Article

Journal of Interdisciplinary Studies in Education

Volume 15, Issue 8 (2026)
Journal of Interdisciplinary Studies in Education
ISSN: 2166-2681Print 2690-0408 Online | https://ojed.org/jise
https://doi.org/10.32674/9hndm058

Professional and Institutional Factors Associated with Special Educators' Familiarity, Preparedness, and Perceptions of Student Engagement in Adaptive Sports: A Cross-Sectional Survey

Rishikesavan Ragupathy
Holy Cross College, South India
ORCID: 0000-0001-8365-2917

Swarnakumari P
Holy Cross College, South India
ORCID: 0000-0002-6683-5743

Suriya S
KMCH College of Physiotherapy, South India
ORCID: 0009-0000-3591-8530

Corresponding author: Rishikesavan Ragupathy**,** Ph.D. Candidate, Department of Rehabilitation Science, Holy Cross College, Tiruchirappalli, South India. Email ID: ptrishi@yahoo.co.in

ABSTRACT

Special educators play a crucial role in promoting adaptive sports for children with disabilities; however, the factors associated with their perceptions remain unclear. This study aimed to investigate the links between the characteristics of special school teachers in terms of their familiarity, training preparedness, and perceptions of student engagement in adaptive sports. A cross-sectional survey was conducted with 241 special education teachers from 58 schools in Tamil Nadu, India. The composite scores of the three domains were analyzed using ANOVA and chi-square tests. Educational qualifications (η^2=.204–.236), organization type (η^2=.187–.221), and professional designation (η^2=.134–.189) showed the strongest associations. Professional development should prioritize diploma holders, subject professionals, rural teachers, and government school educators.

Keywords: disabled children, physical education and training, school teachers, sports for persons with disabilities, professional competence, survey

© Author(s), 2026. Published by Star Scholars Press.
This article is distributed under the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. https://creativecommons.org/licenses/by/4.0/

INTRODUCTION

Children with disabilities continue to experience substantial barriers to participating in physical activity and organized sports. Approximately 240 million children with disabilities engage in minimal levels of physical activity because of these obstacles (United Nations Children's Fund (UNICEF), 2021). Regular physical activity is associated with motor learning, functional mobility, cardiovascular health, functional independence, and psychosocial well-being (Diaz et al., 2019; Isidoro-Cabañas et al., 2023; Patel et al., 2020). Adaptive sports facilitate participation by modifying rules, equipment, and teaching methods to suit individual needs (Peters et al., 2024). Therefore, schools are important environments for integrating these opportunities into sustained engagement processes, with teachers being central to adapting activities, teaching, and physical environments (Haegele et al., 2021). In India, inclusion in adaptive sports is supported through the Rights of Persons with Disabilities Act (2016) and the Khelo India Scheme G. However, its implementation has been inconsistent. In Tamil Nadu, participation rates for children with disabilities are very low, especially among rural children, of whom only 9% participate in adaptive sports compared to 22% from urban areas (Tamilnadu Differently Abled Federation Charitable Trust, 2023). These participation deficits are largely due to infrastructural constraints, limited resources, and inadequately trained teachers (Hayes & Bulat, 2017; Kim et al., 2025).

Theoretical Framework

Ecological Systems Theory (Bronfenbrenner, 1979) serves as the primary theoretical framework for this study as it conceptualizes individual perceptions within interconnected professional and institutional contexts. According to Ecological Systems Theory, human cognition and behavior are determined by multiple environmental systems: the microsystem (the closest environment), mesosystem (interaction between microsystems), exosystem (indirect influences), and macrosystem (culture). In terms of adaptive sports, teachers' perceptions are influenced by institutional culture, administrative support, policies, and social attitudes towards disability. Educational qualification and professional designation function at the microsystem level in this study, whereas organization type and school location operate at the mesosystem and exosystem levels. Ajzen's theory of planned behavior (1991) has been viewed as a supportive theoretical framework that provides a mechanism for understanding how perceptions translate into implementation behavior, with perceived behavioral control— influenced by the availability of institutional resources and accessibility to training —usually acting as the critical constraint. Under this framework, perceived behavioral control is characterized in terms of teachers' access to institutional inputs, training, and professional designations.

Research Gap and Contribution

Although teacher preparedness for inclusive physical education has been examined, evidence specifically concerning special educators in K–12 special schools remain limited, particularly in non-Western settings (Tarantino et al., 2022; Taneja-Johansson et al., 2023; Sullivan et al.,2025). Recent evidence continues to highlight the importance of strengthening teacher preparation, institutional support, and adaptive physical education practices to improve inclusive participation for students with disabilities (Taylor et al., 2026; Engelbrecht et al, 2025). This study addresses this gap by simultaneously examining professional (educational qualifications, experience, designation, and employment status) and institutional characteristics (school location, school type, and organization) in relation to three domains: familiarity with adaptive sports, training preparedness, and perceptions of student's engagement. Conducted in Tamil Nadu, India, this study provides context-specific evidence from a setting where institutional structures and access to professional development may differ from those commonly documented in the literature. The focus on special educators and school-level implementation is relevant to readers in rehabilitation, inclusive education, adapted physical activity, and school-based disability services fields.

Research Questions

This study aimed to examine the associations between special educators' professional and institutional characteristics and their familiarity with adaptive sports, training, and professional preparedness, as well as their perceptions of student engagement and participation. Accordingly, this study addressed the following three research questions:

RQ1: What associations exist between these characteristics and teachers' familiarity with adaptive sports?
RQ2: What associations exist between teachers' training and professional preparedness?
RQ3: What associations exist between teachers' perceptions of student engagement and participation in adaptive sports?

RESEARCH METHOD

Study Design, Setting and Participants

A cross-sectional survey was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to investigate special educators' perceptions of adaptive sports participation **(See Appendix A).** Data were collected from January 2023 to February 2024 across four districts of Tamil Nadu, India, to represent urban, semi-urban, and rural educational contexts, involving 58 special education institutions. The schools that participated in the research were in various places, providing different educational settings, levels of education, management systems, and infrastructure of institutions, thus offering different educational contexts to the research.

The eligible population comprised 297 special education teachers who met the eligibility criteria. Of these, 241 educators completed the study. A stratified random sampling strategy was used based on institution type (private, NGO, government, and government-aided) and geographical district. According to calculations made using G*Power and Raosoft, the sample size was calculated for an effect size of 0.3, $\alpha = 0.05$, and 95% power. It was estimated that at least 230 members of the sample were required. With a 15% allowance for non-response, 241 educators completed the study, resulting in an 81.1% response rate.

Participants were included if they were currently working as special education teachers, had a minimum qualification of a Diploma in Special Education, and were involved in a guided educational or rehabilitation process. Teachers with less than one year of experience, individuals who were not teaching actively, and/or who returned the questionnaire with less than 50% response rate were excluded from the study.

Although recruitment across multiple districts and institution types enhances the diversity of context, teachers recruited from the same institution remain potentially subject to shared organizational, administrative, and resource-related issues. Therefore, institutional diversity was considered a feature of the sampling strategy but was not assumed to eliminate possible within-institution clustering effects.

Survey Instrument and Domain Selection

A structured, self-administered questionnaire was developed based on a literature review of teacher preparedness, student engagement, and professional development. The item content was adapted from validated instruments, including the *Attitude Scale of Individuals with Mental Disabilities toward Sports* (İlhan et al., 2016), *Attitudes toward Inclusion in Sports Scale* (Eminovic et al., 2009), and *Educator Attitudes toward Sports for Individuals with Intellectual Disabilities* (Aslan, 2018). The questionnaire consisted of three parts: socio-demographic and professional characteristics, 33 items rated by respondents using a five-point Likert scale, and four open-ended questions. A Tamil translation was undertaken using forward-backward translation, followed by review by bilingual experts.

The present analysis focused on three areas directly aligned with the study's primary research questions: Domain A, Familiarity with Adaptive Sports (seven items), Domain C, Training and Professional Preparedness (four items), and Domain D, Student Engagement and Participation (five items). The three

areas formed the basis for 16 Likert-scale items **(See Appendix B)**. Domains B (Barriers), E (Support and Resources), and F (Multidisciplinary Collaboration) were not included in the present analysis because they were outside the three prespecified research questions and were reserved for subsequent analyses within the broader doctoral study. The term subject professionals refer to class teachers directly responsible for delivering subject content to students with disabilities in the classroom.

Validity and Reliability

Content validity was evaluated by 13 experts, including six special educators, four rehabilitation specialists, and three academic researchers. Based on the expert feedback, seven items were modified or removed. Pilot testing was conducted with 30 educators from five special schools, and the completion rate was 100%, which took an average of 36 min.

The analysis of the three domains indicated good to acceptable internal consistency. Domain A had a Cronbach's α of .815, Domain C had an α of .709, and Domain D had an α of .826. The Kaiser-Meyer-Olkin (KMO) measure was 0.662, and a significant Bartlett's test of sphericity ($\chi^2 = 5551.684$, $p < .001$) indicated suitability for factor analysis. Principal component analysis (PCA) extracted six components that accounted for 60.27% of the total variance. Domain scores were computed as item means, with higher scores indicating positive perceptions.

Table 1

Internal Consistency Reliability for Domains A, C, and D

Domain	Number of Items	Cronbach's α	Interpretation
Domain A: Familiarity with Adaptive Sports	7	0.815	Good
Domain C: Training and Professional Preparedness	4	0.709	Acceptable
Domain D: Student Engagement and Participation	5	0.826	Good

Statistical Analysis

Statistical analyses were conducted using the IBM SPSS version 26. Descriptive statistics were used to describe participant characteristics. Chi-square tests evaluated associations between categorical variables, while one-way ANOVA compared domain scores across demographic and professional groups. For the significant multi-category ANOVA results, if the assumption of homogeneity of variance was satisfied, Tukey HSD tests were conducted, or in the case of Levene's test inferring unequal variances, Games-Howell tests were utilized ($p < .05$). For item-level analyses, responses from the original five-point Likert scale were collapsed into three categories (Disagree, Neutral, and Agree) to ensure adequate cell frequencies for the chi-square analysis. Chi-square tests and Cramer's V were calculated using these recoded categories. Effect size was calculated as eta-squared (η^2), Cramer's V, and phi (φ) and were interpreted using different types of Cohens conventions. The significance level was set at $p < .05$, with exact p values reported where available. **(Detail post-hoc analyses Appendix C)**

RESULTS

Participant Characteristics

A total of 241 special educators participated in this study. The gender ratio in the sample was almost equal, with 49.4% males and 50.6% females. The largest group consisted of subject professionals, who comprised 69.7% of the total participants. The most prevalent organization type was an NGO (47.7%), with almost equal representation of teachers working in urban and rural areas (51.9% from urban areas and 48.1% from rural areas). More than half of the sample had a postgraduate degree or postgraduate diploma.

The participants had full-time, part-time, contract/temporary, and volunteer employment, showing various forms of work engagement and institutional setups. School level was included in the research for descriptive purposes and was not analyzed as a dependent variable, as the primary interest was in professional identity and types of organizations. A detailed description of the respondents is presented in Table 2.

Table 2

Demographic and Professional Profile of Participants (N=241)

Characteristic	N	%
Gender		
Male	119	49.4
Female	122	50.6
Professional Designation		
Director	17	7.1
Head of Department	36	14.9
Principal	20	8.3
Subject Professional	168	69.7
Employment Status		
Full-time	91	37.8
Part-time	62	25.7
Contract/Temporary	45	18.7
Volunteer	43	17.8
Organization Type		
Private	62	25.7
NGO	115	47.7
Government	16	6.6
Government-Aided	48	19.9
School Location		
Rural	125	51.9
Urban	116	48.1
Educational Qualification		
Diploma	48	19.9
PG Diploma	65	27
Undergraduate	62	25.7
Postgraduate	66	27.4

RQ1: Familiarity with Adaptive Sports

Significant differences in familiarity were observed across educational qualifications, organization types, professional designations, school locations, and employment statuses (Table 3). The strongest associations emerged for educational qualifications ($\eta^2 = .236$), organization type ($\eta^2 = .221$), and professional designation ($\eta^2 = .189$) (Table 5). Postgraduate teachers reported the highest familiarity, whereas diploma holders reported the lowest familiarity. Similarly, educators in non-governmental organizations (NGO) and heads of departments demonstrated higher familiarity than their respective counterparts. Urban teachers also reported higher familiarity than rural teachers, whereas gender was not significantly associated with familiarity (Table 3). At the item level, the largest associations were related to familiarity with adaptive sports, access through professional reading, and staying updated on developments in adaptive sports (Table 4).

RQ2: Training and Professional Preparedness

Perceptions of training and professional preparedness differed significantly across key professional and institutional characteristics (Table 3). Educational qualifications showed the strongest association (η^2 = .204), followed by organization type (η^2 = .187) and professional designation (η^2 = .156) (Table 5). Although postgraduate teachers expressed greater recognition of the importance of professional development, they also reported substantial concerns regarding the adequacy of their training. Government teachers similarly showed strong recognition of training needs, alongside comparatively greater concerns about training adequacy. Employment status and school location were also significantly associated with teachers' training perception. Full-time teachers reported more positive training perceptions than volunteers, while urban teachers reported more favorable perceptions than rural teachers. At the item level, the strongest association was between recognizing the importance of continuous professional development (Table 4).

RQ3: Student Engagement and Participation

Perceptions of student engagement differed significantly according to educational qualifications, organization type, professional designation, and school location (Table 3). Educational qualifications (η^2 = .228) and organization type (η^2 = .212) showed the strongest associations, followed by professional designation (η^2 = .134) and location (η^2 = .097). Postgraduate teachers, NGO teachers, and Heads of Department reported the most positive perceptions, whereas diploma holders, private school teachers, and subject professionals reported comparatively lower scores. Gender was not significantly associated with student engagement (Table 5) in this study. The strongest item-level associations were related to perceptions of positive academic impact and student enjoyment (Table 4).

Overall Pattern of Associations

Across the three domains, educational qualifications and organization type demonstrated the most robust and consistent associations, followed by professional designation. School location showed smaller but consistent associations, whereas gender showed no significant relationship with any of the domains. Employment status showed weaker and less consistent associations, with the largest effect observed for training preparedness (Table 5). The results suggest that professional and institutional characteristics were differentially associated with teachers' familiarity, training preparedness, and perception of students' engagement.

Table 3

Association Between Composite Domain Scores and Demographic Variables (N=241)

Variable	Domain A: Familiarity Mean (SD)	Domain C: Training Preparedness Mean (SD)	Domain D: Student Engagement Mean (SD)
Professional Designation			
Director	4.52 (0.61)	4.18 (0.72)	4.35 (0.58)
Head of Department	4.78 (0.45)	4.35 (0.58)	4.52 (0.48)
Principal	4.12 (0.89)	3.95 (0.85)	4.05 (0.72)
Subject Professional	3.54 (0.92)	3.62 (0.88)	3.72 (0.82)
p-value / η^2	<.001 / .189	<.001 / .156	<.001 / .134
Organization Type			
Private	3.28 (0.95)	3.45 (0.92)	3.48 (0.85)
NGO	4.45 (0.72)	4.12 (0.78)	4.28 (0.68)
Government	3.89 (0.88)	3.78 (0.85)	3.85 (0.78)
Government-Aided	3.72 (0.84)	3.52 (0.88)	3.62 (0.82)
p-value / η^2	<.001 / .221	<.001 / .187	<.001 / .212

Variable	Domain A: Familiarity Mean (SD)	Domain C: Training Preparedness Mean (SD)	Domain D: Student Engagement Mean (SD)
Educational Qualification			
Diploma	3.12 (0.98)	3.28 (0.95)	3.35 (0.88)
PG Diploma	3.86 (0.89)	3.72 (0.85)	3.78 (0.82)
Undergraduate	3.75 (0.91)	3.65 (0.88)	3.72 (0.85)
Postgraduate	4.62 (0.55)	4.15 (0.62)	4.42 (0.52)
p-value / η^2	<.001 / .236	<.001 / .204	<.001 / .228
School Location			
Rural	3.42 (0.96)	3.45 (0.92)	3.52 (0.88)
Urban	4.18 (0.78)	4.05 (0.78)	4.22 (0.72)
p-value / η^2	<.001 / .062	<.001 / .082	<.001 / .097
Employment Status			
Full-time	4.05 (0.82)	4.12 (0.75)	4.08 (0.78)
Part-time	3.62 (0.88)	3.72 (0.82)	3.72 (0.82)
Contract/Temporary	3.55 (0.92)	3.58 (0.88)	3.62 (0.85)
Volunteer	3.48 (0.95)	3.35 (0.95)	3.52 (0.88)
p-value / η^2	<.001 / .041	<.001 / .112	<.001 / .038
Gender			
Male	3.85 (0.88)	3.78 (0.85)	3.85 (0.82)
Female	3.72 (0.92)	3.72 (0.88)	3.78 (0.85)
p-value / η^2	.082 / .012	.215 / .006	.184 / .007

Table 4

Selected Item-Level Associations with Strongest Effect Sizes (Cramer's V ≥ .50)

Domain	Survey Item	Variable	Effect Size	p-value	Interpretation
Domain A: Familiarity	Q4: Familiar with types of adaptive sports	Education Level	0.598	<0.001	Postgraduates (84.8%) vs. Diploma (33.3%); difference = 51.5 pp
	Q2: Read books /newspapers/magazines	Organization Type	0.597	<0.001	NGO (89.6%) vs. Private (60.3%); difference = 29.3 pp
	Q5: Keep updated on advancements	School Location	0.538	<0.001	Urban (80.4%) vs. Rural (19.6%); difference = 60.8 pp
	Q4: Familiar with types of adaptive sports	Professional Designation	0.532	<0.001	HOD (100.0%) vs. Subject Professional (29.9%); difference = 70.1 pp
Domain C: Training	Q15: Importance of professional development	Employment Status	0.534	<0.001	Full-time (83.5%) vs. Volunteer (37.2%); difference = 46.3 pp
	Q15: Importance of professional development	Education Level	0.453	<0.001	Postgraduate (87.9%) vs. Diploma (29.2%); difference = 58.7 pp
Domain D: Engagement	Q20: Positive impact on academic performance	Organization Type	0.541	<0.001	NGO (79.1%) vs. Private (19.0%); difference = 60.1 pp
	Q20: Positive impact on academic performance	Education Level	0.509	<0.001	Postgraduate (95.5%) vs. Diploma (45.8%); difference = 49.7 pp

Note. For item-level analyses, the original five-point Likert responses were recoded into three categories: Disagree (Strongly Disagree + Disagree), Neutral, and Agree (Agree + Strongly Agree). pp = percentage points. Only items with effect sizes ≥ .50 were included.

Table 5

Summary of Effect Sizes (η^2) Across Domains and Demographic Variables

Variable	Domain A: Familiarity	Domain C: Training Preparedness	Domain D: Student Engagement
Educational Qualification	.236 (Large)	.204 (Large)	.228 (Large)
Organization Type	.221 (Large)	.187 (Large)	.212 (Large)
Professional Designation	.189 (Large)	.156 (Large)	.134 (Medium)
School Location	.062 (Medium)	.082 (Medium)	.097 (Medium)
Employment Status	.041 (Small)	.112 (Medium)	.038 (Small)
Gender	.012 (Small)	.006 (Small)	.007 (Small)

Note. Effect sizes: small = .01–.05, medium = .06–.13, large ≥ .14.

DISCUSSION

Interpretation of Key Findings

This study identified significant associations between professional and institutional characteristics and special educators' perceptions of adaptive sports in terms of familiarity, training preparedness, and student engagement. Educational qualifications, organization type, and professional designation had the greatest effect size, while school location had a moderate effect size. Employment status was less reliable, whereas gender revealed no important associations. These findings suggest that perceptions may vary according to professional roles and institutional contexts rather than demographic characteristics.

The strongest educational gradient emerged between postgraduate and diploma-level teachers. Postgraduate teachers reported higher familiarity and more positive perceptions of student engagement, consistent with evidence that greater educational preparation may be associated with increased exposure to inclusive education and rehabilitation concepts (Murphy et al., 2008; Antala et al., 2022). However, the present cross-sectional findings cannot establish whether higher qualifications produce more favorable perceptions. An alternative interpretation is that teachers with more advanced qualifications may have greater access to professional information, training opportunities, and institutional responsibilities.

Professional designations showed similar patterns. Heads of Departments and Directors generally reported more favorable perceptions than subject professionals. Previous research has highlighted teachers' inadequate preparation for inclusive practice and the importance of professional competence and self-efficacy (Hutzler et al., 2019; Tarantino et al., 2022). In the present study, the difference between administrative and subject professionals may reflect differences in access to resources and information, professional development opportunities, and policy-level discussions rather than differences in underlying attitudes. This interpretation is also consistent with evidence from Indian special-education contexts, which indicate uneven access to resources and professional support (Kundu et al., 2020).

Institutional Context, Training and Experience

Organization type was consistently associated with all three domains, with NGO teachers reporting the most favorable perceptions and private school teachers generally reporting lower scores. This pattern may reflect differences in institutional missions, professional networks, or access to disability-related resources. However, these mechanisms were not directly measured and should, therefore, be regarded as plausible explanations rather than established causes. Similarly, the urban-rural disparities observed in familiarity, training preparedness, and engagement perceptions align with reported inequalities in educational resources and professional support within Indian special education (Taneja-Johansson et al., 2023).

An important finding concerns the teachers' preparedness. Teachers with higher qualifications and those working in some organizational settings reported strong recognition of the importance of continuous professional development while also indicating limitations in training adequacy. This combination suggests that awareness of the need for training does not necessarily correspond to access to sufficient training opportunities in the field. In addition, the finding that experience was not consistently associated with higher familiarity further suggests that length of service alone may not ensure the continued development of adaptive sports knowledge. Instead, targeted and continuous professional development may be more relevant for maintaining preparedness, although this conclusion requires longitudinal studies.

Theoretical Interpretation and Unexpected Finding

The observed pattern is broadly consistent with Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1979), which places individual perceptions within interrelated professional and institutional environments. Differences by organization, professional designation, and school location are

compatible with an ecological interpretation, whereby teachers' experiences are embedded in organizational structures, professional relationships, and larger educational frameworks. Ajzen's Theory of Planned Behavior (1991) provides a different point of view, as it indicates that perceived behavioral control, such as access to resources, training, or approach, may be crucial for implementation. These theoretical approaches should thus be viewed as explanations for these characteristics and not as proof that they are associated with perceptions. The absence of a significant relationship between gender and all three domains' contrasts with previous studies indicating gender-based differences in attitudes towards inclusion (Hutzler et al., 2019). In the current sample, professional and institutional characteristics had stronger associations with perceptions than gender. Another substantively important finding was that 51.5% of teachers were unaware of adaptive sports funding mechanisms, indicating significant shortcomings in institutional communications and information flows, although the cross-sectional design does not permit conclusions regarding their effect on program implementation.

IMPLICATIONS AND LIMITATIONS

The results of this study can be compared to the mission of the Rights of Persons with Disabilities Act, 2016, to promote inclusive education and equal opportunities for people with disabilities through the development of institutional capacity and professional assistance. These findings also support the mission of the Khelo India scheme, which provides inclusive sports opportunities and builds capacity by improving accessibility to trained professionals and institutional resources. Accordingly, focused professional development and enhanced institutional support can lead to successful implementation of adaptive sports programs in special education environments (Ministry of Youth Affairs and Sports & Sports Authority of India, 2024; Government of India, 2016). The findings support a targeted rather than a uniform approach to professional development. Particular attention should be given to subject professionals, diploma-level teachers, and teachers in rural regions, together with initiatives aimed at improving organizational communication regarding various aspects of training, funding, and resources available to teachers (Florian & Beaton, 2018). Embedding adaptive sports content within pre-service and continuing professional development may help strengthen preparedness (Antala et al., 2022; Tarantino et al., 2022). At the institutional level, strengthening communication, professional networks, and access to resources may be particularly important for institutions where familiarity and preparedness levels are low, consistent with previous findings on teacher preparedness and institutional support and the importance of workplace support for special educators (Pathak et al., 2026; Fox et al., 2020).

However, some limitations must be considered. The cross-sectional nature of the research design does not allow for the establishment of temporal or causal associations between variables, and the study was conducted in four Tamil Nadu districts; therefore, the findings may not be generalizable to the national level. Although the sample was drawn from 58 institutions with varied locations, educational levels, management structures, and infrastructure, which increased contextual heterogeneity, it did not eliminate potential within-institution clustering effects. Potential clustering of teachers within schools/organizations was acknowledged as a methodological limitation, as school identifiers were not collected to preserve participant anonymity; therefore, interclass correlation coefficients and design effects could not be performed. Future studies can apply multilevel modeling or clustering-adjusted standard errors, in case school identifiers are accessible. Teachers from the same institution may have shared the same organizational and resource backgrounds; however, this was not explicitly modeled in the analysis. Therefore, possible intra-institutional dependence should be considered when interpreting these results. Moreover, the study relied on self-reported data collected using a single questionnaire, creating potential self-report and common method bias. Finally, only special school teachers were included; research should be conducted to find barriers from the perspectives of students, parents, administrators, policymakers, and other stakeholders (Shields & Synnot, 2016).

CONCLUSION

This study examined the professional and institutional characteristics associated with special educators' familiarity with adaptive sports, training preparedness, and perceptions of student engagement. Educational qualifications, organization type, and professional designation showed the most consistent and comparatively large associations across the three domains, whereas school location demonstrated smaller but consistent associations. Employment status showed less consistent relationships, and sex was not significantly associated with any domain. Postgraduate teachers, NGO teachers, and heads of department generally reported more favorable perceptions than diploma-level teachers, private school teachers, and subject professionals.

These findings suggest that special educators' perceptions of adaptive sports vary across professional and institutional contexts. The findings support targeted professional development, particularly for diploma-level teachers, subject professionals, and teachers in rural settings, together with improved institutional communication regarding training, funding, and the available resources. Adaptive sports content may also be strengthened within pre-service and continuing professional development programs in the future.

The findings should be interpreted within the context of the study's cross-sectional design, geographic scope, reliance on self-reported responses, and potential institutional clustering. Therefore, they demonstrate associations within the sampled context rather than causal relationships. Further research using longitudinal and multi-stakeholder designs is warranted to examine whether targeted professional development and institutional support are associated with changes in teacher preparedness and the implementation of adaptive sports.

Author Contributions: Conceptualization, R.R and S.P.; methodology, R.R and S.P; validation, R.R; formal analysis, S.S.; investigation, R.R.; resources, R.R.; data curation, R.R.; writing—original draft preparation, R.R.; writing—review and editing, S.S.; visualization, S.S.; supervision, S.P.; project administration, R.R. All authors have read and agreed to the published version of the manuscript.

Funding Statement: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical Considerations: This study was approved by the Human Ethics Committee of Holy Cross College (Approval No: 022-5734; January 6, 2022). All participants involved in the study were provided with information to help them provide informed consent and were assured of their anonymity and confidentiality, and that they had the right to withdraw from the study at any given time.

Acknowledgement: The authors sincerely thank Dr. Elanchezhian Chinnavan and Mr. S. Saravanakumar for their valuable guidance and support during the conduct of this study. The authors also express their gratitude to all special education teachers who participated in this research.

Conflict of Interest Statement: The author(s) declare that there is no conflict of interest regarding the publication of this paper.

Data Availability Statement: The data supporting the findings of this study are not publicly available due to confidentiality and ethical restrictions. Anonymized data may be made available by the author upon reasonable request and with permission from the relevant authorities.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Antala, B., Průžek, M., & Popluhárová, M. (2022). Self-efficacy and attitudes of physical education teachers towards inclusion of pupils with disabilities. *Sustainability*, *14*(20), 13292. https://doi.org/10.3390/su142013292

Aslan, E. (2018). Examination of Parental and Special Education Teachers' Attitudes towards Sports Activities of Students with Intellectual Disability. *Universal Journal of Educational Research*, *6*(11), 2691-2695. https://doi.org/10.13189/ujer.2018.061136

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard university press.

Diaz, R., Miller, E. K., Kraus, E., & Fredericson, M. (2019). Impact of adaptive sports participation on quality of life. *Sports medicine and arthroscopy review*, *27*(2), 73-82. https://doi.org/10.1097/JSA.0000000000000242

Eminović, F., Nikić, R., Stojković, I., & Pacić, S. (2009). Attitudes toward inclusion of persons with disabilities in sport activities. *Sport Science*, *2*(1).

Engelbrecht, C., du Toit, D., van der Merwe, N., & Kemp, C. (2025). Bridging policy and practice: Adapted physical education for special needs learners in BRICS. *African journal of disability*, *14*, 1626. https://doi.org/10.4102/ajod.v14i0.1626

Florian, L., & Beaton, M. (2018). Inclusive pedagogy in action: getting it right for every child. *International journal of inclusive education*, *22*(8), 870-884. https://doi.org/10.1080/13603116.2017.1412513

Fox, H. B., Tuckwiller, E. D., Kutscher, E. L., & Walter, H. L. (2020). What makes teachers well? A mixed methods study of special education teacher well-being. *Journal of Interdisciplinary Studies in Education*, *9*(2), 223-248. https://doi.org/10.32674/jise.v9i2.2170

Government of India. (2016). The Rights of Persons with Disabilities Act, 2016 (Act No. 49 of 2016). https://www.indiacode.nic.in/bitstream/123456789/15939/1/the_rights_of_persons_with_disabilities_act%2C_2016.pdf

Haegele, J. A., Wilson, W. J., Zhu, X., Bueche, J. J., Brady, E., & Li, C. (2021). Barriers and facilitators to inclusion in integrated physical education: Adapted physical educators' perspectives. *European Physical Education Review*, *27*(2), 297-311. https://doi.org/10.1177/1356336X20944429

Hayes, A. M., & Bulat, J. (2017). Disabilities inclusive education systems and policies guide for low-and middle-income countries. https://doi.org/10.3768/rtipress.2017.op.0043.1707

Hutzler, Y., Meier, S., Reuker, S., & Zitomer, M. (2019). Attitudes and self-efficacy of physical education teachers toward inclusion of children with disabilities: a narrative review of international literature. *Physical education and sport pedagogy*, *24*(3), 249-266. https://doi.org/10.1080/17408989.2019.1571183

İlhan, E. L., Esentürk, O. K., & Yarımkaya, E. (2016). Attitude scale of individuals having mental disabilities towards sports activities (zebseytö): Validity and reliability studyZihinsel engelli bireylerin sportif etkinliklerine yönelik tutum ölçeği (zebseytö): Geçerlik ve güvenirlik çalışması. *Journal of Human Sciences*, *13*(1), 1141-1160. https://doi.org/10.14687/ijhs.v13i1.3656

Isidoro-Cabanas, E., Soto-Rodriguez, F. J., Morales-Rodriguez, F. M., & Perez-Marmol, J. M. (2023, September). Benefits of adaptive sport on physical and mental quality of life in people with physical disabilities: a meta-analysis. In *Healthcare* (Vol. 11, No. 18, p. 2480). MDPI. https://doi.org/10.3390/healthcare11182480

Kim, M., Thomas, A., Sharpe, S., & Farrell, J. (2025). Understanding reasons for participation and barriers within adaptive sports for individuals with physical disabilities. *Recreational Sports Journal*, *49*(1), 46-58. https://doi.org/10.1177/15588661241292027

Kundu, A., Bej, T., & Dey, K. N. (2020). Indian educators' awareness and attitude towards assistive technology. *Journal of Enabling Technologies*, *14*(4), 233-251. https://doi.org/10.1108/JET-04-2020-0015

Ministry of Youth Affairs and Sports, & Sports Authority of India. (2024). Annual report 2023-24. https://sportsauthorityofindia.nic.in/sai/assets/news/1737368346_SAI_AR_English_2023-24.pdf

Murphy, N. A., Carbone, P. S., & Council on Children with Disabilities. (2008). Promoting the participation of children with disabilities in sports, recreation, and physical activities. *Pediatrics*, *121*(5), 1057-1061. https://doi.org/10.1542/peds.2008-0566

Patel, D. R., Neelakantan, M., Pandher, K., & Merrick, J. (2020). Cerebral palsy in children: a clinical overview. *Translational pediatrics*, *9*(Suppl 1), S125. https://doi.org/10.21037/tp.2020.01.01

Peters, D. M., Høigaard, R., & Francis, J. W. (2024). Adapted & (dis) ability sport. *Frontiers in Psychology*, *15*, 1515330. https://doi.org/10.3389/fpsyg.2024.1515330

Pathak, V., Trivedi, A., Singh, A., Yadav, N., Gardia, A., & Singh, P. (2026). Teacher preparedness for migrant children in primary schools: An ecological analysis of professional capacity and structural constraints. *Journal of Interdisciplinary Studies in Education*, *15*(7). https://doi.org/10.32674/n7fqg108

Shields, N., & Synnot, A. (2016). Perceived barriers and facilitators to participation in physical activity for children with disability: a qualitative study. *BMC pediatrics*, *16*(1), 9. https://doi.org/10.1186/s12887-016-0544-7

Sullivan, A. C., Blanchard-Alworth, C., Piletic, C. K., & Hilgenbrinck, L. (2025). Supporting social justice in physical education teacher education programs: A qualitative analysis of adapted PE teachers' perspectives. *Journal of Research in Special Educational Needs*, *25*(4), 1116-1126. https://doi.org/10.1111/1471-3802.70034

Tamilnadu Differently Abled Federation Charitable Trust. (2023, February 25). 20th state-level para sports for people with disabilities. https://www.tndfctrust.com/sports-meet/20th-state-level-para-sports-2023/

Taneja-Johansson, S., Singal, N., & Samson, M. (2023). Education of children with disabilities in rural Indian government schools: A long road to inclusion. *International Journal of Disability, Development and Education*, *70*(5), 735-750. https://doi.org/10.1080/1034912X.2021.1917525

Tarantino, G., Makopoulou, K., & Neville, R. D. (2022). Inclusion of children with special educational needs and disabilities in physical education: A systematic review and meta-analysis of teachers' attitudes. *Educational Research Review*, *36*, 100456. https://doi.org/10.1016/j.edurev.2022.100456

Taylor, H. E., Van Boxtel, J. M., Bueno, S. A., & Foster, E. A. (2026). Integrating high-leverage practices into special education teacher preparation programmes: promoting access and equity for all learners. *International Journal of Inclusive Education*, *30*(4), 749-763. https://doi.org/10.1080/13603116.2025.2490986

United Nations Children's Fund. (2021). Seen, counted, included: Using data to shed light on the well-being of children with disabilities. https://data.unicef.org/resources/children-with-disabilities-report-2021/

APPENDIX A

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	3	State specific objectives, including any prespecified hypotheses	2
Methods			
Study design	4	Present key elements of study design early in the paper	3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	3
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	3
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	Nil
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	4
Study size	10	Explain how the study size was arrived at	3
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	4
		(*b*) Describe any methods used to examine subgroups and interactions	4
		(*c*) Explain how missing data were addressed	Nil
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	Nil
		(*e*) Describe any sensitivity analyses	Nil
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—e.g. numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed	5
		(b) Give reasons for non-participation at each stage	Nil
		(c) Consider use of a flow diagram	Nil
Descriptive data	14*	(a) Give characteristics of study participants (e.g. demographic, clinical, social) and information on exposures and potential confounders	5
		(b) Indicate number of participants with missing data for each variable of interest	Nil

		(c) *Cohort study*—Summarize follow-up time (e.g., average and total amount)	Nil
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	Nil
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	Nil
		Cross-sectional study—Report numbers of outcome events or summary measures	6
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included	5-7 (Unadjusted estimates only)
		(*b*) Report category boundaries when continuous variables were categorized	Nil
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Nil
Other analyses	17	Report other analyses done—e.g. analyses of subgroups and interactions, and sensitivity analyses	Nil
Discussion			
Key results	18	Summarize key results with reference to study objectives	8
Limitations	19	Discuss limitations of the study, considering sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9
Generalizability	21	Discuss the generalizability (external validity) of the study results	9
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	11

APPENDIX B

A	Familiarity with Adaptive Sports
1	I am familiar with disability sports, and it's important for individuals with disabilities to participate Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
2	I read books, newspapers, and magazines, and follow radio or TV programs about adaptive sports for disabled students - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
3	There is enough media coverage for disabled sports events and the participants Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
4	I am familiar with different types of adaptive sports available for students with disabilities Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
5	I keep myself updated on advancements and developments in the field of adaptive sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
6	I am familiar with sports associations and clubs for individuals with disabilities in my local area, state and other states - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree If you Agree, please select where you are familiar: Local area / Your state / Other states
7	I am familiar with recent initiatives taken by government and non-governmental organizations to enhance and promote disability sports - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
B	**Barriers and Challenges for Adaptive Sports**
8	Your school supports adaptive sports programs and competitions for children with disabilities

	Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
9	Your school's accessible facilities adequately support disabled children's participation in adaptive sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
10	The lack of trained coaches and instructors in your school limits disabled children from participating in adaptive sports - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
11	Financial difficulties in family significantly affect disabled children's participation in adaptive sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
12	Limited funding in schools for adaptive sports programs restricts opportunities for disabled children Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
13	Parents and caregivers encourage and support disabled children to participate in adaptive sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
14	The attitudes and beliefs of special school teachers can influence the support provided to students for participating in adaptive sports - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
C	**Special school teacher's perception about - Training and Professional Development**
15	Continuous professional development in adaptive sports is essential for special educators Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
16	I'm interested in taking professional development training to enhance my skills in adaptive sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree If your answer is YES, specify when you recently attended the training. (_____week / _____month /_____year)
17	Special school teachers receive sufficient professional development training to facilitate adaptive sports participation for disabled students - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
18	I receive financial support for participating in professional development training Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree If your answer is YES, who supported you – school / governmental bodies / Non-governmental bodies / if any others please specify _____
D	**Special school teacher's perception about student engagement and participation**
19	Disabled students enjoy and feel satisfied when participating in adaptive sports according to their abilities Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
20	Participating in adaptive sports positively impacts students' academic performance and well-being Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
21	There is a need for increased awareness about adaptive sports among students Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
22	Special school teachers should recognize and celebrate students' achievements in adaptive sports to encourage participation - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
23	Integrating adaptive sports programs in curriculum will support and encourage students to participation in sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
E	**Special school teacher's perception about Support and Resources**
24	The school provides adequate financial support for adaptive sports equipment and facilities Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
25	The school allocates enough time and resources to organize adaptive sports events and competitions Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
26	The administration takes initiative to include adaptive sports in the school's extracurricular activities Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
27	Teachers receive sufficient support and empowerment to promote adaptive sports programs for disabled students Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
28	Physiotherapists are readily available in your school to provide services and support related to disability sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
29	Are you satisfied with the current availability of faculty members for adaptive sports in your school? Very dissatisfied / Dissatisfied / Neutral /Satisfied / Very satisfied
F	**Perception about multidisciplinary team participation in adaptive sports**
30	Incorporating multidisciplinary teams improves disabled students' participation in adaptive sports Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
31	I feel comfortable collaborating with other professionals like therapists and coaches to develop and deliver adaptive sports programs - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
32	Physiotherapists assist in preventing injuries during adaptive sports activities Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree
33	Physiotherapists play a significant role in ensuring the safety and well-being of disabled students during adaptive sports participation - Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree

APPENDIX C

Significant Post hoc pairwise comparisons for domain scores across demographic variables

Demographic Variable	Domain	Pairwise comparison	Mean difference	95 % Confidence Interval	p value
Professional designation	Domain A (Familiarity)	HOD vs Subject Professional	0.71	0.51,0.91	<.001
		Director vs Subject Professional	0.64	0.27,1.02	<.001
	Domain D (Engagement)	HOD vs Subject Professional	0.21	0.08,0.35	.024
		Director vs Subject Professional	0.30	0.001, 0.59	.022
Organization type	Domain A (Familiarity)	NGO vs Private	0.75	0.46, 1.03	<.001
		Government vs Private	0.51	0.03, 0.78	.040
		Government-aided vs Private	0.44	0.02, 0.71	.003
		Government-aided vs NGO	-0.30	0.01, 0.85	.041
	Domain C (Training)	Government-aided vs Private	0.39	0.03, 0.78	.034
		Government-aided vs NGO	0.37	0.02, 0.71	.023
	Domain D (Engagement)	NGO vs Private	0.36	0.23, 0.50	<.001
		Government-aided vs NGO	-0.22	0.01, 0.42	.007
Educational qualification	Domain A (Familiarity)	Postgraduate vs Diploma	0.87	0.57, 1.17	<.001
		Postgraduate vs Undergraduate	0.73	0.46, 1.00	<.001
		Postgraduate vs PG Diploma	0.64	0.38, 0.89	<.001
	Domain D (Engagement)	Postgraduate vs Diploma	0.38	0.19, 0.57	<.001
		Postgraduate vs Undergraduate	0.25	0.07, 0.43	.003
		Postgraduate vs PG Diploma	0.21	0.03, 0.38	.016
Employment status	Domain A (Familiarity)	Full-time vs Part-time	0.53	0.20, 0.84	<.001
		Full-time vs Contract/Temporary	0.55	0.17, 0.89	<.001