). Families play an integral role in a child's healthy lifestyle choices through family rules, emotional support, encouragement, positive reinforcement, and family involvement, with parents influencing their children and vice versa (Gruber & Haldeman, 2009). For African-American girls, a family-based

approach may be a particularly effective, culturally-relevant, behavior change strategy (Barr-Anderson, Wynn-Adams, DiSantis, & Kumanyika, 2013), thus allowing for deeper structural level adaptations. Within African-American communities, an effective strategy for obesity prevention research may be to involve female primary caregivers (i.e., mothers), because of the importance and influential roles of the matriarch in African-American culture (Kumanyika et al., 2007). African-American-women often head households and are responsible for family care and resources (Jarrett & Burton, 1999). Within their communities and extended families, they are respected, key decision makers, including for weight-related choices such as food (Kumanyika et al., 2007).

The current study tested the feasibility and acceptability of a pilot intervention study designed to impact obesity-related behaviors among African-American adolescent girls and their mothers. Aspects of the family, home, and community were incorporated into a PA, healthy eating, and social support intervention. We explored whether a culturally-tailored, family-based intervention would address the specific needs of African-American girls and their mothers. We also examined the impact of this pilot intervention on PA, healthy eating, and sedentary behavior to understand expected effect sizes for planning a larger study.

Method

Study Participants

Mothers and daughters were recruited from the Minneapolis/St. Paul metropolitan area through radio advertisements; flyers and recruitment letters sent to or posted at youth- and family-serving organizations, health-related businesses, or African-American groups (i.e., churches, social and professional organizations); email distribution lists; Facebook posts; and word-of-mouth.

Girls were included in the study, if they were between 10 to 14 years of age, self-identified themselves as African-American, and had a mother or primary female caregiver willing to attend concurrent sessions with them. Exclusion criteria included doctor's restriction of PA and any uncontrolled, chronic health condition that limited PA or required a special diet. Due to the pilot nature of this study, weight status was not a criterion. Informed consent and assent were obtained and the University of Minnesota Institutional Review Board approved the study.

Intervention Description

The *A Family Affair* program was a nine-month, culturally-tailored PA, healthy eating, and social support intervention guided by Social Cognitive Theory (Bandura, 1989) and the Social-Ecological Model (Sallis & Owen, 2002); it focused on impacting PA, dietary, and sedentary behaviors, knowledge of PA and healthy eating, and psychosocial factors, such as social support and self-efficacy for PA and healthy eating (Figure 1). Further development of the intervention and its curriculum was based on previously established community partnerships with local nutrition and PA organizations, prior study results from focus groups with African-American girls and their mothers (Barr-Anderson, Adams-Wynn, Alhassan, & Oreyoka, Under review) and formative focus group research. The resulting intervention was culturally-tailored with surface-level adaptations that matched program materials and messages to the preferences of the daughters and mothers (e.g., same race instructors, materials with same race models) and structural level adaptations such as a family-based intervention component, inclusion of commonly eaten African-American dishes, and PA demonstrations of Gospel aerobics and

different types of dance. Additionally, the intervention incorporated key contextual issues identified in our formative work: emphasizing health rather than weight within the framework of culturally influenced body image; directly addressing emotional eating; and focusing on food-related social and cultural practices.

Intervention Components

Targeted behaviors emphasized within the pilot intervention were increased daily total PA; reduced sedentary behaviors (i.e., TV, video game, and recreational computer use); increased fruit, vegetable, water, and breakfast intake; and reduced sugar-sweetened drink consumption (Table 1; Appendix 1). The study occurred in two phases. Intensive Phase One was implemented in March-April 2011 and Maintenance Phase Two lasted an additional six months (May-November 2011). Daughters were the primary intervention target and mothers were secondary.

Intensive Phase One included eight face-to-face sessions that were three hours each week. One of the primary PA strategies was weekly group exercise classes led by female, mainly African-American (all but one who was Latina) instructors which included a 5-minute warm-up, a 30-45 minute training session, and a 5-10 minute interactive, education-based cool-down. Instructors provided activity modifications during the training session to accommodate the various fitness levels of the participants. Additional PA strategies utilized were providing participants with PA equipment kits (i.e., jump ropes, balance ball, hand weights, and resistance bands) as at-home resources; \$100 to subsidize gym memberships; informational pamphlets on topics such as accessing local PA resources and examples of cardio- and weight-training exercises; and fitness/PA-related incentives (e.g., exercise DVDs and pedometers) for attendance and reaching PA goals. The education-based cool down covered topics related to barriers, types of activity, PA recommendations, and physical inactivity. Decreasing sedentary behavior was discussed during every session as a means to facilitate increasing PA. Additionally, one of the PA education sessions was dedicated to examine all types of sedentary behavior (and not just television watching) and provide alternative activities as a means of becoming more physically active.

Weekly sessions also involved an interactive, family-based healthy eating component that included opportunities for hands-on cooking demonstrations and taste-testing of nutritious meals and snacks; reviewing pamphlets on nutrition-related topics such as healthy fast food options and identifying ripe produce; studying a recipe booklet of taste-tested meals and snacks; and distributing incentives (e.g., mini choppers and measuring cups) for meeting healthy eating goals. Motivational interviewing approaches were utilized to deliver an individualized goal-setting and problem solving component with an emphasis on socially supportive health behaviors for daughters and mothers. Motivational interviewing elicits behavioral change using structured strategies to assist individuals with reducing their ambivalence and enhancing their motivation towards behavior change (Miller & Rollnick, 2002, 2009; Rollnick & Miller, 1995). The approach first gained recognition with addiction treatment, but has yielded positive results for various behavior change interventions, including adult and pediatric obesity treatment (Resnicow, Davis, & Rollnick, 2006). In *A Family Affair*, motivational interviewing counseling phone calls and supportive phone, text, and/or email check-ins throughout the week were conducted with trained research assistants, who served as Health Coaches. The Health Coaches contacted the daughter-mother dyads twice a week (typically Mondays and Thursdays) to check on the participants' progress towards their goals and to help troubleshoot any issues or barriers

that were hindering goal achievement. In order to develop partnerships throughout the goal-setting process, each daughter-mother dyad was asked to articulate specific ways in which they could assist each other in their goal completion. Health Coaches reviewed the plans and provided feedback to the dyads.

During Maintenance Phase Two, participants received monthly newsletters that highlighted answers to participants' questions/concerns about intervention content, and reinforced behavioral change information learned during the face-to-face sessions. Monthly sessions, structured the same as Intensive Phase One's weekly sessions, were held during Months 7-9. Daughter-mother dyads also participated in three family events/celebrations that included other family members.

Quantitative Data Collection

Physiological and behavioral data were collected at three data points: baseline (prior to start of Intensive Phase One), beginning of Month 3 (end of Intensive Phase One), and end of Month 9 (end of all intervention activities). Assessments were administered by trained staff and quality control measures were collected after every 10th assessment. Due to the methodological scope of the feasibility study and small sample size, no control group was used.

Demographics and Family Dynamics. Mothers self-reported their education level, income level, and family structure. Both daughters and mothers self-reported perceived quality of daughter-mother relationship.

Physiological Measurements. Trained staff collected body weight to the nearest 0.1 kg (Tanita scale BF-350) and height to the nearest 0.1 cm (ShorrBoard). All measures were collected twice then averaged. Body mass index (BMI) was calculated (kg/m^2).

PA and Eating Behaviors. A PA and healthy eating behavioral and psychosocial survey was developed from formative research conducted from a previous study (Barr-Anderson et al., Under review) and piloted during the current study.

Process Evaluation. Trained staff completed PA and nutrition component process evaluation forms. Data collected included duration of group exercise or nutrition education session, participant attendance, the group's level of session completion (full, partial, or not at all), and number of participants served a healthy snack and meal. Forms prompted evaluators to describe any circumstances that hindered fidelity to intervention curriculum. After each behavioral counseling session, health coaches completed a summary of specific goals set by participants, including how each daughter and mother planned to support one another's goals. All communication exchanges between Health Coaches and participants were documented. Information included date/time/type of communication and specific details about PA or nutrition topic(s) discussed.

Qualitative Data Collection

Focus groups were conducted after the end of the Post-intervention Phase One (end of Month 2) and Post-maintenance Phase Two (end of Month 9) to gather participant feedback on the feasibility, likability, and practicality of each phase of the intervention. At the end of each phase, separate semi-structured focus groups were conducted with mothers and daughters by the first author, DJBA, and an assistant moderator, who recorded notes. All participants who completed follow-up measures were involved in the focus groups (n=8 daughters and 8 mothers at the end of the Post-intervention Phase One and n=5 dyads at the end of Post-maintenance

Phase Two). Each session lasted for approximately an hour and was held at the same community location that the in-person PA and healthy eating sessions were held. Participants were asked questions about specific intervention components/strategies and suggested revisions to the intervention.

Data Analysis

Results from the process evaluation forms and from Post-intensive Phase One (end of Month 2) and Post-maintenance Phase Two (end of Month 9) focus groups were analyzed by reviewing audiotapes and focus group notes to extract recurring themes. Univariate and bivariate analyses on targeted behaviors (daily total PA; sedentary behaviors; fruit, vegetable, water, and breakfast intake; and sugar-sweetened drink consumption) were performed using SAS version 9.3 (SAS Institute, Cary, NC). Due to the small sample sizes and the pilot nature of the study, point estimates, but not p-values, are reported.

Results

Twelve African-American daughter-mother dyads enrolled in Intensive Phase One. Daughters were 12.4 ± 1.34 years old with a mean BMI percentile of 92.6 ± 12.79 . Mothers were 36.9 ± 5.68 years old with a mean BMI of 38.8 ± 5.81 kg/m². A majority of the mothers completed some college or training after high school (76.9%) and over half (53.8%) reported that their families received some form of public assistance; all daughters qualified for free/reduced lunch.

Four dyads did not complete Intensive Phase One due to work schedules (n=2) and dissatisfaction with incentives or personal weight loss (n=2), even though weight loss was not a goal of the intervention. After Intensive Phase One follow-up data collection, two families were lost to follow-up for unknown reasons. Six families agreed to continue in Maintenance Phase Two, however, one dyad did not complete this phase due to family hardship. There were no baseline age or weight differences between participants based on dropout status.

Process Evaluation

Throughout the intervention, high fidelity to curriculum delivery was achieved. All PA group exercise sessions and cooking demonstrations were implemented fully. Nine of the cool-downs were fully implemented; one was partially implemented, and one was not implemented at all due to lack of time after the swimming session. Eight of the 11 nutrition education sessions were fully delivered; due to time, only 85% of each of the other three sessions was implemented.

Focus Group Feedback

At the end of both phases, daughters reported more conversations with their mothers about healthy eating and PA choices and mothers repeatedly said the intervention helped them achieve stronger bonds and communication with their daughters.

“We do a lot of things together now that we didn’t do before!” (Daughter)

“Even on our drives here and back, it’s just us. The other kids aren’t around and we can talk about the things that are going on and normally we don’t have that time.” (Mother)

However, daughters did report that they would have liked for some intervention sessions to be separate from their moms.

Girls recalled less of the information shared during sessions, but reported enjoying the interactive games. Different aspects of the PA and nutrition sessions were well-received.

“My mom and I enjoyed making them [the different recipes] at home.” (Daughter)

“I liked them [the different instructors] because I could relate to their size...” (Mother)

Although many participants reported never before using some of the low-fat or having tried some of the types of foods (i.e., asparagus) used, they enjoyed the experience and liked being a part of a larger group striving for better health.

“It’s nice to come here and hear about different lifestyles and to know we’re all kind of on the same quest of losing weight or learning to eat breakfast.” (Mother)

The newsletters could not substitute for the face-to-face meeting times and one-on-one support from their well-received Health Coaches.

“My Health Coach was very motivating and gave me really good advice.” (Daughter)

“I wished we met more than once a month. I needed the support more often. The health coaching was good, but I needed to see the others [daughter-mother dyads] so I could stay on track.” (Mother)

Targeted Behaviors

Data on changes in targeted behaviors for daughters and mothers are presented in Tables 2 and 3, respectively. At the end of Intensive Phase One, daughters reported increasing their daily moderate-to-vigorous PA (MVPA) by 7.5 minutes, daily fruit and vegetable intake by 1 serving, and weekly breakfast intake by 2.5 days. Mothers reported similar improvements in PA and eating behaviors. Both daughters and mothers reported increased family support for the child to be more physically active and for healthy eating, increased home availability of healthy foods, and decreased availability of unhealthy foods.

By the end of Maintenance Phase Two, daughters reported further increases in MVPA, but also increased time spent engaging in sedentary behavior (i.e., TV/computer/sedentary video games combined). Most of the daughters’ eating behavior improvements returned to baseline levels, except water intake which increased. Although additional factors (i.e., breakfast intake, fast food consumption) decreased to baseline levels, generally speaking, home food availability and family support continued to be positive.

Discussion

A Family Affair tested whether a culturally tailored intervention with a social support component could be acceptable and feasible to implement in home- and community-based settings among African-American girls and their mothers. Daughters and mothers who completed both phases reported improvements in personal relationships and communication, as well as high levels of enjoyment and interest in participating in a similar type of intervention in the future. Positive trends in reported increased PA and healthy eating indicate a willingness for young and older African-American females to make lifestyle changes. There is promise in utilizing a family-based intervention to address obesity-related behaviors in African-American girls and the next step is to fully test this intervention as a randomized controlled trial.

An unintended, but positive, effect of our intervention was the improvement in personal relationships and communication between daughters and mothers. Adolescence can be a tumultuous time for parent-child relations, but *A Family Affair* provided daughters and mothers an opportunity for quality time, which they reported in the post-intervention focus groups. In previous studies targeting parent-child dyads, there has been little mention about the pair’s relationships or communication (Barr-Anderson et al., 2013). Wadden *et al.* (Wadden et al., 1990) did, however, state that African-American daughter-mother dyads enjoyed interacting with each other during their sessions. Improved relationships and communication may not appear to

be directly associated with weight-related behaviors, but they are. If daughters and mothers experience a non-confrontational, but easygoing relationship in which the daughter feels comfortable sharing with her mother, this type of relationship may foster a stronger bond of sharing and spending time together. An improved daughter-mother relationship may subsequently lead to greater degrees of support in each other's life including support for a healthier lifestyle by being physically active with each other or encouraging the intake of healthy foods.

At the end of Intensive Phase One, participants stated that weekly, face-to-face contact was too time demanding, but the monthly face-to-face contact during the maintenance phase was not enough interaction. Considerations are needed in finding sufficient balance of engagement so participants feel supported in making their behavioral changes, but not overburdened with time commitments. Cullen and Thompson (Cullen & Thompson, 2008) utilized a home-based, computer intervention with African-American mothers and their 9-12 year old daughters with promising results of improving the dyads' healthy nutrition patterns. However, Wadden *et al.* (Wadden et al., 1990), Stolley and Fitzgibbon (Stolley & Fitzgibbon, 1997), and Fitzgibbon *et al.* (Fitzgibbon, Stolley, & Kirschenbaum, 1995) who also engaged African-American daughters and mothers, utilized face-to-face contact only and reported more significant changes in dietary intake (Fitzgibbon et al., 1995; Stolley & Fitzgibbon, 1997) and weight loss (Wadden et al., 1990). Promising next steps may be to utilize a combination of face-to-face and web-based engagement to provide enough contact time without the burden of always meeting face-to-face.

Although this study has several strengths (culturally appropriate intervention; positive response from participants who completed the program; improvements in daughter-mother personal relationships and communication with each other, as well as in PA and healthy eating behaviors), limitations must also be noted. The sample size was small, which limited the power to examine statistically significant differences. The intervention materials were developed to be culturally appropriate for a Midwestern African-American female population; with the heterogeneity of the African-American race, generalizability may not apply to African-American girls and mothers living in other geographical areas of the US. Though our study had attrition issues, we conducted a precise process evaluation. Most studies focusing on this population (African-American daughters and mothers) have not published on the details related to process evaluation. We gathered unique insight that can be utilized with future studies to possibly improve participant retention and involvement.

Conclusion

In future directions, the original curriculum will be revised to reflect changes articulated by daughters and mothers during the focus group and lessons learned from pilot testing Intensive Phase One and Maintenance Phase Two. Changes such as providing child care, requiring attendance by other family members, adding a family/child psychologist to the research team, separating the curriculum delivery from daughters and mothers, and continuing to meet face-to-face on a more frequent basis are strategies likely to enhance intervention engagement and increase attendance and healthy behavior adaptations in the home environment. From a methodological perspective, given the high level of feasibility and acceptability of the pilot intervention, an appropriate next step is to test the efficacy of the *A Family Affair* intervention with a larger sample of daughters and mothers and a control group that is statistically powered to detect changes in health-related behaviors. It is clear that a PA, healthy eating, and social support intervention for African-American daughters and mothers is a feasible and acceptable strategy

for reducing childhood obesity among the most at-risk populations. *A Family Affair* has demonstrated a promising possibility for influencing behavior change for African-American girls and mothers.

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Table 1

A Family Affair Intervention Components

Physical Activity	Nutrition Education	Social Support	Cultural Adaptations
<ul style="list-style-type: none"> • 30-45 minutes of PA at each session • Families with home PA equipment kits • Subsidized cost of gym memberships • Informational pamphlets on PA and PA-related topics • Fitness and PA-related incentives rewarded to participants 	<ul style="list-style-type: none"> • Interactive educational nutritional classes • Taste-testing of nutritious meals and snacks • Hands-on cooking demonstrations • Pamphlets on nutrition-related topics • Recipes distributed • Nutrition-related incentives rewarded to participants 	<ul style="list-style-type: none"> • Motivational interviewing counseling phone calls and supportive phone, text, and/or email check-ins • Strategies for completing goals • Monthly newsletters on PA and health eating • Family events and end of phase celebrations 	<ul style="list-style-type: none"> • PA and nutrition INT components led by AA instructors • Curriculum incorporated AA images and targeted information • Focus groups conducted with targeted population to identify learning needs, strategies, activities, values, to include in INT development • Culturally-specific foods were prepared and served during INT • INT took place in AA community

Note. PA = physical activity, AA = African-American, INT = intervention

Table 2

Daughter Outcomes

	Baseline (n=12)	End of Intensive Phase One (n=8)	End of Maintenance Phase Two (n=5)
BMI Percentile ^a	92.6 ± 12.79	92.4 ± 12.59	88.8 ± 18.43
Activity Behavior			
MVPA ^b (min/day)	22.7 ± 26.56	30.2 ± 28.23	40.9 ± 27.36
Sedentary behavior ^c (hr/day)	6.0±4.47	4.9 ± 4.10	7.4 ± 4.70
Active video game (hr/day)	1.7±1.91	2.2 ± 1.15	1.8 ± 2.19
Eating Behavior			
Fruit & vegetable intake (svg/day)	3.4 ± 1.98	4.4 ± 2.20	4.6 ± .28
SSB ^d intake (svg/day)	2.5 ± 3.08	0.8 ± 1.12	1.5 ± 2.26
Water (svg/day)	2.4 ± 2.31	2.3 ± 1.97	3.1 ± 2.55
Diet soda (svg/day)	0.2 ± 0.28	0.1 ± 0.05	0.1 ± 0.00
Breakfast (days/wk)	3.9 ± 2.24	6.4 ± 0.80	4.2 ± 1.57
Fast food (times/wk)	1.2 ± 1.29	0.8 ± 0.80	1.5 ± 0.00
Snack while watching TV ^e	3.0 ± 0.74	3.1 ± 0.64	2.6 ± 1.34
Healthy Food Availability in Home ^{f,g}	2.7 ± 0.66	2.9 ± 0.60	2.9 ± 0.51
Unhealthy Food Availability in Home ^{g,h}	2.4 ± 0.50	2.0 ± 0.39	1.7 ± 0.83
Family Support to be Physically Active ⁱ			
Family member active with child	2.1 ± 0.70	2.1 ± 0.64	2.0 ± 0.71
Provide transportation	2.3 ± 0.98	2.4 ± 1.19	2.6 ± 0.89
Limit TV watching	2.9 ± 0.90	2.0 ± 1.07	1.8 ± 0.84
Encourage less TV	2.6 ± 0.79	2.1 ± 0.99	2.4 ± 1.52
Family Support for Health Eating ⁱ			
Eat more fruits	2.3 ± 1.23	2.9 ± 1.36	2.6 ± 0.89
Eat more vegetables	2.8 ± 1.03	3.3 ± 1.16	2.8 ± 1.10
Buy fruits & vegetables child likes	2.9 ± 0.79	3.0 ± 1.07	3.4 ± 0.89
Drink more water	2.9 ± 0.79	3.3 ± 1.04	3.2 ± 1.30
Encourage family meals	4.7 ± 3.07	5.3 ± 3.13	4.9 ± 2.38

^a BMI percentile is adjusted for age and sex (CDC reference).

^b MVPA = moderate to vigorous physical activity.

^c Sedentary behavior included watching TV/DVD/video, using the computer not for homework, and sitting while playing Xbox/Play-station/other electronic games.

^d SSB = Sugar-sweetened beverages included drinks like sports drinks, sodas, kool-aid, fruit drinks, and lemonade.

^e 5-point scale in which 1=always, 2=usually, 3=sometimes, 4=rarely, and 5=never.

^f Healthy food availability includes fruits, vegetables, milk at meals, and whole wheat bread.

^g 4-point scale in which 1=never, 2=sometimes, 3=usually, and 4=always.

^h Unhealthy food availability includes “junk food”, fruit juice, chips/salty snacks, chocolate/candy, and soda.

ⁱ 4=point scale in which 1=not at all, 2=sometimes, 3=almost every day, and 4=every day.

Table 3

Mother Outcomes

	Baseline (n=12)	End of Intensive Phase One (n=8)	End of Maintenance Phase Two (n=5)
BMI ^a	38.8 ± 5.81	36.1 ± 4.09	36.5 ± 5.21
Activity Behavior			
MVPA ^b (min/day)	14.7 ± 19.77	47.7 ± 27.2	26.4 ± 21.8
Sedentary behavior ^c (hr/day)	5.9 ± 3.19	3.3 ± 2.26	3.7 ± 0.94
Active video game (hr/day)	0.6 ± 0.70	1.5 ± 2.12	0.2 ± 0.45
Eating Behavior			
Fruit & vegetable intake (svg/day)	3.2 ± 0.94	5.1 ± 1.64	4.8 ± 2.28
SSB ^d intake (svg/day)	1.4 ± 1.79	0.41 ± 0.32	0.6 ± 0.57
Water (svg/day)	3.0 ± 1.83	4.5 ± 0.93	3.3 ± 1.86
Diet soda (svg/day)	0.9 ± 1.71	0.1 ± 0.05	0.2 ± 0.19
Breakfast (days/wk)	4.0 ± 2.05	6.2 ± 1.28	6.0 ± 1.54
Fast food (times/wk)	2.7 ± 1.03	1.9 ± 1.83	1.2 ± 0.67
Snack while watching TV ^e	2.3 ± 0.97	3.3 ± 1.16	3.4 ± 0.56
Healthy Food Availability in Home ^{f,g}	2.9 ± 0.59	3.0 ± 0.43	2.6 ± 0.38
Unhealthy Food Availability in Home ^{g,h}	2.7 ± 0.64	2.0 ± 0.35	2.0 ± 0.17
Family Support to be Physically Active ⁱ			
Family member active with child	1.8 ± 0.39	2.4 ± 0.92	2.4 ± 0.55
Provide transportation	1.9 ± 0.29	2.6 ± 0.92	2.4 ± 0.55
Limit TV watching	2.3 ± 0.62	2.8 ± 1.04	2.8 ± 0.84
Encourage less TV	3.2 ± 0.83	3.4 ± 0.74	2.8 ± 0.84
Family Support for Health Eating ⁱ			
Eat more fruits	2.7 ± 0.78	3.0 ± 0.93	2.4 ± 0.55
Eat more vegetables	2.8 ± 0.83	3.5 ± 0.53	2.8 ± 1.30
Buy fruits & vegetables child likes	3.0 ± 0.77	3.6 ± 0.52	3.0 ± 0.71
Drink more water	3.5 ± 0.67	3.4 ± 0.74	2.6 ± 1.14
Encourage family meals	4.5 ± 2.79	4.4 ± 1.97	6.1 ± 2.04

^a BMI is body mass index defined as [weight in kg/(height in meters)²].

^b MVPA = moderate to vigorous physical activity

^c Sedentary behavior included watching TV/DVD/video, using the computer not for homework, and sitting while playing Xbox/Play-station/other electronic games.

^d SSB = Sugar-sweetened beverages included drinks like sports drinks, sodas, kool-aid, fruit drinks, and lemonade.

^e 5-point scale in which 1=always, 2=usually, 3=sometimes, 4=rarely, and 5=never.

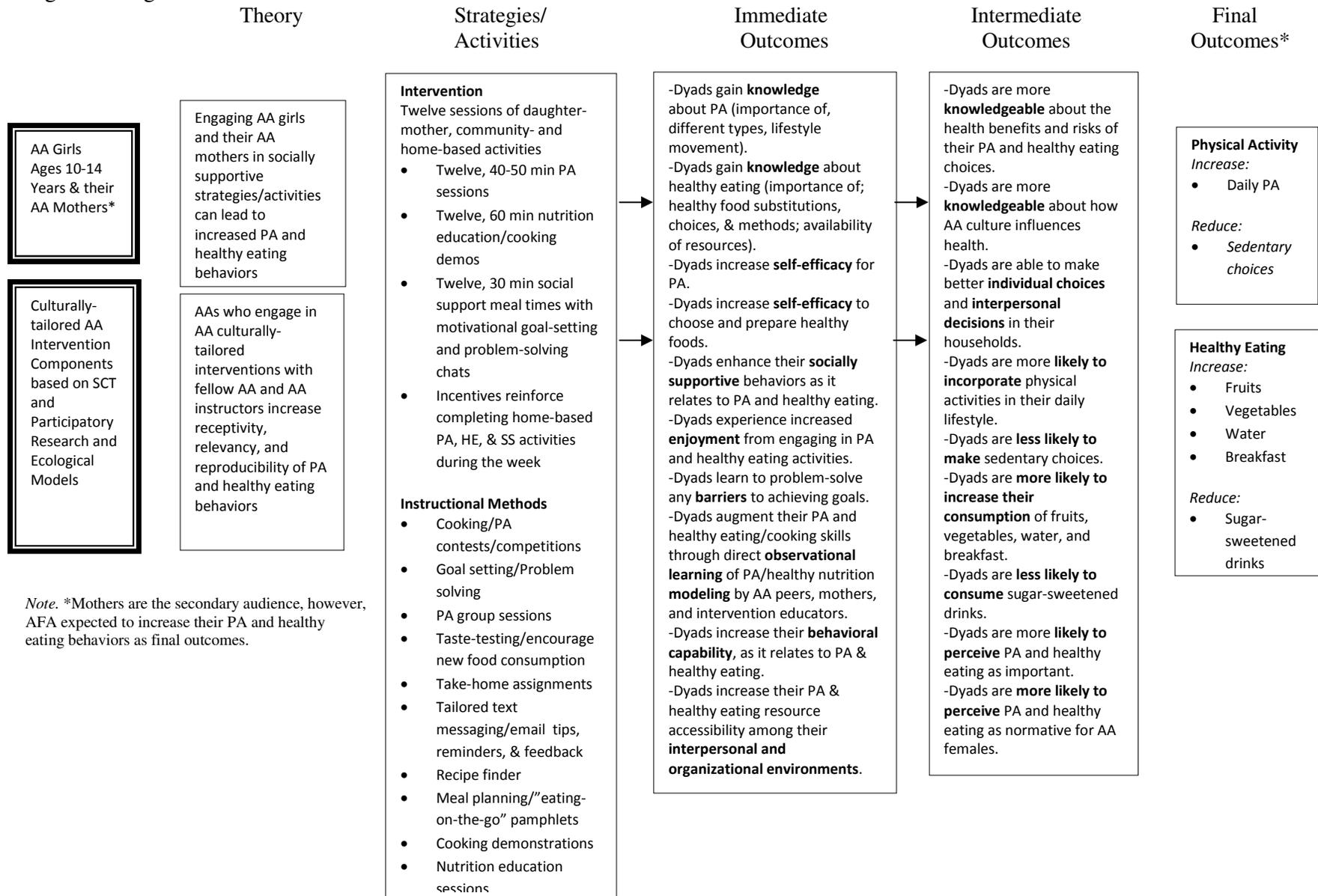
^f Healthy food availability includes fruits, vegetables, milk at meals, and whole wheat bread.

^g 4-point scale in which 1=never, 2=sometimes, 3=usually, and 4=always.

^h Unhealthy food availability includes “junk food”, fruit juice, chips/salty snacks, chocolate/candy, and soda.

ⁱ 4=point scale in which 1=not at all, 2=sometimes, 3=almost every day, and 4=every day.

Figure 1. Logic Model



Note. *Mothers are the secondary audience, however, AFA expected to increase their PA and healthy eating behaviors as final outcomes.

Appendix 1: A *Family Affair* Intervention Schedule

Session	Fitness Class	Physical Activity Education	Nutrition Education	Snack and Lunch
Intensive Phase One				
Week 1	<ul style="list-style-type: none"> • “Welcome Dance” • Spiritual Low-impact Dance 	<ul style="list-style-type: none"> • “Hopes/Dreams for the Future” • “Hair Barriers” Talk with Guest Hairstylist 	<ul style="list-style-type: none"> • “Recipe Remix” • “START/END game” with health statistics and facts 	<ul style="list-style-type: none"> • Fruit Smoothies • Healthy Chicken Salad
Week 2	<ul style="list-style-type: none"> • Circuit Training 	<ul style="list-style-type: none"> • “Time Trainer” (Scheduling short bouts of PA) 	<ul style="list-style-type: none"> • Purpose of the Pyramid • “Deal My Meal” card game 	<ul style="list-style-type: none"> • Fruit Salad • Ratatouille Pasta
Week 3	<ul style="list-style-type: none"> • Low-impact Aerobics with Bun and Thigh Series 	<ul style="list-style-type: none"> • “Breathe In/Breathe Out” (Types of aerobic activity) 	<ul style="list-style-type: none"> • Servings vs. Portions • “Serve Yourself” 	<ul style="list-style-type: none"> • Trail Mix • Meal Strata
Week 4	<ul style="list-style-type: none"> • Zumba 	<ul style="list-style-type: none"> • Building Bodies, Building Bones (Types of bone and muscle strengthening exercises) 	<ul style="list-style-type: none"> • “Truth in the Tally Poll” (Importance of eating breakfast) • Barrier Breakdown Relay • “Put It on the Plate” 	<ul style="list-style-type: none"> • Cereal Sundaes • Oven Roasted Chicken and Vegetables
Week 5	<ul style="list-style-type: none"> • Kickboxing 	<ul style="list-style-type: none"> • How Much? (PA recommendations) 	<ul style="list-style-type: none"> • Reading Food Labels • Macaroni and Cheese Label Puzzle • “What’s My Label?” game 	<ul style="list-style-type: none"> • Fruit Parfait • Vegetable Fried Rice
Week 6	<ul style="list-style-type: none"> • Water Aerobics 	<ul style="list-style-type: none"> • Screens—It’s Not Just TV • Get Moving Relay (Alternatives to sedentary behaviors) 	<ul style="list-style-type: none"> • “Your Daily Drinks” • “Thirst Class” Beverage Scavenger Hunt • “Goal for the Gulp” (Importance of drinking water) 	<ul style="list-style-type: none"> • Turkey, Apple, and Cheese Roll-ups • Jerk Chicken
Week 7	<ul style="list-style-type: none"> • High-intensity 	<ul style="list-style-type: none"> • “Unfair to Compare” 	<ul style="list-style-type: none"> • Importance of Fruits and 	<ul style="list-style-type: none"> • Peanut Butter

Session	Fitness Class	Physical Activity Education	Nutrition Education	Snack and Lunch
Week 8	<ul style="list-style-type: none"> Kickboxing University of Minnesota Collegiate Sports Clinics 	<ul style="list-style-type: none"> audio recording and discussion “Pick out the Positives” Poster Get Set, Get Going! Share our Strength Plan 	<ul style="list-style-type: none"> Vegetables Fruit and Vegetable Ad Up (Benefits of fruits and vegetables) Dietary Guidelines for Americans “Facing the Fat and Sparing the Sodium” of fast food 	<ul style="list-style-type: none"> Pockets Meat and Veggie Macaroni Banana Splits Smothered Greens, Oven Baked Fried Chicken, Classic Macaroni and Cheese
Maintenance Phase Two				
Months 3-6	<ul style="list-style-type: none"> Newsletters mailed only; no in-person sessions scheduled 			
Month 7	<ul style="list-style-type: none"> Yoga 	<ul style="list-style-type: none"> Healthy at Home (Types of convenient, home-based physical activities) 	<ul style="list-style-type: none"> Supermarket Search (Group One) 	<ul style="list-style-type: none"> Rice Cakes with Peanut Butter and Fresh Fruit Oven-fried fish Steamed Broccoli Potato Salad
Month 8	<ul style="list-style-type: none"> Hip-Hop Dance 	<ul style="list-style-type: none"> Maximizing Moves (Increasing physical activity through small, everyday changes) 	<ul style="list-style-type: none"> Supermarket Search (Group Two) 	<ul style="list-style-type: none"> Almonds and Fruit Juice Baked Pork Chop Veggie Sauté Banana Pudding
Family Event 1 Month 9	<ul style="list-style-type: none"> Collegiate Women’s Basketball Game Jump Rope 	<ul style="list-style-type: none"> Stress-Less (Reducing stress through physical activity) 	<ul style="list-style-type: none"> Feeding your Feelings 	<ul style="list-style-type: none"> Milk and Dried Fruit Jumping Jambalaya Fresh Vegetable Salad
Family Event 2	Brunch for Teens Cooking Demonstration			