Hispanic Health Care International, Vol. 7, No. 3, 2009
DOI: 10.1891/1540–4153.7.3.123

Preliminary Effects of the Youth Fit For Life Protocol on Body Mass Index in Mexican American Children in YMCA Before- and After-School Care Programs

James J. Annesi, PhD
Lisa L. Pierce, BS
William A. Bonaparte, MBA
YMCA of Metropolitan Atlanta

Alice E. Smith, MS, MBA
Children's Healthcare of Atlanta

In the United States, Mexican American children have the highest prevalence of combined overweight and obesity at 43%. Youth obesity prevention interventions have demonstrated limited success. A preliminary trial of an intervention based on social cognitive theory, titled Youth Fit For Life, was conducted with 25 Mexican American children with a mean body mass index (BMI; kg/m^2) in the 97th percentile. Measures were BMI for body composition, a shuttle run test for cardiorespiratory fitness, a push-up test for muscular strength, and a reach test for flexibility. Statistically significant improvements in each measure were found over 12 weeks. The effect size for BMI change (d = .14) was similar to findings using the intervention with White (d = .12) and African American (d = .18) children with a mean BMI in the 79th and 85th percentiles, respectively. The need for replication with larger samples and of psychosocial and behavioral factors possibly related to overweight were discussed to better determine the effectiveness of the Youth Fit For Life treatment with Mexican American children.

En los Estados Unidos, los niños de descendencia Mexicana, tienen una alta prevalencia de sobrepeso y obesidad que alcanza una tasa del 43%. Los programas de prevencion de la obesidad juvenile han tenido un exito limitado. Una prueba preliminary basada en la teoria social cognitiva, titulada Youth Fit For Life, se realizo en 25 niños Mexico-Americanos con un indice de masa corporal promedio (IMC; kg/m^2) cerca del 97 percentil. Los parametros usados fueron, el indice de masa corporal (IMC) para la composicion corporal, una carrera de agilidad y aptitude fisica para evaluar el estado cardiorespiratorio, una prueba de planchas (push-ups) para determiner la fuerza muscular, y una prueba de alcanze para determinar la flexibilidad. Durante un periodo de 12 semanas se demostraron mejoras estadisticamente significativas. La magnitud del efecto de cambio en IMC (d = .14) fue similar al resultado de una intervencion que se llevo a cabo con niños de la raza blanca (d = .12) y niños Afro-Americanos (d = .18) con un IMC en el 79 y 85 percentil. Se debatio la necesidad de replicar este estudio con mayores muestras y que incluyan factores psicosociales y de conducta o comportamiento, para determinar la eficaciadel tratamiento, Youth Fit For Life, con niños Mexico-Americanos.

Keywords: obesity; overweight; physical activity; youth; social cognitive; body mass index

Excess weight in children has been an increasing problem in much of the industrialized world (Institute of Medicine, 2007) and is associated with health issues such as hypertension, glucose intolerance, hyperlipidemia, and orthopedic complications as well social stigmatization and obesity throughout the life span (Deitz, 1998). In the United States, overweight in children is defined as being between the 85th and 95th percentile for body mass index (BMI; kg/m^2), based on age-and gender-adjusted norms from 2000 (U.S. Department of Heath and Human Services, 2000). Obesity is defined as being at or above the 95th percentile. Based on the most recent data, 37% of all U.S. children ages 6 to 11 years are either overweight or obese, with Mexican American children having the highest prevalence at 43% (Ogden et al., 2006). In research on enrollees of YMCA after-school care in Atlanta, Georgia, the mean BMI for White children corresponded to the 79th percentile, compared to the 85th percentile for African American children (Annesi, Marti, & Stice, in press; Annesi et al., 2007). Because Mexican American youth were enrolled in small numbers, their BMI percentiles were unavailable for contrasts. The southern United States, specifically Georgia, has been cited for the most growth in obesity, with Americans of Hispanic ethnicity demonstrating the greatest increase (Mokdad et al., 1999).

Along with a diet high in fat, sugar, and calories, a lack of physical activity has been implicated as a primary cause of childhood overweight (Institute of Medicine, 2007). The numbers of children attaining the recommended amounts of exercise is problematic at only 42% for U.S. children ages 6 to 11 years, dropping to an extremely low 8% by early adolescence (Troiano et al., 2008). Although there is a clear negative relationship between physical activity and adiposity in children (Must & Tybor, 2005), many U.S. communities have reduced physical education (National Association for Sport and Physical Education, 2006), and out-of-school time is increasingly spent in sedentary activities (Institute of Medicine, 2007). Hispanic youth had the lowest participation rates in sport activities run by schools and community organizations (U.S. Department of Health and Services, 1996).

Interventions to prevent overweight in youth have had limited success. Some have focused primarily on physical activity, while some emphasized nutrition (Budd & Volpe, 2006; Deitz & Gortmaker, 2001). Most were delivered during school hours and thus competed for time with academic activities that were given priority. In a recent comprehensive meta-analysis of 64 intervention studies from 1980 to 2005 (Stice, Shaw, & Marti, 2006), only 13 (21%) demonstrated a statistically significant reduction in BMI. The overall effect size was small (d = .08) but significantly greater than zero. Females tended to show greater effects. Treatments focused on the elementary school years had smaller and insignificant overall effects (d = .02). Possibly because there were few obesity prevention studies specifically focused on Hispanic youth (Jelalian & Saelens, 1999), data from African American and Hispanic children were aggregated for analysis. This is unfortunate because it has been suggested that interventions should be appraised on the basis of their appropriateness and effects on specific ethnic subgroups (U.S. Department of Health and Human Services, 1999), and aggregating data in this manner did not allow for such evaluation. Although the higher initial BMI in the African American/Hispanic participants made possible greater reductions in their weight, ethnicity, assessed in this compromised manner, was not a significant moderator of effects (Stice et al., 2006).

Recently, initial trials of a new child obesity prevention intervention titled Youth Fit For Life began through YMCA of Metropolitan Atlanta after-school care sites (Annesi, Westcott, Faigenbaum, & Unruh, 2005). Youth Fit For Life was designed for children ages 5 through 12 years and was administered primarily by after-school care counselors who were previously untrained in delivering physical and health education. The 3-day-per-week, 12-week format of Youth Fit For Life included noncompetitive cardiovascular games and tasks, strength exercises, instruction in appropriate nutrition, and instruction in use of an array of self-management and self-regulatory skills. The curriculum was based on social cognitive and self-efficacy theory (Bandura, 1986, 1997) and psychological correlates of physical activity in youth (for reviews, see Barbeau, 2005; Cavill, Biddle, & Sallis, 2001; Sallis, Prochaska, & Taylor, 2000) and had a focus on task mastery, physical self-concept, and enabling children to effectively deal with barriers to their healthy behaviors. It responded to limitations of previous treatments such as the need for a specialized staff, administration during school hours (each of which restricted large-scale dissemination), and use of atheoretical curricula that was often focused primarily on providing information rather than systematically fostering behavioral change.

Preliminary analyses of Youth Fit For Life demonstrated significant overall improvements in BMI in African American (mean d = .18) and White (mean d = .12) children (Annesi et al., in press) that were considerably greater than treatments within the Stice et al. (2006) meta-analysis for the same age-group. Significant changes in muscular strength and, less frequently, cardiorespiratory fitness were also found. Improvements in self-efficacy and self-appraisal factors were found that were related to increased voluntary (nonmandated, nonprogrammed) physical activity (Annesi, 2006; Annesi et al., 2007), which was important because an increase in program-based physical activity has been associated with a *reduction* in free-time physical activity in other research with children (Donnelly et al., 1996). Effects of the Youth Fit For Life intervention with Mexican American children, however, were unknown.

Because of a need to contrast BMI data from Mexican American children eligible for Youth Fit For Life

participation in the Atlanta area with other ethnic groups and the need to test the efficacy of this intervention for the prevention of overweight in Mexican American children, this preliminary, small-sample study was conducted to assess effects on physiological factors. It was expected that the initial age- and gender-adjusted BMI percentile would be higher for Mexican American children than both their White and their African American counterparts and that the Youth Fit For Life protocol would be associated with significant improvements in BMI and other fitness measures similar to those from the other ethnic groups tested. It was hoped that findings would serve to direct and prioritize more comprehensive research, including assessment of behavioral and nutritional factors related to obesity prevention and fitness improvements in Mexican American children—a large, underserved group in *considerable* need.

Method

Participants

Participants were 25 Mexican American children (17 boys) ranging in age from 5 to 11 years (M_{age} = 7.6 years, SD = 1.9) enrolled in a 12-week segment of YMCA of Metropolitan Atlanta after-school care or before-school programming. Because Mexican American children were the focus within this research, data from participants of other ethnicities were not included. Based on records of use of the free and reduced-cost meal program, socioeconomic strata were lower to lower middle class. The English language was spoken fluently by all participants. Participation was voluntary, and institutional review board approval, written consent from a parent or legal guardian (including a statement of sufficient health to participate), and assent from participants were obtained.

Parents and guardians were informed that all data would be analyzed in aggregate form and that all the children's identifying information would be destroyed. All information provided to parents and guardians was available in both English and Spanish.

Measures

BMI. A recently calibrated scale and stadiometer were used to measure BMI. BMI is used to estimate health risks associated with body fat and derived from a ratio of weight to height (kg/m^2). Correlations with the most precise measure of body fat, dual-energy X-ray absorptiometry, were .80 to .90 (Dietz & Robinson, 1998).

Muscular Strength. Number of push-ups completed at a 3-second pace within 1 minute was used as the measure of muscular strength. Participants were required to start in an upright position and lower the body using the arms until the elbows were at a 90-degree angle. The required pace was indicated by a recording heard by both the participant and the tester. The number of properly completed push-ups was recorded. Test–retest reliability was reported at .90 to .91 for ages 7 to 11 years (McManis & Wuest, 1994). Validity was demonstrated through correlations of ≥.70 with combined bench press, latissimus pull-down, and arm curl scores after controlling for body weight (Rutherford & Corbin, 1993).

Cardiorespiratory Fitness. A shuttle run was used as the measure of cardiorespiratory fitness. As fast as possible, a participant retrieved four blocks, one at a time, that were 30 feet (9.1 m) from the starting line. The best of three trials was recorded in seconds. Correlations between shuttle run times and maximal oxygen consumption ($VO_{2\ max}$) test scores was .68 to .69 in children (Van Mechelen, Hlobil, & Kemper, 1986).

Flexibility. Consistent with recent research (Plowman, 2006), the shoulder stretch was used as the measure of flexibility. This was an alternative to the more often used sit-and-reach test that consistently demonstrated poor validity as a measure of general flexibility in youth (Patterson, Wiksten, Ray, Flanders, & Sanphy, 1996). With the right hand, the participant reached over the right shoulder and down the back. The left hand was positioned behind the back reaching up. The distance between the fingers was recorded in cm. If the fingers touched, the score was 0. Test–retest reliability for boys and girls ages 5 through 12 years was ≥.90 (Annesi et al., 2005).

Procedure

The four components of the structured 45-minutes-per-day, 3-days-per-week Youth Fit For Life protocol were (a) moderate to vigorous cardiovascular activities in the form of noncompetitive, mastery-focused games and tasks each day for 20 minutes; (b) strength-building exercises, utilizing resistance bands, 2 days per week for 20 minutes per day; (c) instruction and discussion in various self-management and self-regulatory skills (e.g., goal setting, self-monitoring of progress, self-talk/cognitive restructuring, recruiting social supports) once per week for 20 minutes; and (d) health and nutrition information each day for 5 to 7 minutes. The self-management and self-regulatory skills component of the protocol was supported by an age-appropriate workbook, and the health and nutrition component was supported by posters corresponding to the topic being addressed. Every attempt was made to keep participants physically active throughout the exercise components and to be reflective of personal progress made. The intervention lasted 12 weeks. A more detailed description of the Youth Fit For Life protocol is given elsewhere (see Annesi, Hood, Thacker, & Unruh, 2005; National Cancer Institute, 2008).

Instructors completed a 5-hour training on the structured protocol, supported by manuals and a video for ongoing reference. The participant-to-instructor ratio was approximately 15 to 1. An elementary school all-purpose room was the location of all activities. Breakfast

(before-school programming) and a snack and homework support (after-school care) were also provided, but 45 minutes were dedicated exclusively to the Youth Fit For Life protocol 3 days per week. Supervisors completed regular audits to address compliance with the protocol.

Before the start and at the end of the 12 weeks of the Youth Fit For Life program, participants completed the physiological assessments administered by credentialed exercise specialists. Every attempt was made to keep participants' results private during testing, and identification data were not retained.

Data Analysis

Use of normative, population-based data served as a contrast for observed changes in BMI (U.S. Department of Health and Human Services, 2000), muscular strength (Plowman, 2006), and cardiorespiratory fitness (Hoffman, 2006). This was considered appropriate for this preliminary trial, as it was in larger efficacy trials with other ethnicities (Annesi et al., 2005, 2007). Analyses of community-based treatments capable of large-scale dissemination have been considered important (Glasgow, 2008; Katz et al., 2001), but because of the expected benefits of physical activity for at-risk children, the ethics of using a no-treatment control group is questionable.

Statistical significance was set at $\alpha = .05$ (one tailed) throughout. The sequential Bonferroni procedure suggested by Holm (1979) was used to adjust alpha levels for multiple tests. Thus, for the smallest p value, .05 was divided by the number of tests conducted to establish the critical value (e.g., .05/4 tests = critical value of .01). If significance was met, the second-smallest p value had .05 divided by the number of tests minus 1 (e.g., .05/3 = critical value of .02) and so on until statistical significance was no longer met. Cohen's (1988) measure of effect size (d) was reported where the difference between 12-week changes in the sample and normative means was divided by the standard deviation of the sample at baseline, $M_{\text{change-sample}} - M_{\text{change-norm}}/SD_{\text{sample at baseline}}$. By convention (Cohen, 1988), d values of .20, .50, and .80 are interpreted as small, medium, and large effect sizes, respectively. Because reference data were not available for the flexibility measure used, a within-group t test was substituted.

A regression analysis was used to determine the amount of variance in changes in BMI explained by changes in strength and cardiorespiratory fitness. Because research suggested a possible gender effect on BMI changes associated with obesity prevention interventions (Stice et al., 2006), a linear bivariate correlation was conducted between change scores on BMI and gender to determine if that was the case for the present sample.

Results

Based on normative data from the United States (U.S. Department of Health and Human Services, 2000), the present sample had a mean BMI in the 97th percentile at baseline. This compared unfavorably to the 79th and 85th percentiles, respectively, for White and African American children enrolled in after-school care applications of Youth Fit For Life in the Atlanta area. Statistically significant improvements were found on BMI, cardiorespiratory fitness, muscular strength, and flexibility (see Table 1). The effect size for BMI change ($d = .14$) was similar to effects associated with Youth Fit For Life in White and African American children and greater than overall intervention effects in the Stice et al. (2006) meta-analysis of obesity prevention interventions in youth.

A linear multiple regression equation, with simultaneous entry of changes in cardiorespiratory fitness and muscular strength, accounted for a statistically significant portion of the variance in BMI change, $R^2 = .30$, $F(2, 22) = 4.76$, $p = .02$. This represented a large effect size, $f^2 = .43$.

TABLE 1. Changes in Physiological Factors From Baseline to Week 12 ($N = 25$)

	Baseline		Week 12		Score Change		Norm Change			
Physiological Factors	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	$t(24)$	*p*	*d*
Body mass index (BMI)[a]	20.84	4.87	20.48	5.08	−0.37	0.93	.30	−3.60	.03	.14
Muscular strength[b]	2.68	4.06	7.64	5.29	4.96	3.16	.33	3.76	<.001	1.14
Cardiorespiratory fitness[c]	31.04	3.12	21.73	2.31	−9.31	2.32	−1.55	−16.72	<.001	2.49
Flexibility[d]	3.55	2.50	2.08	1.73	−1.48	1.52	. . .	−4.35	<.001	.59

Note. t tests were one-tailed. d = Cohen's measure of effect size.
[a]Body mass index (BMI) is expressed as weight(kg)/height(m^2). [b]Muscular strength is expressed as number of push-ups completed in 1 minute with a 3-second cadence. [c]Cardiorespiratory fitness is expressed as time (seconds) to complete a shuttle run with four blocks. [d]Flexibility is expressed as the distance (cm) from fingers touching when stretched behind the back.

A significant unique contribution to the overall explained variance was made by change scores in muscular strength, $\beta = .55$, $p = .01$, but not changes in cardiorespiratory fitness, $\beta = -.07$, $p = .71$. The correlation between gender and changes in BMI was not statistically significant; however, the strength of the association was moderate, with female gender associated with the greater reductions in BMI, $r_{pb} = .32$, $p = .06$.

Discussion

This preliminary investigation tested effects associated with the Youth Fit For Life intervention on BMI and other physiological factors in 5- to 11-year-old Mexican American children enrolled in YMCA before-school programming and after-school care. Contrasts of BMI percentiles taken from YMCA of Metropolitan Atlanta sites indicated that the Mexican American children tested were at a BMI percentile *considerably* higher than their White and African American counterparts. In fact, the mean BMI percentile found (97th percentile) suggested that the average Mexican American child assessed was already obese and at a high risk for a number of physiological pathologies. This unfavorable difference from White and African American children, who were also at an unhealthy weight in large numbers, was greater than in recent population-based data from the overall United States (Ogden et al., 2006). Possibly a regional difference associated with factors that predispose for obesity in Mexican American children may partially explain this. Possibly poor assimilation into the community at large minimized opportunities for physical activity, while cultural practices encouraged consumption of a high-fat diet. Direct research will be needed to clarify.

Changes in BMI, and measures of cardiorespiratory fitness, muscular strength, and flexibility, associated with 12 weeks of the Youth Fit For Life protocol, were significant. Effect sizes for BMI were greater than overall effects of obesity prevention treatments in children (Stice et al., 2006) and similar to applications of Youth Fit For Life with White and African American participants. Although the present effect size in BMI could be termed small by convention (Cohen, 1988), it is a variable that is difficult to change (Prentice & Miller, 1992), with an apparent ceiling on how much change is possible over relatively brief periods (Annesi et al., in press). Thus, the observed effects were noteworthy. Effect sizes for cardiorespiratory fitness and muscular strength were large. A high degree of initial decondition in the present sample may have contributed to these findings. It must be noted, however, that the experimental power of this preliminary field investigation was low. Until replications with larger samples of Mexican American children are completed, the present findings must be considered tentative.

Multiple regression analysis suggested that changes in cardiorespiratory fitness and muscular strength explained a considerable 30% of the overall variance in BMI change. However, careful inspection of decomposition of this finding (through analysis of beta weights) suggested that the considerable gains in muscular strength might have actually been associated with a *minimization* of BMI improvements. An increase in lean body mass, associated with such muscular strength gains, tends to minimize BMI score reduction in children who are overweight and obese—even though favorable fitness and health-risk factor improvements (e.g., in body composition) may occur (Pikosky, Faigenbaum, Westcott, & Rodriguez, 2002). The use of direct body fat measurement (e.g., dual-energy X-ray absorptiometry) in replications of this research may clarify actual effects on health risks related to body composition. Again, larger samples will be required for replications.

Similar to previous research, some evidence of greater effects on BMI for the girls was found. It is not known, however, whether this was related to the girls being more receptive to the intervention or an artifact related to higher initial weight or less gain in muscular strength over the course of the intervention. Greater experimental power will allow testing of the association of the Youth Fit For Life protocol on changes in voluntary physical activity and its psychological correlates, such as self-concept and self-efficacy, for Mexican American children. Within this preliminary study, we may only indirectly infer that the theoretical basis of the protocol was sound and that its focus on self-management/self-regulatory skills and the development of a sense of task mastery was efficacious. Additional research is needed to determine directly if (a) voluntary physical was increased, (b) psychological correlates of increased physical activity were affected by the treatment, and (c) an increase in voluntary activity was associated with prevention of overweight and obesity. Effects over longer periods also require evaluation.

Although limitations of this research included a small sample size, some self-selection for participation, possible expectation effects, and lack of a no-treatment control group, its field research design had high external validity because of the use of settings that may be applicable to many children. In the future, careful attention should be given to incorporating parents into support roles for their children's health behavior change, even though research has, to date, demonstrated few effects associated with parental involvement (Stice et al., 2006). Further discussion on the ethics of withholding a treatment with expected health benefits is required to determine the most appropriate control conditions. Continued research and development of the Youth Fit For Life protocol in YMCA associations in 10 cities in the United States and Canada are intended to refine its contribution as a resource for community health promotion. It is hoped that the favorable results of this initial trial of the Youth Fit For Life intervention with Mexican

American children may be extended and, possibly, specifically tailored for additional positive effects. It is important that culturally acceptable, effective interventions are readily available to be applied in a large-scale manner to improve the very unfavorable situation of overweight and obesity in Mexican American children.

References

Annesi, J. J. (2006). Relations of physical self-concept and self-efficacy with frequency of voluntary physical activity in preadolescents: Implications for after-school care programming. *Journal of Psychosomatic Research, 61*, 515–520.

Annesi, J. J., Faigenbaum, A. D., Westcott, W. L., Smith, A. E., Unruh, J. L., & Hamilton, F. G. (2007). Effects of the Youth Fit For Life protocol on physiological, mood, self-appraisal, and voluntary physical activity changes in African American preadolescents: Contrasting after-school care and physical education formats. *International Journal of Clinical and Health Psychology, 7*, 641–659.

Annesi, J., Hood, E., Thacker, L., & Unruh, J. (2005). Youth Fit For Life: Partnering wellness and childcare to improve physical education in response to the obesity epidemic in children. *Fitness Management, 21*(6), 26–31.

Annesi, J. J., Marti, C. N., & Stice, E. (in press). A meta-analytic review of the Youth Fit For Life intervention for effects on body mass index in 5- to 12-year-old children. *Health Psychology Review*.

Annesi, J. J., Westcott, W. L., Faigenbaum, A., & Unruh, J. L. (2005). Effects of a physical activity protocol delivered by YMCA after-school counselors (Youth Fit For Life) on fitness and self-efficacy changes in 5- to 12-year-old boys and girls. *Research Quarterly for Exercise and Sport, 76*, 468–476.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barbeau, P. (2005). *School-based physical activity interventions to prevent or treat childhood obesity*. Atlanta: Policy Leadership for Active Youth.

Budd, G. M., & Volpe, S. L. (2006). School-based obesity prevention: Research, challenges, and recommendations. *Journal of School Health, 76*, 485–495.

Cavill, N., Biddle, S. J. H., & Sallis, J. F. (2001). Health-enhancing physical activity for young people: Statement of the United Kingdom Expert Consensus Conference. *Pediatric Exercise Science, 13*, 12–25.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Dietz, W. H. (1998). Health consequences of obesity in youth: Childhood predictors of adult disease. *Pediatrics, 101*, 518–525.

Deitz, W. H., & Gortmaker, S. L. (2001). Preventing obesity in children and adolescents. *Annual Review of Public Health, 22*, 337–353.

Dietz, W. H., & Robinson, T. N. (1998). Use of body mass index (BMI) as a measure of overweight in children and adolescents. *Journal of Pediatrics, 132*, 191–193.

Donnelly, J. E., Jacobsen, D. J., Whatley, J. E., Hill, J. O., Swift, L. L., Cherrington, A., et al. (1996). Nutrition and physical activity program to attenuate obesity and promote physical and metabolic fitness in elementary school children. *Obesity Research, 4*, 229–243.

Glasgow, R. E. (2008). What types of evidence are most needed to advance behavioral medicine? *Annals of Behavioral Medicine, 35*, 19–25.

Hoffman, J. (2006). *Norms for fitness, performance, and health*. Champaign, IL: Human Kinetics.

Holm, D. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics, 6*, 65–70.

Institute of Medicine. (2007). *Progress in preventing childhood obesity*. Washington, DC: National Academies Press.

Jelalian, E., & Saelens, B. E. (1999). Empirically supported treatments in pediatric psychology: Pediatric obesity. *Journal of Pediatric Psychology, 24*, 223–248.

Katz, D. L., Nawaz, H., Jennings, G., Chan, W., Ballard, J., Comerford, B., et al. (2001). Community health promotion and the randomized trial: Approaches to finding common ground. *Journal of Public Health Management and Practice, 7*, 33–40.

McManis, B. G., & Wuest, D. A. (1994). Stability reliability of the modified push-up in children [Abstract]. *Research Quarterly for Exercise and Sport, 65*(Suppl.), A58–A59.

Mokdad, A. H., Serdula, M. K., Dietz, W. H., Bowman, B. A., Marks, J. S., & Koplan, J. P. (1999). The spread of the obesity epidemic in the United States, 1991–1998. *Journal of the American Medical Association, 282*, 1519–1522.

Must, A., & Tybor, D. J. (2005). Physical activity and sedentary behavior: A review of longitudinal studies of weight and adiposity in youth. *International Journal of Obesity, 29*(Suppl. 2), S84–S96.

National Association for Sport and Physical Education. (2006). *Shape of the nation report: Status of physical education in the USA*. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance.

National Cancer Institute. (2008). *Research-Tested Intervention Program*. Retrieved April 14, 2008, from http://rtips.cancer.gov/rtips/index.do

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999–2004. *Journal of the American Medical Association, 295*, 1549–1555.

Patterson, P., Wiksten, D. L., Ray, L., Flanders, C., & Sanphy, D. (1996). The validity and reliability of the back saver sit-and-reach test in middle school girls and boys. *Research Quarterly for Exercise and Sport, 67*, 448–451.

Pikosky, M., Faigenbaum, A., Westcott, W., & Rodriguez, N. (2002). Effects of resistance training on protein utilization in healthy children. *Medicine and Science in Sports and Exercise, 34*, 820–827.

Plowman, S. A. (2006). *Muscular strength, endurance, and flexibility assessments*. Retrieved December 2, 2006, from http://www.cooperinst.org/ftgrefintro.asp

Prentice, D. A., & Miller, D. (1992). When small effects are impressive. *Psychological Bulletin, 112*, 160–164.

Rutherford, W. J., & Corbin, C. B. (1993, Fall). Measuring upper body strength and endurance: Which test is best? *Kentucky AHPERD Journal*, 20–24.

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise, 32*, 963–975.

Stice, E., Shaw, H., & Marti, C. N. (2006). A meta-analytic review of obesity prevention programs for children and adolescents: The skinny on interventions that work. *Psychological Bulletin, 132*, 667–691.

Troiano, R. P., Berrigan, D., Dodd, K. W., Mâsse, L. C., Tilert, T., & McDowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise, 40*, 181–188.

U.S. Department of Heath and Human Services. (1996). *Physical activity and health: A report of the surgeon general*. Atlanta: U.S. Department of Heath and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

U.S. Department of Heath and Human Services. (1999). *Promoting physical activity: A guide for community action*. Champaign, IL: Human Kinetics.

U.S. Department of Heath and Human Services. (2000). *2000 CDC growth charts: United States.* Retrieved September, 13, 2007, from http://www.cdc.gov/growthcharts

Van Mechelen, W., Hlobil, H., & Kemper, H. C. G. (1986). Validation of two running tests as estimates of maximal aerobic power in children. *European Journal of Applied Physiology, 55*, 503–506.

Correspondence regarding this article should be directed to James J. Annesi, PhD, YMCA of Metropolitan Atlanta, 100 Edgewood Avenue NE, Suite 1100, Atlanta, GA 30303. E-mail: jamesa@ymcaatlanta.org