



Published in final edited form as:

Behav Med. 2016 ; 42(2): 112–119. doi:10.1080/08964289.2014.979757.

The Activity Support Scale for Multiple Groups (ACTS-MG): Child-reported physical activity parenting in African American and non-Hispanic White families

Amy M. Lampard, PhD, MPsych^{1,2}, Akihiro Nishi, MD, DrPH^{3,4}, Monica L. Baskin, PhD⁵,
Tiffany L. Carson, PhD⁵, and Kirsten K. Davison, PhD¹

¹Department of Nutrition, Harvard School of Public Health, Boston, MA, USA

²School of Psychology and Speech Pathology, Curtin University, Perth, WA, Australia

³Yale Institute for Network Science, New Haven, CT, USA

⁴Department of Sociology, Yale University, New Haven, CT, USA

⁵Division of Preventive Medicine, School of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA

Abstract

This study aimed to assess the psychometric properties of a child-report, multidimensional measure of physical activity (PA) parenting, the Activity Support Scale for Multiple Groups (ACTS-MG), in African American and non-Hispanic white families. The ACTS-MG was administered to children aged 5 to 12 years. A three factor model of PA parenting (Modeling of PA, Logistic Support, and Restricting Access to Screen-based Activities) was tested separately for mother's and fathers' PA parenting. The proposed three-factor structure was supported in both racial groups for mothers' PA parenting and in the African American sample for fathers' PA parenting. Factorial invariance between racial groups was demonstrated for mother's PA parenting. Building on a previous study examining the ACTS-MG parent-report, this study supports the use of the ACTS-MG child-report for mothers' PA parenting. However, further research is required to investigate the measurement of fathers' PA parenting across racial groups.

Keywords

Physical activity parenting; physical activity; measurement; child; parent

Address correspondence to: Amy Lampard, School of Psychology and Speech Pathology, Curtin University, GPO Box U1987, Perth, Western Australia, 6845, amy.lampard@curtin.edu.au.

Conflict of Interest statement

The authors declare that there are no conflicts of interest.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIMHD or the NIH.

Introduction

While the physical and mental health benefits of physical activity (PA) for children are widely established¹, children are not engaging in sufficient PA for optimal health^{2, 3}. Further, disparities in PA have been observed across US racial/ethnic groups, with African American and Hispanic children engaging in less PA than non-Hispanic white children^{4, 5}. While the solution to this problem will be multi-faceted, PA parenting has consistently been identified as an important factor in child PA^{6–10}.

PA parenting is a multidimensional construct which encompasses the provision of logistic support, modeling PA behaviors, co-participating in PA, and restricting children's access to screen-based activities. Improved understanding and measurement of the multiple aspects of PA parenting is needed to identify specific parenting behaviors to target in family-based PA interventions^{11, 12}. In a recent systematic review¹³, eleven PA parenting questionnaires were identified; five of which have been administered as child-report questionnaires^{14–18}. Only two child-report measures are multidimensional. In addition, none of these child-report measures have been validated for measurement invariance across multiple racial/ethnic groups, which is essential to facilitate comparisons between groups. The availability of a validated, interviewer administered, multidimensional measure of child-reported PA parenting would enable this construct to be assessed in child-focused studies that do not include parents. Further, child perceptions of PA parenting are of inherent interest, given their likely role in shaping the child's developing PA habits and identity.

The Activity Support Scale for Multiple Groups (ACTS-MG; ¹⁹ parent-report is a multidimensional measure of PA parenting with demonstrated reliability and validity among non-Hispanic white (hereafter referred to as “white”) and African American parents¹⁹. This study presents the child-report version of the ACTS-MG and tests its psychometric properties among white and African American 5- to 12-year-old children. Based on previous findings with the parent-reported measure¹⁹, we hypothesized that the child-report ACTS-MG would show factorial validity, factorial invariance and reliability in African American and white families.

Methods

Revisions to the ACTS

The ACTS-MG is based on the Activity Support Scale (ACTS). The ACTS was originally developed for use with white families and includes parent²⁰ and child¹⁴ report versions. As outlined in Davison et al.¹⁹, the ACTS was modified to be culturally relevant for African American families. In brief, five focus groups were conducted with 27 African American parents of elementary school-aged children. Parents discussed necessary changes to the ACTS to ensure that it was relevant for African American families. Changes included modifications to the examples provided, converting negatively phrased items to positively phrased items, and updating the terminology used to reflect current trends (e.g., a reference to Gameboys was changed to DS Nintendo).

Parents were also asked to identify changes required to ensure that items were developmentally appropriate for elementary school-aged children. This was necessary because the ACTS child-report was originally developed for use with adolescents¹⁴. Saturation was achieved by the fifth focus group with no new information emerging. The resulting scales from this process included the ACTS-MG parent-report and the ACTS-MG child-report. Items for the ACTS-MG child-report also underwent cognitive testing with ten children (50% female; African American; aged 5 to 12 years). Cognitive testing indicated that younger children experienced difficulty with the term “physical activity”. In response, the interview protocol was adapted to include an initial introductory phase where the interviewer asks the child what physical activity means to them, and then clarifies the term if necessary. Table 1 illustrates the original items from the ACTS child-report and the parallel items in the ACTS-MG child-report (adapted following cognitive testing) and ACTS-MG parent-report.

Participants and procedures

Participants were 195 children, aged 5 to 12 years, including 109 African American and 86 white children. One adult caregiver (hereafter referred to as parent) of each child also participated (91% female; Mean age = 37.5 years, SD = 7.6). Where multiple siblings were sampled from the same family, the eldest child was included in the current study.

Participants were recruited in New York and Alabama through afterschool programs, community centers, summer camps and traditionally black sororities (New York) and local newspaper advertisements and targeted mailing to neighborhoods with high proportions of African American households and white households (Alabama). Children were eligible for participation if they were enrolled in elementary school and between the ages of 5 and 12 years of age. While race/ethnicity was not an eligibility criterion for participation, a number of participants (N = 32) who were not white or African American or who did not report their race/ethnicity were excluded from analysis for the current study.

Trained research assistants verbally administered the ACTS-MG child-report to each child in a quiet location. Parents completed a brief background survey and the ACTS-MG parent-report (data reported elsewhere)¹⁹ at home and returned the completed forms. Study procedures were approved by the Institutional Review Boards at the University at Albany and the University of Alabama Birmingham. Parents provided written consent for themselves and their children to participate and children provided verbal assent. At both sites, parents received a \$5 gift card for their time and children received a novelty prize (e.g., pencil).

Measures

ACTS-MG parent-report—The final ACTS-MG parent-report includes 12-items measuring four dimensions of PA parenting including parents’ logistic support, modeling, use of community resources for PA and restricting access to screen-based activities¹⁹. Response options range from “strongly disagree” (1) to “strongly agree” (4). Prior research with the parents of the children included in the current study supports the internal

consistency of the ACTS-MG parent-report and its factorial invariance across race/ethnicity¹⁹.

ACTS-MG child-report—The ACTS-MG child-report includes 26 items measuring maternal (13 items) and paternal (13 items) PA parenting. Response options range from “really false” (1) to “really true” (4). Responses were obtained in a two-step process. Children were first asked if the statement was “true” or “false” for them and based on their initial response they were asked if the statement was “really” or “sort of” true/false. Children completed the scale with reference to their primary female (e.g., mother, stepmother, grandmother, aunt) and male (e.g., father, stepfather, grandfather, uncle) caregivers, which are referred to respectively hereafter as mothers and fathers to simplify reporting. Children living with only one caregiver (male or female) reported solely on the PA parenting of that caregiver.

Demographic questionnaire—Parents completed a brief demographic survey assessing parent gender, age (years), race/ethnicity (African American, white), education (8 response options ranging from 8th grade or less through to finished post-graduate or professional degree) and household income (assessed in \$15,000 increments).

Statistical analysis

To examine the factor structure and measurement invariance of the ACTS-MG child-report, confirmatory factor analysis (CFA) and multi-group CFA were performed in Amos version 20²¹. Consistent with the ACTS-MG parent-report, a three-factor model was specified composed of Modeling PA, Logistic Support, and Restricting Access to Screen-based Activities. Of note, the ACTS-MG parent-report also includes a subscale assessing “use of community resources” which was not assessed on the child-report version. Four items were excluded from the ACTS-MG child-report as they did not map on to the ACTS-MG parent-report subscales (see Table 1). Factor structure was examined separately for children’s report of mothers’ and fathers’ PA parenting. The factor structure was tested on the full sample first, and then measurement invariance across racial groups was tested using multi-group CFA. Full-information maximum likelihood (FIML) estimation was used to accommodate missing data (.7% for mothers’ and 1.2% for fathers’ PA parenting items). A non-significant chi-square statistic, root mean square error of approximation (RMSEA) < .08, comparative fit index (CFI) > .90, and standardized root mean square residual (SRMR) < .10 indicated reasonable model fit²². Model fit of the three-factor structure was compared to a unidimensional factor structure using Akaike’s Information Criterion²².

Three levels of measurement invariance were tested: structural (equivalent pattern of relations between latent variables and indicator items), metric (invariant factor loadings) and scalar (invariant factor intercepts). Measurement invariance was tested using the χ^2 difference test²³; a non-significant χ^2 difference supports measurement invariance, indicating that model fit did not significantly worsen when parameters were fixed to be equivalent between groups.

As significant skewness and kurtosis were observed, two additional procedures were implemented using bootstrap estimation for non-normal data²¹. First, bias-corrected 90%

confidence intervals were estimated to determine statistical significance of factor loadings. Second, to complement χ^2 difference tests in testing for measurement invariance, mean maximum likelihood (ML) discrepancies were examined²¹. An increase in mean ML discrepancy indicates a decline in model fit.

To examine the reliability of ACTS-MG subscales, coefficient H was computed as recommended by Mueller and Hancock^{24, 25}. The reliability criterion outlined by Nunnally and Bernstein²⁶ can be applied to coefficient H (i.e., a reliability of .70 is acceptable for research purposes). Cronbach's alpha was also computed to supplement coefficient H, although alpha is limited given its dependence on the number of items within each subscale, which is limited in the ACTS-MG. To test convergent validity, correlations between ACTS-MG child-report and ACTS-MG parent-report were examined.

Results

Participant characteristics

Children had a mean age of 8.7 years ($SD = 1.6$). The following age distribution was observed (5–6 years, 11.8%; 7–8 years, 30.7%; 9–10 years, 47.2%; 11–12 years, 10.3%). Slightly less than half of participants were male (45.0%). Demographic characteristics for the white and African American samples are reported in Table 2. Parents of white children were older (Mean age = 38.9 years; $SD = 6.5$) than parents of African American children (Mean age = 36.4 years; $SD = 8.3$) ($t(191) = -2.42, p = .016$). In addition, 12.8% of African American parents reported a household income of \$75,001 or more, compared to 39.8% of white parents.

Children reported mothers' ($N = 195$) and fathers' ($N = 174$) PA parenting separately; 10.7% of children did not have a male caregiver. "Mother's" relationship to focal child was 90.3% mother, 7.2% grandmother, 1.5% aunt and 1.0% other or missing. "Father's" relationship to focal child was 72.4% father, 9.8% grandfather, 6.9% uncle, 5.2% stepfather, and 5.7% other or missing. Among African American participants, 12.8% of "mothers" were grandmother or aunt compared to 2.3% among white participants. Similarly, 10.5% of "fathers" were grandfather or uncle among African American participants compared to 2.5% among white participants.

Confirmatory factor analysis on the full sample

CFA was performed on the full sample for mothers' and fathers' PA parenting. For mothers' PA parenting, model fit was reasonable ($\chi^2(24) = 50.14, p = .001, RMSEA = .075, CFI = .905, SRMR = .076$).

For fathers' PA parenting, the initial model fit indicated some model misspecification ($\chi^2(24) = 57.47, p < .001, RMSEA = .089, CFI = .885, SRMR = .090$). Modification indices indicated that the addition of four error covariance paths would improve model fit. Conceptual links relating to joint father and child activities were apparent for one of these error covariance paths (item 2 "My father and I do active things together" and item 5 "My father signs me up for sports teams or clubs like soccer, basketball, and dance"). Given this conceptual overlap and the presence of common method variance, this path was added.

Subsequent model fit was reasonable ($\chi^2(23) = 52.13, p < .001, RMSEA = .085$ (90% CI = .054, .116), CFI = .900, SRMR = .088).

Multi-group analysis

Multi-group CFA was then performed to test for measurement invariance across racial groups. For mothers' PA parenting, the initial model was a good fit to the data in both the African American sample and the white sample (Table 3). Multi-group analysis supported full measurement invariance between racial groups, including equivalence of form, factor loadings, and factor intercepts (Table 3).

For fathers' PA parenting, the proposed factor structure was an excellent fit in the African American sample, but a poor fit in the white sample (Table 3). In the white sample, modification indices suggested the presence of item cross-loadings. Specifically, modification indices suggested that the item, "My father lets me watch TV as much as I want" (reverse-scored; Restricting Access to Sedentary Activities subscale) cross-loaded on both the Modeling PA subscale and the Logistic Support subscale. Given the model misspecification observed in the white sample, measurement invariance across racial groups was not investigated for fathers' PA parenting.

For both mothers' and fathers' PA parenting, overall and in both racial groups, AIC indicated that the three factor model was a better fitting model than a unidimensional factor structure.

Exploratory factorial validity analysis with mothers' PA parenting for younger and older children

Given that measurement invariance was supported for mothers' PA parenting across racial groups, data for African American and white families were combined to test for factorial validity in mothers' PA parenting across younger (5–8 years; $N = 83$) and older children (9–12 years; $N = 112$). In the younger age group, it was necessary to impose one additional constraint to identify the model. To achieve this, an error covariance path was added between item 2 and item 3 of the Modeling of PA subscale ("My mother and I do active things together (like walking, bike riding, playing sports)" and "When my mother does something active she lets me do it with her"), given the conceptual overlap between these items. Fit indices indicated that the model was a good fit to the data in the younger age group ($\chi^2(23) = 26.35, p = .285, RMSEA = .042$ (90% CI = .000, .104), CFI = .967, SRMR = .077).

In the older age group, the initial model fit indicated some model misspecification ($\chi^2(24) = 54.33, p < .001, RMSEA = .107$ (90% CI = .069, .145), CFI = .820, SRMR = .098). Modification indices suggested that estimating an error covariance between item 1 ("My mother exercises or plays sports") and item 6 ("My mother watches me play sports or do other activities like martial arts and dance") would improve model fit. Given the conceptual link between these items and the presence of common method error variance, this path was added to the model, but fit indices remained below those recommended for a reasonable model fit ($\chi^2(23) = 44.13, p = .005, RMSEA = .091$ (90% CI = .049, .131), SRMR = .092,

CFI = .874). Modification indices indicated further model misspecification related to error covariance involving item 7 (“My mother lets me watch TV as much as I want (reversed)”); however, the inclusion of these error covariance paths was not theoretically justified. As some misspecification was observed in the model for the older children, multi-group analysis was not attempted. A larger sample size is required for further investigation of the factorial validity of the ACTS-MG in this age group.

ACTS-MG child-report subscales

Means and coefficient H estimates (i.e., reliability estimates) of the ACTS-MG child-report subscales are presented in Table 4. Supplementing coefficient H estimates, Cronbach’s alpha estimates were also calculated for modeling PA (mothers’ $\alpha = .51$; fathers’ $\alpha = .62$), logistic support (mothers’ $\alpha = .58$; fathers’ $\alpha = .70$), and restricting screen activities (mothers’ $\alpha = .68$; fathers’ $\alpha = .63$). In both groups, reports of higher parental modeling were associated with reports of greater logistical support from mothers (African American $r = .45, p < .001$; white $r = .26, p = .049$) and fathers (African American $r = .38, p < .001$; white $r = .47, p < .001$). In addition, higher reports of maternal modeling were associated with greater restriction of screen activities among white children ($r = .43, p < .001$). As shown in Table 5, child-reports of mothers’ PA parenting were significantly and positively correlated with maternal-reports of the same constructs for both racial groups, with the exception of Modeling of PA in African American families; small to moderate correlations were observed.

Discussion

The current study examined the psychometric properties of the ACTS-MG child-report measure of PA parenting in African American and white families. Results were largely supportive of the use of the ACTS-MG as a child-report measure of PA parenting; the three-factor model was supported for mothers’ PA parenting in both African American and white families and for fathers’ PA parenting in African American families. Full measurement invariance between racial groups was supported for mothers’ PA parenting. Results therefore support the use of the ACTS-MG as a child-report measure of mothers’ and father’s PA parenting in African American families, and this is the first measure of child-reported PA parenting validated for use specifically with African American families.

Mixed results were observed for the reliability of subscales. Reliability was acceptable for the Restricting Access to Screen-based Activities subscale for both mothers’ and fathers’ PA parenting. In addition, reliability was acceptable for mothers’ Logistic Support in the white sample and for fathers’ Logistic Support in the white and African American samples. However, with the exception of white fathers’ PA parenting, reliability of the Modeling PA subscale was weak. Parental role modeling of PA is considered to be an important component of parents’ support for child PA⁶, and as such, identifying a reliable child-report measure of this construct is important. The current results indicate that revision of existing items or expansion of the item set for parental role modeling may be necessary for this subscale. The subscale as currently devised assesses both parent engagement in PA as well as parent and child joint participation in PA. It may be that these represent two separate

constructs, although a previous measure of parent activity has combined these concepts with acceptable reliability¹⁷.

Factor analysis results indicated that the item assessing the restriction of access to TV was problematic in subgroups, including child-report of white fathers' PA parenting and report of mothers' PA parenting by older children. Further work is recommended to refine this item, possibly involving reversal of the item valence to more directly assess restriction of child TV time. In addition, preliminary investigations in this sample indicate that child age may be an important factor to consider in the measurement of PA parenting and factorial invariance of the ACTS-MG should therefore be further examined across different developmental periods. A recent systematic review has highlighted the need to identify valid and reliable instruments for the assessment of PA parenting and called for researchers to establish the factorial validity and factorial invariance of PA parenting measures¹². The current study responds to this need. Strengths of this study include the use of a multi-racial sample and the examination of the ACTS-MG as a measure of mothers' and fathers' PA parenting separately. Nevertheless, limitations were apparent. Additional work is required to examine the sensitivity to change and test-retest reliability of the ACTS-MG child-report, which was not investigated in the current study and which is necessary in order to use this instrument to evaluate PA parenting interventions. Additional work is also required to assess the construct validity of the ACTS-MG. Construct validity was partly established by the observed small to moderate correlations between child-rated and parent-rated mothers' support for PA parenting, particularly for the Logistic Support and Restricting Access to Screen-based Activities subscales. Construct validity could be further investigated by examining the correlation between child-reported PA parenting and child PA.

While limitations were observed in the psychometric properties of the ACTS-MG, particularly in relation to subscale reliability and factorial validity in specific subgroups, study findings remain relevant. It is important to develop validated child-report measures in this area for two primary reasons. First, children and parents have interrelated but distinct perceptions of parenting behavior in general²⁷, and this variation may have important implications for child engagement in PA. Second, a multidimensional child-report instrument is needed for use in child-focused research and evaluation settings where parents may not be directly assessed. Current options for validated, multidimensional measures of child-reported PA parenting are limited. A recent systematic review identified only one additional multidimensional measure of child-reported PA parenting: the Parental Influence on Children's Physical Activity Scale¹⁷. The strengths of the ACTS-MG in comparison involves the inclusion of a subscale assessing parent restriction of child screen-based activities, which may be an important component of parent support in this area, and the specific development and testing of the ACTS-MG for use with multiple racial groups.

Conclusion

To our knowledge, the ACTS-MG is the first child-report multidimensional measure of PA parenting to be validated for use across multiple racial groups. Continued psychometric evaluation of the ACTS-MG is recommended and particular work is needed in relation to subscale reliability and the measurement of child-reported parents' restriction of TV use.

Acknowledgments

We would like to thank Vanessa Sarfoh, Ariel Bernstein, Laurie Young and Dr. Catherine Lawson for their assistance with data collection.

Funding

This research was supported in part by the National Institute on Minority Health and Health Disparities (NIMHD), National Institutes of Health (NIH) (R24MD001120). AN is supported by a Postdoctoral Fellowship from the Japan Society for the Promotion of Science (JSPS).

References

1. Janssen I, LeBlanc A. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int J Behav Nutr Phys Act.* 2010; 7(1):40. [PubMed: 20459784]
2. Bornstein DB, Beets MW, Byun W, McIver K. Accelerometer-derived physical activity levels of preschoolers: a meta-analysis. *J Sci Med Sport.* 2011; 14(6):504–11. [PubMed: 21684809]
3. Fakhouri T, Hughes JP, Brody DJ, Kit BK, Ogden CL. Physical activity and screen-time viewing among elementary school-aged children in the United States from 2009 to 2010. *JAMA Pediatrics.* 2013; 167(3):223–9. [PubMed: 23303439]
4. Eaton DK, Kann L, Kinchen S, Shanklin S, Ross J, Hawkins J, et al. Youth Risk Behavior Surveillance --- United States, 2009. *MMWR.* 2010; 59:1–142. [PubMed: 20520591]
5. Schuster MA, Elliott MN, Kanouse DE, Wallander JL, Tortolero SR, Ratner JA, et al. Racial and ethnic health disparities among fifth-graders in three cities. *N Engl J Med.* 2012; 367(8):735–45. [PubMed: 22913683]
6. Edwardson CL, Gorely T. Parental influences on different types and intensities of physical activity in youth: a systematic review. *Psychol Sport Exerc.* 2010; 11(6):522–35.
7. Gustafson SL, Rhodes RE. Parental correlates of physical activity in children and early adolescents. *Sports Med.* 2006; 36(1):79–97. [PubMed: 16445312]
8. Pugliese J, Tinsley B. Parental socialization of child and adolescent physical activity: a meta-analysis. *J Fam Psychol.* 2007; 21(3):331–43. [PubMed: 17874918]
9. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc.* 2000; 32(5):963–75. [PubMed: 10795788]
10. Trost SG, Loprinzi PD. Parental influences on physical activity behavior in children and adolescents: a brief review. *Am J Lifestyle Med.* 2011; 5(2):171–81.
11. Davison KK, Mâsse LC, Timperio A, Frenn MD, Saunders J, Mendoza JA, et al. Physical activity parenting measurement and research: challenges, explanations, and solutions. *Child Obes.* 2013; 9:S-103–S-9. [PubMed: 23944918]
12. Trost SG, McDonald S, Cohen A. Measurement of general and specific approaches to physical activity parenting: a systematic review. *Child Obes.* 2013; 9:S-40–S-50. [PubMed: 23944923]
13. Sleddens EFC, Kremers SPJ, Hughes SO, Cross MB, Thijs C, De Vries NK, et al. Physical activity parenting: a systematic review of questionnaires and their associations with child activity levels. *Obes Rev.* 2012; 13(11):1015–33. [PubMed: 22845791]
14. Davison KK. Activity-related support from parents, peers and siblings and adolescents' physical activity: are there gender differences? *J Phys Act Health.* 2004; 1:363–76.
15. Taylor WC, Sallis JF, Dowda M, Freedson PS, Eason K, Pate RR. Activity patterns and correlates among youth: differences by weight status. *Pediatr Exerc Sci.* 2002; 14(4):418–31.
16. Kahan D. Jewish day-schooled adolescents' perceptions of parental and environmental support of physical activity. *Res Q Exerc Sport.* 2005; 76(3):243–50. [PubMed: 16270701]
17. Jago R, Fox KR, Page AS, Brockman R, Thompson JL. Development of scales to assess children's perceptions of friend and parental influences on physical activity. *Int J Behav Nutr Phys Act.* 2009;6. [PubMed: 19159476]
18. Anderson CB, Masse LC, Hergenroeder AC. Factorial and construct validity of the athletic identity questionnaire for adolescents. *Med Sci Sports Exerc.* 2007; 39(1):59–69. [PubMed: 17218885]

19. Davison KK, Li K, Baskin ML, Cox T, Affuso O. Measuring parental support for children's physical activity in white and African American parents: the Activity Support Scale for Multiple Groups (ACTS-MG). *Prev Med.* 2011; 52:39–43. [PubMed: 21111755]
20. Davison K, Cutting T, Birch L. Parents' activity-related parenting practices predict girls' physical activity. *Med Sci Sports Exerc.* 2003; 35:1589–95. [PubMed: 12972881]
21. Arbuckle, JL. Amos Development. SPSS; 2011. IBM SPSS Amos 20 user's guide.
22. Kline, RB. Principles and Practice of Structural Equation Modeling. 2. New York: Guilford Press; 2005.
23. Byrne, BM. Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming. 2. New York: Routledge; 2010.
24. Hancock, GR.; Mueller, RO. Rethinking construct reliability within latent variable systems. In: Cudeck, R.; du Toit, S.; Sörbom, D., editors. *Structural Equation Modeling: Present and Future - A Festschrift in Honor of Karl Jöreskog*. Lincolnwood, IL: Scientific Software International; 2001. p. 195-216.
25. Mueller, R.; Hancock, G. Structural equation modeling. In: Hancock, G.; Mueller, R., editors. *The Reviewer's Guide to Quantitative Methods in the Social Sciences*. New York, NY: Routledge; 2010.
26. Nunnally, JC.; Bernstein, IH. *Psychometric theory*. 3. New York: McGraw-Hill; 1994.

Table 1

Items included on the original child-report survey and the revised Activity Support Scale for Multiple Groups (ACTS-MG) child- and parent-report surveys.

Subscale	ACTS child-report original ¹	ACTS-MG child-report ²	ACTS-MG parent-report ³
Modeling of PA	My (<i>mother/father</i>) exercises or does something active	My (<i>mother/father</i>) exercises or plays a sport (Item 1)	I exercise or am physically active on a regular basis
	My (<i>mother/father</i>) and I do active things together (like walking, bike riding, playing sports)	My (<i>mother/father</i>) and I do active things together (like walking, bike riding, playing sports) (Item 2)	I encourage my child to be physically active by leading by example (by role modeling)
	My (<i>mother/father</i>) tries to include me when <i>s/he</i> does something active	When my (<i>mother/father</i>) does something active (<i>she/he</i>) lets me do it with (<i>her/him</i>) (Item 3)	I enjoy exercise and physical activity
Logistic support	My (<i>mother/father</i>) drives me to places where I can be physically active (for example, sports practice, meets, the pool, the skating rink).	My (<i>mother/father</i>) takes me to places where I can be active (like to sport practices, meets, soccer games, the park) (Item 4)	I take my child to places where he/she can be active
	My (<i>mother/father</i>) enrolls me in sports and other physical activities.	My (<i>mother/father</i>) signs me up for sports teams or clubs like soccer, basketball, and dance (Item 5)	I enroll my child in sports teams and clubs such as soccer, basketball, and dance
	My (<i>mother/father</i>) watches me compete in sporting events or other physical activities	My (<i>mother/father</i>) watches me play sports or do other activities like martial arts and dance (Item 6)	I watch my child play sports or participate in other activities such as martial arts or dance
Restricting access to screen-based activities	My (<i>mother/father</i>) limits how much television I can watch	My (<i>mother/father</i>) lets me watch TV as much as I want (Item 7)	I limit how long my child can watch TV or DVDs each day (including educational and non-educational programs)
	My (<i>mother/father</i>) limits how much time I spend using the computer for things other than school work	My (<i>mother/father</i>) lets me use the computer as much as I want for things that aren't homework like playing games, surfing the internet, and sending emails (R) (Item 8)	I limit how long my child can use the computer for things other than homework (such as playing computer games and surfing the internet)
	My (<i>mother/father</i>) limits how long I play video/computer games	My (<i>mother/father</i>) lets me play video games (such as PlayStation, Xbox, and Gameboy) as much as I want (R) (Item 9)	I limit how long my child plays video games (including PlayStation, Xbox, and Gameboy)

R. Reversed- scored;

¹ Davison, 2004;

² Current study;

³ Davison et al. 2011.

Additional items included on the ACTS-MG child-report which were not retained for analysis: My *mother/father* tells me to go outside when the weather is nice; I like doing active things because of my *mother/father*; My *mother/father* signs me up for after school programs and camps where I can be active.

Table 2

Demographic characteristics for the African American and white samples

Measures	African American (n = 109)	White (n = 86)
Child age (M, SD)	8.6 (1.6)	8.7 (1.7)
Child sex (% Male)	43.4%	47.1%
Parent age (M, SD)	36.4 (8.3)	38.9 (6.5)
Parent sex (% Male)	2.8%	16.3%
Parent education		
Some high school, did not finish	2.7%	3.5%
Graduated high school or GED	17.4%	12.8%
Vocational, trade, or technical school	3.7%	7.0%
Started college	29.4%	27.9%
Graduated college	37.6%	27.9%
Started post graduate work	2.8%	5.8%
Finished post-graduate or professional degree	6.4%	15.1%
Parent income		
\$0 – \$15,000	15.6%	3.6%
\$15,001 – \$30,000	29.4%	18.1%
\$30,001 – \$45,000	24.8%	10.8%
\$45,001 – \$60,000	11.9%	14.4%
\$60,001 – \$75,000	5.5%	13.3%
\$75,001 and up	12.8%	39.8%

Table 3
Fit indices for multi-group confirmatory factor analyses with African American and white families

	χ^2	df	p	RMSEA (90% CI)	SRMR	CFI	Factor loadings	χ^2 diff	df	p	Mean ML discrepancy
Mothers' PA parenting											
Single group solutions											
African American (n = 109)	35.88	24	.056	.068 (<.001, .111)	.086	.927	.38-.76	-	-	-	-
White (n = 86)	30.36	24	.173	.056 (<.001, .110)	.078	.932	.24-.89	-	-	-	-
Measurement invariance											
Equivalent form	66.25	48	.041	.044 (.009, .069)	.082	.929	-	-	-	-	164.33
Equivalent factor loadings	77.97	54	.018	.048 (.021, .070)	.087	.906	-	11.73	6	.068	162.27
Equivalent factor intercepts	85.52	63	.031	.043 (.014, .065)	.087	.912	-	7.55	9	.580	159.87
Fathers' PA parenting											
Single group solutions											
African American (n = 97)	23.58	24	.486	<.001 (<.001, .081)	.071	1.00	.34-.77	-	-	-	-
White (n = 80)	58.93	24	<.001	.136 (.092, .180)	.130	.835	.46-.85	-	-	-	-

Note: For all factor loadings, bias-corrected confidence intervals did not overlap zero, with the exception of one item ("My mother lets me use the computer as much as I want for things that aren't homework like playing games, surfing the internet and sending emails") on the restricting access to screen-based activities subscale for mothers' PA parenting in the white sample; χ^2 diff, chi-square difference test; RMSEA, root mean square error of approximation; SRMR, standardized root square mean residual; CFI, comparative fit index; PA, physical activity. As the proposed model was not a good fit for fathers' PA parenting in the white group, measurement invariance was not tested for fathers' PA parenting.

Subscale means and reliability of the Activity Support Scale Child-Report for African American and white families

Table 4

Sample	Subscale	Mothers' PA parenting		Fathers' PA parenting	
		Mean (SD)	Reliability	Mean (SD)	Reliability
Overall	Modeling	3.03 (0.78)	.54	3.22 (0.84)	.67
	Logistic Support	3.41 (0.75)	.64	3.13 (0.90)	.72
	Restricting Access to Screen-based Activities	2.82 (0.92)	.75	2.77 (0.94)	.72
African American	Modeling	2.96 (0.83)	.55	3.16 (0.82)	.59
	Logistic Support	3.32 (0.83)	.66	2.96 (0.97)	.70
	Restricting Access to Screen-based Activities	2.86 (0.99)	.75	2.70 (0.92)	.68
White	Modeling	3.10 (0.71)	.52	3.30 (0.86)	.77
	Logistic Support	3.53 (0.61)	.81	3.32 (0.78)	.80
	Restricting Access to Screen-based Activities	2.78 (0.84)	.75	2.84 (0.95)	.79

SD, standard deviation. Reliability is Co-efficient H, which conveys the squared correlation between a factor and the optimum linear composite formed by its factor items.²⁴

Table 5

Correlations between children's and mothers' reports of mothers' physical activity parenting

Parent-child correlations in reports of mothers' physical activity parenting			
African American	Modeling	$r = .16$	$p = .140$
	Logistic support	$r = .55$	$p < .001$
	Restricting screen activities	$r = .44$	$p < .001$
Non-Hispanic white	Modeling	$r = .30$	$p = .021$
	Logistic support	$r = .52$	$p < .001$
	Restricting screen activities	$r = .68$	$p < .001$

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript