Exploring Racial Disparities in Physical Activity and Quality of Life Through an Expectancy-Value Perspective

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Abstract:

Objectives Alleviating racial/ethnic disparities in physical activity (PA) and health outcomes during childhood becomes an important public health priority as the nation's populace continues to diversify. Guided by expectancy-value model, the purposes of this study were (a) to examine the potential differences in expectancy-value beliefs, PA and health-related quality of life (HRQOL) between African-American (AA) children and their American-Caucasian (AC) peers, and (b) to determine how the relationships among these variables might differ between the two racial groups.

Method Participants were 321 (152 boys; 189 AC) children from three schools who completed a previously validated questionnaire assessing their expectancy-value beliefs in physical education, leisure-time PA (PAQ-C), and HRQOL.

Results Students' PA was positively associated with HRQOL among AC and AA children ($p < .01$). AA children had significant higher expectancy-value beliefs but lower HRQOL than AC children. The regression results revealed that both racial groups had a nearly identical effect of expectancy beliefs on their self-reported PA ($\beta = .34$ in AA group, $\beta = .33$ in AC group, respectively). The regression analysis also suggests that expectancy-value belief was a significant predictor of HRQOL while controlling for all other variables ($\beta = .36$; $p < .001$) for the AC group, but not the AA group.

Conclusions The growing health disparities across racial/ethnic subgroups are of great public health concern. Thus, this study provided valuable insights regarding how to promote AA children's PA and HRQOL through an expectancy-value approach.

Keywords: health disparity | African Americans | motivation | mental health | physical activity

Article:

The prevalence of childhood obesity in the USA remains higher than the goal of Healthy People 2020 for children aged 6 to 11 years (18.4% vs. 15.7%) based on the 2015–2016 NHANES data report [1]. In particular, the obesity epidemic is more evident in minority groups, such as the African-American (AA) youth, many of whom are from low-income families [2]. One in five AA youths is obese, which is a considerable higher rate than their American-Caucasian (AC) peers in the USA [1]. Research also indicates that child obesity is associated with a myriad of health conditions in youth, and that AA youth are more likely than any other racial group to develop negative health outcomes (i.e., obesity, lower quality of life) associated with physical inactivity [3, 4]. Alleviating racial disparities in physical activity (PA) and other health outcomes during childhood becomes an important public health priority as the nation's populace continues to diversify [5, 6].

School provides most of the PA opportunities throughout the day for all children to accumulate the recommended 60 min of moderate-to-vigorous PA (MVPA) [7]. However, less than half of children, especially the minority groups (i.e., AAs) [8], met the US national daily MVPA recommendation. Furthermore, children's participation in PA within and beyond physical education (PE) classes declines over the school years [3, 7, 9]. It is well acknowledged in the motivation literature that students tend to engage in activities in which they believe they are competent [10, 11], as well as those that they view as interesting, important, and useful in school PE domains [3, 9, 12, 13]. Racial disparities in motivational variables such as expectancy-related beliefs and specific sports participation between AA and AC youth have been reported [14, 15]. However, the underlying motivational mechanism of PA and health-related outcomes between the two racial groups is not clear in the pre-adolescent stage of development.

To understand students' motivation and motivational behaviors, the expectancy-value model of achievement choice has been widely used in PE settings [3, 9, 12, 16, 17]. Eccles and her colleagues [12, 18] proposed two primary indicators of expectancy-value beliefs that affect the person's achievement choices and behaviors: (a) expectancy-related beliefs in a particular domain (beliefs about ability and expectancies for success), and (b) subjective task values (importance, interest, and usefulness). Beliefs about ability are defined as individuals' evaluations of their competence in different achievement tasks. Expectancies for success refer to individuals' beliefs about how well they will do with an upcoming task. These components are related to each other although they are conceptually distinct. Subjective task values are defined as an incentive, that is, how an achievement task meets various needs of individuals. The major components include attainment value (importance), intrinsic value (interest), and utility value (usefulness) [12]. Specifically, attainment value refers to the importance of doing well in a given task. Intrinsic value pertains to the enjoyment an individual obtains from performing the task or the subjective interest an individual has for the task. Utility value or usefulness of the task reflects how the task fits into an individual's current or future plans.

Expectancy-related beliefs and subjective task values have demonstrated distinct motivational impacts on various PE outcomes among children and adolescents [16]. Whereas, it remains unclear whether such motivational effects are similar across elementary school children of different races. It has been well acknowledged that in the sports domain, racial groups display different perceptions of racial-role appropriateness toward particular sports and PA [15, 19]. In general, sports such as football, basketball, and track sprinting are perceived as more appropriate for AAs, while others such as golf, baseball, and hockey are regarded as more appropriate for ACs [20]. Indeed, a significantly higher proportion of AAs than ACs chose to play basketball in middle or high school [21]. In comparison with the ACs, the AAs scored significantly higher on

expectancy beliefs and task beliefs as basketball athletes in high school, indicating that they had higher perceptions of competence, were more interested in basketball, and perceived basketball to be more useful and important to them [14]. These findings provided good evidence of the racial disparities in expectancy beliefs and task values for specific sports (i.e., basketball). To guide the development of interventions designed to increase PA and health in school-aged children, researchers and school health professionals need further understanding of the effects of race/ethnicity on various motivational factors associated with PA and health-related outcomes [5].

Motivation researchers have begun to focus on the motivational process toward individuals' health and behavioral changes through which a person acquires motivation to be physically active [22, 23]. In expectancy-value literature, Gu and colleagues provided collective evidence of a positive association of expectancy-value beliefs in PE with PA and health-related quality of life (HRQOL) among children [22]. Specifically, children with higher level of expectancy-related beliefs in PE are more likely to engage in more PA and demonstrate higher HRQOL [3, 24]. It is suggested that reduced expectancy-related beliefs toward school PE are more likely to lead to subsequent reductions in health-related outcomes, including PA and HRQOL [3]. Expectancy-value beliefs provide an important insight into understanding the motivational mechanism of PA and HRQOL, a vital aspect of school and public health. Different norms, values, motivational process, or other features of racial/ethnic communities may vary across groups and affect children's PA and HRQOL differently. To address disparities across racial/ethnic groups, it is important to examine the motivational correlates of PA and HRQOL that may better guide the development of health promotion interventions and recommendations for diverse pediatric populations.

To date, there has been little research examining the racial effects on the motivational process toward children's PA and HRQOL based on expectancy-value theory, which supports the need for culturally appropriate interventions for health promotion among diverse youth [5]. It is becoming increasingly necessary to fully explicate the differences in the motivational pattern of health outcomes such as PA and HRQOL between AA and AC fourth and fifth grade children. Specifically, the purpose of this study was twofold: (a) to examine the potential differences in expectancy-related beliefs, subjective task values, self-reported PA, and HRQOL between AA children and their AC peers, and (b) to determine how the relationships among these variables may differ between the two racial groups.

Method

Participants

Participants for this study were recruited from three public schools in the southeastern region of the USA There were 321 fourth (49.2%) and fifth (50.8%) graders ranging from 9 to 12 years old (M age = 9.90, SD = 0.73) in our final sample (boys, n = 152), with 41.4% of AA children. Specifically, Lowery School (LS) is a public school that serves students in kindergarten through 12th grade with the student/teacher ratio of 16:1. The major student population at LS includes 84% White and 16% minority (majority Black) with 2% eligible for free/reduced lunch program. Ponder School (PS) is a public school that serves students in fifth through eighth grades with the student/teacher ratio of 7:1. The major student population at PS includes 83% AA and 11% AC, and a large proportion (94%) of students qualifies for free/reduced lunch program. The third school, Cedar School (CS), is also a public school that serves students in third through fifth grades,

with the student/teacher ratio of 8:1. The major student population at CS school includes 13% AC and 87% AA, and 95% of students qualify for free/reduced lunch program. Students from Cedar Elementary matriculate to Ponder School. The two schools (PS and CS) are both in a rural school district of primarily low socioeconomic status.

Lowery school (LS) and Ponder School (PS) provided 30-min PE class 5 days per week with an average of 25–30 students per class. The students in Cedar elementary attended a 50-min PE class once a week with around 15 to 20 students per class. The PE classes were conducted in either indoor gym or outdoor playground upon weather conditions in all three schools. The PE curriculum was state-mandated in these public schools, with grade level expectations aimed at developing physically literate children who have the skills, knowledge, and motivation to enjoy a physically active lifestyle (SHAPE America 2014). The PE classes were focusing on health-related physical fitness and basketball contents by the time of our data collection. The PE classes in each school emphasized enjoyment through health- and skill-related games in order to maximize participation for all children. The study was approved by the Institutional Review Boards of the researchers' universities and the participating schools. Written child assent and parental consent were obtained in accordance with the University Institutional Review Board and school district requirements.

Measurements

Expectancy-Related Beliefs

The participants were asked five questions to assess their beliefs about ability (three items) and expectancies for success (two items) in class using a 5-point scale. These self-report measures chosen from a previously validated questionnaire were developed and used by Xiang and colleagues [25]. Example questions include: (a) How good are you at activities and games in PE? (1 = very bad, 5 = very good), and (b) How good would you be at learning something new in PE this year? (1 = very bad, 5 = very good).The mean of these five items represents an overall magnitude of a student's expectancy-related beliefs. The internal consistency of this measure was acceptable (Cronbach's alpha = .72).

Subjective Task Values

A six-item validated instrument was developed and used by Xiang et al. [25] to assess the participants' subjective task values. This instrument includes attainment value (importance; two items), intrinsic value (interest; two items), and utility value (usefulness; two items). Participants responded on each of the six statements with a 5-point scale appropriate for the items. Example items of the scale include: (a) For me, being good at activities and games in PE is… (1 = not very important, 5 = very important), (b) How much do you like activities and games in PE? (1 = do not like it at all, 5 = like it very much), and (c) Compared to your other school subjects, how useful is what you learn in PE? (1 = not useful at all, 5 = very useful). The mean of these six items was used in data analysis as students' task values. Cronbach's alpha of this scale was .73 in this study.

Physical Activity

The Physical Activity Questionnaire for Older Children (PAQ-C) was used to assess students' levels of physical activity (PA) [26]. It is a 7-day recall questionnaire intended to assess students' moderate and vigorous PA such as recreational activities, sports, and other types of exercise in the previous week. Other PA behaviors related to students' physical education class, free time, recess, extracurricular sports, weekend activities, and evening activities were also measured within this questionnaire. An overall score (ranging from 1 to 5) was calculated as an indicator of PA level for each child. The PAQ-C is a reliable and valid measure of PA for students beyond grade 3 [26].

Health-Related Quality of Life

The 23-item pediatric QOL inventory generic core scales (PedsQL 4.0) [27] was used to assess participants' health-related quality of life (HRQOL), including physical functioning (8 items) and psychosocial functioning (15 items). Both sub-scales demonstrated sufficient reliability in the current studies (Cronbach's $\alpha = .77$ and .84; respectively). The items were reverse-scored and linearly transformed to a 0 to 100 scale, with 100 indicating highest and 0 lowest possible of HRQOL. Scale scores were created by dividing the sum of the responses by the number of items answered ranging from 0 to 100. Higher scores represent better HRQOL.

Research Design and Procedures

A cross-sectional research design was used in this study. All the survey data, including students' expectancy-value beliefs in PE, PA behaviors, and HRQOL, were administered at the middle of the spring semester. These surveys were distributed to all participating students under the supervision of the researchers. Specifically, students were asked to complete the survey in one classroom break, and the research assistant read each item to the class in order to make sure everyone understood the question before moving to the next one. All students were informed that their PE teachers would not have access to their responses and that their answers to the questions would not affect their PE grades. Students spent approximately 15–20 min completing all questionnaires.

Data Analyses/Results

Several steps were taken to analyze the data. First, bivariate correlations among the study variables (students' expectancy-related beliefs and task values in PE, physical and psychosocial functioning of HRQOL, and self-reported PA) were conducted separately by racial group (AAs vs. ACs). Then, two multivariate analyses of covariance (MANCOVAs) were performed to determine the effects of race on study variables by controlling for grade and gender. Specifically, motivational constructs (expectancy-related beliefs and task values) were dependent variables in the first MANCOVA, and students' HRQOL and self-reported PA were included in the second MANCOVA as dependent variables. Race (AAs vs. ACs) was the fixed factor, and gender and grade were included as covariates in both MANCOVA models. Finally, four multiple regression analyses were used to determine the predictive strength of students' expectancy-related beliefs and task values in PE on HRQOL and self-reported PA in AA and AC children, after adjusting for children's gender and grade. An alpha level of .05 was used for all statistical analyses.

The initial research questions were centered on relationships among study variables. Bivariate correlations are presented for both racial groups (AAs vs. ACs) in Table 1. Reliability coefficients indicated that all of the self-report instruments demonstrated acceptable internal consistency. The correlation analysis revealed that children's expectancy-related beliefs were significantly associated with HRQOL and self-reported PA for both racial groups (rs ranged from .23 to .43, $p < .001$). Task values had weak to moderate associations with self-reported PA ($r = .35$ in AAs; $r = .14$ in ACs), but no associations with HRQOL in both racial groups. HRQOL was positively associated with self-reported PA in both AA children and AC children ($r = .25$ and $r = .31$, $p < .001$, respectively).

Table 1. Pearson correlation matrix of the variables (N = 321)

Variables	1	2	3	4
1. HRQOL	1	.31**	.34**	.11
2. Self-reported PA	.25**	1	.37**	.14*
3. Expectancy beliefs	.23**	.43**	1	.35**
4. Task value	.06	.35**	.53**	1

Correlations for African American (AA; n = 132) are below the diagonal; correlations for America Caucasian (AC; n = 189) are above the diagonal highlighted in gray
*p < .05 **p < .01

Descriptive statistics by race and gender are reported in Table 2. The MANCOVA on expectancy-related beliefs and task values yielded a significant group difference between two racial groups (AAs vs. ACs) [Wilk's Lambda = .923, $F(2,316) = 13.26$, $p < .001$] after controlling for gender and grades. Follow-up univariate comparisons between groups show significant racial effects for expectancy-related beliefs [$F(1,321) = 11.97$, $p < .001$, ES = .04] and task values [$F(1,321) = 23.88$, $p < .001$, ES = .07]. As can be seen in Table 2, the AA children scored higher than AC children on expectancy-related beliefs and task values. The second MANCOVA was conducted by including HRQOL and self-reported PA as the dependent variables in the model yielding a significant racial effect [Wilk's Lambda = 0.93, $F(2,316) = 11.21$, $p < .001$], after controlling for gender and grade. Follow-ups found significant racial effects for HRQOL [$F(1,321) = 17.76$, $p < .001$, ES = .05], but not for self-reported PA [$F(1,321) = 1.09$, $p = .29$, ES = .003]. Specifically, AC children reported significantly higher HRQOL than AA children, but no significant differences were found for self-reported PA between AC and AA groups (see Table 2).

Table 2. Descriptive results of the variables by race and gender (n = 321)

Variables	African-American			American-Caucasian		
	Total (n = 132)	Boys (n = 63)	Girls (n = 69)	Total (n = 189)	Boys (n = 89)	Girls (n = 100)
HRQOL	78.29 (16.70)	80.78 (16.69)	76.01 (16.49)	84.88 (11.33)	85.82 (10.33)	84.04 (12.15)
Self-reported PA	3.37 (0.64)	3.46 (0.62)	3.29 (0.65)	3.30 (0.61)	3.44 (0.61)	3.18 (0.58)
Expectancy beliefs	4.27 (0.51)	4.41 (0.44)	4.14 (0.54)	4.07 (0.52)	4.24 (0.48)	3.93 (0.52)
Task values	4.17 (0.54)	4.27 (0.50)	4.08 (0.56)	3.82 (0.71)	3.84 (0.75)	3.81 (0.68)

HRQOL, health-related quality of life; Self-reported PA, self-reported physical activity

Discussion

The primary purpose of this study was to examine the potential racial differences (AAs vs. ACs) in the relation between expectancy-value beliefs and PA and HRQOL among fourth and fifth grade students. This research increased our understanding of how children's expectancy-related belief and task values toward PE might influence their PA engagement and HRQOL (i.e., physical and psychosocial functioning). Our study provided specific evidence that racial differences exist in children's expectancy-value beliefs and their health status (i.e., HRQOL), given similar PA levels. The growing health disparities across racial groups are of great public health concern, and thus this study provided valuable insights regarding how to promote AA children's PA and HRQOL through an expectancy-value approach.

Significant differences were observed between AC and AA children on most of the study variables, including expectancy-related beliefs, task values, and HRQOL. This highlights the importance of considering cultural factors when examining these variables. In particular, the results indicated that compared to their AC peers, AAs reported higher expectancy-related beliefs and task values toward PE, in which they may feel more competent and interested in what was being taught in the PE classes (i.e., racial-role inappropriateness) [28]. Gao and colleagues, however, found that the scores in expectancy-related beliefs for a dart-throwing task were higher in AA college athletes than their AC counterparts, but those in task values and task performance were not different between the groups [28]. Given the inconsistent results, the dart-throwing task might be viewed as a task not linked to racial roles by the participants in their study. Perceived racial-role appropriateness may explain the higher motivation and participation rates of AA toward particular sports, such as basketball, than other races [21]. It is plausible that perceived racial-role appropriateness also explains the racial effect on the expectancy-value beliefs in our AA sample, as their primary PE task or activity was basketball.

The findings also revealed that ACs scored significantly higher on HRQOL than AAs, although there was no significant racial difference on self-reported PA. Consistent with previous research [29] focusing on a large sample of fifth graders, racial disparity existed in HRQOL; ACs reported higher HRQOL scores than their AA counterparts. Research has shown that a supportive social context (i.e., a mastery-involving climate) is positively related to exercise behaviors as well as health-related well-being [3, 30]. This might be one of the reasons that AA children perceived lower HRQOL, as they might perceive the PE climate as more ego-involving than AC children [3]. Such perceptions of environment that focused on outcomes outside of their personal control (i.e., winning over others, attaining social approval and rewards) could negatively influence HRQOL [31]. Socioeconomic status (SES) might be the confounding variable which low SES is associated with low HRQOL [29, 32], as virtually all of the AA children were of lower SES while the majority of AC children were from middle income or higher family. In AA culture, sports is commonly valued as an expression of self and a potential way to stand out from economic hardship and racial oppression [33], which could be another reason for AAs' higher scores on expectancy-value beliefs. It is possible that perceived racial-role appropriateness might also affect students' PA participation and health-related outcomes beyond those stereotyped activities for their race.

Motivation is pivotal for children's behaviors in PE [34]. One of the most pressing findings of this study was that expectancy-related beliefs emerged as the unique predictor of self-reported PA for both AA and AC children. In line with previous studies, it is clear that a positive perception of competence and success is attached to learning activities such as PA engagement in PE regardless of their racial/ethnic identity [3, 16]. When the PE tasks/activities fall within children's

ability with higher chances for mastery and success, children, regardless of race, are more likely motivated to be physically active. It is interesting that although the AA children had significantly higher expectancy-related beliefs compared with the AC children, the expectancy-related belief emerged as a significant predictor of HRQOL for the AC group, but not for the AA group in our sample. The results suggest that expectancy-value beliefs toward PE appear to be more related to AA children's PA, instead of their HRQOL. Given that family contextual differences such as SES, parents' education, and language spoken at home might impact fifth grade children's HRQOL among different races [29], it may be a potential approach to improve HRQOL in AA children by improving their expectancy-related beliefs of competence and ability in successful performance in PE. In particular, strategies such as providing and designing tasks with reasonable levels of difficulty, fostering beliefs of abilities, and encouraging beliefs of efforts for success may contribute to physical activity participation and quality of life differently in AA children. Noticeably, task values, although positively associated with self-reported PA, were not significant predictors in the regression models for both AA and AC groups. This is consistent with previous research that expectancy-related belief was a stronger predictor to PA than task values [3, 35].

Unfortunately, few studies have examined motivational predictors or correlates of PA and HRQOL in AA children [5]. The findings of this study provide essential practical implications in alleviating racial disparities. Enhancing children's HRQOL and PA engagement in PE classes by implementing culturally appropriate instructional approaches and/or providing culture-related sports game/activities are suggested as essential elements in future education endeavors [36]. Meanwhile, physical educators and coaches need to create a motivational learning environment in order to optimize expectancy and value beliefs. As this line of research continues to develop, it will be important to extend past correlational and cross-sectional designs that represent a "snapshot" approach in exploring the changes of these motivational constructs in various races. Longitudinal studies where expectancy-value beliefs, PA and HRQOL assessed over several time periods are needed to further our understanding of the reciprocal effects of these constructs. In due course, following this line of inquiry, theory-driven interventions need to be designed and tested.

Despite the innovative findings of this study, they must be considered with inherent limitations. With the cross-sectional nature of the study, causal relationships cannot be established. There is a need for prospective, longitudinal, and experimental studies to test for causality. Second, in this study, we measured HRQOL using children's self-report. The inclusion of both self-report and parent-report of children's HRQOL in future research could be a more accurate approach to detecting health-related problem in children [29, 37]. These findings also shed light with regard to future studies about monitoring and reporting data by activity types and using multiple measures of PA, such as accelerometers. Lastly, the racial effects reported in the current study should be explained with caution due to the unavailable information for the children's SES, school factors, and family contextual factors for possible confounding effects. Children from a greater variety of SES and racial populations drawn from a larger sample of schools would also strengthen the generalizability of future studies.

To conclude, these findings underscore the importance of future PE research to inform the development of teaching methods and curricula for promoting children's PA and optimal psychosocial health, especially among the racial/ethnic minorities. Health practitioners and pediatricians should be made aware that measurable racial differences in HRQOL begin in childhood, suggesting that school-based interventions should be designed to meet the needs of specific populations. In terms of public health, it is imperative to monitor HRQOL in children and adolescents representing various individual, social, and culture differences. Although the racial-

role stereotypes may be improved in sports and PE, it is important for physical educators to understand evidence-based practices that foster intrinsic motivation for diverse groups. Strategies, such as offering choice, using personal reference for success, supporting autonomy, increasing awareness of the benefits of PA, and providing learning experiences that are enjoyable and interesting to diverse individuals are critical for enhancing motivation in PE across races and age groups [38, 39]. One important implication for practitioners might be that children's expectancy-value beliefs in PE, perceptions of health, and self-reported activity levels could be useful screening methods to identify groups of children who are at risk to be physically inactive and therefore more prone to poor health status.

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