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Designing a Quantitative Model for the Development of Sports for Children with Special Needs in Iran

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A B S T R A C T

The present study aimed to design a quantitative model for the development of sports for children with special needs in Iran. In terms of purpose, the study was applied-developmental, and methodologically, it employed a descriptive-survey design. The questionnaire was developed based on the components and indicators extracted in relation to the development of sports for children with special needs. Following data collection, the proposed model was examined, tested, and validated using quantitative data. Finally, the final model and the magnitude of the effect of each factor on the development of sports for children with special needs in Iran were presented. The researcher-made questionnaire was distributed among 400 managers, experts, coaches, physical education teachers, special education specialists, rehabilitation experts, and faculty members, and the data were analyzed using partial least squares structural equation modeling (PLS-SEM). Confirmatory factor analysis and structural equation modeling were used to examine and validate the model for the development of sports for children with special needs in Iran. Quantitative data were analyzed using SPSS version 27 and SmartPLS version 3. SPSS was used for descriptive analyses and preliminary data screening, whereas SmartPLS was employed for confirmatory factor analysis, assessment of construct validity and reliability, and validation of the final research model. The quantitative findings indicated that causal conditions had a positive and significant effect on the central phenomenon (path coefficient = 0.96; t = 160.89). Moreover, the central phenomenon (path coefficient = 0.47; t = 33.51), contextual conditions (path coefficient = 0.51; t = 40.47), and intervening conditions (path coefficient = 0.53; t = 47.12) had positive and significant effects on strategies. The effect of strategies on the outcomes of sports development for children with special needs was also positive and significant (path coefficient = 0.97; t = 167.31). The coefficients of determination for the central phenomenon, strategies, and outcomes were 0.928, 0.709, and 0.943, respectively, and the overall model goodness-of-fit index was 0.781. Overall, the research model demonstrated satisfactory explanatory power and goodness of fit and can provide a systematic framework for policymaking and planning for the development of sports for children with special needs in Iran.

Keywords: *children with special needs, sports development, inclusive sports, grounded theory, structural equation modeling.*

1. Introduction

Sport and physical activity are increasingly recognized as essential components of healthy development during childhood because they contribute simultaneously to physical fitness, motor competence, psychological well-being, cognitive functioning, social development, and quality of life. Participation in organized sport can provide children with structured opportunities to acquire movement skills, establish active lifestyles, develop interpersonal competencies, experience belonging, and strengthen self-efficacy. Evidence from systematic reviews indicates that youth sport participation is associated with a broad range of health-related outcomes and can function as an important developmental context when participation is regular, safe, inclusive, and developmentally appropriate (Bengtsson et al., 2025). Similarly, sport has been described as a meaningful contributor to quality of life across childhood, preadolescence, and adolescence because it combines physical, psychological, and social experiences that extend beyond the immediate effects of exercise (Ivanović, 2024). From a broader human-development perspective, sport can therefore be regarded not merely as recreational activity but as a multidimensional developmental resource with potential relevance to health, education, social participation, and long-term well-being (Som, 2024).

The developmental value of sport begins early in life, particularly through its effects on movement proficiency and physical competence. Participation in different forms of sport during the preschool years has been associated with differences in the development of motor competence, suggesting that the type, continuity, and structure of sports participation can shape children's movement-related abilities (Guo et al., 2025). Exercise intensity and program characteristics are also important because different exercise modalities and intensity levels may have distinct effects on health-related physical fitness among children and adolescents (Zhou et al., 2024). These findings highlight the importance of designing sports opportunities according to developmental needs rather than adopting a uniform approach to participation. Physical condition, fitness capacity, and functional preparedness remain important components of effective sport participation, and assessment of these factors can help align programs with participants' capabilities and performance requirements (Nurdin, 2024). Consequently, the development of children's sport requires attention not only to increasing participation rates but also to the quality, suitability, continuity, and developmental appropriateness of the sporting opportunities provided.

The developmental significance of sport becomes even more pronounced when children with disabilities, developmental disorders, learning difficulties, or other special educational needs are considered. These children may benefit substantially from structured physical activity, yet they frequently encounter greater barriers to participation than their typically developing peers. Evidence concerning children and young people with physical disabilities indicates that sport and physical recreation can positively influence health-related outcomes, although participation opportunities and intervention quality vary considerably across contexts (West et al., 2025). Adapted physical education and para-athletics can also contribute to the development of mental skills while facilitating pedagogical and school inclusion among adolescents with disabilities (Rakaa et al., 2025). These findings indicate that sport for children with special needs should not be understood solely as a rehabilitative or therapeutic activity; rather, it can serve as a mechanism for participation, empowerment, educational inclusion, and social integration.

The benefits of physical activity for specific groups of children with exceptionalities further demonstrate the importance of appropriately designed sport programs. In children with attention-deficit/hyperactivity disorder, physical exercise has been associated with beneficial effects on behavioral, cognitive, and health-related outcomes, supporting the inclusion of structured exercise as a complementary developmental strategy (Chan et al., 2022). Among children with Down syndrome, group aerobic exercise designed on the basis of sensory integration theory has been shown to improve gross and fine motor skills, indicating that systematic physical activity can address important functional needs when intervention content is adapted to developmental characteristics (Ahmadi & Ghasemzadeh, 2022). Likewise, sports games designed around cognitive skills can improve attention and response inhibition among children with dyslexia, demonstrating that well-designed movement experiences may contribute to cognitive and executive functioning in populations with learning disabilities (Sharifi et al., 2024). Such evidence supports a multidimensional conception of adapted sport in which physical, cognitive, emotional, and educational outcomes are interconnected.

Participation itself, however, is not automatically produced by the availability of an activity. Children with disabilities and special educational needs may face complex

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interacting barriers associated with personal characteristics, school conditions, social attitudes, family support, teacher preparedness, accessibility, facilities, program design, and institutional policies. A meta-synthesis of qualitative research on students with disabilities in integrated school settings has demonstrated that participation in physical activity is influenced by both barriers and facilitators operating at individual, interpersonal, environmental, and organizational levels (Liu et al., 2025). Situational analyses of community physical activity participation among children and young people with neurodisability similarly emphasize that participation is shaped by the interaction between individual needs and broader social and environmental conditions (Visser, 2024). Accordingly, low participation among children with special needs cannot be adequately explained by impairment alone; it must be examined within the broader systems in which opportunities for sport are created, delivered, supported, or constrained.

The school environment is one of the most important settings for establishing regular and equitable access to physical activity. Physical education teachers play a central role in determining whether students with disabilities are meaningfully included in ordinary physical education and whether instruction is adapted to their capacities. Teachers' perspectives indicate that facilitating regular physical education for students with disabilities requires appropriate competence, organizational support, accessible environments, flexible pedagogical approaches, collaboration, and sufficient resources (Bertills & Björk, 2024). The effectiveness of instructional approaches is also relevant to motivation. For example, the tactical games teaching approach has been found to differ from traditional teaching methods in its effects on sport participation motivation among children with developmental coordination disorder, illustrating how instructional design can influence engagement among children with special needs (Jalilvand & Rezheh, 2021). Thus, the expansion of sport participation in this population requires educational structures capable of moving beyond nominal access toward sustained, motivating, and developmentally appropriate involvement.

Family and teacher involvement are equally important because children with exceptionalities often depend on adults to gain access to opportunities, overcome logistical barriers, and maintain participation. Research examining teachers' and parents' perceptions has highlighted the need for strategies that improve physical activity involvement among children with exceptionalities by addressing support, communication, accessibility, and environmental constraints (MacDougall, 2022). These interpersonal dimensions are especially important because participation is not determined solely by formal policy. Even when programs are theoretically available, lack of family encouragement, transportation difficulties, insufficient information, low expectations, or negative attitudes can reduce actual engagement. Conversely, supportive families, competent instructors, accessible programs, and positive school cultures can operate as facilitators. This emphasizes the need for developmental models that integrate family, educational, organizational, and social factors rather than examining each determinant in isolation.

The psychological and social implications of sport provide another compelling rationale for expanding participation opportunities among children with special needs. A recent systematic review updating the "Mental Health through Sport" conceptual model reported that sport participation can influence psychological health and social outcomes in children and adolescents through mechanisms such as social connection, competence, positive relationships, and meaningful engagement (Wade et al., 2026). These pathways may be particularly relevant to children with disabilities, who can encounter social exclusion, stigma, isolation, or restricted participation in peer activities. Sport can provide opportunities for interaction and shared achievement and may help strengthen feelings of competence, belonging, and social identity. Physical activity interventions also affect children's perceptions, indicating that movement-based experiences may influence psychological processes beyond physical fitness alone (Zhao et al., 2024). Accordingly, inclusive sport development should incorporate psychological and social outcomes as central indicators of success rather than treating them as secondary consequences.

The concept of inclusion also requires attention to social justice and community capacity. Sport can operate as a platform for social change when programs deliberately address exclusion, participation inequalities, and community empowerment. Analyses of sport as a tool for social justice demonstrate the importance of critical pedagogy and community capacity building in creating environments in which marginalized groups can participate meaningfully (Ponciano Núñez & Carter, 2025). Within this perspective, access to sport for children with special needs represents an issue of equity as well as health. Inclusive sporting systems should therefore enable participation regardless of disability, socioeconomic status, geographical location, or institutional disadvantage. The development of trust, belonging, and

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community is likewise important within learning environments, because participatory experiences are strengthened when individuals perceive that they are accepted and supported within a social group (Xu et al., 2024). Although such processes have been examined in educational and experiential contexts, they also provide a useful conceptual lens for understanding why inclusive sport should emphasize social connection and community membership.

Evaluation is essential to ensure that sport-for-development initiatives produce the intended outcomes. Traditional assessments focusing exclusively on attendance or physical performance may not fully capture changes in social engagement, behavior, confidence, inclusion, or broader developmental outcomes. A framework incorporating observational and visual data has been proposed for evaluating the effects of sport-for-development activities on children, emphasizing the importance of context-sensitive and multidimensional evaluation strategies (Rütti et al., 2024). Such approaches reinforce the idea that successful sport development should be assessed through multiple dimensions, including participation, physical competence, psychological functioning, social interaction, institutional sustainability, and support systems. For children with special needs in particular, evaluation should account for heterogeneity in functional abilities and developmental goals.

At the system level, the development of sport is closely associated with policy design, governance arrangements, organizational coordination, and strategic investment. International experiences show that national sport systems do not evolve spontaneously; rather, they are shaped by deliberate policies, institutional priorities, resource allocation, and long-term strategic planning. Analyses of China's pathway to Olympic success, for example, illustrate how organized policy structures and project-based investment can influence the development and performance of sport systems (Leite, 2025). Similarly, the introduction and strategic development of a specific competitive sport in Taiwan demonstrates how coordinated institutional planning, clear developmental purposes, and implementation strategies can accelerate the establishment of new sporting pathways (Wu et al., 2025). Although elite sport and children's inclusive sport differ substantially in their objectives, these examples illustrate a broader principle: sustainable sport development requires coherent governance, strategic coordination, and institutional capacity.

Contemporary sport development is also affected by wider transformations in sports management and the digital economy. Innovations in sports industry management increasingly influence how sport organizations plan, communicate, allocate resources, monitor participation, and improve service quality (Ziming & Kharchenko, 2023). Digital systems can potentially support the identification of participation gaps, communication with families, training of personnel, program monitoring, and equitable distribution of resources. At the same time, organizational leadership remains fundamental. Sport has been associated with the development of leadership capacities, including vision, teamwork, decision-making, resilience, and strategic thinking, suggesting that leadership competencies can influence organizational effectiveness within and beyond sporting settings (Rajkumar & Deshpande, 2025). For programs serving children with special needs, effective leadership is particularly important because implementation frequently depends on collaboration among schools, sport organizations, rehabilitation services, municipalities, families, and specialized professionals.

Sport may additionally generate broader community and territorial effects that extend beyond individual participants. Research examining the relationship between sporting events, urban tourism, and destination development illustrates how sport can interact with local institutions, infrastructure, community identity, and economic activity (Herman et al., 2025). While the objectives of children's adapted sport are primarily developmental and inclusive, this broader systems perspective is valuable because local infrastructure, geographical accessibility, municipal support, and institutional cooperation strongly influence whether sport opportunities can be sustained. Accordingly, geographical and contextual disparities should be regarded as substantive elements of a national model rather than background variables.

In Iran, the need for a systematic approach to children's sport development is especially important because the sporting needs of children intersect with educational, social, health, and institutional priorities. Research on talent identification in children's sport with an educational sport approach has identified multiple factors that influence the development of children's sporting pathways in the Iranian context, indicating that sport development depends on interconnected managerial, educational, infrastructural, human-resource, and policy-related components (Abdollahi et al., 2024). However, talent-oriented models do not fully address the needs of children with disabilities and special

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educational requirements, for whom equitable participation, accessibility, adapted programming, family support, rehabilitation expertise, and specialized instruction are central concerns. Therefore, a model specifically focused on children with special needs is necessary to capture the distinctive determinants and consequences of their participation.

The Iranian context also requires attention to the coordination of different stakeholder groups. Sport opportunities for children with special needs may involve special education schools, mainstream educational settings, sport federations, rehabilitation centers, municipalities, governmental organizations, coaches, physical education teachers, parents, and academic specialists. Fragmented action among these actors can lead to duplicated activities, inconsistent standards, unequal access, and discontinuity of services. Conversely, coordinated governance can facilitate integrated policymaking, development of human resources, standardization of sport programs, mobilization of social support, and more efficient use of existing infrastructure. The evidence reviewed internationally and nationally suggests that the development of sport for children with special needs should therefore be conceptualized as a systems problem involving causal needs, contextual conditions, intervening factors, strategic responses, and multidimensional outcomes rather than as a single intervention or isolated educational program.

Another important issue is sustainability. Short-term programs may produce temporary benefits, but meaningful sport development requires continuity across childhood and institutionalization within schools, communities, and public policy. Regular participation is particularly important because developmental benefits accumulate through repeated exposure to appropriate physical, social, and psychological experiences. Health, motor competence, mental well-being, and social inclusion are unlikely to be optimized through sporadic programs. Therefore, a comprehensive model should address not only the establishment of services but also the sustainability of financial support, specialized human resources, family engagement, local managerial commitment, and interorganizational collaboration. Such a perspective is consistent with the emerging international literature emphasizing participation quality, environmental facilitators, institutional capacity, and multidimensional developmental outcomes (Liu et al., 2025; Wade et al., 2026; West et al., 2025).

Taken together, the literature demonstrates a strong evidence base for the physical, psychological, cognitive, educational, and social benefits of sport for children, while simultaneously revealing substantial barriers affecting children with disabilities and special educational needs. Existing studies have frequently focused on specific exercise interventions, individual diagnostic groups, motor or cognitive outcomes, teacher and parent perceptions, or particular institutional settings. Although these contributions are essential, a comprehensive quantitative framework capable of integrating the multiple determinants of sports development for children with special needs remains necessary. Such a framework should account for children's developmental and functional needs, deficiencies in sports services and social support, school and geographical contexts, financial and human resources, stakeholder engagement, governance mechanisms, implementation capacity, social participation, and the resulting physical, psychological, social, and sustainability outcomes. Developing and empirically validating such an integrated model can provide a stronger evidence base for coordinated decision-making, policy development, resource allocation, and long-term planning for inclusive sport in Iran.

Therefore, the present study aimed to design and validate a quantitative model for the development of sports for children with special needs in Iran.

2. Methods and Materials

The present study aimed to design a quantitative model for the development of sports for children with special needs in Iran. In terms of purpose, the study was applied-developmental, and methodologically, it employed a descriptive-survey design. The questionnaire was developed based on the components and indicators extracted in relation to the development of sports for children with special needs. Following data collection, the proposed model was examined, tested, and validated using quantitative data. Finally, the final model and the magnitude of the effect of each factor on the development of sports for children with special needs in Iran were presented. The researcher-made questionnaire was distributed among 400 managers, experts, coaches, physical education teachers, special education specialists, rehabilitation experts, and faculty members, and the data were analyzed using partial least squares structural equation modeling (PLS-SEM). Confirmatory factor analysis and structural equation modeling were used to examine and validate the model for the development of

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sports for children with special needs in Iran. Quantitative data were analyzed using SPSS version 27 and SmartPLS version 3. SPSS was used for descriptive analyses and preliminary data screening, whereas SmartPLS was employed for confirmatory factor analysis, assessment of construct validity and reliability, and validation of the final research model.

3. Findings and Results

In this study, the partial least squares algorithm (PLS Algorithm) was implemented to estimate path coefficients, factor loadings, the proportion of explained variance in endogenous constructs, and the direct, indirect, and total effects among the research variables. The model results are presented in Figure 1 based on the path coefficients and explained variance values and in Figure 2 based on the t-statistic values. Subsequently, the results of the measurement model and structural model were examined and interpreted.

Figure 1

Path Coefficients and Explained Variance

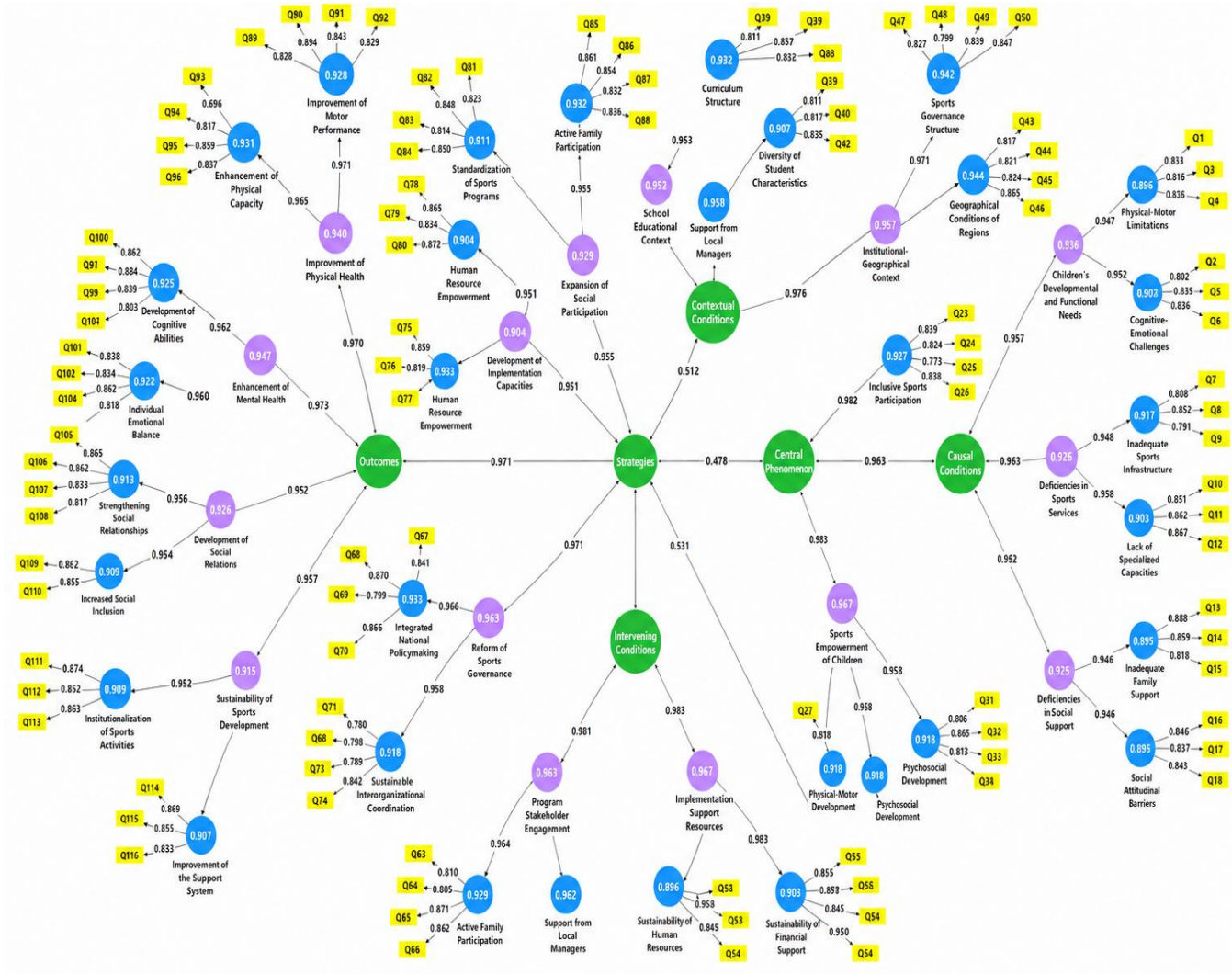
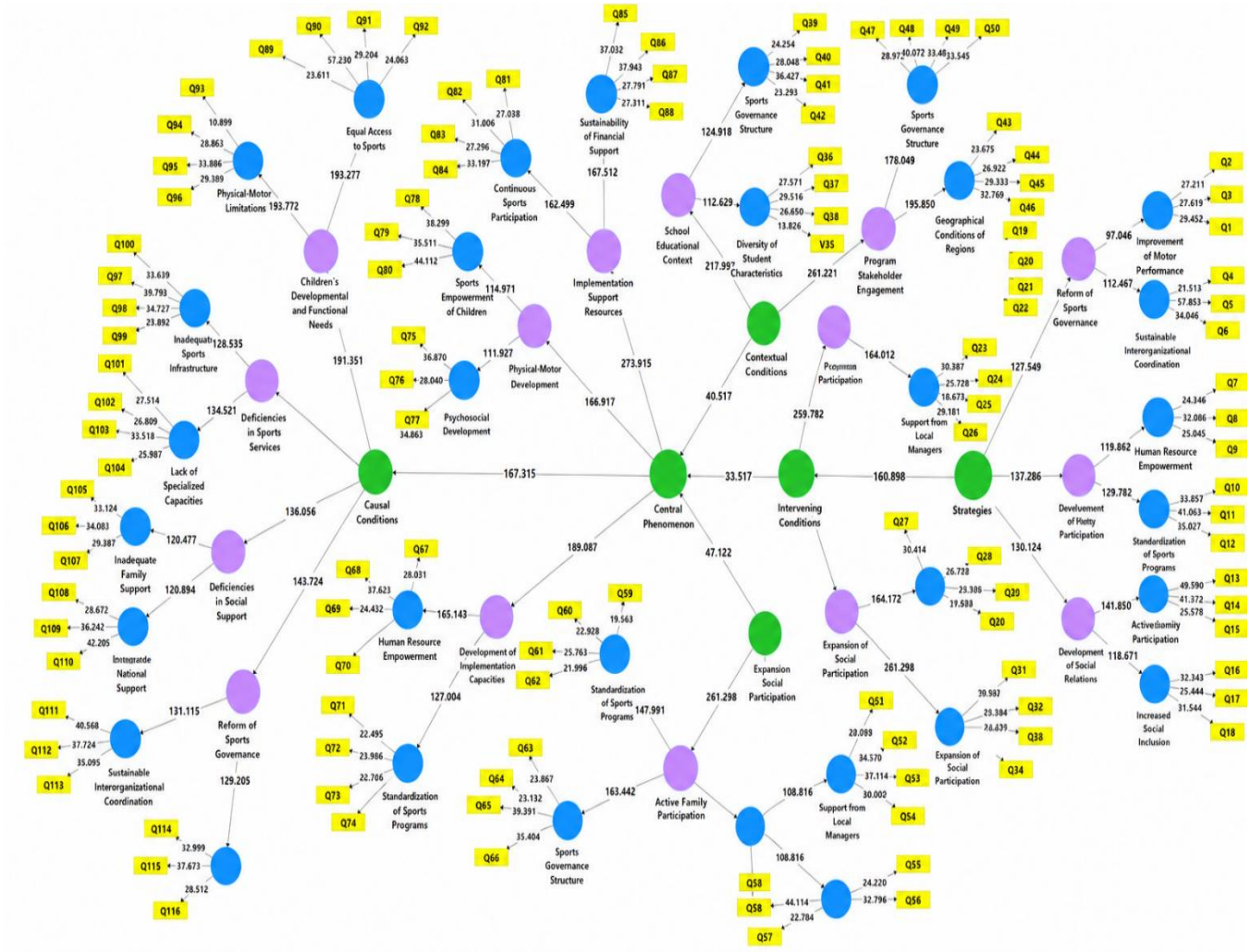


Figure 2

Significance Coefficients



To evaluate the fit and validity of the proposed model, criteria appropriate for partial least squares structural equation modeling were employed. Because conventional global goodness-of-fit indices used in covariance-based structural equation modeling have limited applicability in the PLS approach, model evaluation was conducted in three stages. In the first stage, the measurement model was assessed in terms of construct reliability and validity; in the second stage, the structural model was evaluated using criteria pertaining to the relationships among the constructs; and in the third stage, the overall fit of the proposed model was examined. Accordingly, the results of the measurement model tests, structural model tests, and overall model fit served as the basis for validating the model for the development of sports for children with special needs in Iran.

To assess the reliability of the research measurement model, factor loadings, Cronbach's alpha coefficients, composite reliability, and communality reliability were examined. To evaluate measurement model reliability, Cronbach's alpha, composite reliability, and construct communality were assessed.

In accordance with the stages of data analysis in the partial least squares approach, after examining the factor loadings of the items, Cronbach's alpha coefficients, composite reliability, and average variance extracted (AVE) were calculated. The results for these indices are presented in Table 1. Cronbach's alpha and composite reliability values equal to or greater than 0.70 indicate satisfactory construct reliability.

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Table 1

Results of Cronbach's Alpha, Composite Reliability, and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	Convergent Validity (AVE)
Causal Conditions	0.96	0.96	0.59
Children's Developmental and Functional Needs	0.88	0.91	0.62
Physical-Motor Limitations	0.75	0.86	0.67
Cognitive-Emotional Challenges	0.80	0.88	0.71
Deficiencies in Sports Services	0.88	0.91	0.63
Inadequate Sports Infrastructure	0.75	0.85	0.66
Lack of Specialized Capacities	0.82	0.89	0.74
Deficiencies in Social Support	0.89	0.91	0.64
Inadequate Family Support	0.81	0.89	0.73
Social Attitudinal Barriers	0.79	0.88	0.70
Central Phenomenon	0.95	0.96	0.60
Inclusive Sports Participation	0.91	0.92	0.61
Equal Access to Sports	0.83	0.88	0.66
Continuous Sports Participation	0.83	0.89	0.67
Sports Empowerment of Children	0.91	0.93	0.63
Physical-Motor Development	0.85	0.90	0.69
Psychosocial Development	0.85	0.90	0.69
Contextual Conditions	0.95	0.96	0.60
School Educational Context	0.91	0.92	0.61
Curriculum Structure	0.86	0.89	0.68
Diversity of Student Characteristics	0.83	0.89	0.67
Institutional-Geographical Context	0.92	0.93	0.65
Sports Governance Structure	0.84	0.89	0.68
Geographical Conditions of Regions	0.85	0.90	0.69
Intervening Conditions	0.95	0.96	0.60
Implementation Support Resources	0.91	0.93	0.62
Sustainability of Financial Support	0.82	0.88	0.65
Sustainability of Human Resources	0.85	0.90	0.70
Program Stakeholder Engagement	0.91	0.93	0.63
Active Family Participation	0.85	0.90	0.69
Support from Local Managers	0.87	0.91	0.72
Strategies	0.97	0.97	0.61
Reform of Sports Governance	0.91	0.93	0.62
Integrated National Policymaking	0.86	0.90	0.71
Sustainable Interorganizational Coordination	0.81	0.88	0.64
Development of Implementation Capacities	0.89	0.92	0.65
Human Resource Empowerment	0.81	0.89	0.73
Standardization of Sports Programs	0.79	0.88	0.71
Development of Social Relations	0.92	0.93	0.65
Targeted Public Awareness and Culture Building	0.85	0.90	0.69
Mobilization of Social Support	0.86	0.90	0.71
Outcomes	0.97	0.97	0.61
Improvement of Physical Health	0.91	0.93	0.64
Improvement of Motor Performance	0.87	0.91	0.72
Enhancement of Physical Capacity	0.81	0.88	0.64
Enhancement of Mental Health	0.92	0.93	0.65
Development of Cognitive Abilities	0.86	0.91	0.70
Individual Emotional Balance	0.85	0.90	0.70
Development of Social Relations	0.89	0.92	0.65
Strengthening Social Relationships	0.81	0.88	0.72
Increased Social Inclusion	0.79	0.88	0.71
Sustainability of Sports Development	0.90	0.92	0.66
Institutionalization of Sports Activities	0.82	0.89	0.74
Improvement of the Support System	0.81	0.88	0.72

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Table 2

Results of the CV-Communality Criterion for the Constructs

Construct	SSO	SSE	Q^2 (= 1 − SSE/SSO)
Causal Conditions	341.24	164.55	0.52
Children's Developmental and Functional Needs	117.85	55.73	0.53
Physical-Motor Limitations	65.13	44.91	0.31
Cognitive-Emotional Challenges	53.03	37.43	0.29
Deficiencies in Sports Services	109.53	56.06	0.49
Inadequate Sports Infrastructure	51.72	35.67	0.31
Lack of Specialized Capacities	57.68	33.35	0.42
Deficiencies in Social Support	108.31	57.54	0.47
Inadequate Family Support	54.74	28.50	0.48
Social Attitudinal Barriers	49.72	29.56	0.41
Central Phenomenon	256.38	128.29	0.50
Inclusive Sports Participation	123.25	69.08	0.44
Equal Access to Sports	59.56	30.71	0.48
Continuous Sports Participation	80.55	42.91	0.47
Sports Empowerment of Children	153.57	57.77	0.51
Physical-Motor Development	76.33	37.89	0.50
Psychosocial Development	77.29	39.45	0.49
Contextual Conditions	322.68	170.15	0.47
School Educational Context	150.22	88.61	0.41
Curriculum Structure	71.04	38.79	0.45
Diversity of Student Characteristics	93.81	55.69	0.41
Institutional-Geographical Context	162.10	81.13	0.50
Sports Governance Structure	59.87	27.68	0.54
Geographical Conditions of Regions	84.52	50.18	0.41
Intervening Conditions	328.99	161.82	0.51
Implementation Support Resources	156.22	79.40	0.49
Sustainability of Financial Support	68.32	44.11	0.35
Sustainability of Human Resources	59.96	34.65	0.42
Program Stakeholder Engagement	149.02	78.59	0.47
Active Family Participation	74.83	44.16	0.41
Support from Local Managers	73.10	30.72	0.58
Strategies	384.70	180.06	0.53
Reform of Sports Governance	133.14	67.35	0.49
Integrated National Policymaking	121.69	29.85	0.45
Sustainable Interorganizational Coordination	78.53	57.22	0.27
Development of Implementation Capacities	117.35	57.69	0.51
Human Resource Empowerment	40.09	24.29	0.39
Standardization of Sports Programs	49.74	32.31	0.35
Development of Social Relations	143.57	69.82	0.51
Targeted Public Awareness and Culture Building	78.41	37.22	0.53
Mobilization of Social Support	57.91	33.60	0.42
Outcomes	521.76	244.86	0.53
Improvement of Physical Health	167.52	80.52	0.52
Improvement of Motor Performance	62.01	32.29	0.48
Enhancement of Physical Capacity	46.76	37.41	0.20
Enhancement of Mental Health	138.37	59.88	0.57
Development of Cognitive Abilities	75.75	35.61	0.53
Individual Emotional Balance	83.86	74.64	0.43
Development of Social Relations	101.99	55.59	0.45
Strengthening Social Relationships	51.70	35.45	0.31
Increased Social Inclusion	59.90	30.95	0.48
Sustainability of Sports Development	109.41	56.21	0.49
Institutionalization of Sports Activities	47.23	29.39	0.38
Improvement of the Support System	68.98	47.51	0.31

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As shown by the results in Table 2, the SSO index represents the sum of squares of observations for each latent variable in the matrix blocks, and its positive values indicate the adequacy of the index. The SSE index represents the sum of squared prediction errors for each cell of the matrix; in a model with acceptable fit, these values are positive. The SSO/SSE-based cross-validated communality criterion likewise reflects predictive relevance, and this index should be positive in an adequately fitting model. As shown in the table, all values were positive, indicating the adequacy of this criterion in the proposed model.

Table 3

Results of the CV-Redundancy Criterion for the Constructs

Construct	SSO	SSE	Q^2 (= 1 − SSE/SSO)
Causal Conditions	312.60	142.92	0.54
Children's Developmental and Functional Needs	117.99	67.41	0.43
Physical-Motor Limitations	56.56	42.18	0.26
Cognitive-Emotional Challenges	58.98	31.65	0.46
Deficiencies in Sports Services	112.94	53.57	0.53
Inadequate Sports Infrastructure	53.16	33.40	0.37
Lack of Specialized Capacities	57.59	29.49	0.46
Deficiencies in Social Support	119.10	64.69	0.45
Inadequate Family Support	59.25	35.56	0.40
Social Attitudinal Barriers	49.36	34.24	0.31
Central Phenomenon	305.27	153.82	0.50
Inclusive Sports Participation	149.72	87.29	0.42
Equal Access to Sports	70.41	44.28	0.37
Continuous Sports Participation	74.35	40.79	0.45
Sports Empowerment of Children	137.75	22.05	0.53
Physical-Motor Development	63.76	33.96	0.47
Psychosocial Development	79.75	40.05	0.50
Contextual Conditions	293.96	140.00	0.52
School Educational Context	133.94	33.28	0.45
Curriculum Structure	75.42	43.33	0.43
Diversity of Student Characteristics	65.20	37.51	0.42
Institutional-Geographical Context	141.09	64.31	0.54
Sports Governance Structure	73.62	48.11	0.35
Geographical Conditions of Regions	66.69	32.88	0.51
Intervening Conditions	315.74	160.55	0.49
Implementation Support Resources	135.76	68.15	0.50
Sustainability of Financial Support	65.60	38.98	0.41
Sustainability of Human Resources	70.34	39.91	0.43
Program Stakeholder Engagement	170.34	96.06	0.44
Active Family Participation	90.20	52.57	0.42
Support from Local Managers	63.04	28.45	0.55
Strategies	440.89	198.80	0.55
Reform of Sports Governance	164.72	78.07	0.53
Integrated National Policymaking	96.61	42.71	0.56
Sustainable Interorganizational Coordination	78.01	39.45	0.49
Development of Implementation Capacities	113.80	52.84	0.54
Human Resource Empowerment	69.45	38.52	0.45
Standardization of Sports Programs	55.12	30.48	0.45
Development of Social Relations	169.67	73.72	0.57
Targeted Public Awareness and Culture Building	55.03	47.76	0.52
Mobilization of Social Support	88.89	37.21	0.58
Outcomes	512.22	217.37	0.58
Improvement of Physical Health	149.87	67.63	0.55
Improvement of Motor Performance	79.91	35.05	0.56

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Enhancement of Physical Capacity	92.04	43.98	0.52
Enhancement of Mental Health	162.76	69.87	0.57
Development of Cognitive Abilities	90.95	45.42	0.50
Individual Emotional Balance	62.46	28.46	0.54
Development of Social Relations	140.21	67.06	0.52
Strengthening Social Relationships	65.49	38.52	0.41
Increased Social Inclusion	47.83	35.59	0.26
Sustainability of Sports Development	110.80	53.37	0.52
Institutionalization of Sports Activities	60.22	35.42	0.41
Improvement of the Support System	49.93	21.89	0.56

As shown by the results in Table 3, the SSO index represents the sum of squares of observations for each latent variable within the matrix blocks, and positive values indicate the adequacy of the index. The SSE index represents the sum of squared prediction errors for each cell of the matrix; in an adequately fitting model, these values are positive. The SSO/SSE-based cross-validated redundancy criterion also reflects predictive relevance and should be positive in a model with acceptable fit. As shown in the table above, all values were positive, indicating the adequacy of this criterion in the proposed model.

According to Figures 1 and 2 and Table 4, because the t-coefficients obtained for all hypotheses were greater than ±2.58, their statistical significance was confirmed at the 99% confidence level. The criterion adopted here was that values greater than 1.96 are significant at the .05 level, whereas values greater than 2.58 are significant at the .01 level.

Table 4

Significance Coefficients Obtained From the Structural Equation Model

Relationship	Original Sample (O)	*T* Statistics (|O/STDEV|)
Improvement of Physical Health → Enhancement of Physical Capacity	0.96	192.76
Improvement of Physical Health → Improvement of Motor Performance	0.97	213.70
Reform of Sports Governance → Integrated National Policymaking	0.97	133.67
Reform of Sports Governance → Sustainable Interorganizational Coordination	0.96	108.95
School Educational Context → Diversity of Student Characteristics	0.95	125.49
School Educational Context → Curriculum Structure	0.95	125.93
Institutional-Geographical Context → Sports Governance Structure	0.97	184.32
Institutional-Geographical Context → Geographical Conditions of Regions	0.97	176.12
Enhancement of Mental Health → Individual Emotional Balance	0.96	146.44
Enhancement of Mental Health → Development of Cognitive Abilities	0.96	150.83
Sports Empowerment of Children → Physical-Motor Development	0.96	159.12
Sports Empowerment of Children → Psychosocial Development	0.96	149.66
Development of Social Relations → Increased Social Inclusion	0.95	124.27
Development of Social Relations → Strengthening Social Relationships	0.96	126.32
Development of Implementation Capacities → Standardization of Sports Programs	0.95	124.48
Development of Implementation Capacities → Human Resource Empowerment	0.95	109.98
Strategies → Reform of Sports Governance	0.97	189.55
Strategies → Development of Implementation Capacities	0.96	131.18
Strategies → Outcomes	0.97	190.04
Strategies → Expansion of Social Participation	0.98	281.13
Contextual Conditions → School Educational Context	0.98	203.03
Contextual Conditions → Institutional-Geographical Context	0.98	247.94
Contextual Conditions → Strategies	0.512	40.473
Causal Conditions → Children's Developmental and Functional Needs	0.97	128.04
Causal Conditions → Central Phenomenon	0.96	159.98
Causal Conditions → Deficiencies in Social Support	0.96	147.50
Causal Conditions → Deficiencies in Sports Services	0.96	145.87
Intervening Conditions → Strategies	0.531	47.122
Intervening Conditions → Implementation Support Resources	0.98	254.31
Intervening Conditions → Program Stakeholder Engagement	0.98	226.88

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Inclusive Sports Participation → Equal Access to Sports	0.96	150.37
Inclusive Sports Participation → Continuous Sports Participation	0.96	182.63
Implementation Support Resources → Sustainability of Financial Support	0.95	97.19
Implementation Support Resources → Sustainability of Human Resources	0.95	116.00
Children's Developmental and Functional Needs → Physical-Motor Limitations	0.95	90.48
Children's Developmental and Functional Needs → Cognitive-Emotional Challenges	0.95	99.16
Program Stakeholder Engagement → Support from Local Managers	0.96	181.03
Program Stakeholder Engagement → Active Family Participation	0.96	131.70
Sustainability of Sports Development → Improvement of the Support System	0.95	123.38
Sustainability of Sports Development → Institutionalization of Sports Activities	0.95	126.50
Central Phenomenon → Sports Empowerment of Children	0.98	384.10
Central Phenomenon → Strategies	0.478	33.517
Central Phenomenon → Inclusive Sports Participation	0.98	306.08
Outcomes → Improvement of Physical Health	0.97	186.40
Outcomes → Enhancement of Mental Health	0.97	223.61
Outcomes → Development of Social Relations	0.96	135.38
Outcomes → Sustainability of Sports Development	0.96	138.61
Deficiencies in Social Support → Inadequate Family Support	0.95	41.132
Deficiencies in Social Support → Social Attitudinal Barriers	0.95	99.68
Deficiencies in Sports Services → Inadequate Sports Infrastructure	0.95	121.05
Deficiencies in Sports Services → Lack of Specialized Capacities	0.96	132.44
Expansion of Social Participation → Mobilization of Social Support	0.97	169.51
Expansion of Social Participation → Targeted Public Awareness and Culture Building	0.96	172.43

One of the criteria for evaluating structural model fit is the coefficient of determination of the endogenous constructs in the model. This index indicates the proportion of variance in each endogenous construct explained by the exogenous constructs. Values of 0.19, 0.33, and 0.67 were considered indicative of weak, moderate, and strong coefficients of determination, respectively. Based on the model results, the R^2 values for the development of inclusive sports for children with special needs, strategies, and outcomes were 0.928, 0.709, and 0.943, respectively. Because all these values exceeded 0.67, the explanatory power of the structural model was evaluated as strong.

Table 5

Results of the R^2 Criterion for Endogenous Constructs (Exogenous Variables: Causal, Contextual, and Intervening Conditions)

Latent Variables	Coefficient of Determination
Causal Conditions (Exogenous)	—
Contextual Conditions (Exogenous)	—
Intervening Conditions (Exogenous)	—
Central Phenomenon (Endogenous)	0.928
Strategies (Endogenous)	0.709
Outcomes (Endogenous)	0.943

The Fornell–Larcker criterion was used to assess the discriminant validity of the constructs. According to this criterion, the square root of the average variance extracted (AVE) for each construct was placed on the main diagonal of the correlation matrix. If the square root of the AVE for each construct is greater than the correlations between that construct and the other constructs in the model, the discriminant validity of the construct is confirmed.

Table 6

Correlations Among Latent Variables

Construct	Causal Conditions	Central Phenomenon	Contextual Conditions	Intervening Conditions	Strategies	Outcomes
Causal Conditions	0.968					
Central Phenomenon	0.866	0.961				
Contextual Conditions	0.843	0.851	0.960			

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Intervening Conditions	0.770	0.778	0.777	0.878		
Strategies	0.077	0.083	0.067	0.077	0.971	
Outcomes	0.072	0.080	0.061	0.081	0.782	0.882

The results presented in Table 6 indicated that the diagonal values for causal conditions, the central phenomenon, contextual conditions, intervening conditions, strategies, and outcomes were greater than all corresponding correlation coefficients for each construct. Therefore, the research constructs were empirically distinct from one another, and the discriminant validity of the model was confirmed based on the Fornell–Larcker criterion.

To assess the overall fit of the model, the goodness-of-fit (GoF) index was used. Values of 0.01, 0.25, and 0.36 were considered indicative of weak, moderate, and strong fit, respectively. Therefore, the higher the GoF value, the better the overall quality of both the measurement model and the structural model.

This criterion was calculated using the following equation:

In this equation, the mean communality was obtained from the average communality reliability or AVE values of the model constructs, whereas the mean R^2 was calculated from the average coefficients of determination of the endogenous constructs.

Table 7

Mean Communality and R² Values of the Variables Included in the Analysis

Latent Variables	Mean Communality	Mean R^2
Latent Variables	0.672	0.908

The GoF index was calculated as 0.781. Because this value exceeded the criterion of 0.36, the overall fit of the model was evaluated as strong. Therefore, both the measurement model and the structural model demonstrated satisfactory overall quality and goodness of fit.

The structural model was evaluated using standardized path coefficients, *t*-statistics, and coefficients of determination (R^2). The path coefficients indicated the direction and magnitude of the relationships among the constructs, and *t*-statistic values greater than 1.96 confirmed the statistical significance of the relationships at the 95% confidence level. Furthermore, the coefficient of determination indicated the proportion of variance explained in the endogenous constructs of the model.

Table 8

Results of the Direct Relationships and Significance Coefficients for the Model Hypotheses

Conceptual Model Hypotheses	Standardized Coefficient (Beta)	Significance Coefficient (*T* Statistics)	Coefficient of Determination (R^2)
Causal Conditions → Development of Sports for Children with Special Needs in Iran	0.96	160.89	0.928
Development of Sports for Children with Special Needs in Iran → Strategies	0.47	33.51	0.709
Contextual Conditions → Strategies	0.51	40.47	—
Intervening Conditions → Strategies	0.53	47.12	—
Strategies → Outcomes	0.97	167.31	0.943

Hypothesis 1: Causal conditions have a significant effect on the development of sports for children with special needs.

Based on the results presented in Table 8, the path coefficient from causal conditions to the development of inclusive sports for children with special needs was 0.96, and the *t*-statistic was 160.89. Because the *t*-statistic exceeded 1.96, the relationship was confirmed to be positive and statistically significant. Furthermore, the coefficient of determination was 0.928, indicating that causal conditions explained 92.8% of the variance in the central phenomenon. Therefore, children's developmental needs, deficiencies in sports services, and deficiencies in social support played a determining role in shaping the need for the development of inclusive sports for children with special needs.

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Hypothesis 2: The development of inclusive sports for children with special needs has a significant effect on strategies.

The path coefficient from the development of inclusive sports for children with special needs to strategies was 0.47, and the *t*-statistic was 33.51. These values indicated a positive and statistically significant relationship between the central phenomenon and strategies. This finding means that strengthening inclusive sports participation and promoting the sports empowerment of children provided the foundation for adopting appropriate strategies for the development of sports for children with special needs. The coefficient of determination for strategies was 0.709; therefore, the central phenomenon, contextual conditions, and intervening conditions collectively explained 70.9% of the variance in strategies.

Hypothesis 3: Contextual conditions have a significant effect on strategies.

The path coefficient from contextual conditions to strategies was 0.51, and the *t*-statistic was 40.47. Accordingly, the positive and statistically significant effect of contextual conditions on strategies was confirmed. This finding indicated that the educational context of schools and the institutional-geographical context affected the selection and implementation of strategies for developing sports for children with special needs.

Hypothesis 4: Intervening conditions have a significant effect on strategies.

The path coefficient from intervening conditions to strategies was 0.53, and the *t*-statistic was 47.12. Therefore, the relationship between intervening conditions and strategies was evaluated as positive and statistically significant. This finding indicated that implementation support resources and program stakeholder engagement played important roles in facilitating the implementation of strategies for the development of sports for children with special needs.

Hypothesis 5: Strategies have a significant effect on the outcomes of sports development for children with special needs.

The path coefficient from strategies to outcomes was 0.97, and the *t*-statistic was 167.31. These results confirmed a very strong, positive, and statistically significant effect of strategies on the outcomes of the model. Furthermore, the coefficient of determination was 0.943, indicating that strategies explained 94.3% of the variance in outcomes. Therefore, reforming sports governance, developing implementation capacities, and expanding social participation provided the foundation for improving physical health, enhancing mental health, expanding social participation, and ensuring the sustainability of sports development.

4. Discussion

The present study aimed to design and validate a quantitative model for the development of sports for children with special needs in Iran. The findings showed that the proposed model had strong explanatory power and satisfactory overall fit. Causal conditions exerted a strong, positive, and statistically significant effect on the central phenomenon of sports development for children with special needs, with a path coefficient of 0.96 and a *t*-value of 160.89. The coefficient of determination for the central phenomenon was 0.928, indicating that causal conditions explained 92.8% of its variance. In addition, the central phenomenon had a positive and significant effect on strategies ($\beta = 0.47$, $t = 33.51$), while contextual conditions ($\beta = 0.51$, $t = 40.47$) and intervening conditions ($\beta = 0.53$, $t = 47.12$) also significantly predicted strategies. Together, these factors explained 70.9% of the variance in strategies. Finally, strategies had a very strong positive effect on outcomes ($\beta = 0.97$, $t = 167.31$), explaining 94.3% of the variance in the outcome construct. The overall goodness-of-fit index was 0.781, further indicating that the model provided an empirically coherent framework for explaining sports development for children with special needs in Iran.

The first major finding concerned the substantial effect of causal conditions on the central phenomenon. In the proposed model, causal conditions included children's developmental and functional needs, deficiencies in sports services, and deficiencies in social support. The magnitude of this relationship suggests that the necessity for developing inclusive sport is fundamentally rooted in the interaction between children's needs and shortcomings in the systems designed to serve them. Children with special needs may experience physical-motor limitations, cognitive-emotional challenges, and developmental differences that require adapted, individualized, and accessible sporting opportunities. Previous studies support this interpretation. Physical activity has been shown to generate meaningful physical, behavioral, and cognitive benefits among children with different developmental conditions. Exercise interventions can improve outcomes in children with attention-deficit/hyperactivity disorder, while structured aerobic activities have been associated with gains in gross

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and fine motor skills among children with Down syndrome (Ahmadi & Ghasemzadeh, 2022; Chan et al., 2022). Likewise, cognitively designed sports games can enhance attention and response inhibition in children with dyslexia, indicating that the developmental characteristics of children should directly inform the content and structure of sport programs (Sharifi et al., 2024).

This finding is also consistent with evidence showing that children with disabilities frequently experience barriers that arise not only from functional limitations but also from environmental and organizational constraints. A meta-synthesis of qualitative evidence has shown that participation in physical activity among students with disabilities is shaped by a combination of personal, interpersonal, environmental, and institutional barriers and facilitators (Liu et al., 2025). Similarly, situational analysis of participation among children and young people with neurodisability indicates that access to community physical activity is embedded in complex social and contextual systems rather than determined solely by impairment (Visser, 2024). Thus, the very high path coefficient from causal conditions to the central phenomenon in the present study can be interpreted as evidence that sports development becomes necessary precisely where developmental needs intersect with service inadequacies, limited infrastructure, insufficient specialized capacity, weak family support, and negative societal attitudes.

The role of deficiencies in sports services within the causal conditions is particularly important. The findings indicated that inadequate infrastructure and insufficient specialized capacities are integral components of the problem. This is consistent with research emphasizing that meaningful participation requires more than nominal program availability. Physical education teachers have reported that successful inclusion of students with disabilities depends on professional competence, suitable facilities, organizational support, and adaptable teaching conditions (Bertills & Björk, 2024). Moreover, strategies to enhance physical activity among children with exceptionalities often require coordinated involvement from parents and teachers, along with improvements in accessibility and support structures (MacDougall, 2022). Consequently, the present results reinforce the view that the development of inclusive sport must involve simultaneous improvement in physical infrastructure, specialized human resources, program design, and social support.

The second finding showed that the central phenomenon, defined in terms of inclusive sports participation and sports empowerment of children, had a positive and significant effect on strategies. This result suggests that when participation becomes more inclusive, continuous, and equitable, and when children gain greater physical-motor and psychosocial empowerment through sport, the system becomes more capable of generating and implementing effective strategic responses. In other words, participation is not simply an endpoint; it also functions as a mechanism that shapes policy and implementation priorities. This interpretation is supported by evidence indicating that the type, duration, and consistency of sport participation influence motor competence development in children (Guo et al., 2025). Similarly, research on children with developmental coordination disorder has shown that instructional approaches can influence motivation for sport participation, highlighting the importance of designing participatory environments that are engaging and developmentally responsive (Jalilvand & Rezheh, 2021).

The central phenomenon also included the empowerment dimension, which is theoretically compatible with evidence on the multidimensional benefits of sport. Youth sport participation has been associated with improvements across physical, psychological, and social domains (Bengtsson et al., 2025). Sport also contributes to quality of life throughout childhood and adolescence by providing opportunities for competence development, social interaction, and meaningful engagement (Ivanović, 2024). Furthermore, recent evidence on the "Mental Health through Sport" conceptual model indicates that sport can affect psychological health and social outcomes through mechanisms such as belonging, supportive relationships, competence, and connection (Wade et al., 2026). Therefore, the effect of the central phenomenon on strategies can be understood as reflecting the fact that successful participation and empowerment create both evidence and momentum for more systematic governance, capacity building, and social mobilization.

The third finding showed that contextual conditions had a significant positive effect on strategies. Contextual conditions in this study consisted primarily of the school educational context and the institutional-geographical context. This finding demonstrates that strategy selection and implementation are shaped by the environment in which sport development occurs. Schools influence curriculum organization, accessibility, teacher practices, and the day-to-day continuity of physical activity, while geographical and institutional contexts determine infrastructure availability, governance structures, resource distribution, and opportunities for collaboration. Research on physical

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education inclusion supports this interpretation, showing that teachers' ability to facilitate regular participation among students with disabilities depends on contextual factors including educational organization, resources, professional preparation, and supportive institutional conditions (Bertills & Björk, 2024). Similarly, evidence on physical activity interventions indicates that environmental structure and program characteristics influence how children perceive and respond to physical activity experiences (Zhao et al., 2024).

The institutional-geographical component can also be interpreted in relation to sport governance and strategic planning. International evidence demonstrates that sports development is strongly influenced by coordinated policy, institutional structure, and sustained investment. Analyses of sports policy in China illustrate how strategic planning and organized investment can shape national sport development pathways (Leite, 2025). Likewise, the strategic development and introduction of sepaktakraw in Taiwan illustrates how deliberate institutional coordination and policy direction can accelerate the development of a sport system (Wu et al., 2025). Although these examples relate partly to competitive sport, the underlying principle is applicable to inclusive children's sport: sustainable development requires governance mechanisms that connect policy, implementation, facilities, human resources, and long-term planning.

The fourth finding showed that intervening conditions had a significant positive effect on strategies. In the proposed model, intervening conditions included implementation support resources and program stakeholder engagement. This means that even when developmental needs are identified and supportive contextual conditions are present, strategy implementation depends substantially on financial stability, human-resource continuity, active family participation, and local managerial support. This result is consistent with prior studies emphasizing that children's participation in physical activity is strongly affected by family support, teacher involvement, social facilitation, and environmental accessibility (Liu et al., 2025; MacDougall, 2022). The importance of stakeholder engagement can also be understood from a social justice perspective, in which sport development is strengthened through community capacity building, participatory structures, and attention to marginalized populations (Ponciano Núñez & Carter, 2025).

The role of social belonging is also relevant to understanding the effect of intervening conditions. Children and families are more likely to sustain participation when environments are perceived as supportive, trustworthy, and inclusive. Research on transformative educational experiences has shown that trust and belonging can strengthen participation and community formation (Xu et al., 2024). In the context of inclusive sport, this implies that family involvement, managerial support, and stakeholder cooperation are not merely administrative variables; they can shape whether children experience sport as accessible, safe, meaningful, and socially affirming. In addition, adapted physical education and para-athletics have been found to promote both mental skills and educational inclusion among adolescents with disabilities (Rakaa et al., 2025), further suggesting that sustained support and stakeholder coordination can convert participation opportunities into broader developmental outcomes.

The fifth and strongest structural relationship in the model was the effect of strategies on outcomes. The path coefficient of 0.97 indicated that reforming sports governance, developing implementation capacities, and expanding social participation were strongly associated with improvements in physical health, mental health, social relationships, and the sustainability of sports development. This result highlights the practical importance of strategic intervention at the system level. It suggests that favorable outcomes are unlikely to emerge solely from individual-level exercise programs unless they are embedded within coherent governance structures, appropriately trained human resources, standardized programs, and social support mechanisms. This is consistent with the literature showing that sport participation can contribute to health-related outcomes in children and adolescents (Bengtsson et al., 2025), while structured exercise programs can improve health-related physical fitness when appropriately designed and implemented (Zhou et al., 2024).

The physical-health outcomes identified in the model, including improvement in motor performance and physical capacity, are also supported by prior evidence. Sport and physical recreation have demonstrated beneficial health effects among children and young people with physical disabilities (West et al., 2025). Similarly, participation in different sport types can contribute differently to motor competence development (Guo et al., 2025). These findings align with the present model in suggesting that strategic development of inclusive sport can enhance physical functioning when programs are accessible, sustained, and adapted to participants' needs.

The psychological outcomes identified in the present study, including enhancement of mental health, cognitive abilities, and emotional balance, likewise correspond with

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existing evidence. Sport participation has been associated with psychological and social benefits in children and adolescents, particularly when participation occurs in supportive and well-structured environments (Wade et al., 2026). Exercise has also been linked to cognitive and behavioral improvements in children with neurodevelopmental conditions (Chan et al., 2022; Sharifi et al., 2024). Therefore, the strong effect of strategies on outcomes may reflect the capacity of coordinated sport-development systems to create conditions in which physical activity functions simultaneously as a health-promoting, cognitive, emotional, and social intervention.

The social outcomes of the model are equally noteworthy. Development of social relations, strengthening of social connections, and increased social inclusion formed a distinct outcome dimension. These findings are consistent with approaches that conceptualize sport as a means of advancing social justice and community capacity (Ponciano Núñez & Carter, 2025). They also correspond with broader arguments that sport should be considered an indicator or component of human development because of its effects on participation, social functioning, and collective well-being (Som, 2024). The social value of sport extends beyond individual interactions, and sporting activities can also contribute to community identity, local development, and wider institutional engagement (Herman et al., 2025). Thus, the present findings support a conception of inclusive sport as both an individual developmental resource and a mechanism of social integration.

The sustainability dimension of outcomes is especially important. The results indicated that sports development should culminate not only in immediate improvements but also in institutionalization of sporting activity and strengthening of support systems. This interpretation is compatible with sport-for-development research emphasizing the importance of evaluating long-term effects through multidimensional and context-sensitive frameworks (Rütti et al., 2024). It is also consistent with contemporary sport management research showing that innovation, digitalization, and improved organizational management can enhance the quality and sustainability of sport systems (Ziming & Kharchenko, 2023). At the national level, sustainability requires leadership capable of maintaining strategic direction, coordination, and institutional learning. Sport-related experiences have been linked to development of leadership capacities such as vision, teamwork, and strategic decision-making, which may be relevant to organizational effectiveness in sport systems (Rajkumar & Deshpande, 2025).

The findings also have particular significance for the Iranian context. Previous Iranian research on the development of talent identification in children's sport has emphasized the importance of educational, managerial, infrastructural, and organizational factors (Abdollahi et al., 2024). The present study extends this perspective by focusing specifically on children with special needs and by integrating developmental needs, service deficiencies, social support, educational and geographical contexts, implementation resources, stakeholder engagement, strategies, and multidimensional outcomes within a single quantitative framework. This broader structure may be particularly valuable because inclusive sport development requires coordination across education, sport, rehabilitation, family systems, municipalities, and policy institutions rather than reliance on a single sector.

5. Conclusion

Overall, the findings support the validity of a systems-based approach to the development of sport for children with special needs. The high coefficients of determination and strong overall fit indicate that the proposed constructs are closely interconnected and collectively explain a substantial proportion of the variance in the central phenomenon, strategies, and outcomes. The results suggest that sports development in this population is not adequately explained by isolated exercise interventions or individual motivation alone. Rather, it emerges from the interaction of developmental needs, social and service deficits, educational and geographical contexts, implementation resources, stakeholder participation, governance reform, capacity building, and social mobilization. The model therefore provides an integrated framework through which policymakers and practitioners can understand how structural and contextual conditions may be translated into effective strategies and, ultimately, into sustainable physical, psychological, and social outcomes for children with special needs.

The present study had several limitations that should be considered when interpreting the findings. First, the quantitative data were collected through a researcher-made questionnaire and therefore depended on participants' perceptions and self-reported judgments, which may have introduced response bias, social desirability effects, or differences in interpretation of the items. Second, although

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the sample included managers, experts, coaches, physical education teachers, special education specialists, rehabilitation professionals, and faculty members, the perspectives of children with special needs and their parents were not directly incorporated into the quantitative validation stage. Third, the cross-sectional design limits conclusions regarding temporal or causal changes in the relationships among constructs. Fourth, the model was developed within the Iranian educational, social, cultural, and organizational context; consequently, its generalizability to other countries or substantially different administrative systems may be limited. Finally, despite the strong statistical fit of the model, high path coefficients do not necessarily indicate that every component will have an equally strong practical effect across all disability groups, age ranges, regions, or service settings.

Future studies should validate the proposed model in independent samples and across different provinces to examine its stability and generalizability. Multi-group analyses could compare the model across types of disability, age groups, gender, school type, socioeconomic status, and urban versus rural settings. Longitudinal research is also recommended to determine whether improvements in contextual conditions, stakeholder engagement, or governance are followed by measurable increases in participation and developmental outcomes over time. Future studies should directly incorporate the perspectives of children with special needs and their families and may combine quantitative modeling with interviews, focus groups, or participatory research methods. Experimental or quasi-experimental studies could further test selected strategic components of the model, such as teacher training, standardized adapted-sport programs, family engagement interventions, or interorganizational coordination mechanisms. In addition, future research could examine mediating and moderating effects among the constructs and assess whether digital technologies, regional inequalities, organizational culture, or policy implementation quality alter the effectiveness of the proposed pathways.

In practice, the findings indicate that the development of sport for children with special needs should be addressed through an integrated national and local implementation framework rather than through isolated programs. Educational authorities, sport organizations, rehabilitation services, municipalities, and relevant social institutions should establish formal mechanisms for interorganizational coordination and clearly define responsibilities for planning, financing, implementation, monitoring, and evaluation. Schools should improve accessibility, strengthen adapted physical education, and provide specialized professional development for physical education teachers and coaches. Sustainable financial mechanisms and dedicated human resources should be established to prevent discontinuity of programs. Families should be actively engaged in planning and participation processes, while public awareness initiatives should be used to reduce negative attitudes and strengthen social inclusion. Programs should be standardized while remaining adaptable to different functional needs, and implementation should be monitored using indicators of participation continuity, physical and psychological outcomes, social inclusion, and long-term sustainability.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

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Ethics Considerations

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