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## Measuring Parental Support for Children's Physical Activity in White and African American Parents: The Activity Support Scale for Multiple Groups (ACTS-MG)

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### Abstract

**Objectives**—The Activity Support Scale (ACTS) was expanded for use with African American families. Its factorial invariance and internal reliability were examined for non-Hispanic white and African American parents.

**Methods**—The ACTS was modified to improve its applicability to African American families based on information from five focus groups with 27 African American parents of elementary school-aged children. Between 2006 and 2008, the revised scale was administered to 119 African American and 117 non-Hispanic white parents in northeastern NY and Alabama. Its factorial invariance across race/ethnicity and internal consistency were examined.

**Results**—Factor analysis of the revised scale, the Activity Support Scale for Multiple Groups (ACTS-MG), identified four parenting factors in white and African American parents including logistic support, modeling, use of community resources to promote physical activity (PA), and restriction of sedentary behaviors. Results supported the scale's internal reliability and factorial invariance across race/ethnicity.

**Conclusion**—The ACTS-MG is appropriate for use with non-Hispanic white and African American families and will enable the extension of current research with white families to the examination of strategies supporting PA in African American families. Additional psychometric work with the ACTS-MG is encouraged.

### Keywords

Children; Youth; Parenting; Social Support; Scale Development

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#### Conflict of Interest

The authors declare there is no conflict of interest.

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## Introduction

Physical activity (PA) levels are low among youth (Troiano, et al., 2008) and decline dramatically with age (Nader, et al., 2008). By adolescence, less than 10% of youth meet PA recommendations. These trends are more pronounced among minority youth (Crespo, 2005). Based on data from the 2007 Youth Risk Behavior Surveillance System, 32% of African American adolescents failed to attain 60 minutes of PA on any day in the past week, compared with 22% of non-Hispanic white youth (Centers for Disease Control and Prevention, 2008). Consequently, African American children and adolescents disproportionately report negative health outcomes associated with insufficient levels of PA (Crespo, 2005). These findings collectively highlight the need to identify strategies to promote and sustain active lifestyles among African American children and adolescents.

A burgeoning body of research examining the effect of parents on children's PA has shown that children and adolescents are more likely to be physically active when their parents are active (Davison, et al., 2003; Davison and Jago, 2009; Fogelholm, et al., 1999; Freedson and Evenson, 1991; Trost, et al., 2001; Vilhjalmsson and Thorlindsson, 1998), encourage them to be active (Biddle and Goudas, 1996; McGuire, et al., 2002; Prochaska, et al., 2002; Trost, et al., 2003) and participate in sport or PA with them (Davison, 2004; Davison, et al., 2003; Prochaska, et al., 2002). Furthermore, children exhibit higher levels of PA when their parents take them to places where they can be active, enroll them in organized activities and pay the associated fees (Davison, 2004; Davison and Jago, 2009; Hoefler, et al., 2001; Prochaska, et al., 2002; Sallis, et al., 2000). The majority of studies to date, however, have focused on non-Hispanic white populations. While a number of studies have included African American sub-samples (Hoefler, et al., 2001; McGuire, et al., 2002; Prochaska, et al., 2002; Sallis, et al., 1999), only a handful of studies have reported results for African Americans separately from other ethnic groups (Adkins, et al., 2004; Kuo, et al., 2007; Madsen, et al., 2009; McGuire, et al., 2002; Trost, et al., 1999).

Knowledge regarding the influence of parents and families on African American children's PA is modest compared to what is known in non-Hispanic white populations. Furthermore, studies to date have been limited by the use of single item (McGuire, et al., 2002) or uni-dimensional (Adkins, et al., 2004; Kuo, et al., 2007) measures of parental support. For example, McGuire et al. (2002) used one question to examine the extent to which parents encouraged their children to be physically active. Additionally, Adkins et al. (2004) measured parents' support of daughter's activity using one 6-item scale (e.g., "I try to get my daughter to play outside" and "I go for a walk with my daughter"). The absence of a multidimensional measure of activity support validated for use with African American families hinders the ability to examine relationships between parental support and African American children's PA in detail and to develop targeted intervention strategies.

In this research, the Activity Support Scale (ACTS), originally developed for use in a non-Hispanic white sample (Davison, 2004; Davison and Jago, 2009), is revised for use with African American parents of elementary school-aged children and its factorial structure and factorial invariance across race/ethnicity are examined with African American and non-Hispanic white parents. Elementary school-aged children are the focal age group in this study given noted declines in physical activity during adolescence (Nader, et al., 2008), and the protective effect of parental support during middle childhood on this decline (Davison, 2004; Davison and Jago, 2009; Hoefler, et al., 2001; Prochaska, et al., 2002; Sallis, et al., 2000).

## Methods

### Measure

**The Activity Support Scale (ACTS)**—The parent-report version of the ACTS includes 7 items and assesses two domains of parental support for children’s PA including logistic support (e.g., taking children to places where they can be active, enrolling them in activities) and modeling (e.g., being active with children, using own behavior to show children how to be active) (Davison, et al., 2003). The scale was originally developed for use with a longitudinal sample of non-Hispanic white girls (ages 9 to 15 years) and their parents (Davison, et al., 2003) and is shown to be a valid measure in this population (Davison, 2004; Davison, et al., 2003; Davison and Jago, 2009). A child-report version of the ACTS has been developed and tested in a sample of non-Hispanic adolescent girls and boys (Davison, 2004), but was not the focus of this study.

**Revisions to the ACTS**—In preparation for the current study, five focus groups (4–7 parents per group) led by the first author, were conducted with 27 African American parents of elementary school-aged children. Parents were recruited from afterschool programs, churches, and community centers in a moderate-sized city in northeastern New York. Parents were predominantly female (85%) and the majority had some post high school training (23% high school or less, 50% some college or post high school training, 27% bachelors or higher). Additionally, parents were from a range of income groups (20% < \$20,000; 44% \$20–\$34,999, 16% \$35–\$49,999, 20% \$50,000+).

Prior to conducting the focus groups, the seven items on the ACTS were converted from questions (e.g., “How much do you use your own behavior to encourage your child to be physically active”) to statements (“I use my own behavior to encourage my child to be physically active) to enable the same response options (i.e., 1=strongly disagree to 4=strongly agree) to be used for all items. Previously, different response options were used for each item (Davison, et al., 2003). In each focus group session, parents were given a copy of the ACTS and asked to comment on the relevance of items to African American families. In particular, parents were asked to: a) suggest changes to the wording of items; b) identify items that were not culturally relevant; and c) identify parenting strategies that should be added. The group moderator took extensive notes during each session and revised the ACTS iteratively after each focus group. Newly identified parenting strategies not already included on the ACTS were added to the scale and the language of the existing items was modified as suggested. This process continued under saturation where no new parenting strategies were recommended for inclusion and no substantive changes were recommended to the item language. Saturation was achieved by the fifth focus group.

Revisions to the ACTS included the addition of 13 items and modifications to 6 of the 7 original items (see Table 1 for the original and revised versions of the scale). Parents did not identify any items to delete. Examples of items that were added based on parent feedback include “I encourage my child to walk or bike to places in my neighborhood if it is safe and appropriate for his/her age” and “I encourage my child to use resources in our neighborhood to be active such as the park and the school”. These items reflect the use of community resources for PA, a construct that was not included in the original version of the ACTS. Additional new items such as “I limit how long my child can watch TV or DVDs each day” and “I encourage my child to play outdoors (with supervision) when the weather is nice” reflected parent restriction of children’s access to sedentary activities. Modifications to the original items generally clarified the meaning of statements or provided more relevant examples. The revised ACTS was used in the current study and its factorial structure and internal consistency were tested with white and African American parents.

## Participants and procedures

Participants for this study include 119 African American parents and 117 non-Hispanic white parents of elementary school-aged children. Parents completed the revised ACTS, referred to hereafter as the Activity Support Scale for Multiple Groups (ACTS-MG), and a brief background survey. Parents were recruited from moderate-sized cities in northeastern New York (N= 111) and Alabama (N=126); African American and non-Hispanic white participants were recruited from each site. Parents recruited in New York were recruited through after school programs, community centers, summer camps and traditionally black sororities. Parents recruited in Alabama were recruited through local newspaper advertisement and targeted mailing to neighborhoods with high proportions of African American and white households. Participants at both sites received a \$5 gift card for their time. Study procedures were approved by the University at Albany and the University of Alabama Birmingham IRB boards. All participants provided written informed consent.

## Statistical Analyses

Preliminary analyses examined the mean values, standard deviation (SD), univariate skewness and kurtosis at the item level for the ACTS-MG. Multivariate normality at the scale level was evaluated using the Mardia coefficient for skewness and kurtosis (Mardia, 1970). Additional preliminary analyses were performed to reduce the item pool and identify a select set of high-performing items for each of the four anticipated factors. To achieve this objective, exploratory factor analysis was conducted separately for each factor. In each instance, two factors were retained and then rotated using promax rotation. Items with high factor loadings on the second factor but not the first were deleted. The intent of these analyses was to facilitate the creation of a parsimonious and high-performing measure of parent activity support.

The factor structure of the ACTS-MG was then tested using confirmatory factor analysis (CFA) (Muthén and Muthén, 1998–2007). A maximum likelihood estimation with robust standard errors (MLR) was used in the CFA models (Brown, 2006; Muthén and Muthén, 1998–2007) because of the violations of univariate and multivariate normality of the data and the use of incomplete data. Model fit was assessed using (a) the Chi square statistic, (b) Standardized Root Mean Square Residual (SRMR), (c) Root Mean Square Error of Approximation (RMSEA), (d) the Comparative Fit Index (CFI) and (e) the Tucker-Lewis index (TLI). The following thresholds were used to determine model fit: a non-significant chi-square; a SRMR value below 0.05 (Brown, 2006), a RMSEA less than 0.08 (Browne and Cudek, 1993) (acceptable fit) or less than 0.06 (Hu and Bentler, 1999) (good fit), and CFI and TLI values approaching 1.0. Model modifications were based on substantive information supplemented by factor loadings, squared multiple correlations (SMCs), and modification indices (MIs).

Factorial invariance was examined among African American and white parents using multiple-group CFA. Prior to this analysis, the posited model was run separately in African American and non-Hispanic white parents to ensure that it was acceptable in each sample (i.e., all freely estimated factor loadings were statistically significant and salient). As recommended by Brown (2006), the “step-up” strategy for multiple-group CFA invariance was then used to test equality in the factor structure (M1), factor loadings (M2), indicator intercepts (M3), indicator residuals (M4), factor variances (M5), factor covariance (if > 1 latent factor) (M6), and latent means (M7). Step 2–4 are tests of measurement invariance (equivalence of the measurement solution) and steps 5–7 are tests of population heterogeneity (equivalency of the structural solution). Following the assessment of the factor structure of the ACTS-MG and its equivalence across groups, the internal consistency of each factor was examined.

## Results

### Sample characteristics

Participants were predominantly female (87%) and the majority had completed at least some college or post high school training. In particular, 20% of parents completed high school or less, 35% completed some college or post high school training, and 45% had a bachelor's degree or higher. Parents were from a wide range of income groups with 11% earning \$0 – \$15,000, 24% earning \$15,001–\$30,000, 21% earning \$30,001–\$45,000, 12% earning \$45,001–\$60,000, and 34% earning \$60,000 or more per year.

### Item Reduction and Model Testing

Results from the exploratory factor analyses identified three high-performing items for each of the anticipated subscales resulting in a final scale of 12 items. A four-factor CFA, with three items per factor, was conducted to examine the factorial validity of the ACTS-MG with African American parents ( $n = 119$ ). The model fit for the African American parents was good. Similarly, the same model showed appropriate fit among white parents (see single group solutions in Table 2).

The final model was cross-validated using a multiple-group analysis of factorial invariance between African American and white parents. Measurement invariance was tested by comparing models M1, M2, M3, and M4 and population heterogeneity was tested by comparing models M5, M6, and M7. The nested  $\chi^2$  evaluations showed there was no significant difference between M1 and M2, and M2 and M3, indicating that the model form and factor loadings were invariant for white and African American parents (see Table 2). There was a significant difference, however, between M3 and M4 indicating unequal indicator residual variances and between models M6 and M7 indicating unequal latent means. As indicated by Brown (2006), equality of error variances and covariances is an overly restrictive test and is not necessary to confirm measurement invariance. Furthermore, significant differences in the factor means likely reflect the diversity in background characteristics of the two samples and the possibility that white and African American parents differentially use each of the strategies.

As shown in Table 3, all items had statistically significant factor loadings and their sign and magnitude were reasonable. Additionally, all the Pearson correlation coefficients between mean scores for each subscale and the mean of all items were highly significant and positive among all participants ( $r = .69$  to  $.76$ ), African American parents ( $r = .69$  to  $.76$ ) and white parents (ranging from  $.71$  to  $.78$ ), thus supporting the construct and content validity of the scale (see Table 3). Finally, the internal consistency coefficients were acceptable for each subscale for the joint sample ( $\alpha = .71$  to  $.83$ ) as well as for African American ( $\alpha = .69$  to  $.77$ ) and white ( $\alpha = .72$  to  $.88$ ) parents.

## Discussion

In this study, a revised version of the ACTS, referred to as the Activity Support Scale for Multiple Groups or ACTS-MG, was tested in a sample of non-Hispanic white and African American parents of elementary school-aged children. Support was gained for the anticipated four factor structure and the internal reliability of the revised scale for both ethnic/racial groups. Furthermore, the ACTS-MG exhibited factorial invariance for non-Hispanic white and African American parents indicating that the scale is appropriate for use in both populations.

This study fills an important niche in the literature examining parental influences on children's emerging PA patterns. To the authors' knowledge, there are no multidimensional

scales measuring parental support for PA that have been validated for use with multiple racial/ethnic groups – and in particular for use with African American families. The ACTS-MG allows for a more detailed examination of the strategies that African American parents use to foster active lifestyles in children, how such strategies change with age, differences in the strategies utilized by mothers and fathers, and the effectiveness of each strategy. While each of these questions has been examined in non-Hispanic white families (Davison, et al., 2003; Davison and Jago, 2009; Gustafson and Rhodes, 2006) very little is known about similar relationships in African American families. Such information will better equip interventionists to develop PA promotion programs that meet the needs of African American children and their families, a group at increased risk of insufficient PA and the associated negative health effects (Centers for Disease Control and Prevention, 2008; Crespo, 2005).

While the ACTS-MG is currently limited for use with non-Hispanic white and African American families, it enables a preliminary examination of the strategies that parents use to support children's physical activity and potential outcomes across multiple racial/ethnic groups. Psychometric testing of self-report scales requires multiple studies with varied populations and repeated assessments over time. As such, this study represents the first of a series of steps necessary to provide full information on the reliability and validity of the revised ACTS-MG across multiple racial/ethnic groups. In addition to further testing the psychometric properties of the ACTS-MG, future research could build on this study by (a) utilizing a longitudinal design, (b) incorporating a measure of children's PA to examine the scale's concurrent and predictive validity, (c) collecting multi-rater reports of parental support (e.g., parents and children) and examining differences in effects by rater, (d) ensuring greater diversity in the sample in parent gender and race/ethnicity, and (e) having multiple people code qualitative data.

## Conclusions

The ACTS-MG is appropriate for use with non-Hispanic white and African American parents of elementary school-aged children. The ACTS-MG will enable the extension of current research with white families to the examination of parenting strategies that support PA in African American families. Additional psychometric work with the modified scale is encouraged.

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The original version of the Activity Support Scale (ACTS) and modifications resulting in the Activity Support Scale for Multiple Groups (ACTS-MG)

**Table 1**

Items from original version of the Activity Support Scale (ACTS) <sup>7</sup>	Items on the Activity Support Scale for Multiple Groups (ACTS-MG)	Items retained following EFA
Logistic Support		
I go out of my way to enroll my child in sports and other activities that get him/her to be physically active (e.g. after school programs, programs at the YMCA).	I enroll my child in sports teams and clubs such as soccer, basketball, and dance.	Retained
I often drive or take my child to places where he/she can be active (e.g., parks, playgrounds, sport games or practices).	I take my child to places where he/she can be active.	Retained
I often watch my child participate in sporting activities (e.g., watch your child perform at a softball game or a dance recital).	I watch my child play sports or participate in other activities such as martial arts or dance.	Retained
Modeling		
I often organize family outings that involve physical activity (e.g., going for a walk or a bike ride, going ice skating).	I buy games, toys, and equipment for my child that encourage physical activity.	Dropped
I frequently exercise or do something active with my child.	We have family outings that include physical activity (such going for a walk, bike riding, or ice skating).	Dropped
I use my behavior to encourage my child to be physically active.	I try to include my child when I do something active.	Dropped
I exercise or am physically active on a regular basis.	I encourage my child to be physically active by leading by example (by role modeling).	Retained
Use of community resources		
	I exercise or am physically active on a regular basis.	Retained
	I enjoy exercise and physical activity.	Retained
	I encourage my child to use resources in our neighborhood to be active (such as the park and the school).	Retained
	I enroll my child in community-based programs (such as Girls and Boys Club, YMCA) where he/she can be active.	Retained
	I find ways for my child to be active when school is out by, for example, enrolling him/her in summer camp and after school programs.	Retained
	I encourage my child to walk or ride his/her bike in our neighborhood if it is safe and appropriate for his/her age.	Dropped
Restricting access to sedentary activities		
	I limit how long my child plays video games (including playstation, Xbox, and gameboys).	Retained
	My child is allowed to have a TV in his/her bedroom. (R)	Dropped
	My child is allowed to have a computer in his/her bedroom. (R)	Dropped
	I limit how long my child can watch TV or DVDs each day (including educational and non-educational programs).	Retained
	I encourage my child to play (with supervision) outdoors when the weather is nice.	Dropped

Items from original version of the Activity Support Scale (ACTS) <sup>†</sup>	Items on the Activity Support Scale for Multiple Groups (ACTS-MG)	Items retained following EFA
	I limit how long my child can use the computer for things other than homework (such as playing computer games and surfing the internet).	Retained
	I don't like my child to hang around indoors when the weather is nice.	Dropped
	I limit how much time my child can spend on the phone.	Dropped

EFA = Exploratory Factor Analysis

<sup>†</sup>Information [data] from (9).

This study was conducted in Albany NY and Birmingham Alabama between 2006 and 2008.

**Table 2**  
Tests of Measurement Invariance of the ACTS across African American and non-Hispanic White parents

	$\chi^2$	df	Scaling correction factor	$\chi^2_{diff}^{2d}$	$\Delta df$	RMSEA (90% CI)	SRMR	CFI	TLI
Single group solutions									
AA parents (n=119)	65.01*	48	1.148			0.05 (<0.001-0.086)	0.083	0.944	0.923
white parents (n=117)	73.53*	48	1.156			0.067 (0.033-0.097)	0.096	0.943	0.921
Measurement invariance									
M1	138.57**	96	1.152			0.061 (0.037-0.083)	0.034	0.943	0.922
M2	144.94**	104	1.155	6.526	8	0.058 (0.033-0.079)	0.095	0.946	0.931
M3	154.17**	112	1.147	9.039	8	0.057 (0.032-0.077)	0.098	0.944	0.934
M4	186.26***	124	1.184	28.580***	12	0.065 (0.045-0.084)	0.119	0.917	0.912
M5	188.10***	128	1.178	1.058	4	0.063 (0.043-0.082)	0.132	0.920	0.918
M6	196.97***	134	1.175	8.873	6	0.063 (0.043-0.081)	0.137	0.916	0.917
M7	213.43***	138	1.170	18.219***	4	.068(0.050-.086)	0.158	0.900	0.904

Note. AA=African American; M1: Equal form; M2: Equal factor loadings; M3: Equal indicator intercepts; M4: Equal indicator residual variances; M5: Equal factor variances; M6: Equal covariance; M7: Equal latent mean. RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; TLI = Tucker-Lewis index.

<sup>a</sup>Difference testing using the Satorra-Bentler Scaled Chi-Square at <http://statmodel.com/chidiff.shtml>.

\*  $p < 0.05$ ,

\*\*  $p < 0.01$ ,

\*\*\*  $p < 0.001$ .

This study was conducted in Albany NY and Birmingham Alabama between 2006 and 2008.

**Table 3**

Subscale means (std), correlation coefficients of each subscale with total parental support, and internal consistency coefficients in the whole sample and separately for African American and non-Hispanic White Parents

Sample	Subscale	Subscale Mean (sd)	Total Support Mean (sd)	Correlation coefficients with the parenting support	Cronbach's alpha ( $\alpha$ )
All	Logistical Support	3.33 (0.62)	3.21 (0.47)	0.725***	0.716
	Use of Community Resources	3.33 (0.61)		0.764***	0.713
	Modeling	2.91 (0.69)		0.693***	0.828
	Limiting Sedentary Activities	3.27 (0.63)		0.687***	0.734
AA	Logistical Support	3.25 (0.61)	3.15 (0.43)	0.686***	0.687
	Use of Community Resources	3.27 (0.62)		0.763***	0.685
	Modeling	2.77 (0.64)		0.690***	0.769
	Limiting Sedentary Activities	3.32 (0.60)		0.617***	0.725
white	Logistical Support	3.42 (0.62)	3.27 (0.50)	0.762***	0.737
	Use of Community Resources	3.40 (0.61)		0.762***	0.723
	Modeling	3.05 (0.71)		0.712***	0.876
	Limiting Sedentary Activities	3.23 (0.65)		0.778***	0.745

\*\*\*  
p < 0.001

AA: African American parents

Total support reflects the mean of all items.

This study was conducted in Albany NY and Birmingham Alabama between 2006 and 2008.