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Research article

Analysis of Physical Activity on Positive Youth Development Based on the 5Cs Model

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Abstract: Adolescence represents a critical developmental stage in which positive competencies and psychosocial strengths must be nurtured to support lifelong wellbeing. Within the Positive Youth Development (PYD) framework, the 5Cs model comprising competence, confidence, connection, character, and caring provides a comprehensive lens for understanding thriving among youth. Given the growing concerns regarding sedentary lifestyles, examining the contribution of physical activity to these developmental assets is increasingly urgent. This study aimed to analyze the influence of physical activity levels on Positive Youth Development based on the 5Cs model in adolescents. A quantitative cross-sectional analytical design was employed. The study involved 144 adolescents aged 19 years or older selected through random sampling. Physical activity levels were measured using the International Physical Activity Questionnaire–Short Form (IPAQ-SF), while PYD was assessed using a 28-item 5Cs-based Positive Youth Development Scale. The instrument demonstrated excellent reliability (Cronbach's Alpha = 0.926). Data were analyzed using descriptive statistics, normality testing, Pearson correlation, and linear regression analysis. The results indicated a positive relationship between physical activity and PYD. Correla-tion coefficients increased across activity categories (low r = 0.60; moderate r = 0.66; high r = 0.72), while the overall correlation was moderate (r = 0.37). These findings suggest that higher levels of physical activity are associated with stronger positive developmental out-comes. In conclusion, physical activity contributes meaningfully to the development of the 5Cs among adolescents. It is recommended that schools and community programs pro-mote structured and sustained physical activity to optimize positive youth development.

Keywords: Physical Activity, Positive Youth Development, 5Cs Model, Adolescents, Sport and Physical Education

1. Introduction

The concept of positive youth development emphasizes a strength-based perspective, viewing young individuals as valuable resources to be nurtured through structured activities, leading to the acquisition of beneficial competencies [1], [2]. Participation in sports and physical activity is strongly correlated with a variety of positive outcomes for young people's physical, psychological, social, and spiritual well-being [3]. Specifically, engagement in organized sports has been linked to enhanced psychological and social benefits among youth athletes [4]. These activities foster the development of both internal and external health assets, thereby enabling participants to transfer skills learned in sports to other life contexts [3]. This includes the development of cognitive and social-emotional skills, as well as strategic, tactical, and technical competencies, all of which are critical for holistic individual growth [5], [6].

A prominent theoretical framework for understanding this comprehensive development is the 5Cs model, which posits that fostering competence, confidence, connection, character, and caring in youth can optimize healthy development by leveraging family, school, and community resources [7]. This framework provides a robust lens through which to analyze the multifaceted impact of physical activity on youth, as it encompasses a broad spectrum of developmental outcomes [8], [9]. Rooted in relational developmental systems theory, the 5Cs model highlights the bidirectional interactions between an individual and their environment as crucial determinants of developmental trajectories [10]. This theoretical perspective underscores the dynamic interplay between personal attributes and environmental factors in shaping a young person's growth, particularly within the context of structured physical activities. This approach contrasts with traditional deficit-based models by focusing on youth's inherent strengths and capacity for growth rather than viewing them as problems to be solved [11], [12]. Moreover, the proactive engagement in physical activities, especially within organized community sports settings, provides a vital platform for adolescents to acquire crucial life skills, establish meaningful interpersonal relationships, and cultivate a robust sense of personal identity and resilience [13]. Such programs, particularly those intentionally structured, have demonstrated significant efficacy in promoting positive youth development outcomes, often surpassing the benefits observed in less structured or purely competitive contexts [14], [15].

The 5Cs model, encompassing Character, Confidence, Connection, Caring, and Competence, offers a comprehensive framework for evaluating the holistic benefits of youth engagement in physical activity [16]. This framework, derived from extensive reviews of youth development literature, operationalizes the concept of "thriving" by assessing these five interconnected components [17], [18]. Each C represents a distinct yet interdependent dimension of positive growth, reflecting the intricate nature of human development [16]. For instance, competence refers to a young person's positive views of their actions in specific areas, such as academics, social interactions, or sports [12]. Confidence, on the other hand, reflects an internal sense of overall positive self-worth and efficacy, extending beyond specific skill sets to encompass a generalized belief in one's capabilities [19]. Connection denotes the positive reciprocal bonds individuals form with significant others and institutions, while Character signifies the adherence to societal and cultural norms and the possession of ethical standards for behavior [20]. Finally, Caring represents a sense of sympathy and empathy for others, indicating a commitment to prosocial actions and values [21], [22]. These five elements collectively contribute to the development of a thriving young person who actively cultivates positive qualities and resources [19]. This model, therefore, considers adolescents as active participants in their own development, capable of acquiring the necessary resources and strengths to foster positive relationships and outcomes [23]. While originally developed in the United States, the 5Cs model has demonstrated generalizability, with evidence supporting its relevance in diverse international contexts, including Europe [23]. Indeed, research indicates that higher scores in Connection, Competence, Character, and Confidence are positively associated with improved mental health, enhanced academic performance, and greater contributions to society and the environment [23]. This widespread applicability underscores its utility as a framework for understanding how physical activity programs can be strategically designed to foster comprehensive positive development across various cultural settings [16], [19], [23].

Furthermore, the interrelation of these Cs is crucial, as strengths in one area can positively influence others, collectively leading to improved indicators of well-being and adaptive developmental regulation [16]. This integrated approach contrasts sharply with deficit-focused models that predominantly address adolescent problems, instead emphasizing the cultivation of inherent potentials and strengths within young individuals [24]. This shift in perspective, from problem-centric to strength-

based, provides a more holistic and effective strategy for promoting healthy developmental trajectories. Consequently, investigating the specific mechanisms through which physical activity interventions foster these interdependent Cs is paramount for optimizing youth development programs. Specifically, understanding how physical engagement cultivates aspects like connection through team sports or enhances competence via skill acquisition can inform more targeted and effective interventions [10].

This study aims to analyze the influence of physical activity levels on Positive Youth Development (PYD) based on the 5Cs model in adolescents. Specifically, this study examines the extent to which adolescents' physical activity levels contribute to the development of the five main dimensions in the 5Cs model: competence, confidence, connection, character, and caring. By using physical activity level measurements and PYD instruments, this study is expected to provide an empirical overview of the relationship and contribution of physical activity in supporting the overall positive development of adolescents.

2. Methods

2.1 Design

This study used a quantitative approach with an analytical cross-sectional design. This cross-sectional design was chosen because data collection occurred at a single point in time without any treatment or intervention for the participants. This approach allowed researchers to identify relationships and analyze the influence between physical activity levels and Positive Youth Development (PYD) based on the 5Cs model within the context of the respondents' actual conditions.

Methodologically, this study is non-experimental because it does not involve manipulation of independent variables, but rather measures variables as they exist in the field. The independent variable in this study is physical activity level, while the dependent variable is Positive Youth Development, which consists of five main dimensions: competence, confidence, connection, character, and caring. The analytical design was used to test the extent to which variations in physical activity levels can explain variations in positive youth development. This design was chosen based on the research objectives, which focused on analyzing relationships and predictive contributions, rather than experimentally determining causal relationships. Thus, the results are expected to provide an empirical overview of the role of physical activity in supporting positive youth development in the context of education and sports.

2.2 Participants

This study involved 144 participants categorized as adolescents with an age limit of 19 years or older, according to the World Health Organization (WHO) age classification for adolescents. Participants were in the late adolescent developmental stage and met the inclusion criteria established in this study.

The sampling technique used was random sampling, ensuring that every member of the population had an equal chance of being selected as a respondent. This technique was chosen to increase sample representativeness and reduce the potential for selection bias, allowing the study results to be more broadly generalizable to adolescent populations with similar characteristics. The sample size of 144 participants was deemed adequate for quantitative statistical analysis, particularly for regression testing, as it met the principle of sufficient sample size to achieve adequate statistical power. All participants participated voluntarily and provided informed consent prior to data collection.

2.3 Instruments

This study used two main instruments to measure the research variables: physical activity levels and Positive Youth Development (PYD) based on the 5Cs model. Physical activity levels were measured using the International Physical Activity Questionnaire - Short Form (IPAQ-SF) [25], which is designed to identify the frequency and duration of light, moderate, and vigorous physical activity undertaken by respondents over the past seven days. Data obtained from this questionnaire were then converted into MET-minutes per week according to the IPAQ calculation guidelines, allowing for classification of physical activity levels into low, moderate, or high categories.

Meanwhile, positive youth development was measured using the Positive Youth Development Scale based on the 5Cs model, which encompasses five main dimensions: competence, confidence, connection, character, and caring [26]. Each item in this instrument is scored on a 7-point Likert scale, with responses ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate higher levels of positive development. Scores can be analyzed as a whole to represent total PYD or separately for each 5Cs dimension to examine the developmental profile of each aspect.

Before conducting further analysis of the relationship between physical activity and Positive Youth Development (PYD), a reliability test was first conducted on the PYD instrument used in this study. The purpose of this reliability test is to ensure that the instrument has a good level of internal consistency in measuring the construct of positive youth development. This ensures that the measurement results are reliable and reflect the respondents' actual conditions.

Instrument reliability was tested using the Cronbach's Alpha coefficient, which is commonly used to assess internal consistency in Likert-scale instruments. Cronbach's Alpha values range from 0 to 1, with the closer to 1 indicating a higher level of reliability. In general, an alpha value of ≥ 0.70 is considered to indicate good reliability and is acceptable in social and psychological research.

The results of the PYD instrument reliability test in this study are presented in Table 1 and 2, which contains the overall reliability coefficient values. These results serve as the basis for ensuring the instrument's suitability for use in subsequent correlation analyses and hypothesis testing.

Table 1. Results of the Reliability Test Per Item of the Positive Youth Development Instrument Based on the 5Cs Model

Question Items	Dimensions	Cronbach's Alpha if Item Deleted
I have learned how to be kind to other people.	Character	.921
I have learned how to get along with adults who are not part of my family.	Connection	.921
I have learned to recognize other people's feelings.	Caring	.921
My friends from sport are good friends.	Connection	.921
I have learned how to respect the values and beliefs of people who are of a different race or culture than I am.	Character	.923
I have become closer with my family.	Connection	.923
When I see another person who is hurt or upset, I feel sorry for them.	Caring	.922
I have learned to do well at school.	Competence	.921
I have learned how to help people.	Character	.938
I don't feel sorry for other people when they are having problems. (R)	Caring	.922
I have learned how to make friends with other people.	Connection	.921
When I see someone being taken advantage of, I want to help them.	Caring	.922
My friends from sport are there when I need them.	Connection	.923
I have learned how to see things from other people's perspectives.	Caring	.926
I have learned how to get along with my parents.	Connection	.921
I have learned how to believe in myself in any situation.	Confidence	.923
I have learned how to tell the truth, even when it's not easy.	Character	.923
I have learned how to care for people who are hurt or upset.	Caring	.923

Question Items	Dimensions	Cronbach's Alpha if Item Deleted
I have learned how to finish my school class work quickly.	Competence	.922
I like the way I am leading my life.	Confidence	.922
At times I think I am no good at all. (R)	Confidence	.921
I have learned how to become good at any new physical activities.	Competence	.922
I have learned how to improve at all kinds of other sports.	Competence	.922
When I am an adult, I'm sure I will have a good life.	Confidence	.922
I have learned how to like myself.	Confidence	.934
I feel like I am smart for my age.	Competence	.921
I have learned lots of different sport skills.	Competence	.924
I have learned how to stand up for what I believe, even when it's unpopular.	Character	.921

Table 2. Results of the Overall Reliability Test of the Positive Youth Development Instrument Based on the 5Cs Model

Cronbach's Alpha	N of Items
.926	28

Based on the results of the reliability test, the Cronbach's Alpha value for each question item was above 0.900. This indicates that each item in the instrument has very high internal consistency. An alpha value above 0.90 is generally categorized as excellent reliability, meaning each question item is strongly related to measuring the same construct, namely Positive Youth Development (PYD).

Overall, the Cronbach's Alpha value for the 28 questions was 0.926. This value indicates that the PYD instrument in this study has a very high level of reliability, far exceeding the recommended minimum limit (≥0.70). Therefore, it can be concluded that the instrument used has very good internal consistency and is suitable for further analysis.

This high reliability value indicates that the items in the PYD scale support each other in consistently measuring dimensions of positive youth development. Therefore, the data generated from this instrument are reliable for use in correlation testing and other statistical analyses in this study.

2.4 Data Analysis

Data were analyzed using a quantitative statistical approach in accordance with the cross-sectional analytical design of this study. The analysis began with descriptive statistics to describe participant characteristics and the distribution of physical activity and Positive Youth Development (PYD) scores based on the 5Cs model, including mean values, standard deviations, minimum and maximum scores. Next, normality and linearity assumptions were tested to ensure the feasibility of using parametric analysis.

The primary analysis in this study was linear regression, which was used to examine the effect of physical activity levels on overall Positive Youth Development. Additionally, multiple linear regression was also conducted to analyze the contribution of physical activity to each of the 5Cs dimensions: competence, confidence, connection, character, and caring. The coefficient of determination (R^2) was used to determine the extent of physical activity's contribution in explaining variance in PYD, while a significance value ($p < 0.05$) was used to determine statistical significance. All analyses were conducted using relevant statistical software.

3. Results

Based on the results of the normality test, the significance value (Sig.) for the IPAQ and PYD variables is above 0.05. This indicates that the data for both variables are normally distributed, as they meet the normality test criteria, namely $p > 0.05$. Therefore, there is no statistically significant deviation from the normal distribution.

These results are further supported by the Normal P–P Plot shown in Figure 1. The figure shows that the data points are spread along and around the diagonal line. The relatively parallel distribution of the points indicates that the data distribution approaches a normal distribution. There are no extreme deviations or significant curvature patterns that could indicate a violation of the normality assumption.

The agreement between the statistical test results in the table and the visualization via the P–P Plot graph strengthens the conclusion that the IPAQ and PYD data meet the normality assumption. Therefore, further analysis using parametric statistical tests, such as Pearson correlation, can be conducted because the prerequisites for a normal distribution have been met.

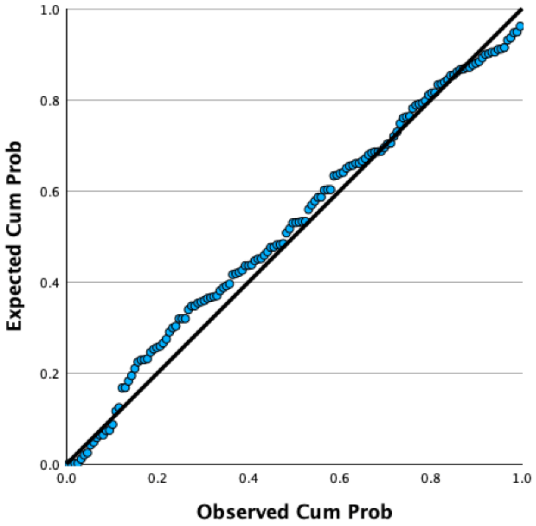

Figure 1. Normal P-P Plot of Regression Standardized Residual Dependent Variable PYD

This section presents the results of a correlation analysis between physical activity levels measured using the International Physical Activity Questionnaire (IPAQ) and Positive Youth Development (PYD). The analysis was conducted to determine the extent of the relationship between physical activity and positive youth development. Correlation testing was conducted both by physical activity level category (low, moderate, and high) and overall, without any categorization.

The IPAQ category grouping was based on the standard MET-minutes/week assessment guidelines, which classify respondents into low, moderate, and high levels of physical activity. Next, a correlation analysis was conducted to determine the strength and direction of the relationship between IPAQ scores and PYD scores in each category. An overall correlation analysis was also conducted to illustrate the general relationship between the two variables in the study population.

The correlation results are presented in the form of a correlation matrix in Tables 3-6. The correlation coefficient (r) is used to interpret the strength of the relationship between variables, with a positive relationship indicating that increased physical activity tends to be followed by an increase in PYD scores. The interpretation of the results is presented in stages, starting with low, moderate, and high categories, leading up to the overall analysis.

Table 3. Correlation Test Results between Low IPAQ Category and Positive Youth Development

	IPAQ	PYD
IPAQ	1	
PYD	0,60	1

Based on the correlation analysis for the low IPAQ category, a correlation coefficient of r = 0.60 was obtained between low physical activity and PYD scores. This value indicates a strong positive relationship. This means that in the group of respondents with low levels of physical activity, there is a tendency for an increase in IPAQ scores to be associated with an increase in PYD scores. In other words, even though physical activity is in the low category, variations in activity levels within that category still have a significant relationship with positive youth development (PYD).

Statistically, a coefficient of 0.60 indicates a substantial relationship, where changes in physical activity variables are directly related to changes in PYD. This can be interpreted to mean that even at minimal levels of physical activity, engagement in physical activity still contributes to positive developmental aspects, such as competence, self-confidence, character, social connections, and caring. These findings suggest that physical activity, even if it has not yet reached the moderate or high categories, remains relevant in supporting individual psychosocial development.

Table 4. Correlation Test Results between IPAQ Moderate Category and Positive Youth Development

	IPAQ	PYD
IPAQ	1	
PYD	0,66	1

The correlation analysis for the moderate IPAQ category showed a correlation coefficient of r = 0.66 between moderate physical activity levels and PYD. This value indicates a strong positive relationship, higher than that for respondents with moderate physical activity levels. This means that for respondents with moderate physical activity levels, increased physical activity is significantly associated with increased PYD scores.

The coefficient of 0.66 indicates that moderate-intensity physical activity has a significant association with positive adolescent development. The higher an individual's involvement in moderate-intensity physical activity, the greater the likelihood of developing positive aspects of themselves. This can be explained by the fact that moderate-intensity physical activity tends to be more regular and structured, thus providing benefits not only physically but also psychologically and socially.

Compared to the low category, the correlation strength for the moderate category increases. This indicates that increasing the intensity of physical activity can strengthen the contribution to positive development. Therefore, moderate-intensity physical activity can be considered an optimal level for supporting better PYD achievement.

Table 5. Correlation Test Results between High IPAQ Category and Positive Youth Development

	IPAQ	PYD
IPAQ	1	
PYD	0,72	1

In the high IPAQ category, a correlation coefficient of r = 0.72 was obtained between high-intensity physical activity and PYD. This value indicates a very strong positive relationship and is the highest compared to the low and moderate categories. This means that the higher the level of physical activity a respondent engages in, the higher their PYD score.

A coefficient of 0.72 indicates a substantially strong relationship between high-intensity physical activity and positive adolescent development. Physical activity in the high category generally involves more intense, consistent involvement, and possibly participation in structured or competitive sports activities. This has the potential to enhance aspects of discipline, cooperation, self-confidence, and emotional regulation, which are important components of PYD.

Compared to the low (r = 0.60) and moderate (r = 0.66) categories, the high category demonstrated the strongest relationship. This indicates a pattern of increasing correlation with increasing levels of physical activity. Thus, these findings support the assumption that the higher the intensity of physical activity, the greater its contribution to an individual's positive development.

Table 6. Results of the Correlation Test between IPAQ (overall) and Positive Youth Development

	IPAQ	PYD
IPAQ	1	
PYD	0,37	1

Based on the results of the correlation analysis between the overall IPAQ and PYD scores, a correlation coefficient of r = 0.37 was obtained. This value indicates a positive relationship with moderate strength (tending to low to moderate). This means that, in general, there is a tendency that the higher the respondent's physical activity level, the higher the Positive Youth Development (PYD) score. However, the strength of this relationship is not as strong as the correlations found for each IPAQ category (low, medium, and high).

The r = 0.37 indicates that physical activity does contribute to positive youth development, but the contribution is not significant when all respondents are combined without differentiating activity intensity categories. This relationship remains significant in the positive direction, but the variation in PYD scores cannot be fully explained by physical activity level alone. This suggests that other factors beyond physical activity also influence positive development, such as family support, social environment, psychological well-being, and educational factors.

The reason why the overall correlation (r = 0.37) is lower than the correlations within each category (r = 0.60; r = 0.66; r = 0.72) can be explained methodologically. When data is analyzed by category, the observed relationships become more homogeneous because respondents fall into relatively uniform activity intensity groups. This can strengthen the pattern of relationships within each group. Conversely, when all categories are combined, there is greater variation (heterogeneity) in the data. Differences in characteristics between activity groups (low, medium, high) can lead to a weakening of the overall correlation coefficient, a phenomenon known in statistics as the data aggregation effect or attenuation effect.

Thus, although there is a general positive relationship between the IPAQ and PYD, the strength of the relationship becomes clearer and stronger when analyzed specifically by physical activity level category.

4. Discussion

These reliable items were then subjected to confirmatory factor analysis to evaluate the dimensionality of the Positive Youth Development-Short Form Scale, following established recommendations [27]. Prior to the factor analysis, an internal consistency test indicated a very high level of reliability, with a Cronbach's Alpha coefficient of .926 across 28 items, demonstrating excellent overall scale reliability. This methodological approach ensured the robustness of the scale's structure, allowing for confident interpretation of subsequent analyses regarding its effectiveness in empirical research [28].

The subsequent phase involved the examination of associations between physical activity metrics and the 5Cs model of Positive Youth Development, extending

previous research that has largely focused on general positive outcomes rather than specific thriving indicators [29]. Specifically, the investigation sought to determine how variations in physical activity levels correlate with individual components of the 5Cs model, including competence, confidence, connection, character, and caring, thereby enriching the understanding of holistic adolescent development [29]. This nuanced approach helps clarify the mechanisms through which physical activity contributes to different facets of youth development, moving beyond broad correlations to pinpoint specific impacts on self-efficacy and overall well-being [30], [31].

4.1 The Role of Physical Activity in Promoting the 5Cs of Positive Youth Development

This model departs from traditional prevention-oriented paradigms, which primarily concentrate on mitigating negative behaviors like substance abuse or violence, by instead promoting the development of inherent talents and positive attributes in youth [32]. Specifically, engagement in sports and physical activities offers a structured environment conducive to fostering personal and social characteristics, along with strategic, tactical, and technical competencies [6]. This framework acknowledges that participation in such activities contributes significantly to various aspects of youth health, including cardiovascular function, psychological well-being, and healthy weight, while also building crucial life skills transferable to broader contexts [33]. For instance, organized sports participation has been linked to enhanced psychological and social benefits, indicating that well-designed youth sport programs are vital for promoting positive developmental outcomes [4]. Furthermore, physical activity and sport programs, particularly those organized outside of school hours, create essential developmental contexts for young individuals to experience Positive Youth Development [34]. This includes the development of physical fitness, social skills, and broader life skills, which are crucial for youth to act as agents of change in their communities and for national success [35]. This holistic development, often termed "athleticism," integrates motor competence, physical fitness, and psychosocial characteristics, which are synergistically developed through various environments and interventions [36]. This perspective aligns with the 5Cs model of Positive Youth Development (Competence, Confidence, Connection, Character, and Caring/Compassion), which posits that these attributes are cultivated through structured experiences and supportive environments, often facilitated by engagement in physical activity [37].

Empirically, the findings of this study support the theoretical assumptions above. The correlation analysis presented in Table 1–4 demonstrates a positive relationship between physical activity (IPAQ) and Positive Youth Development (PYD). Specifically, the correlation coefficient for the low physical activity category was $r = 0.60$, indicating a strong positive relationship. In the moderate category, the correlation increased to $r = 0.66$, while in the high physical activity category, the relationship was even stronger ($r = 0.72$). When analyzed collectively without categorization, the overall correlation between IPAQ and PYD was $r = 0.37$, reflecting a moderate positive association. These findings indicate that higher levels of physical activity are associated with higher levels of positive youth development, and that the strength of the relationship tends to increase with higher activity intensity levels.

The 5Cs model, encompassing competence, confidence, connection, character, and caring, provides a robust framework for understanding how physical activity contributes to holistic youth development [38]. Each of these dimensions is uniquely impacted by participation in sport and physical activity, fostering skills and attributes transferable to various life domains [3]. Competence, defined as exhibiting mastery across physical, social, and emotional capabilities, is directly enhanced through consistent engagement in physical activities, where skill acquisition and improvement are central [10]. This includes the development of sport-specific skills and general motor skills, which are fundamental for both athletic success and overall physical literacy [39]. Confidence, the second C, stems from this perceived competence, as

young people gain assurance in their abilities through repeated successful experiences and positive feedback within physically active settings [3]. This enhanced self-efficacy is crucial for fostering a belief in one's capacity to overcome challenges and achieve goals, extending beyond the sporting arena [13].

The positive correlations observed in this study are consistent with the theoretical proposition that structured physical activity environments facilitate the development of competence and confidence. The stronger correlations found in the moderate and high activity categories ($r = 0.66$ and $r = 0.72$) suggest that greater engagement intensity may provide more opportunities for mastery experiences, social interaction, and character-building processes, which are central to the 5Cs framework. Connection, the third C, is cultivated through the social interactions inherent in team sports and group physical activities, promoting a sense of belonging and fostering peer relationships and teamwork [40]. Character, the fourth C, is developed through adherence to rules, fair play, and the development of prosocial behaviors within the structured environment of sports, instilling values such as respect and integrity [12]. Finally, caring, the fifth C, is nurtured through empathy and concern for others, often observed in supportive team dynamics and mentorship opportunities that arise in athletic contexts, promoting altruism and community engagement [4]. Indeed, the 5Cs model emphasizes that these interlinked constructs collectively facilitate thriving, which is defined as a holistic and positive developmental outcome [18], [41].

This theoretical framework thus offers a comprehensive lens through which to analyze the multifaceted benefits of physical activity on youth development [19]. These five Cs, namely Competence, Confidence, Character, Connection, and Caring, are widely recognized and have been validated across numerous contexts as integral components of positive youth development [16], [21]. Confidence, characterized by a positive self-perception and self-efficacy, and competence, reflecting an individual's positive actions in specific domains, are particularly salient outcomes observed in youth engaging in structured physical activities [20]. Research has consistently shown that improvements in these areas, particularly competence and confidence, are associated with better mental health, academic performance, and increased social contribution [23].

4.2 Interpreting the Findings Through the 5Cs Framework of Positive Youth Development

This perspective gained prominence in the early 2000s with the operationalization of the "5Cs" model, which posits that optimizing youth development requires aligning individual strengths with family, school, and community resources [7]. The interplay between these individual attributes and external support systems is critical for fostering holistic growth, moving beyond a sole focus on ameliorating deficits [42]. Moreover, a sixth C, "Contribution," has been identified as an advanced stage of positive youth development, emerging when the initial five Cs are well-established and integrated, leading young individuals to actively engage in prosocial behaviors and community betterment [32], [43]. This expanded framework underscores the dynamic and reciprocal relationship between individual development and environmental influences, where sustained engagement in physical activity can catalyze the progression through these developmental stages [19]. The foundational premise of the 5Cs model is rooted in the relational developmental systems theory, which posits that youth possess inherent resources that can be effectively cultivated within supportive social contexts such as family, school, and community organizations [19]. These interactions facilitate the development of the 5Cs by providing opportunities for skill acquisition, self-discovery, and meaningful relationships [29]. The model, initially proposed by Lerner et al., focuses on developing youth strengths rather than solely addressing deficits [44]. This focus allows for a more comprehensive understanding of how young people thrive, identifying the positive attributes and capabilities that can be nurtured through intentional programming [45].

This framework has proven to be a valuable tool for assessing coaching effectiveness in promoting PYD in organized youth sports settings, offering a tangible way to measure these constructs through existing questionnaires and measurement techniques [9]. Furthermore, empirical evidence derived from various cultural and contextual settings supports the generalizability of the 5Cs model, underscoring its utility in diverse populations [23], [29]. The overarching goal is to explore how different aspects of physical activity engagement contribute to the enhancement of each of the 5Cs within this established developmental framework [16], [19]. This paper will delve into the specific mechanisms through which physical activity fosters competence, confidence, connection, character, and caring, ultimately contributing to a more robust and resilient youth population [16], [22]. Specifically, this analysis will explore how structured physical education programs and organized sports contribute to fostering cognitive resilience and positive adaptive behaviors, which are crucial for navigating developmental challenges [46], [47].

5. Conclusions

This comprehensive examination aims to elucidate the intricate relationship between physical activity and the 5Cs of PYD, providing a foundation for future interventions and policy recommendations in youth development programming. By understanding these mechanisms, educators, coaches, and policymakers can design more effective programs that leverage the power of physical activity to cultivate well-rounded, thriving young individuals. Moreover, this analysis may inform a deeper understanding of how physical activity acts as a potent stimulus for support utilization and fosters prosocial behaviors via skills acquisition, thereby contributing to academic competencies and overall resilience. This approach aligns with a paradigm shift in public health that moves beyond deficit reduction towards strength-based approaches. It underscores the importance of fostering environments where youth can actively develop the "Five C's" and, ultimately, the "Sixth C" of contribution, through sustained engagement in health-promoting activities, thus cultivating skills that generalize beyond specific tasks. This framework emphasizes the synergistic development of psychosocial and physical competencies, providing a robust foundation for holistic youth development in various contexts.

This includes examining how participation in diverse physical activities, such as youth circus arts, can specifically satisfy basic psychological needs and consequently promote positive youth development outcomes like the 5Cs. Such non-traditional activities have been shown to enhance relatedness and self-determination, which are critical for sustained physical activity adoption and maintenance throughout life. Further research is warranted to explore how features unique to novel physical activity contexts, like youth circus, contribute to supporting the psychological needs of participants and fostering a broader range of developmental outcomes.

6. Limitations

This reliance on pre-existing measures may inadvertently overlook emergent or context-specific indicators of positive youth development that are not captured by standardized tools, thereby limiting a comprehensive understanding of the multifaceted impacts of physical activity interventions. Additionally, the generalizability of findings may be constrained by the sociocultural contexts of the samples from which these instruments were developed, potentially limiting their applicability to diverse populations and settings. Furthermore, the exclusive use of existing instruments may not fully capture the dynamic and individualized pathways through which physical activity influences the 5Cs, potentially obscuring nuanced developmental trajectories. Future research should consider incorporating mixed-methods approaches, including qualitative data collection, to explore these deeper and more individualized developmental processes. Similarly, while junior high school students offer a representative segment of the adolescent demographic, the findings may lack universality

due to the restricted sample size. Future investigations could benefit from a larger, more diverse cohort, encompassing varied age groups, genders, and socioeconomic backgrounds, to enhance the robustness and applicability of the results across broader populations. This would enable a more thorough examination of differential effects based on activity type, which accelerometers alone cannot provide, thus enhancing the ecological validity of the study.

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