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# Have I Seen You Here Before? Social Network and Physical Activity Implications of Previous Participation in a Summer Care Program

Jeong-Hui Park<sup>a</sup>, Tyler Prochnow<sup>a</sup>, Sara A. Flores<sup>a</sup>, Deja Jackson<sup>a</sup>,  
Meg Patterson<sup>a</sup>, and M. Renée Umstattd Meyer<sup>b</sup>

<sup>a</sup>School of Public Health, Texas A&M Health Science Center, College Station, Texas, USA;

<sup>b</sup>Robbins College of Health and Human Sciences, Baylor University, Hankamer Academic Center, Waco, Texas, USA

## ABSTRACT

This study explores the impact of prior participation in summer care programs (SCPs) on children's physical activity (PA) and social connections at the start (T1) and end (T2) of summer. Children aged 8–12 reported their attendance, PA, and social connections (T1:  $n = 100$ , T2:  $n = 77$ ). T-tests and exponential random graph modeling were used to analyze data. Results showed that prior attendance didn't significantly affect friend count or PA. New connections formed over time were more likely among children with similar PA levels. The study highlights SCPs' role in integrating new children into social circles without preferential attachment.

## KEYWORDS

Summer care program;  
physical activity;  
social network;  
adolescents

## Introduction

Convincing scientific evidence has been reported to support the benefits of participating in regular physical activity (PA) to improve children's health (Andermo et al., 2020; Eddolls et al., 2017; Errisuriz et al., 2018). Regular PA in childhood is essential for establishing health-related behaviors supporting physical, psychological, and social development (Telama et al., 2005). The acquisition of poor health behaviors and negative physical outcomes in childhood are associated with chronic diseases (i.e., diabetes, obesity, autoimmune diseases, gastrointestinal disorders, and heart diseases) in adulthood (Almuneef et al., 2014; Bellis et al., 2015; Goodwin et al., 2003; Williamson et al., 2002). Moreover, these health habits formed in childhood are difficult to change as adolescents move into young adulthood (Kim et al., 2021). Therefore, the World Health Organization (WHO) has recommended children and adolescents ages 5 through 17 years old participate in at least 60 minutes

**CONTACT** Tyler Prochnow  [tprochnow@tamu.edu](mailto:tprochnow@tamu.edu)  School of Public Health, Texas A&M Health Science Center, 212 Adriance Lab Rd., College Station, TX 77843, USA.

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of moderate-to-vigorous intensity PA each day (activity types between 4 and 8 metabolic equivalents (METs)), with muscle and bone strengthening activities at least 3 days per week (WHO, 2020).

Previous research has found that children's PA varies depending on the season (Goodman et al., 2012; Harrison et al., 2017). Specifically, some scholars have indicated that children's PA might be lower in the summer as compared to school times (Brazendale et al., 2018; McCue et al., 2013; Nagy et al., 2019). According to Nagy et al. (2019), children's PA decreased and their sedentary behaviors increased during a summer holiday (Nagy et al., 2019), which may have accelerated negative health outcomes such as weight gain. This is thought to be partially due to less formal PA opportunities over the summer (Brazendale et al., 2017). Summer care programs (SCPs) are one potential source of structure and PA promotion throughout the summer. According to the Afterschool Alliance (Afterschool Alliance, 2021), 14.3 million adolescents participate in summer activities each year. During the summer break, the Boys & Girls Club Inc. also offers programs tailored to sustain children's engagement, PA, and educational enrichment (Anderson-Butcher et al., 2003). Each program encompasses a diverse range of activities, including but not limited to Fun Activities (e.g., Basketball, Free Gym access, and Game Room Activities), Arts & Crafts, Social Recreation, and STEM/Robotics initiatives (Anderson-Butcher et al., 2003). Therefore, structured PA opportunities provided by organizations such as Boys & Girls Club Inc., through their SCPs, have the potential to address the lack of organized PA that children often experience during the summer months (Brazendale et al., 2020; Dugger et al., 2020). In fact, children in summer day camps typically engage in an average 89.2 minutes of moderate-to-vigorous PA each day (Brazendale et al., 2020). Outside of PA outcomes, SCPs have also demonstrated youth development by promoting adventure, independence, positive identity, and fostering friendships and peer interactions (Henderson et al., 2007), and participation in summer programs have the potential to promote and sustain health-related fitness levels among adolescents throughout the summer period (Wahl-Alexander et al., 2020).

As SCPs offer structured opportunities for PA and engagement, they also can serve as platforms for fostering friendships and peer interactions. Indeed, social dynamics within peer groups play a significant role in shaping children's health behaviors, including PA levels (De La Haye et al., 2011). One factor affecting children's health behavior is parental and peer behavior (Baker et al., 2003). As supported by a systematic literature review, social influence from peers significantly affects children's PA (Prochnow et al., 2020). Steglich and colleagues revealed PA can be enhanced through social influence from peers as well as influenced by common activities or environments (e.g., specific sports programs, physical education class at school) (Steglich et al., 2010).

Elements of popularity can also be a driving force behind children's health behavior, as being more popular may predict the ability to influence or be influenced by social norms (Montgomery et al., 2020), and it may also create a tendency for children to befriend others who exhibit a given health behavior (i.e., engagement in the given behavior leads to changes in popularity) (Montgomery et al., 2020). In addition, children often choose friends who are similar to themselves as well as become more similar to their friends over time (Prochnow et al., 2020; Simpkins et al., 2013). This effect can be attributed to the theory of homophily where individuals tend to be friends or connect with others that are similar to themselves (Valente, 2010).

One way to study peer influences in summer programs is social network analysis (SNA). SNA is a set of theories and methods used to understand social influences related to individual behaviors and beliefs (Valente, 2010). SNA helps to understand the connections between individuals and how these connections relate to behaviors to investigate concepts such as influence, selection, and popularity. For example, one study explored the impact of sport participation on PA levels, perceived skill competency, and social connections within SCPs using SNA, and their findings indicated that SCPs facilitate PA promotion through playful activities and offer opportunities for children to cultivate friendships, irrespective of their engagement in organized sports (Prochnow et al., 2022). Furthermore, it can analyze the social influences and structures related to individual or collective health behaviors (Borgatti et al., 2018). The analytical focus is on the connections between individuals within a group, such as a school and SCPs, and what those connections mean for health and health behavior (Valente, 2010).

The theory of preferential attachment may be a theoretical framework underlying understanding peers' relationships and their influence on each other in summer programs. The theory posits that adolescents who have previously attended the program may have more connections and gain more connections based on popularity and increased opportunities to connect (Barabasi & Albert, 1999; Jeong et al., 2003). Stated differently, individuals who are present in networks the longest tend to have the most opportunity to create connections, forming a centralized network centered on a few popular individuals (Barabasi & Albert, 1999; Jeong et al., 2003). Preferential attachment is shown to be a significant predictor of friendships among students in an elementary classroom (Lintner, 2022). This effect is also seen in two previous studies analyzing preferential attachment in sports and PA environments in which a few original popular nodes have a strong influence on the network process and tend to build cooperative ties with new nodes (Brownson et al., 2010; Meisel et al., 2014).

Social networks developed in SCPs can be influential in understanding children's PA engagement and provide a structure for PA and social support, which can be a strategy to increase PA. Previous attendance may be

associated with more and/or maintained connections as opposed to preferential attachment theory. Therefore, the study's purpose is to examine the relationship between previous participation in SCPs, social connections, and PA engagement over two time points (e.g., at the beginning (T1) and end (T2) of the SCPs). This means that the researchers are interested in understanding how participation in SCPs influences both social connections and PA engagement over time, specifically at T1 and T2 of the SCPs. Further, this study aims to better understand the role of preferential attachment theory (previous attendance) in the formation of friendship networks at SCP as well as its potential association with PA, previously identified as an important catalyst of social connection within SCP environments.

## **Methods**

### ***Procedures and participants***

Children (aged 8–12 years old) at a SCP in the Southern United States were recruited to participate in researcher-administered surveys at the T1 ( $n = 100$ ) and T2 ( $n = 77$ ), with 8 weeks between the two time points. The SCP provided consistent structured and semi-structured activities throughout the summer on a daily basis for at least 8 hours each day. Before participating in the survey, all children were asked to provide written assent forms. Parents/guardians were informed before participation and were given the opportunity to withdraw their children from the study anytime without interruption of care or benefits. Also, all children and adolescents were able to take the survey if they chose to at T1 and T2. Children completed the survey on the researcher's computer in a room away from the main activities during program hours. The study was approved by the Institutional Review Board of Baylor University (No.1359500).

### ***Measures***

As part of the survey, children self-reported their age, sex, race, ethnicity, and whether they had attended the program in past years (e.g., have you participated in a summer program at the Boys & Girls Club before this summer). Children were also asked to report their skill competency, PA, and social networks through the survey at the start (T1) and end (T2) of summer, roughly 8 weeks apart.

#### ***Skill competency***

Children's skill competency was measured by the PlaySELF physical literacy assessment (Cairney et al., 2016). The children were asked, "How good do you feel you are at physical activities at the Boys & Girls Club" and they

were able to respond with coded answers from 0 to 4 respectively, “never tried,” “not so good,” “okay,” “very good,” and “excellent.”

### **Physical activity (PA)**

Children’s PA was measured by the WHO’s Health Behavior School Aged Children survey (Booth et al., 2001). They were asked to estimate the number of hours they were physically active in the last week. Response options were coded 0 to 4, with higher scores corresponding to being more physically active (“none,” “about half an hour per week,” “about one hour per week,” “about 2 – 3 hours per week,” and “about 4 – 6 hours per week,” respectively).

### **Social network**

Children were asked to report the names of up to five of their peers who they hung out with or talked with the most in and out of the SCPs. They were given a complete roster of children’s names to nominate. All nomination data were coded as a directed friendship tie (1 = tie, 0 = no tie). In addition, the children were asked several questions related to the alter (e.g., sex, age, place of residence, frequency and time of play, and whether the alter helps them to be active). This process has been used previously and reported in more depth elsewhere (Prochnow et al., 2020; 2021; 2022).

### **Data analysis**

Children’s personal demographic information (e.g., age, sex, race, ethnicity, and previous participation) were summarized by mean (M) and standard deviation (SD) in SPSS 25.0 (SPSS Inc., Chicago, IL, USA). Differences in self-reported PA, friendships, and skill competency between children who had attended the program previously and those that did not were determined with independent sample t-tests. The change in network tie (friendship) for tie stability from T1 to T2 was calculated by the Jaccard index. In addition, we used exponential random graph model (ERGM) to estimate important factors in the presence of friendships at each point in the network and separable temporal exponential random graph models (STERGMs) to model changes in the network over time.

ERGM is an analytical method that can approximate the maximum likelihood estimates of the connection between the tie presence and parameters such as factors related to network structure/network individual characteristics based on the iterative Markov Chain Monte Carlo algorithm (Lusher et al., 2013). Therefore, in the current study, ERGM has been used to determine significant factors related to the association between children in the cross-sectional networks of T1 and T2.

STERGMs is used to model connection formation and maintenance over time because it models the formation and maintenance of connections individually in two separate models (Krivitsky & Handcock, 2014). STERGM calculates a parameter estimate (PE) and a standard error (SE) for each factor entered into the model, where PE means an approximate log-odds representing an increase/decrease in edge's formation/maintenance probability. If the PE is greater than twice the SE, the factor is considered significant at the  $p < .05$  level. A significant positive formation factor means a significant increase in the probability that a connection will be formed over time. A significant positive maintenance factor also means a significant increase in the probability of a connection persisting or remaining over time. ERGM and STERGMs were analyzed using R Studio's statnet package (Hunter et al., 2008).

## Results

In total, 100 children were surveyed at T1 and 77 were surveyed at T2. When comparing the full samples at each time point, there was no significant difference in child self-reported PA at T1 and T2 ( $t(75) = -0.11, p = .91$ ) (T1:  $M = 3.08$ ;  $SD = 1.44$ ; T2:  $M = 3.10$ ;  $SD = 1.49$ ). Children nominated a mean of 2.92 ( $SD = 1.02$ ) others as friends at T1 and 2.81 ( $SD = 1.25$ ) at T2. When examining only the children who reported data at both timepoints, 52 children participated in both time points and displayed a Jaccard Index of 0.31. Roughly this means that 30% of friendships among the subset of children observed at both timepoints remained stable. In total, 57% of children surveyed at T1 and 58% at T2 had attended the program in previous years. Children who had not attended the program previously reported significantly more active play (e.g., help their friends to be active and hung out with or talked with the most in and out of the SCPs) with friends at the program at T1 ( $t(98) = 2.68; p = .04$ ) and significantly less help from friends at T2 ( $t(75) = 2.99; p = .04$ ) when compared to children who had attended the program in previous years. Children who had attended the program previously were not significantly more likely to report more friends, more skill competency, or more PA. Complete demographic information for children at each time point and for those who completed both time points can be found in Table 1.

## ERGM

Connections were significantly more likely to occur between children if they had both previously attended the program or were both new to the program. However, this effect was only significant at T1 ( $PE = 0.71$ ;  $SE = 0.12$ ) and not at T2 ( $PE = 0.10$ ;  $SE = 0.13$ ). Moreover, children were significantly more likely to be connected in T2 if they were similar in self-

**Table 1.** Sample characteristics for children surveyed at each time point and those who participated in both time points.

|                          | Time 1 (n = 100) | Time 2 (n = 77) | Both (n = 52)            |
|--------------------------|------------------|-----------------|--------------------------|
| Age M (SD)               | 9.94 (1.34)      | 9.83 (1.46)     | 9.79 (1.46)              |
| Sex % (N)                |                  |                 |                          |
| Male                     | 47.0% (47)       | 50.6% (39)      | 46.0% (25)               |
| Female                   | 53.0% (53)       | 49.4% (38)      | 54.0% (27)               |
| Race % (N)               |                  |                 |                          |
| Black                    | 55.0% (55)       | 49.4% (38)      | 50.0% (26)               |
| White                    | 33.0% (33)       | 27.3% (21)      | 38.5% (20)               |
| Multi-racial             | 7.0% (7)         | 10.4% (9)       | 5.8% (3)                 |
| Other                    | 5.0% (5)         | 13.0% (10)      | 5.8% (3)                 |
| Ethnicity % (N)          |                  |                 |                          |
| Hispanic                 | 36.0% (36)       | 40.3% (31)      | 40.0% (21)               |
| Non-Hispanic             | 64.0% (64)       | 59.7% (46)      | 60.0% (31)               |
| Previous Participation   | 57.0% (57)       | 58.4% (45)      | 57.6% (30)               |
| Physical Activity M (SD) | 3.08 (1.44)      | 3.10 (1.49)     | 2.98 (1.39), 3.30 (1.32) |
| Perceived Skill M (SD)   | 3.39 (0.79)      | 2.99 (0.92)     | 3.06 (0.56), 2.77 (0.64) |
| Network Measures         |                  |                 |                          |
| Ties M (SD)              | 2.92 (1.02)      | 2.81 (1.25)     | 3.40 (1.31), 4.37 (0.93) |
| Density                  | 0.07             | 0.06            | 0.03, 0.05               |
| Reciprocity              | 0.33             | 0.31            | 0.37, 0.38               |
| Transitivity             | 0.22             | 0.25            | 0.27, 0.28               |

Note: M: Mean, SD: Standard Deviation, N: Number; Time 1: At the beginning of summer care program, Time 2: At the end of summer care program.

**Table 2.** Final model parameter estimates and standard errors for exponential random graph models of friendship ties among children at each timepoint.

| Variables           | Start of summer |      |         | End of summer |      |         |
|---------------------|-----------------|------|---------|---------------|------|---------|
|                     | PE              | SE   | p-value | PE            | SE   | p-value |
| Edges               | -4.33           | 0.42 | <.001   | -3.55         | 0.48 | <.001   |
| Reciprocity         | 3.31            | 0.20 | <.001   | 2.84          | 0.25 | <.001   |
| Transitivity        | 0.81            | 0.07 | <.001   | 0.77          | 0.09 | <.001   |
| Similarity          |                 |      |         |               |      |         |
| Previous Attendance | 0.71            | 0.12 | <.001   | 0.10          | 0.13 | .40     |
| Age                 | 0.80            | 0.08 | <.001   | 1.07          | 0.11 | <.001   |
| Gender              | 1.08            | 0.15 | <.001   | 1.07          | 0.15 | <.001   |
| Race/Ethnicity      | 0.57            | 0.11 | <.001   | 0.58          | 0.13 | <.001   |
| PA                  | 0.04            | 0.04 | .23     | -0.09         | 0.04 | .03     |
| Skill competency    | -0.05           | 0.10 | .62     | -0.03         | 0.12 | .76     |
| Total Connections   |                 |      |         |               |      |         |
| Previous Attendance | 0.03            | 0.06 | .57     | 0.05          | 0.09 | .59     |
| PA                  | 0.05            | 0.02 | .06     | 0.02          | 0.03 | .50     |
| Skill competency    | -0.07           | 0.06 | .25     | -0.03         | 0.07 | .65     |

Note: PA: Physical Activity; PE: Parameter Estimate, SE: Standard Error.

reported PA (PE = -0.10; SE = 0.05). Children were significantly more likely to be connected at both time points if they were of similar age, gender, and race/ethnicity. See Table 2 for full ERGM results.

### STERGM

Children were significantly more likely to form new connections over time if they were similar in self-reported PA (PE = -0.12, SE = 0.05), age (PE = 0.75, SE = 0.21), gender (PE = 0.77, SE = 0.24), and race/ethnicity (PE =



**Table 3.** Final model parameter estimates and standard errors for separable temporal exponential random graph modeling of friendship tie formation and maintenance.

| Variables           | Formation |      |         | Maintenance |      |         |
|---------------------|-----------|------|---------|-------------|------|---------|
|                     | PE        | SE   | p-value | PE          | SE   | p-value |
| Edges               | −4.75     | 0.82 | <.001   | −1.03       | 2.07 | .61     |
| Reciprocity         | 1.90      | 0.33 | <.001   | −0.16       | 0.78 | .83     |
| Transitivity        | 0.79      | 0.12 | <.001   | 0.94        | 0.37 | .01     |
| Similarity          |           |      |         |             |      |         |
| Previous Attendance | 0.35      | 0.21 | .09     | 1.67        | 0.80 | .03     |
| Age                 | 0.75      | 0.21 | <.001   | 1.18        | 0.57 | .02     |
| Gender              | 0.77      | 0.24 | <.001   | 1.15        | 0.85 | .10     |
| Race/Ethnicity      | 0.54      | 0.23 | .02     | 1.68        | 0.75 | .02     |
| PA                  | −0.12     | 0.05 | .04     | 0.22        | 0.25 | .37     |
| Skill competency    | 0.19      | 0.20 | .34     | −0.03       | 0.61 | .94     |
| Total Connections   |           |      |         |             |      |         |
| Previous Attendance | −0.11     | 0.12 | .37     | −0.58       | 0.32 | .07     |
| PA                  | −0.001    | 0.05 | .98     | 0.21        | 0.12 | .08     |
| Skill competency    | 0.07      | 0.12 | .55     | −0.25       | 0.32 | .43     |

Note: PA: Physical Activity; PE: Parameter Estimate, SE: Standard Error.

0.54,  $SE = 0.23$ ). Connections were significantly more likely to be maintained if the children were of similar age ( $PE = 1.18$ ,  $SE = 0.57$ ) and race/ethnicity ( $PE = 1.68$ ,  $SE = 0.75$ ). Connections were also significantly more likely to be maintained over time if the children were both new to the program or both had previously attended the program ( $PE = 1.67$ ;  $SE = 0.80$ ). However, children were not significantly more likely to gain connections or maintain connections over time (T1 to T2) if they had participated previously in the program compared to children who were new to the program. See Table 3 for full STERGM results.

## Discussion

The present study aimed to examine whether there were differences in social connections and PA engagement between adolescents who previously attended the SCP and those that did not cross two timepoints in summer (beginning and end). Overall, children who had never participated in SCPs before reported actively playing with friends at the SCP more frequently at T1 compared to children who had previously attended. There was no significant difference between these groups in self-reported friends, skill competency, or PA between children. Connections between children were significantly more likely at the start of the summer if both children were new to the program or if both had previously attended; however, this finding was not significant at end of the summer. Moreover, children were significantly more likely to be connected in T2 if they were similar in perceived PA. Further, connections were more likely to form over time among children of similar PA levels, age, gender, and race/ethnicity.

There was no significant difference between children who had previously attended SCPs and those who had not in terms of self-reported friends, skill

competency, and PA. This finding suggests that attending SCPs in previous years did not confer a significant advantage in terms of social connections and PA engagement. This is counterintuitive to the theory of preferential attachment as there was no advantage to previous attendance. This finding also suggests current attendance in the SCP or exposure to the programming may provide certain benefits regardless of past participation. Students endeavor to establish an emotionally safe environment at the outset of the program through proactive engagement with their peers, initiating conversations aimed at mitigating or alleviating tension within the unfamiliar setting, and fostering trust among the individuals involved (Chlup & Collins, 2010). Therefore, the absence of significant differences in self-reported friends, skill competency, and PA between the two groups suggests that factors beyond program attendance play a more prominent role in the formation of social connections and engagement in PA. In contrast, children who had never participated in SCPs before reported actively playing with friends at the SCP more frequently at T1 compared to children who had previously attended. In the context of the SCP, children who were new to the program may have had a greater opportunity to form new social connections and engage in play activities with their peers. This result is consistent with previous research on the formation of social connections in SCPs (Dressel, 2020). The active play behaviors observed among children who had never participated in SCPs before may be attributed to their enthusiasm and motivation to establish social connections in a novel environment.

Connections between children were significantly more likely at the start of the summer if they were both had previously attended; however, this was not significant at the end of the summer. Distinguishing between peer selection and peer influence as factors contributing to observed similarities poses a challenge. Despite of this challenge, due to the influence of homophily, which emphasizes individuals' tendency to establish stronger relationships with peers exhibiting similar activities or traits (Borgatti et al., 2018), the heightened level of social connection observed during the early stages of the program among children with prior attendance is likely attributed more significantly to homophily within the SCP rather than the formation of social connections at a later phase. At the beginning of the summer, both new and returning children may have sought out connections with others who were in a similar position (i.e., new to the program or familiar with it). This finding is consistent with previous studies on social network dynamics, which have demonstrated that nodes tend to attach preferentially to other nodes with similar characteristics or experiences (Altinisik & Aydin, 2023; Sala et al., 2010). However, as the summer progressed, the initial differences between new and returning children may have diminished, leading to a convergence of social connections. This pattern of convergence

has been observed in other settings, such as schools, where initial homophily tends to weaken over time as individuals form connections based on shared experiences and interactions (McPherson et al., 2001).

Moreover, children were significantly more likely to be connected at T2 if they were similar in perceived PA. This result also supports the theory of homophily. In the context of PA engagement, children who had similar perceived PA levels may have found it easier to engage in physical activities together, leading to the formation of social connections. This finding aligns with previous research on the association between social connections and PA among adolescents. For example, Smith found that adolescents who were socially connected to physically active peers were more likely to engage in higher levels of PA themselves (Smith, 2019). The formation of social connections based on shared PA levels may facilitate social support, competition, and mutual motivation, leading to increased PA engagement among connected individuals. Further, connections were more likely to form over time among children of similar PA levels, age, gender, and race/ethnicity. This result suggests that social connection formation in the SCP is influenced by multiple factors, not PA alone. In the context of the SCP, these shared attributes may have provided a basis for social connections to develop and strengthen over time. Additionally, similar PA levels may have acted as a common interest that facilitated the formation of connections among children, reinforcing the notion that homophily plays a significant role in shaping social networks within the SCP.

The primary concept in numerous summer camps is PA, which serves as a means of social connection (Brazendale et al., 2020). Increased engagement in PA is linked to the formation of more friendships, so participation in programming or SCPs can help bridge the gap in achieving PA among different groups of children. SCP coordinators and/or educators should facilitate interactions between children who have previously participated in SCPs and their peers. For instance, if program participants tend to befriend those with similar PA levels, it raises questions about how effectively PA can be leveraged to bridge gaps among different groups of children. To address this, organizers of SCPs should actively facilitate interactions between returning participants and newcomers. They can encourage collaborative activities that promote both PA and social bonding, such as group challenges or cooperative learning sessions. Emphasizing the value of teaching others and fostering a supportive rather than competitive environment can further enhance the positive social and physical outcomes for all participants involved.

## Implications

This study has several important implications for practitioners and researchers of SCPs. They should pay attention to children's social connections and

associated factors at the start of SCPs to develop appropriate grouping strategies. They may improve children's PA by leveraging the social impacts and connections that are made early in the program. Practitioners should make concerted efforts to maintain social relationships and connections that have already been formed among returning participants while also being more active with their new peers to maintain new social connections. Specifically, the social network approach that children form within the program (e.g., similar PA levels and ages, the same gender and race/ethnicity) can be used to improve their PA levels and social connectivity.

## **Limitations**

Since this study measured PA using a self-reported questionnaire, the measured PA was likely over- or under-estimated. In addition, the study evaluated age and race/ethnicity but was limited to the age and race/ethnic diversity present within the SCPs studied. Therefore, it is necessary to examine more evidence with various ethnicities and an adequate sample from the same perspective. Similarly, since network dynamics are specific to a particular program, it must be reviewed repeatedly in other programs to evaluate the generalizability.

## **Conclusions**

Results of this study indicate that children who had never participated in SCPs before reported more frequent active play with friends at the SCP compared to children who had previously attended. However, there were no significant differences in self-reported friends, skill competency, and PA between the two groups. The formation of social connections in the SCP was influenced by a combination of preferential attachment, homophily, and social identity. Initial connections were influenced by both program experience and the similarity of program experience, but these differences diminished over time. Furthermore, connections were more likely to form among children who were similar in terms of PA levels, age, gender, and race/ethnicity. These findings contribute to our understanding of the complex dynamics of social connections and PA engagement in the context of summer care programs for adolescents. Future research should continue to explore the interplay of various factors in shaping social networks and their impact on adolescent well-being and development.

## **Translation to health education practice**

The findings of the present study align with several core competencies outlined by the National Commission for Health Education Credentialing

(NCHEC). Firstly, the competency of “Assessing Individual and Community Needs for Health Education” is relevant, as the study examined social connections and PA engagement among adolescents who either attended or did not attend a SCP previously. By comparing the social connections and PA engagement of SCP participants who were either returning or newcomers, the study sheds light on the differences between these groups over two time points. This assessment helps to identify the unique needs and preferences of adolescents in relation to community-based programs like SCPs. Understanding these dynamics is crucial for health educators to develop targeted interventions that promote PA and foster social connections among adolescents effectively.

Secondly, the competency of “Planning Health Education Strategies, Interventions, and Programs” is implicated in the study’s objective to determine whether attending the SCP influenced social connections and PA engagement. In terms of planning health education strategies and interventions, the study underscores the importance of refining SCPs to maximize their impact on social connections and PA engagement. This might involve reassessing program structure, incorporating new activities that appeal to both returning and newcomer participants, and implementing strategies to encourage active play and socialization among all attendees. By recognizing the potential benefits of SCPs in facilitating active play with friends and promoting social connections, the study advocates for the expansion and enhancement of similar interventions targeting adolescents. Through thoughtful planning and implementation, SCPs can serve as valuable platforms for promoting both physical and social well-being among participants.

Thirdly, the competency of “Conducting Evaluation and Research Related to Health Education” is relevant to the study’s methodology and findings. By comparing the reported frequency of active play and self-reported measures of friends, skill competency, and PA, the researchers evaluate the impact of SCP attendance on these factors. By systematically assessing the differences between SCP attendees and non-attendees in terms of social connections and PA engagement, the evaluation adds to the evidence base regarding the role of structured programs like SCPs in addressing these health-related outcomes. It helps identify the specific mechanisms through which SCPs influence participants’ social interactions and PA behaviors.

Fourthly, the study touches upon the competency of “Communicating and Advocating for Health and Health Education.” By highlighting the differences and similarities in social connections and PA engagement between adolescents who attended SCP previously and those who did not, the study emphasizes the importance of promoting and advocating for community-

based programs that foster social connections and encourage PA among adolescents. Furthermore, by identifying the benefits of SCPs in fostering social connections and encouraging PA among adolescents, the study provides evidence to support the promotion of similar programs. This advocacy is crucial for raising awareness among stakeholders, including policymakers, educators, and community leaders, about the importance of investing in initiatives that promote healthy behaviors and social development among adolescents.

In conclusion, the findings of the study align with multiple core competencies outlined by the NCHEC, including assessing needs, planning interventions, conducting research, and advocating for health education. The study contributes to the field of health education by providing insights into the impact of community programs on social connections and PA engagement among adolescents.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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