



Original Research

Associations between extracurricular activity participation and health-related variables in underrepresented children

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ABSTRACT

Background: Children from underrepresented populations exhibit low levels of physical activity (PA), diet quality, and health-related quality of life (QoL), but participation in extracurricular activities may positively impact these health outcomes.**Purpose:** To examine differences in PA, dietary behavior, and QoL in underrepresented children by extracurricular activity dose (0, 1, ≥ 2) and type (sports, dance/martial arts, art/music).**Methods:** Children (N = 754; Grades 4–6) completed the Physical Activity Questionnaire for Children, KidsScreen-27 (QoL), and the School Physical Activity and Nutrition Survey and self-reported extracurricular activity participation. One-way MANOVA tests were used in this analysis.**Results:** Individuals participating in 1 and ≥ 2 activities ($p < 0.001$), sport/dance/martial arts ($p < 0.001$), and art/music ($p = 0.029$) had higher PA than non-participants. Those participating in ≥ 2 activities reported higher fruit intake compared to 1 activity and non-participants ($p = 0.009$; $p < 0.001$, respectively). Participants with ≥ 2 activities reported higher parent- and peer-related QoL compared to non-participants ($p = 0.001$; $p = 0.025$, respectively).**Conclusions:** Extracurricular activity participation was positively associated with health behaviors in underrepresented children. Schools may be encouraged to allocate some of their resources to extracurricular activity programming.

Introduction

Increasing physical activity is of great importance, particularly during childhood, due to the potential for short- and long-term benefits.^{1,2} One setting for increasing physical activity during childhood is organized sports, in which 44 million American youth participate on an annual basis.³ Health benefits of youth sport participation are expansive, and include increased energy expenditure through accumulated moderate to vigorous physical activity,⁴ reduced cardiometabolic risk, improved quality of life and reductions in all-cause mortality.^{5,6} In addition to structured youth sports, children participate in other extracurricular activities that may contribute to increased physical activity levels including dance or martial arts class, although research on the effect of these extracurriculars on other health-related variables, like quality of life, is limited.

In addition to the physical and socioemotional benefits of extracurricular activities, research has shown associations between participation, especially in sports, and other health-related lifestyle behaviors and characteristics in White children with slightly higher affluent backgrounds. Children from underrepresented, low-socioeconomic groups often present lower levels of PA and less opportunities to be physically active and eat a healthy diet.^{7,8} Therefore, the potential health benefits of extracurricular participation may be especially salient in underrepresented children. It is also important to consider extracurricular activities that are less inherently active, such as art and music class, since they may still have positive effects in underrepresented youth, including less school-related stress,⁹ more communication with parents,¹⁰ and greater perceived quality of life.^{11,12}

With respect to healthy dietary behaviors in children, boys and girls participating in sports consumed greater amounts of fruits, vegetables,

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dairy and whole grains compared to those not participating in sports.^{13,14} However, it is important to note that the majority of existing literature examines the dietary behaviors of children participating in sports at an elite level,¹⁵ and it remains unclear if general sport and/or extracurricular activity participation is associated with healthier dietary behaviors in children, especially those from underrepresented backgrounds. Therefore, determining the association among extracurricular activity participation and dietary behaviors in children is important given that consumption of fruits and vegetables is low, particularly in children living in low socioeconomic status environments.^{7,8}

In addition to providing an avenue for physical activity, extracurricular activity participation has been shown to be positively related to psychological health in children.¹⁶ One psychosocial construct of interest in children and adolescents is quality of life and well-being.¹⁷ The majority of studies measuring quality of life focus on the adolescent age group, with findings supporting that those participating in various extracurricular activities have higher levels of pro-social behavior and self-image and lower emotional anxiety compared to non-participants.¹² However, it remains unknown if underrepresented children participating in extracurricular activities (sports/dance/martial arts, art/music) have higher quality of life compared to children with no extracurricular activity participation.

It is plausible to infer that participation in extracurricular activities other than sports teams share similar benefits, yet the associations among a holistic set of health behaviors (i.e. physical activity, diet, quality of life) and various extracurricular activities (sports/dance/martial arts, art/music) in children are not well documented. Furthermore, it is unknown if a dose-response pattern exists between underrepresented children who participate in multiple extracurricular activities versus those who participate in one or no activities. Therefore, the purpose of this study was to examine differences in physical activity, dietary behavior and quality of life in underrepresented children between extracurricular activity participation dose (0, 1, or ≥ 2) and health benefits. In attempts to isolate the potential benefits of active extracurricular activities, a secondary purpose of this study was to determine differences in outcome measures among sports/dance/martial arts participants, those participating in only art or music class, and non-participants. We hypothesized that those participating in two or more extracurricular activities would report higher overall physical activity compared to those participating in only one or no activities, and those participating in at least one activity would report higher fruit and vegetable consumption and quality of life and lower junk food consumption compared to those participating in no activities. Second, we hypothesized that participants in sports/dance/martial arts would report higher overall physical activity, fruit and vegetable consumption, and quality of life and lower junk food consumption, compared to those only participating in art/music and non-participants, with those only participating in art/music class reporting higher quality of life compared to non-participants.

Materials and Methods

Participants and procedures

A sample of 754 students grades 4–6 from nine elementary schools (mean age 10.4 ± 1.0 years; 53.2% males) within one public school district in Flint, MI were administered a holistic health behavior survey (see Outcome Measures section) as part of this cross-sectional analysis. All schools in the present study were defined as low-income based on the percentage of children in grades 4–6 at these schools eligible for free or reduced lunch (average 85%).¹⁸ At the time of data collection, 25% of residents had not earned a high school diploma, and 28% of families were living below the poverty line. Approximately 60% of children in the city were African American. This research study was deemed as a program evaluation for the CrimFit Youth Program through the University Institutional Review Board. Although child assent was not required for this program evaluation, a letter was sent home to parents stating that they

could opt out their child from participating in the assessments.

Height was measured by trained researchers to the nearest 0.1 cm using a portable stadiometer (Shorr Board, Olney, MD), and weight was measured to the nearest 0.1 kg using a digital scale (Tanita BC-534 InnerScan Body Composition Monitor, Tokyo, Japan). Body mass index (kg/m^2) was used to classify students according to age- and sex-specific growth charts as healthy weight (<85th percentile) or overweight/obese (≥ 85 th percentile) according to the Centers for Disease Control and Prevention (CDC) cutpoints.¹⁹ The paper and pencil surveys were administered in a classroom setting during school hours where one research assistant read the questions out loud, and students answered for themselves. Students could ask any questions to a separate research assistant who was present during survey administration. Students self-reported their race/ethnicity. The survey consisted of self-reported questions regarding physical activity, dietary behavior and four dimensions of quality of life.

Outcome measures

Physical activity and extracurricular activity participation. Habitual physical activity level was determined from the Physical Activity Questionnaire for Children (PAQ-C), in which nine items were scored from one to five, then averaged to create one score, where higher scores indicate greater amounts of physical activity.²⁰ Test-retest reliability of the PAQ-C over one week in elementary school aged boys ($r = 0.75$) and girls ($r = 0.82$) is adequate²⁰ and the PAQ-C received support from an expert panel for population-level surveillance of physical activity in children.²¹ Yearly extracurricular activity participation was assessed by a single item derived from The International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) validated questionnaire²² that asked, ‘did you do any of these activities during the past year (12 months)’ with possible responses being ‘sports teams’, ‘dance/martial arts class’, ‘art/music class’, or ‘none’. Students could select multiple activities to determine the quantity (dose) of extracurricular activity participation.

Dietary Behavior. Dietary behavior was assessed with the elementary school version of the School Physical Activity and Nutrition Survey (SPAN), in which participants reported how many times they consumed various food items during the previous day, with responses from 0 times/day to 3 or more times/day.²³ Single items were used to determine fruit and vegetable intake with the mean values for each question reported. Junk food index was calculated from the sum of six items regarding consumption of various types of soft drinks, desserts, and candy, with average of the sum of the six items reported.²⁴ The SPAN survey has been validated against a 24-h recall measure with percent agreement values ranging from 51 to 78% for the items used in the present study and has demonstrated moderate to high reproducibility in a sample of 4th grade students.²⁵

Quality of Life. Quality of life was assessed using portions of the Kidscreen-27 survey which included items across four quality of life (QoL) dimensions, including psychological well-being (7 items), autonomy and parent relations (parent-related QoL) (7 items), social support and peers (peer-related QoL) (4 items), and school environment (4 items).²⁶ Each item was scored using a 5-point scale (1 = ‘not at all’, 2 = ‘a little’, 3 = ‘moderately’, 4 = ‘much’ and 5 = ‘very much’) with negatively-worded items reversed coded so that higher scores indicated a greater perceived quality of life.²⁶ Scores per dimension were standardized to a maximum of 100 points, similar to previous studies in children.^{27,28} Ravens-Sieberer and colleagues have demonstrated adequate reliability of this measure, with Cronbach’s alpha > 0.70 across each of the subscales in children and adolescents aged 8–18 years.²⁶ In the present analysis, Cronbach’s alpha was 0.79 for parent-related, 0.82 for peer-related, 0.75 for school environment and 0.68 for psychological well-being dimensions of quality of life.

Data analysis

Descriptive statistics were determined for each variable and are presented as mean \pm standard deviation. Participants without complete survey data were excluded from the analysis, for a final sample size of 545 students for the extracurricular type analysis and 677 students for the extracurricular activity dose-response analysis. Two separate one-way multivariate analysis of variance (MANOVA) tests were used in this analysis. The first model was used to determine if outcome measures (physical activity, fruit and vegetable intake, junk food consumption, quality of life) differed among non-participants, those participating in one extracurricular activity (sports, dance/martial arts, or art/music class) and those participating in two or more extracurricular activities. Due to the relatively small number of participants who reported participating in all 3 activities ($n = 37$) we collapsed the groups to no participation, participation in one activity, or participation in 2 or more activities. A second one-way MANOVA was used to determine differences in outcome measures by extracurricular activity type (i.e., non-participants, those participating in sports/dance/martial arts, and those only participating in art/music class).

The assumption of homogeneity of covariance matrices of the dependent variables was violated according to Box's M test. As cell sizes were uneven, analyses were re-run after randomly reducing the sample sizes to be approximately equal and the only difference between the analyses was that those participating in sports/dance/martial arts no longer had significantly higher parent-related quality of life compared to non-participants. However, all other results remained similar and therefore the overall sample is presented.

Following the MANOVA, individual univariate analysis of variance (ANOVA) tests were used to assess significance of individual variables. Additionally, the Roy-Bargmann stepdown procedure was used, in which variables are first ordered by contextual importance and then univariate linear models for significance of each variable are conducted, while controlling for variables of a higher order. For example, if PA is significantly different by type of extracurricular activity, then whether junk food intake is different by type of extracurricular activity is assessed, while controlling for PA. Results from individual univariate ANOVAs are reported unless otherwise stated. Bonferroni adjustment was used for post hoc pairwise comparisons, with Games/Howell post-hoc analyses used when the assumption of homogeneity of variance was violated. All statistical tests were conducted using SPSS version 24 (IBM Corporation, Armonk, NY, USA) with significance at $p < 0.05$.

Results

Participant characteristics are reported in Table 1. Over half (56%) of youth participated in at least one extracurricular activity (sports, dance/martial arts, art/music class), and 19% participated in at least two activities. Differences in physical activity, dietary behavior, and quality of life for those participating in no activities, one extracurricular activity (sports, dance/martial arts, art/music class) and two or more activities are presented in Table 2. Differences in outcome measures by

extracurricular activity type (no participation, sport/dance/martial arts, art/music-only) are presented in Table 3.

Physical activity

Youth participating in one activity and those participating in at least two extracurricular activities had significantly higher PAQ-C scores compared to non-participants (mean difference = 0.31 ± 1.56 , $p < 0.001$; mean difference = 0.41 ± 2.08 , $p < 0.001$, respectively), with no differences between those participating in only one activity and at least two extracurricular activities. Sports/dance/martial arts and art/music-only participants reported significantly higher physical activity compared to non-participants (mean difference = 0.34 ± 1.40 , $p < 0.001$; mean difference = 0.22 ± 1.87 , $p = 0.029$, respectively), but there were no differences between sports/dance/martial arts and arts/music participants. No other differences in physical activity level by number or type of extracurricular activity were evident.

Dietary behavior

There were no differences in fruit consumption by extracurricular activity type, but those participating in at least two extracurricular activities reported higher fruit intake compared to those participating in only one activity (mean difference = 0.32 ± 2.8 , $p = 0.009$) and non-participants (mean difference = 0.54 ± 3.12 , $p < 0.001$). There were no differences in vegetable consumption by extracurricular activity dose or type. Compared to non-participants, junk food consumption was higher in those participating in one extracurricular activity (mean difference = 1.28 ± 9.11 , $p = 0.001$), with no other differences by extracurricular activity dose. Sports/dance/martial arts participants reported higher junk food consumption compared to non-participants (mean difference = 1.48 ± 8.64 , $p < 0.001$) with no differences with those only participating in art/music class.

Quality of life

Significant between-group differences were found for certain dimensions of quality of life, but not all. Those participating in at least two extracurricular activities reported significantly higher parent-related and peer-related quality of life compared to non-participants (mean difference = 7.72 ± 55.16 , $p = 0.001$; mean difference = 6.32 ± 61.41 , $p = 0.025$). However, peer-related quality of life was not significant in the Roy-Bargmann stepdown procedure. There were no differences by extracurricular activity dose for the psychological well-being and school environment quality of life dimensions. Additionally, those participating in sports/dance/martial arts had significantly higher parent-related quality of life compared to non-participants (mean difference = 4.54 ± 42.26 , $p = 0.038$), but this was not significant in the Roy-Bargmann stepdown procedure. There were no differences in those participating in only art/music class. Peer-related, psychological well-being and school environment quality of life dimensions were not different between extracurricular activity types.

Discussion

Existing research investigating associations of extracurricular activity participation in children focus on academic or behavioral outcomes or associations among sport participation and physical health-related variables in affluent populations. Given that extracurricular activity participation may be positively associated with both physical and psychosocial health outcomes, it is important to examine these variables collectively. Further, it is important to examine the associations among health-related variables and extracurricular activity participation in underrepresented children since they are at greater risk for poor health outcomes, and extracurricular activities may provide an avenue to promote health in this population.^{7,29} Our study contributes to the previous literature by

Table 1

Sample characteristics ($n = 754$).

Demographic Groups	Percent of Sample
Male	53%
Female	47%
Black	56%
White	14%
Multiracial/Other	30%
Healthy Weight	56%
Overweight and Obese	44%
Fourth Grade	30%
Fifth Grade	36%
Sixth Grade	34%

Table 2
Dose response of extracurricular activity participation and health-related variables in children (n = 677).

Outcome Variable	No Participation (n = 171)	Participated in 1 Activity (n = 374)	Participated in ≥2 Activities (n = 132)	Overall Model
Physical Activity (PAQ-C) (scored 1–5)	2.88 ± 1.30 (2.79, 2.99)	3.19 ± 0.88* (3.12, 3.26)	3.30 ± 1.51* (3.18, 3.41)	F(2,674) = 17.493, p < 0.001
Fruit Intake (times consumed/day, scored 0–3)	1.20 ± 2.11 (1.05, 1.36)	1.42 ± 1.43 (1.31, 1.53)	1.74 ± 2.39*† (1.56, 1.92)	F(2,674) = 9.670, p < 0.001
Vegetable Intake (times consumed/day, scored 0–3)	0.91 ± 1.95 (0.76, 1.06)	1.01 ± 1.30 (0.91, 1.11)	1.01 ± 2.24 (0.84, 1.18)	F(2,674) = 0.625, p = 0.535
Junk Food Index (scored 0–18)	4.81 ± 7.59 (4.24, 5.39)	6.09 ± 5.20* (5.70, 6.45)	5.82 ± 8.59 (5.17, 6.47)	F(2,674) = 6.600, p = 0.001
Parent-related Quality of life (QoL) (scored 1–100)	71.83 ± 36.41 (69.08, 74.58)	75.46 ± 24.72 (73.59, 77.32)	79.55 ± 41.63* (76.41, 82.68)	F(2,674) = 6.611, p = 0.001
Peer-related QoL (scored 1–100)	78.71 ± 40.84 (75.64, 81.79)	82.34 ± 27.58 (80.26, 84.42)	85.04 ± 46.32* (81.54, 88.54)	F(2,674) = 3.697, p = 0.025
Psychological Well-being QoL (scored 1–100)	77.39 ± 30.43 (75.09, 79.70)	77.80 ± 20.56 (76.24, 79.36)	80.54 ± 34.87 (77.92, 83.16)	F(2,674) = 1.900, p = 0.150
School Environment QoL (scored 1–100)	76.40 ± 38.75 (73.48, 79.32)	77.18 ± 26.02 (75.21, 79.15)	76.82 ± 43.97 (73.50, 77.32)	F(2,674) = 0.095, p = 0.909

Variables are presented as Mean ± standard deviation and (95% confidence interval).

*Significantly greater than no participation (p < 0.05); † Significantly greater than 1 activity (p < 0.05).

Table 3
Differences in health-related variables by type of extracurricular activity in children (n = 545).

Outcome Variable	No Participation (n = 171)	Sports/Dance/Martial Arts (n = 276)	Art/Music Class (n = 98)	Overall Model
Physical Activity (PAQ-C) (scored 1–5)	2.89 ± 1.17 (2.79, 2.99)	3.23 ± 0.93* (3.15, 3.30)	3.10 ± 1.63* (2.97, 3.23)	F(2,542) = 13.800, p < 0.001
Fruit Intake (times consumed/day, scored 0–3)	1.20 ± 1.87 (1.05, 1.36)	1.44 ± 2.50 (1.31, 1.56)	1.38 ± 2.57 (1.17, 1.59)	F(2,542) = 2.605, p = 0.075
Vegetable Intake (times consumed/day, scored 0–3)	0.91 ± 1.87 (0.76, 1.06)	1.05 ± 1.40 (0.94, 1.17)	0.89 ± 2.34 (0.69, 1.08)	F(2,542) = 1.615, p = 0.200
Junk Food Index (scored 0–18)	4.81 ± 6.82 (4.24, 5.38)	6.29 ± 5.37* (5.85, 6.74)	5.51 ± 8.87 (4.76, 6.26)	F(2,542) = 8.169, p < 0.001
Parent-related Quality of life (QoL) (scored 1–100)	71.83 ± 33.39 (69.03, 74.63)	76.37 ± 26.15* (74.16, 78.57)	72.89 ± 43.90 (69.19, 76.59)	F(2,542) = 3.479, p = 0.032
Peer-related QoL (scored 1–100)	78.71 ± 37.59 (75.55, 81.87)	83.03 ± 29.65 (80.54, 85.51)	80.41 ± 49.74 (76.24, 84.59)	F(2,542) = 2.304, p = 0.101
Psychological Well-being QoL (scored 1–100)	77.39 ± 28.02 (75.04, 79.74)	78.34 ± 21.95 (76.53, 80.22)	76.18 ± 36.89 (73.08, 79.29)	F(2,542) = 0.751, p = 0.472
School Environment QoL (scored 1–100)	76.40 ± 35.26 (73.45, 79.36)	76.78 ± 27.79 (74.45, 79.10)	78.32 ± 46.70 (74.41, 82.22)	F(2,542) = 0.313, p = 0.732

Variables are presented as Mean ± standard deviation and (95% confidence interval).

*Significantly greater than no participation (p < 0.05).

examining relationships between various types and doses of extracurricular activity participation and a breadth of health-related variables (physical activity, dietary behavior, quality of life) that are important indicators of current and long-term health in a sample of underrepresented students. Our first hypothesis regarding extracurricular activity dose was partially supported since children who participated in one or at least 2 activities reported significantly higher physical activity compared to non-participants, whereas participation in at least two activities appeared to be the minimum dose required for other health-related variables including fruit consumption and peer- and parent-quality of life. However, those participating in one extracurricular activity reported higher junk food consumption compared to those not participating in extracurricular activities. Although our second hypothesis regarding extracurricular activity type was not supported, a similar benefit to physical activity was evident from either type of activity (sports/dance/martial arts versus art/music), both of which were greater than non-participants.

Extracurricular activity participation and physical activity

Previous literature has demonstrated a positive relationship between sport participation and physical activity levels in children,^{30,31} yet relationships among other extracurricular activities has yet to be established. Similar studies support our finding that participation in sports was associated with increased physical activity, including Hebert et al. who

demonstrated that sport participation, especially in soccer, was associated with increased levels moderate-to-vigorous physical activity (MVPA) in young boys and girls.³⁰ Secondly, our findings support a dose response pattern of extracurricular activity participation and physical activity levels since those participating in one or at least two extracurricular activities reported higher physical activity levels compared to non-participants. In regard to the type of extracurricular activity, art and music classes are less inherently active, and therefore we expected similar physical activity levels between those only participating in art/music class and children reporting no extracurricular activity involvement. However, those participating in only art/music class reported higher amounts of physical activity compared to those participating in no extracurricular activities. An explanation for this finding is that students participating in art/music could be actively transporting to or from the class because underrepresented children from a low socioeconomic background often have issues with transport.²⁹ Our results support that participation in a variety of extracurricular activities, including art/music class, may play a unique role in increasing physical activity levels in this sample of underrepresented children given that low socioeconomic status is often associated with physical inactivity and physical inactivity is an independent cardiovascular disease risk factor.^{32,33}

Extracurricular activity participation and dietary behavior

In this analysis, underrepresented children participating in two or

more extracurricular activities reported higher fruit consumption compared to those participating in only one activity and non-participants. Previous studies investigating the association between organized sport participation and dietary behaviors support our findings.³⁴ In a similar demographic to our analysis, students who participated in multiple sports had higher fruit consumption and reported stronger beliefs regarding the health benefits of fruit and vegetable consumption compared to single- or no-sport students.³⁴ Similarly, Dortch et al. demonstrated a dose-response between the number of sports teams on which children played and fruit and vegetable consumption.³⁵ However, it is important to note the only extracurricular activity included in the aforementioned analyses was sport participation, while we demonstrated that participation in multiple extracurriculars (sports or dance/martial arts) resulted in higher reported fruit intake. Our finding that participation in multiple extracurricular activities was related to fruit consumption is suggestive of the phenomenon that one healthy behavior may influence another in a positive manner (i.e. physical activity and healthy eating).^{31,36} However, in our analysis by type of extracurricular activity we found no differences in fruit or vegetable consumption between sport/dance/martial arts and art/music participants, which contradicts the findings of Dortch and colleagues, who found greater vegetable consumption in those participating in sports compared to non-participants.³⁵ Our study contributes to the existing literature by indicating that other extracurricular activities in addition to sport teams (dance/martial arts) may be associated with fruit consumption.

Contrary to our hypothesis, children participating in sports/dance/martial arts consumed greater amounts of junk food compared to non-participants, with no differences among art/music-only participants. Interestingly, other studies support this finding. For example, a cross-sectional analysis of pentathlon adolescent athletes identified frequent consumption of baked goods and sugar-sweetened beverages.³⁷ Secondly, Aerenhouts and colleagues found high total and saturated fat intake in adolescent sprint athletes over a three year period.³⁸ Lastly, girls participating in multiple sports were more likely to consume greater amounts of sugar-sweetened beverages.³⁵ On the contrary, a study employing similar methodology to our analysis demonstrated no relationship between sport participation and junk food consumption.³⁵ Additionally, those participating in one extracurricular activity reported higher junk food consumption than non-participants, which may be due to lack of nutrition knowledge in this population, the type of snacks provided at extracurricular activity practices, and that underrepresented children from low socioeconomic demographics often have poor diet quality.^{8,13} In summary, this study demonstrates that extracurricular activity participation was associated with both healthy (fruit consumption) and poor (junk food consumption) dietary behaviors. Underrepresented children may not have access to healthy foods so the benefits of extracurricular activity participation on healthy dietary behaviors may be particularly salient in this population.

Extracurricular activity participation and quality of life

Although previous research has investigated the relationship between habitual physical activity levels and quality of life,^{39–41} this study contributes to the literature by investigating relationships among various extracurricular activities and specific quality of life dimensions in children. There may be a minimum dose of extracurricular activity participation required to have a positive effect on quality of life since the only observed difference was between those participating in two or more activities and non-participants. For example, in this analysis participating in only one extracurricular activity was insufficient to demonstrate greater psychosocial health benefits compared to non-participants. Participating in multiple extracurricular activities provides an opportunity for children to interact and build relationships with their peers and parents,⁴² providing an explanation for our findings. We expected that participation in sports/dance/martial arts or art/music class would

report higher peer-related quality of life compared to non-participants because the majority of these activities are characterized by social interaction and teamwork with their peers,⁴³ yet we demonstrated no differences by extracurricular activity type and peer-related quality of life. A potential explanation for this finding is that art/music participants completed individual lessons with minimal peer-to-peer interaction. Further, parent-related quality of life in sports/dance/martial arts participants was higher compared to non-participants with no other differences by activity type. However, this finding must be replicated because the relationship between sports/dance/martial arts participation and parent-related quality of life was no longer significant after randomly reducing the sample sizes and re-running the analysis. Although data were not collected on parent physical activity levels in the current study, it typically shows an association with higher participation in organized sports in children,⁴⁴ which provides a plausible explanation for our finding.

In the present study, we do not have additional contextual information about the extracurricular activities, like where they took place or frequency of attendance. However, we know that sport participation often occurs outside of the school context and involves parental interaction in regards to support and transportation,⁴⁵ which may have contributed to the greater parent-related quality of life in sport/dance/martial arts participants. Interestingly, no relationship was found between extracurricular activity participation and the school environment quality of life dimension. Our null finding may be explained by the context of extracurricular activity participation, and since sports/dance/martial arts and art/music classes are often performed in after-school settings, they may not contribute to enhanced quality of life in the school environment given that these questions addressed the extent of happiness at school and teacher interactions.²⁴ Additionally, no relationship was found between psychological well-being and extracurricular activity participation. A probable explanation for this finding is that our sample of children are from a low socioeconomic demographic, which is associated with lower quality of life.²⁹ Another explanation for our findings could be the characteristics of the questions included in the KIDSCREEN 27 survey. For example, one psychological well-being dimension question directly asks “have you felt full of energy?”.²⁴ Children participating in extracurricular activities exert effort, and may have responded with a lower score to this question, contributing to a lower psychological well-being dimension score. Overall, the beneficial relationship between extracurricular activity participation, particularly sports/dance/martial arts, and parent- and peer-related quality of life highlighted in this study may be of particular importance in underrepresented children who often report lower quality of life and higher stress levels compared to their more affluent counterparts in part due to stress-inducing conditions.²⁹ Additional research regarding the context of extracurricular activity participation in underrepresented children is required to understand their relationship with quality of life.

The present study has limitations that must be addressed. A main limitation of this study was the use of a single question for assessing extracurricular activity participation. Future research may employ parent proxy to assess children's extracurricular activity participation due to potential recall concerns in children.⁴⁶ Further, participation was determined on an annual basis and did not infer if the student was currently participating in extracurricular activities. Another limitation of this study was the lack of an objective measure of physical activity, which would be difficult given the size and context of our study sample. Therefore, future research should implement a monitor-based approach to further understand the relationship between extracurricular activity participation and health-related variables. Although the present study focused on children from an underrepresented school district in which 85% of students were eligible for free and reduced lunch, a direct assessment of socioeconomic status for each participant was not used. Lastly, comparisons in outcome measures between underrepresented and affluent children cannot be determined from the current study. This study also has multiple strengths, including an underserved population at risk

for adverse health outcomes. An additional strength of this study is the generalizability of findings given that the survey was administered to all fourth through sixth grade classrooms within an entire public school district and assessed multiple health behaviors.

The majority of extracurricular activity research in children focuses on academic and behavioral outcomes. Although academic success and behavior are important, physical activity, dietary behavior, and quality of life assessed in this study also contribute to long-term health outcomes. Our preliminary findings suggest that participation in multiple extracurricular activities is positively associated with physical activity, fruit intake, and peer- and parent-related dimensions of quality of life. However, participating in even one extracurricular activity per year was beneficial in this population. In regard to type of extracurricular activity, both sports/dance/martial arts and arts/music participants reported higher physical activity compared to non-participants, yet only sport participation was associated with greater junk food consumption and parent-related quality of life. Future research is required to address the timing and tempo of extracurricular activity participation (i.e. hours/week, location, simultaneous participation, group dynamics) to better understand the relationship between extracurricular activity participation and health-related behaviors in children.

Conclusions

Extracurricular activities function within school and community contexts and provide an avenue to influence health behaviors. Our findings have school health ramifications including that participating in just one extracurricular activity, even less inherently active types such as art/music lessons, was beneficial for physical activity promotion. However, sport participation was associated with higher junk food consumption (i.e. sugar-sweetened beverages) indicating there may also be certain negative effects associated with extracurricular activity participation. Overall, our findings provide initial support for schools from low socioeconomic demographics to emphasize extracurricular activity programming. Secondly, knowledge translation practices regarding health behaviors (i.e. healthy snacks and limited sugar-sweetened beverages) should be provided by coaches and teachers to their participants.

Ethical approval

The study was approved by the Ethics Committee or Institutional Review Board of Michigan State University as a program evaluation (#09–1204). Although child assent was not required for this program evaluation, a letter was sent home to parents stating that they could opt out their child from participating in the assessments.

Author's contributions

JR, KC, SS, SD, and KP contributed to the conception and design of the study, data analysis, and drafting or critical revising of the manuscript. JR and KC were responsible for statistical analyses and data interpretation, supervised by KP. SS and KP supervised data collection, and SD was involved with data collection. All authors approved the final version of the manuscript.

Submission statement

This manuscript has not been published and is not under consideration for publication elsewhere.

Conflict of interest

The authors have no conflict of interest to report.

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