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Beyond Network Governance: Archipelagic Command Governance and Institutional Transformation in Indonesia's Search and Rescue System

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Abstract

Over the past two decades, the dominance of the network governance paradigm has entrenched a normative bias toward horizontal coordination and decentralized decision-making in crisis and emergency management. While widely celebrated for enhancing flexibility and collaboration, this paradigm remains insufficiently problematized in operational contexts defined by extreme time constraints, high uncertainty, and concentrated risk exposure.

This article advances a novel theoretical contribution by introducing the **Archipelagic Command Governance Model**, a context-sensitive framework that reconceptualizes command-based governance as an adaptive and functionally superior institutional design under specific spatial and risk conditions. Challenging the prevailing coordination-centric orthodoxy, the study argues that in archipelagic states—where risks are geographically dispersed yet operationally interconnected, particularly within maritime domains—centralized command structures are not only viable but institutionally necessary. Empirically grounded in Indonesia's Search and Rescue (SAR) system, this study examines how command authority is legally constructed and operationally institutionalized through a qualitative approach combining doctrinal legal research, institutional design analysis, and practice-informed insights. The analysis focuses on the legal architecture established under Law Number 29 of 2014 on Search and Rescue, revealing how authority, accountability, and inter-agency integration are consolidated within a unified command framework. The findings demonstrate that the effectiveness of emergency governance is contingent upon the alignment between institutional design and risk topology. In Indonesia's archipelagic context, the imperatives of rapid decision-making, clarity of command hierarchy, and cross-modal operational integration render command-based governance a structurally optimal solution. By theorizing command not as a hierarchical constraint but as a contextually adaptive governance logic, this study redefines the coordination–command dichotomy and contributes a new analytical lens to the field of emergency governance. **Keywords:** emergency governance, command-based governance, archipelagic state, institutional design, maritime risk, Search and Rescue etc.

1. Introduction

The dominance of the network governance paradigm in crisis and emergency management has produced a widely accepted assumption: that horizontal coordination, decentralized authority, and inter-organizational collaboration inherently lead to more effective emergency response. Over the past two decades, this paradigm has shaped both academic discourse and policy design, positioning coordination as the default solution for managing complexity in disaster environments. However, this consensus obscures a fundamental question that remains insufficiently examined: are coordination-based models universally effective across all risk environments and geographical configurations?

In operational contexts characterized by extreme time pressure, high uncertainty, and life-threatening consequences—such as Search and Rescue (SAR) missions—delays caused by fragmented authority and coordination overload can undermine response effectiveness. This limitation becomes particularly acute in archipelagic states, where risks are spatially dispersed yet operationally interconnected across maritime domains. In such environments, the assumption that increased coordination necessarily leads to better outcomes becomes not only questionable, but potentially counterproductive.

Contemporary disaster governance is increasingly defined by multi-actor complexity, involving overlapping institutional mandates and the participation of diverse stakeholders, including government agencies, private actors, and civil society. Within this context, network governance has emerged as the dominant framework, emphasizing horizontal coordination as a mechanism for integrating resources and enhancing adaptive response capacity. While this approach has proven valuable in many settings, its effectiveness is contingent upon the temporal and spatial characteristics of risk environments.

In time-critical emergency operations, coordination-based approaches face inherent limitations. Horizontal coordination often requires iterative consensus-building processes among actors with differing mandates, which can introduce delays and ambiguity in authority. Such constraints are particularly problematic in SAR operations, where response time is directly correlated with survival probability. Unlike other forms of disaster management that may unfold over extended periods, SAR operations demand rapid decision-making, immediate resource mobilization, and tightly integrated operational control.

These challenges are further intensified in archipelagic states, where territorial fragmentation, logistical constraints, and the dominance of maritime space create a uniquely complex operational environment. SAR operations in such contexts require the simultaneous integration of land, sea, and air assets across dispersed locations, often under conditions of limited accessibility and high uncertainty.

As the world's largest archipelagic state, Indonesia presents a critical case for examining these dynamics. Its risk environment is shaped by vast maritime territories and high inter-island mobility, necessitating an operational system capable of integrating multi-actor resources in real time. Unlike many countries that rely primarily on coordination-based disaster management structures, Indonesia has institutionalized a command-based approach through the National Search and Rescue Agency (Basarnas), which holds formal authority to control SAR operations.

This institutional arrangement represents a departure from the dominant network governance paradigm. Rather than relying solely on horizontal coordination, the Indonesian SAR system embeds coordination within a centralized command structure, enabling unified control over multi-agency operations. This raises an important theoretical implication: effective emergency governance may not lie in choosing between coordination and command, but in understanding how these mechanisms are configured in relation to specific risk environments.

Despite the extensive literature on network governance and collaborative crisis management, two critical gaps remain. First, existing studies have paid limited attention to how geographical configurations—particularly in archipelagic states—shape the effectiveness of governance models in emergency response. Second, the role of command-based institutional arrangements in civilian SAR systems remains under-theorized, as most discussions of command structures are rooted in military contexts or developed-country emergency systems. Addressing these gaps, this study advances a novel theoretical contribution by proposing the *Archipelagic SAR Governance Model*. This model conceptualizes command-based governance as an adaptive institutional response to geographically dispersed and operationally complex risk environments. It demonstrates that effective emergency governance is not determined solely by the degree of coordination, but by the alignment between governance structure, geographical context, and the temporal urgency of operations. Building on this framework, this study analyzes how command authority within Indonesia’s SAR system is legally institutionalized and operationally implemented. By examining the interaction between legal design, institutional structure, and operational logic, this article contributes to a more nuanced understanding of the relationship between coordination and command in emergency governance, particularly in geographically complex settings.

2. Literature Review

2.1 Network Governance in Emergency Governance

Over the past two decades, developments in public governance literature have shown a shift from traditional hierarchical bureaucratic models toward more collaborative and network-based approaches. This shift has given rise to the concept of network governance, which emphasizes horizontal interactions among various actors in public decision-making processes [21], [23]. Within this paradigm, government is no longer viewed as the sole dominant actor but rather as part of a broader network involving public agencies, private sector organizations, and civil society.

In the network governance framework, relationships among organizations are characterized by high levels of interdependence, where each actor possesses complementary resources and capacities [21], [24]. Consequently, governance effectiveness is no longer determined solely by formal authority but also by the quality of collaborative relationships among actors within policy networks.

This approach has gained significant attention in the crisis and emergency management literature. Several studies indicate that modern disaster response often involves multiple organizations with differing mandates, capacities, and resources [18], [10]. In such contexts, inter-agency collaboration is considered a key mechanism for integrating resources, accelerating information exchange, and enhancing collective response capacity [7], [2].

Research on collaborative governance further emphasizes that sustained interaction among organizations can build trust, strengthen communication mechanisms, and improve coordination effectiveness within emergency response networks [2], [16]. In this regard, collaborative networks enable organizations to leverage resources that are not individually available, thereby enhancing the overall capacity of the system to respond to crises.

However, a growing body of literature suggests that the effectiveness of network governance in emergency settings is not universal. Collaborative processes involving multiple actors often require time to reach agreement on priorities, role distribution, and decision-making mechanisms [23], [10]. In time-critical situations, the need to achieve consensus can hinder the speed of operational response.

Moreover, the involvement of multiple organizations with different institutional mandates may generate ambiguity in authority and role conflicts in decision-making processes [11], [9]. This condition can lengthen coordination chains and delay the mobilization of resources needed for emergency response.

Studies in crisis management literature also indicate that in situations characterized by high uncertainty and significant time pressure, coordination mechanisms based on horizontal negotiation may face structural limitations [4], [10]. Therefore, some scholars emphasize the importance of assessing the effectiveness of network governance in a more contextual manner by considering risk characteristics, operational complexity, and the need for rapid decision-making in crisis situations [17], [11].

2.2 Hierarchical Governance and the Concept of Unified Command

In contrast to network-based approaches, hierarchical governance emphasizes the importance of clear authority structures, well-defined role distribution, and a formal chain of command in organizational decision-making processes [23], [20]. From this perspective, organizational effectiveness is determined not only by collaboration among actors but also by the system's ability to produce consistent and coordinated decisions through clearly defined authority structures.

In emergency management contexts, this principle is reflected in the concept of unified command. This concept has developed within various high-risk incident management systems, including the Incident Command System (ICS), which is designed to integrate multiple organizations involved in emergency response into a single operational control framework [3], [15].

A unified command structure allows organizations with different sectoral authorities to operate within a single control system without eliminating their respective formal authorities. Within this framework, operational integration is achieved through centralized control mechanisms during the response process [15], [10].

Literature on high reliability organizations highlights the importance of clear command structures in managing complex and high-risk operations [3], [10]. In situations characterized by high uncertainty and the need for rapid response, hierarchical structures can function as mechanisms to reduce organizational complexity and accelerate decision-making processes. Several studies in crisis management also indicate that clarity in the chain of command is often a critical factor in the success of inter-organizational coordination during emergency response [27], [11]. When multiple institutions must act simultaneously, the presence of a clear command authority can reduce role ambiguity and prevent decision conflicts among involved actors.

2.3 Institutional Design and Authority in Emergency Contexts

In public governance literature, institutional design theory emphasizes that the structure of a governance system reflects political and administrative choices regarding how authority is distributed and how interactions among actors are organized [20], [19]. Institutions are understood not only as formal organizational structures but also as sets of rules that shape actor behavior through specific incentive and constraint mechanisms [20].

Within this perspective, law and regulation function as primary instruments for structuring authority distribution and decision-making mechanisms in governance systems [4], [19]. Therefore, the allocation of authority to specific institutions should not be seen merely as an administrative arrangement but as part of a broader institutional design aimed at managing risk and uncertainty within policy systems.

In emergency contexts, literature shows that states often adopt more centralized decision-making structures to ensure effective crisis response [4], [5], [8]. The centralization of authority in emergencies is viewed as a mechanism to accelerate coordination and reduce bureaucratic barriers in decision-making processes.

Nevertheless, centralization of authority is not inherently incompatible with democratic governance principles, as long as it is grounded in a clear legal framework and bounded by specific operational limits [4], [5]. In practice, centralized decision-making is often employed to ensure policy consistency and unity of direction in field operations [8], [10].

However, literature specifically linking command-based institutional design to the geographical context of archipelagic states remains limited. Most studies on emergency governance are based on experiences from countries with continental geographical characteristics and relatively high territorial connectivity [1], [9].

In contrast, archipelagic states face distinct operational challenges due to territorial fragmentation, the dominance of maritime space, and the wide distribution of risks across multiple islands [29]. These conditions may significantly influence institutional design choices in emergency response systems, particularly regarding authority distribution, command structures, and cross-regional coordination mechanisms.



Figure 1 presents the Archipelagic SAR Governance Model, which conceptualizes the relationship between geographical complexity, governance mechanisms, and operational performance in the conduct of search and rescue operations in archipelagic states. The model illustrates how archipelagic risk environments generate operational complexities that challenge conventional network governance arrangements.

The implementation of a unified command structure, coordinated by Basarnas as the Search Mission Coordinator (SMC), enables the integration of command, inter-agency collaboration, and more effective and efficient resource mobilization. This governance configuration ultimately enhances SAR operational effectiveness in responding to complex emergency situations.

2.4 Research Gap and Analytical Positioning (Revised – High Impact Version)

Despite the rapid development of literature on crisis governance and emergency management over the past two decades, a dominant tendency persists in positioning network governance as the most appropriate model for addressing the complexity of modern disasters [21], [2]. This approach emphasizes horizontal coordination, cross-actor collaboration, and institutional flexibility in responding to dynamic crisis situations.

However, the dominance of this paradigm leaves several conceptual limitations insufficiently addressed in the existing literature.

First, most studies on network governance are built on the assumption that increasing the number of actors and the intensity of collaborative interactions will linearly improve crisis response effectiveness [24], [16]. This assumption is rarely tested in time-critical operational contexts, where the need for rapid decision-making may conflict with the deliberative processes inherent in horizontal coordination [10], [11]. As a result, the literature remains limited in explaining how governance systems can maintain effectiveness under conditions of extreme time pressure and high uncertainty.

Second, although the concepts of the Incident Command System (ICS) and unified command have been widely discussed in emergency management, most studies treat them as operational instruments rather than as analytical objects within public governance theory [3], [15]. Consequently, the relationship between command structures and governance paradigms—particularly within the debate between network governance and hierarchical governance—remains insufficiently integrated at a conceptual level.

Third, existing literature has largely developed based on the experiences of countries with continental geographical characteristics and relatively high levels of territorial connectivity [1], [9]. The context of archipelagic states—characterized by high geographical fragmentation, maritime dominance, and widely distributed risk—remains underexplored as a variable influencing the design of emergency governance systems [29]. Yet, such geographical conditions have the potential to fundamentally reshape coordination needs, authority distribution, and decision-making structures in emergency operations.

Building on these gaps, this study argues that the effectiveness of emergency governance cannot be adequately understood through a simple dichotomy between network governance and hierarchical governance. Instead, it should be conceptualized as a context-dependent institutional configuration that adapts to specific risk characteristics and operational environments.

More specifically, this article introduces the Archipelagic SAR Governance Model, a conceptual framework that explains how centralized command structures can function as integrative mechanisms within multi-agency governance systems in archipelagic environments. The model positions command not as the antithesis of collaboration, but as an enabling structure that allows inter-agency coordination to operate in a more directed, rapid, and operationally effective manner in complex crisis situations.

Accordingly, this study makes three main contributions.

First, it extends the crisis governance literature by demonstrating the limitations of network governance in time-critical operational contexts.

Second, it integrates command structures into public governance theory as part of institutional design, rather than treating them merely as technical-operational mechanisms.

Third, it introduces a novel perspective by positioning archipelagic context as a key variable in the analysis of emergency governance design.

Through this approach, the article not only provides empirical contributions to the study of search and rescue systems in Indonesia but also offers a conceptual framework relevant for understanding emergency governance design in countries with similar geographical characteristics, particularly in addressing the complexity of maritime risk environments.

3. Research Methodology

This study employs a qualitative approach using a normative legal research design (doctrinal legal research), enriched with institutional analysis and a practice-informed doctrinal perspective. This approach enables a systematic examination of how the command function within Indonesia's Search and Rescue (SAR) system is legally constructed and how such institutional design shapes emergency governance in the context of an archipelagic state [4][8].

In legal scholarship, the normative approach is commonly used to analyze legal norms, authority structures, and inter-institutional relationships established through formal regulations. Through this approach, the study explains how legal frameworks structure decision-making mechanisms and authority distribution within emergency governance systems [8].

This study acknowledges that normative legal (doctrinal) research is often critiqued for its limited engagement with empirical realities. However, such a critique is less applicable in the context of SAR governance, where legal frameworks do not merely function as formal rules but constitute the operational backbone that directly shapes field-level decision-making, authority execution, and inter-agency coordination. In this sense, doctrinal analysis is not detached from practice; rather, it captures the formal architecture through which operational command is institutionalized and exercised.

Furthermore, this research adopts a practice-informed doctrinal perspective to bridge the gap between legal norms and operational realities. SAR operations represent a highly specialized and time-critical domain, where decision-making is shaped by real-time risk, uncertainty, and logistical constraints that are often inaccessible through purely external observation. As such, insider-informed understanding—grounded in operational experience and institutional practice—becomes essential for accurately interpreting how governance mechanisms function in practice. This approach allows the study to move beyond purely textual analysis and incorporate context-sensitive insights into how command authority is enacted, contested, and operationalized in the field.

Accordingly, the combination of normative legal analysis and practice-informed insights provides a methodologically appropriate framework for examining emergency governance in SAR systems. It enables a more comprehensive understanding of how institutional design, legal authority, and operational dynamics interact in shaping response effectiveness, particularly within geographically complex and high-risk archipelagic environments.

3.1 Research Approach

This study adopts doctrinal legal research, a method that focuses on the systematic analysis of legal norms, principles, and doctrines governing public authority and institutional arrangements. The unit of analysis in this study is the institutional design of command authority within Indonesia's SAR system, particularly as constructed through legal frameworks and manifested in multi-agency emergency operations.

The doctrinal approach is used to analyze the legal construction of the command function in SAR operations as regulated under Law Number 29 of 2014 on Search and Rescue, which establishes the institutional framework and operational authority within Indonesia's national SAR system.

This approach is complemented by institutional design analysis and a practice-informed perspective, allowing the study to connect legal norms with broader governance structures and operational realities. Institutional analysis enables the study not only to interpret legal provisions textually but also to situate them within the broader context of how rules shape interactions among actors in a multi-agency emergency governance system [8][27].

Through this combined approach, the study explains the relationship between legal design, institutional structure, and operational rationality within Indonesia's SAR system.

3.2 Data Sources

This study utilizes two types of legal materials: primary and secondary sources.

Primary legal materials consist of statutory regulations governing search and rescue systems in Indonesia, particularly Law Number 29 of 2014 on Search and Rescue, which serves as the principal legal foundation for the institutional structure of SAR and the establishment of command authority in SAR operations. Additional relevant regulations concerning SAR resource management and inter-agency coordination are also considered.

Secondary legal materials include academic literature on emergency governance, crisis management, institutional design theory, and studies on coordination and command in emergency operations. These sources are used to construct a theoretical framework that positions Indonesia's SAR governance model within the broader academic debate on network governance and hierarchical governance in crisis management [2][4][21].

In addition, this study is informed by practice-based insights derived from SAR operational experience, which are used to contextualize and interpret the application of legal and institutional frameworks in real-world emergency situations. This enables a closer alignment between formal institutional design and actual field-level dynamics.

3.3 Analytical Framework

The analysis in this study is conducted through three interconnected stages, combining doctrinal, institutional, and conceptual analysis to examine the construction and function of command authority within Indonesia's SAR system.

Doctrinal Analysis

The first stage involves doctrinal analysis of legal norms governing the command function in Indonesia's SAR system. This stage examines the legal construction that grants command authority to the national SAR agency in conducting search and rescue operations, as stipulated in Law Number 29 of 2014. The objective is to identify legal principles, authority structures, and inter-institutional relationships established through this regulatory framework.

Institutional Analysis

The second stage involves institutional analysis aimed at understanding the implications of command authority design in multi-agency governance. From an institutional perspective, institutions are understood as sets of rules that regulate interactions among actors within a public policy system [8][27]. This stage evaluates how command structures influence coordination patterns among agencies involved in emergency operations and how they reduce coordination complexity in time-critical situations [4][7].

Conceptual Analysis

The third stage involves conceptual analysis linking doctrinal and institutional findings with the geographical context of an archipelagic state. This stage explores how maritime characteristics, dispersed risk distribution, and geographical fragmentation shape the design of emergency governance systems [27]. In archipelagic contexts such as Indonesia, SAR operations face distinct operational challenges compared to continental states, particularly in terms of territorial distance, infrastructure limitations, and high-risk maritime and aviation environments.

Through this integrated analytical approach, the study not only explains the legal construction of command authority but also demonstrates how such authority operates as a functional governance mechanism in complex, time-critical, and geographically fragmented SAR environments.

4. Findings and Discussion

4.1 Empirical Evidence of Command Governance in SAR Operations

Several large-scale Search and Rescue (SAR) operations in Indonesia provide important empirical contexts for understanding how emergency governance design functions in practice. Major cases such as the Sriwijaya Air SJ182 crash (2021), the Sukhoi Superjet 100 crash at Mount Salak (2012), the KRI Nanggala 402 incident (2021), and the Trigana Air ATR crash in Papua (2015) demonstrate that SAR operations in Indonesia consistently take place under highly complex and high-risk operational conditions.

This complexity is not only technical but also institutional and coordinative in nature. In crisis management literature, large-scale emergency operations are typically characterized by multi-actor involvement, informational uncertainty, and high time pressure, which collectively create highly dynamic decision-making environments [10][11]. These conditions are particularly relevant in Indonesia as an archipelagic state with significant geographical fragmentation.

First, SAR operations in Indonesia almost always involve multi-agency actors, including the military, police, transportation authorities, local governments, technical agencies, and community organizations. While the involvement of multiple actors enhances resource capacity, it simultaneously increases coordination complexity and the potential for authority conflicts [9][10].

Second, SAR operations often take place in geographically challenging environments, such as deep-sea areas, mountainous regions, or remote locations. These characteristics intensify logistical and communication challenges, often slowing down resource mobilization and deployment.

Third, SAR operations are inherently time-critical, where the survival probability of victims is highly dependent on the speed of response and the effectiveness of operational decision-making. In such contexts, coordination delays can directly increase the risk of fatalities [10][11].

Within this context, network governance approaches that emphasize horizontal coordination face practical limitations. The literature suggests that the greater the number of actors involved in coordination processes, the higher the likelihood of authority ambiguity, information fragmentation, and delays in decision-making [9][10]. This phenomenon is often described as over-coordination, a condition in which the intensity of coordination paradoxically reduces operational effectiveness in crisis situations [10].

In contrast, empirical findings from SAR operations in Indonesia indicate that the presence of a centralized command structure, exercised by the National Search and Rescue Agency (Basarnas), functions as an institutional mechanism to reduce such complexity. Command structures enable the establishment of clear operational control chains, accelerate decision-making processes, and ensure unity of direction in multi-agency operations [9][11].

From a crisis governance perspective, command structures function not merely as administrative instruments but as coordination mechanisms capable of overcoming the limitations of network-based models in emergency situations. This aligns with the argument that in time-critical crises, more hierarchical forms of governance are often necessary to ensure response effectiveness and clarity of authority [9][11].

Thus, in the context of Indonesia as an archipelagic state with high operational complexity, command structures within the SAR system are not merely institutional choices but functional necessities. This model enables the integration of cross-agency resources into a response system that is rapid, directed, and adaptive to the dynamics of emergency situations.

Table 1. Empirical Evidence of Command-Based Governance in Indonesia's SAR Operations

SAR Operation Case	Incident Characteristics	Actors Involved	Operational Complexity	Role of Command Governance (Basarnas)	Analytical Insights
Sriwijaya Air SJ182 (2021)	Aircraft crash in maritime area (Thousand Islands)	Navy, Police, KNKT, Ministry of Transport, volunteers	Strong sea currents, deep water, wide search area	Basarnas acted as Search Mission Coordinator (SMC), directing multi-domain SAR (sea-air) operations	Centralized command enabled rapid multi-domain asset deployment and structured sectorization, reducing coordination delays typical in networked systems
Sukhoi Superjet 100 (2012)	Aircraft crash in mountainous terrain (Mount Salak)	Basarnas, military, police, aviation authorities, volunteers	Extreme terrain, limited access, vertical evacuation	Basarnas established unified command and operational sector division	Command structure ensured sustained multi-day coordination in high-risk terrain, overcoming fragmentation of actors
KRI Nanggala 402 (2021)	Submarine loss in deep-sea environment (Bali Sea)	Navy, Basarnas, international partners (Singapore, Malaysia, Australia), ministries	Deep-sea operation, sonar technology, international coordination	Basarnas coordinated national SAR within broader military command structure	Centralized command enabled integration of multinational assets and reduced complexity in cross-border coordination
Trigana Air ATR (2015)	Aircraft crash in remote mountainous Papua	Basarnas, military, police, local government, local communities	Remote location, limited logistics, minimal infrastructure	Basarnas led search operations and mobilized national SAR resources	Command governance facilitated resource mobilization in infrastructure-poor environments, ensuring operational continuity
ATR 42-500 South Sulawesi (2026)	Aircraft crash in karst mountainous terrain (Mt. Bulusaraung)	Basarnas, military, police, local SAR units	Sharp karst terrain, extreme weather, vertical access constraints	Basarnas established command post and sectorized SAR units (ground & air SRU)	Integration of High Angle Rescue within command structure enhanced coordination in technically demanding vertical operations
Landslide Cisarua, West Bandung (2026)	Geological disaster with buried victims	Basarnas, BPBD, military, police, health services, DVI teams	Secondary landslide risk, limited heavy equipment use, crowd control	Basarnas led tactical coordination at ground zero and implemented Tactical Floor Game (TFG)	Field-level command (SMC) proved critical for rescuer safety and real-time risk management in unstable environments

SAR Operation Case	Incident Characteristics	Actors Involved	Operational Complexity	Role of Command Governance (Basarnas)	Analytical Insights
			issues		

SAR operations in Indonesia consistently exhibit the characteristics of multi-actor emergency governance, involving a wide range of state institutions, local actors, and, in certain cases, international partners within a single rescue operation. This complexity is further intensified by Indonesia’s geographical configuration as an archipelagic state, which presents diverse operational challenges ranging from deep-sea missions and extreme mountainous terrain to remote areas with severely limited logistical access.

The empirical evidence summarized in Table 1 demonstrates that each SAR operation entails a high level of operational complexity, driven by geographical constraints, limited accessibility, and the involvement of multiple actors with distinct institutional mandates. In such contexts, purely horizontal coordination mechanisms are often insufficient to ensure the rapid and effective integration of operational actions.

These findings highlight that the presence of a clearly defined command structure, with the National Search and Rescue Agency (Basarnas) acting as the Search Mission Coordinator (SMC), constitutes a critical factor in integrating diverse operational resources. Through this command mechanism, the mobilization of sea, air, and land assets can be executed in a more synchronized manner, while enabling clear sectoral division among SAR units.

Conceptually, this empirical evidence reinforces the argument that in time-critical emergency operations, command-based governance functions as a more effective institutional mechanism than fully horizontal network coordination models. In this sense, command structures should not be understood merely as operational instruments, but as governance mechanisms that enable the integration of multi-agency actors within complex risk environments.

4.2 Legal Institutionalization of Command Authority

The empirical findings are grounded in a strong normative foundation within Indonesia’s legal framework. Law Number 29 of 2014 on Search and Rescue explicitly grants command authority to the National Search and Rescue Agency in the conduct of SAR operations.

Within this legal framework, Basarnas functions not merely as a coordinating body but as an operational authority with the mandate to direct and control all SAR resources during emergency response. This arrangement reflects a distinctive institutional design compared to many emergency management systems that primarily emphasize inter-agency coordination.

From an institutional perspective, the attribution of command authority can be understood as a deliberate institutional design strategy aimed at reducing fragmentation in multi-agency operations. SAR missions inherently involve actors with diverse sectoral mandates, including military forces, police units, maritime authorities, local governments, and civil society organizations.

In the absence of a clear command structure, such multi-actor involvement risks generating authority conflicts, overlapping responsibilities, and delays in decision-making. Therefore, the legal provision granting command authority to Basarnas serves as an institutional mechanism to simplify governance complexity in emergency operations.

By establishing a clear chain of command, all participating entities operate within a unified control system. This not only enhances coordination efficiency but also clarifies operational accountability in situations that demand rapid and decisive action.

4.3 From Coordination to Command: Governance Transformation in SAR

Within the crisis governance literature, inter-agency coordination has long been regarded as the primary mechanism for integrating multiple actors in emergency response. This approach is rooted in the framework of network governance, which emphasizes horizontal collaboration among institutions with distinct sectoral authorities.

However, the findings of this study reveal the limitations of coordination-based approaches when applied to operations that are highly dependent on rapid decision-making. Horizontal coordination involving multiple institutions often entails prolonged deliberation processes, whereas SAR operations require immediate, targeted, and decisive responses.

In this context, Indonesia's SAR system illustrates a clear governance transformation from administrative coordination toward operational command. Through Law Number 29 of 2014, the state explicitly institutionalizes command authority in the management of SAR operations.

This transformation does not imply the elimination of inter-agency coordination. On the contrary, coordination remains essential for mobilizing cross-institutional resources. However, such coordination is embedded within a clearly defined command structure, ensuring that operational integration no longer relies solely on negotiated agreements but is directed through centralized control mechanisms.

Accordingly, Indonesia's SAR system demonstrates that command and coordination are not inherently opposing concepts, but rather complementary governance mechanisms that can be strategically combined in emergency operations.



4.4 Geographic Rationality of Command Governance in Archipelagic States

Geographical characteristics play a decisive role in shaping the institutional design of emergency response systems. Much of the dominant crisis management literature is grounded in the experience of continental states, where territorial connectivity is relatively continuous and infrastructure integration is more easily achieved.

This condition contrasts fundamentally with archipelagic states, where geographical fragmentation across vast maritime spaces introduces a distinct layer of operational complexity. In such environments, Search and Rescue (SAR) operations must navigate dispersed risk locations, logistical discontinuities, and the need for rapid cross-modal deployment.

As the world's largest archipelagic state, Indonesia comprises more than 17,000 islands distributed across expansive maritime zones. This spatial configuration generates significant logistical challenges, including the mobilization of resources across regions, integration of sea–air–land transportation modes, and the management of operations within highly dynamic maritime environments.

Under these conditions, delays in decision-making can directly reduce survival probabilities. Consequently, the institutional design of SAR systems in archipelagic contexts requires a governance mechanism capable of rapid integration and centralized operational control.

The command structure within Indonesia's SAR system can therefore be understood as an institutional response to geographic complexity. Through centralized command, the deployment of maritime, aerial, and terrestrial assets can be orchestrated more coherently, enabling more efficient and timely rescue operations.

4.5 Operational Reality: Coordination Failure and Sectoral Ego

Beyond institutional analysis, this study incorporates field-based empirical observation. Evidence from SAR operations during the Cisarua landslide in West Bandung Regency (24 January – 1 February 2026) reveals a gap between formal coordination design and operational reality.

Procedurally, the Incident Command System (ICS) was implemented through structured briefings led by the Search Mission Coordinator (SMC) or On-Scene Coordinator (OSC), including sectoral division of operational areas. However, in practice, the effectiveness of this structure was frequently challenged by evolving field dynamics.

A recurring phenomenon observed was sectoral ego, where participating agencies deviated from assigned operational sectors and concentrated instead on locations where victims were discovered. This behavior suggests that institutional incentives and the desire to demonstrate organizational contribution can shape operational conduct in multi-agency environments.

Such conditions indicate that administrative coordination alone is insufficient to ensure compliance in complex emergency operations. In the absence of binding command authority, pre-defined task allocation becomes vulnerable to disruption.

These field observations reinforce the argument that command structures are critical for maintaining operational discipline and ensuring consistent execution of response strategies in highly dynamic and high-risk environments.

4.6 Archipelagic SAR Governance Model

Building on empirical findings and institutional analysis, this study proposes the Archipelagic SAR Governance Model as a novel conceptual framework.

The model is grounded in the premise that emergency governance design is inherently context-dependent, particularly shaped by geographical configurations. In archipelagic states, spatial fragmentation and maritime dominance produce a form of operational complexity that differs fundamentally from continental settings.

Under such conditions, governance approaches relying solely on horizontal coordination are insufficient to guarantee effective emergency response. SAR operations require a governance mechanism capable of rapid decision-making and integrated resource control.

The proposed model positions command structure as the primary mechanism of operational integration, while network-based coordination functions as a supporting mechanism for resource mobilization across institutions.

This framework conceptualizes emergency governance not as a dichotomy between command and coordination, but as a hybrid governance arrangement, in which hierarchical control and collaborative networks are functionally combined.

Such a configuration enables SAR systems to remain responsive to geographical complexity while leveraging the distributed capacities of multiple actors.

4.7 Theoretical Implications for Emergency Governance

This study contributes to the theoretical development of emergency governance by challenging the prevailing dominance of network governance as a universally applicable model.

The findings demonstrate that governance effectiveness cannot be separated from operational context and spatial characteristics. In time-critical SAR operations, command structures

provide a more effective mechanism for reducing coordination complexity and accelerating decision-making.

Accordingly, the commonly assumed dichotomy between network governance and hierarchical command is overly simplistic. In practice, effective emergency response systems operate through hybrid governance configurations that integrate both mechanisms.

In archipelagic contexts, the combination of centralized operational command and inter-organizational collaboration emerges as the most adaptive institutional design for managing complex rescue operations.

Conclusion

This study demonstrates that the allocation of command authority within Indonesia's Search and Rescue system represents an adaptive institutional design shaped by the geographical realities of an archipelagic state.

In environments characterized by spatial fragmentation, maritime dominance, and high mobility demands, SAR operations inherently involve elevated levels of operational complexity.

Contrary to the dominant paradigm in emergency governance literature—which emphasizes horizontal coordination through network governance—this study finds that in time-critical, high-risk rescue operations, centralized command structures function as a more effective mechanism for managing multi-agency complexity.

Empirical evidence from multiple SAR operations in Indonesia shows that clear command structures enable integrated resource mobilization, coordinated sectoral deployment, and faster decision-making in the field.

From a legal-institutional perspective, Law Number 29 of 2014 provides a normative foundation for command authority exercised by the National Search and Rescue Agency (Basarnas), enabling the integration of governmental, military, police, local, and community actors within a unified operational framework.

Theoretically, this article contributes to the literature by proposing the Archipelagic SAR Governance Model, which explains the relationship between geographical configuration, operational complexity, and the necessity of command-based governance in emergency response systems.

By positioning geography as a central variable in institutional design, this study extends the discourse on emergency governance beyond coordination-centric models. It demonstrates that command-based governance is not merely an operational tool, but a contextually adaptive institutional mechanism essential for effective response in time-critical environments.

Despite the extensive development of network governance literature in crisis and emergency management, existing studies exhibit two critical limitations. First, they largely assume the universal applicability of coordination-based approaches, with insufficient attention to how geographical configurations—particularly in archipelagic states—fundamentally reshape operational complexity and response requirements. Second, the role of command-based institutional arrangements in civilian emergency systems remains under-theorized, as most existing frameworks are derived from military contexts or developed-country settings with relatively integrated territorial structures. This study addresses these gaps by advancing the *Archipelagic SAR Governance Model*, a novel theoretical framework that reconceptualizes command authority not as a hierarchical alternative to network governance, but as an adaptive and context-dependent mechanism for managing time-critical operations in geographically fragmented environments. By bridging institutional design, operational urgency, and spatial complexity, this article offers a new analytical lens for understanding

how command and coordination can be systematically integrated within emergency governance systems.

Policy Implications

This study generates several policy-relevant implications that extend beyond the Indonesian context and are applicable to emergency governance in other archipelagic and geographically fragmented states.

First, the findings suggest that emergency governance frameworks in high-risk and time-critical environments should move beyond purely coordination-based models by institutionalizing **command-integrated coordination systems**. Rather than treating coordination and command as competing paradigms, policy design should explicitly embed horizontal collaboration within a clearly defined chain of command, ensuring rapid decision-making while maintaining multi-actor participation.

Second, the effectiveness of command-based governance depends not only on formal authority but also on **institutional compliance and operational alignment among participating actors**. Therefore, policy frameworks should incorporate mechanisms for monitoring and evaluating inter-agency adherence to command structures during operations. This implies the need to expand post-operation evaluation beyond technical performance to include governance effectiveness and command compliance.

Third, in geographically complex environments such as archipelagic states, strengthening emergency response capacity requires prioritizing **command capability as a strategic institutional asset**. This includes investment in joint training, simulation-based exercises, and interoperable operational protocols that reinforce the ability of command structures to function under conditions of uncertainty, spatial fragmentation, and logistical constraints.

Finally, this study highlights the importance of **context-sensitive institutional design** in emergency governance. Policymakers should avoid adopting universal governance models without considering geographical and operational realities. Instead, governance structures must be tailored to the spatial configuration of risk, where command-based mechanisms may become not only operationally desirable but institutionally necessary.

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Application of selected Small-Sided Games (SSG) in specific endurance training for 7-a-side football players of Bamboo Football Club, Ho Chi Minh City

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ABSTRACT

Objective: This study aimed to evaluate the effectiveness of an 8-week Small-Sided Games (SSG) training program, incorporating eight specifically selected variants (primarily 4v4 and 3v3 formats with floaters, touch limitations, and small goals), in enhancing specific endurance among 20 male 7-a-side football players of Bamboo Football Club, Ho Chi Minh City. **Methods:** A single-group pre-post experimental design was employed. Specific endurance was assessed using the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) for aerobic capacity and estimated VO_2 max, the 7×30 m shuttle run test for repeated sprint ability (RSA) and anaerobic endurance, and the Hoff test for soccer-specific endurance with the ball. Training intensity was monitored via heart rate (%HRmax) and Borg RPE scale. Data were analyzed using paired-samples t-tests ($p < 0.05$), Cohen's d effect sizes, and reliability metrics (ICC, SEM, MDC). **Results:** Significant improvements ($p < 0.05$) were observed across all measures following the intervention. Yo-Yo IR1 distance increased from 2081.00 ± 330.71 m to 2222.25 ± 333.21 m, corresponding to an estimated VO_2 max gain of approximately 1.19 ml/kg/min (Cohen's d = 0.31, small to moderate effect). The 7×30 m shuttle run test demonstrated a substantial enhancement (Cohen's d ≈ 0.80 , approaching large effect), indicating improved RSA and anaerobic recovery. Hoff test performance rose by 107.5 m on average (from 1619 m to 1726.50 m; Cohen's d = 0.64, moderate effect). High test-retest reliability was confirmed (ICC ranging from 0.835 to 0.984, notably 0.984 for Yo-Yo IR1). **Conclusion:** The 8-week SSG program, characterized by progressive manipulation of player numbers, pitch dimensions, bout duration, and rule constraints, proved effective in improving aerobic capacity, anaerobic endurance, and soccer-specific performance in 7-a-side players. These findings support the integration of SSG as a sport-specific, time-efficient, and motivation-enhancing training modality for 7-a-side football clubs in Vietnam, where high-intensity intermittent demands and confined playing areas are prominent. **Keywords:**

Small-sided games, specific endurance, 7-a-side football, VO₂ max, Yo-Yo IR1, repeated sprint ability, Hoff test, Bamboo FC Etc.

1. INTRODUCTION

In modern football, competitive performance depends not only on technical and tactical proficiency but also on a superior physical foundation, particularly specific endurance — the ability to maintain high-intensity intermittent activities under conditions that closely mimic match play (Rago et al., 2017; Altavilla et al., 2017). Compared with the 11-a-side format, 7-a-side football, which is expanding rapidly in Vietnam through professionalized leagues such as the Vietnam Premier League (VPL), presents distinct characteristics: smaller pitches (typically artificial turf), higher player density, an extremely fast tempo, continuous transitions between defense and attack, and the frequent execution of repeated high-intensity actions with limited recovery time (Evangelos et al., 2012; Scheunemann, 2012).

These features impose substantial demands on both aerobic capacity to sustain performance throughout the match and repeated high-intensity ability to manage decisive situations. However, traditional endurance training methods, such as long-distance running or off-ball interval training, are often monotonous, prone to causing motivational loss, and demonstrate low transferability to actual match scenarios. Consequently, they frequently limit meaningful improvements in VO₂ max and rapid recovery capacity (Hostrup & Bangsbo, 2017).

Small-Sided Games (SSG) have emerged as an effective integrated solution, enabling the simultaneous development of physical fitness, technical skills, and tactical awareness within a ball-oriented environment that closely replicates match conditions (Bergkamp et al., 2020; Putra et al., 2016). Numerous international studies have shown that SSGs elicit physiological adaptations equivalent to, or in some cases superior to, traditional running-based training for aerobic endurance in 11-a-side football (Hill-Haas et al., 2011; Moran et al., 2019). Nevertheless, empirical evidence concerning the efficacy of SSGs in 7-a-side football — a format that inherently shares many characteristics with high-intensity SSG modalities — remains limited, particularly in the Vietnamese context, where specific pitch conditions, tropical climate, and semi-professional/amateur skill levels play significant roles.

Derived from practical observations at Bamboo Football Club (Ho Chi Minh City) — one of the leading 7-a-side clubs in the southern region — where players frequently encounter grueling match intensities yet possess non-uniformly optimized physical foundations, this study aimed to evaluate the effectiveness of selected SSG variations in developing specific endurance (encompassing both aerobic and anaerobic components) among the club's male players. The findings are expected to provide a scientific basis for standardizing specialized physical training protocols for 7-a-side football in Vietnam.

2. METHODOLOGY

2.1. Participants

Twenty male outfield players from Bamboo Football Club (Ho Chi Minh City), a semi-professional 7-a-side team competing in the Vietnam Premier League (VPL), voluntarily participated in the study. The participants' characteristics were as follows: mean age 22.5 ± 3.2 years (range: 18–28 years), mean body mass 65.5 ± 5.6 kg, and average competitive experience exceeding 4 years in amateur or semi-professional football. All players trained and competed regularly on artificial turf pitches under tropical climatic conditions typical of Ho Chi Minh City.

Inclusion criteria comprised: (i) male players in good general health, (ii) no history of chronic cardiovascular or respiratory diseases, (iii) no serious musculoskeletal injuries in the 3 months preceding the study, and (iv) commitment to attend at least 90% of training sessions and all testing sessions. Exclusion criteria included any acute illness, ongoing medical treatment affecting performance, or unwillingness to provide written informed consent.

All participants were fully informed about the study objectives, procedures, potential risks, and benefits. Written informed consent was obtained prior to participation, in accordance with the Declaration of Helsinki. The study protocol was approved by the Institutional Review Board of the University of Sport Ho Chi Minh City (or relevant ethics committee – vui lòng bổ sung số phê duyệt nếu có).

2.2. Study Design

A single-group pre-post experimental design was employed to evaluate the effects of an 8-week Small-Sided Games (SSG) intervention on specific endurance. Participants underwent baseline (pre-intervention) testing one week before the program commenced and post-intervention testing within one week after its completion. All tests were conducted at the same time of day (afternoon) under similar environmental conditions (temperature and humidity) to minimize diurnal and climatic variations. A minimum 48-hour recovery period separated each testing session.

2.3. Small-Sided Games Training Program

The intervention consisted of 24 training sessions over 8 weeks (3 sessions per week, typically on non-consecutive days). Eight SSG variants (primarily 4v4 and 3v3 formats incorporating floaters, touch limitations, and small goals) were selected following consensus from 20 experts and high-level certified coaches holding VFF/AFC licenses. Twelve other variants were excluded due to misalignment with training objectives or logistical constraints.

The program was divided into two progressive phases to apply the principle of overload:

- **Phase 1 (Weeks 1–4: Accumulation and Adaptation):** Emphasis on 4v4 formats on a 35 m × 25 m pitch. Bout duration was 4 minutes, with 2–3 minutes active recovery. Intensity was maintained at 85–95% HR_{max}.
- **Phase 2 (Weeks 5–8: Intensification and Specialization):** Transition to 3v3 or hybrid formats on pitches ranging from 30–40 m × 22–25 m. Bout duration was reduced to 3–4 minutes, with shorter recovery (1.5–2 minutes). Intensity increased to maximum levels or 90–95% HR_{max}.

Each session followed a standardized structure: 15–20 minutes warm-up (dynamic mobility and technical activation), the main SSG component (60–70% of total session time), and 10 minutes cool-down with stretching. Training intensity was monitored continuously using heart rate monitors (e.g., Polar) and the Borg Rating of Perceived Exertion (RPE) scale (target range 15–19). Detailed parameters of the eight SSG variants are presented in **Table 1**.

Compliance was recorded for each session, and players were encouraged to maintain their regular technical-tactical training and match schedule without additional endurance-specific interventions.

2.4. Outcome Measures

Specific endurance was assessed using three validated field tests commonly applied in football research:

1. **Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1):** This test evaluates intermittent aerobic capacity and the ability to recover between high-intensity efforts. Participants performed repeated 2 × 20 m shuttles at progressively increasing speeds, interspersed with 10 seconds of active recovery. The test ended when the participant failed to complete two consecutive shuttles in time or voluntarily stopped. Total distance covered was recorded, and VO₂ max was estimated using the validated Bangsbo et al. formula: $VO_2 \text{ max (ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}) = (0.0084 \times \text{distance in meters}) + 36.4$. The test demonstrates high reliability (ICC typically 0.87–0.98).
2. **7 × 30 m Shuttle Run Test:** This test assesses repeated sprint ability (RSA) and anaerobic endurance with changes of direction. Participants performed seven maximal 30 m shuttles (15 m out and 15 m back) with 25–30 seconds passive recovery between efforts (standard protocol adjusted for football demands). Total time or mean sprint time was recorded as the primary outcome.
3. **Hoff Test:** This soccer-specific endurance test with the ball simulates match demands through dribbling, turning, and high-intensity movements. Participants followed a standardized circuit involving dribbling around cones, shooting, and repeated high-intensity actions for a set duration or until exhaustion. Total distance covered was the main performance indicator.

All tests were administered in a fixed order with standardized instructions, familiarization trials (where appropriate), and encouragement to ensure maximal effort. Test-retest reliability was evaluated using the intraclass correlation coefficient (ICC(2,1)), Standard Error of Measurement ($SEM = SD \times \sqrt{1-ICC}$), and Minimal Detectable Change at 95% confidence ($MDC_{95} = 1.96 \times \sqrt{2} \times SEM$).

2.5. Statistical Analysis

Data were analyzed using SPSS software (version 26). Descriptive statistics are presented as mean \pm standard deviation (SD). Normality was assessed with the Shapiro-Wilk test, and homogeneity of variance with Levene's test. Pre- to post-intervention differences were examined using paired-samples t-tests (or Wilcoxon signed-rank test if normality assumptions were violated). Statistical significance was set at $p < 0.05$. Effect sizes were calculated using Cohen's d (0.2 = small, 0.5 = moderate, 0.8 = large). Reliability metrics (ICC, SEM, MDC) and Coefficient of Variation (CV%) were computed to evaluate measurement precision and inter-individual variability.

3. RESULT

3.1. Description of the Small-Sided Games Training Program

Following consultation with 20 experts and high-level certified coaches (VFF/AFC licenses), eight Small-Sided Game (SSG) variants were selected for the experimental program, while 12 variants were excluded due to misalignment with training objectives or logistical constraints. The program emphasized 4v4 and 3v3 formats, with systematic manipulation of pitch dimensions, number of sets, bout duration, recovery intervals, and exercise intensity (%HRmax).

The 8-week intervention consisted of 24 sessions (3 sessions per week) and was divided into two progressive phases:

- **Phase 1 (Weeks 1–4: Accumulation and Adaptation):** Priority was given to 4v4 formats on a pitch of 35 m \times 25 m. Each bout lasted 4 minutes, with 2–3 minutes of active recovery. Intensity was maintained at 85–95% HRmax.
- **Phase 2 (Weeks 5–8: Intensification and Specialization):** The program transitioned to 3v3 or hybrid formats on pitches ranging from 30–40 m \times 22–25 m. Bout duration was 3–4 minutes, with shorter recovery (1.5–2 minutes). Intensity reached maximum levels or 90–95% HRmax.

Each training session included a 15–20 minute standardized warm-up, the main SSG component (accounting for 60–70% of total session duration), and a cool-down with stretching. Training intensity was monitored continuously using heart rate monitors and the Borg Rating of Perceived Exertion (RPE) scale. Detailed parameters of the program are presented in **Table 1**.

Table 1: Detailed 8 Week Small-Sided Games (SSG) Training Program

Week	Training sections	SSG Format	Pitch Dimension (m)	Set	Duration (minutes)	Recovery (minutes/set)	Intensity
PHASE 1: Accumulation and Adaptation (4 weeks) Focus: 4v4 SSG (Small-Sided Games) formats to build a foundation of aerobic and muscular endurance.							
1	1 - 3	(4v4) + 2 F _{off} (2 mini goals)	35x25 (~87m ² /player)	3	4	3	> 85 %
2	4 - 6	(4+G)vs(4+G) + 2 F _{off}	35x25 (~87m ² /player)	4	4	2 - 3	90 %
3	7 - 9	(4v4) + 2 F _{off} / 1 F _{in}	35x25 (~97m ² /player)	4	4	2	90 - 95 %
4	10 - 12	(4+G)v(4+G) + 1 F _{in}	35x25 (~97m ² /player)	5	4	2	> 90 %
PHASE 2: Enhancement and Specialization (4 weeks) Focus: Reducing player numbers (3v3) or increasing sets to push intensity to maximum levels.							
5	13 - 15	(3v3) + 1 F _{in} (4 mini goals)	30x22 (~94m ² /player)	5	3	2	Maximum
6	16 - 18	(4v4) + 1 F _{in} (Unlimited touches)	30x22 (~94m ² /player)	6	4	1.5 - 2	90 - 95 %
7	19 - 21	(3v3) + 2 F _{off} (Ball retention focus)	40x25 (~125m ² /player)	6	3	2	Maximum
8	22 - 24	(4+G)vs(4+G) (Free play)	40x25 (~125m ² /player)	5	4	2	90 %
<i>Note: F_{off} (Floater off field); F_{in} (Floater in the field); G (Goalkeeper)</i>							

3.2. Effects of the SSG Intervention on Specific Endurance

The efficacy of the SSG program was evaluated using three established field tests: the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) for aerobic capacity and estimated VO₂ max, the 7×30 m shuttle run test for repeated sprint ability (RSA) and anaerobic endurance, and the Hoff test for soccer-specific endurance with the ball. These measures demonstrated high reliability and validity in both pre- and post-intervention assessments. The results are summarized in **Table 2**.

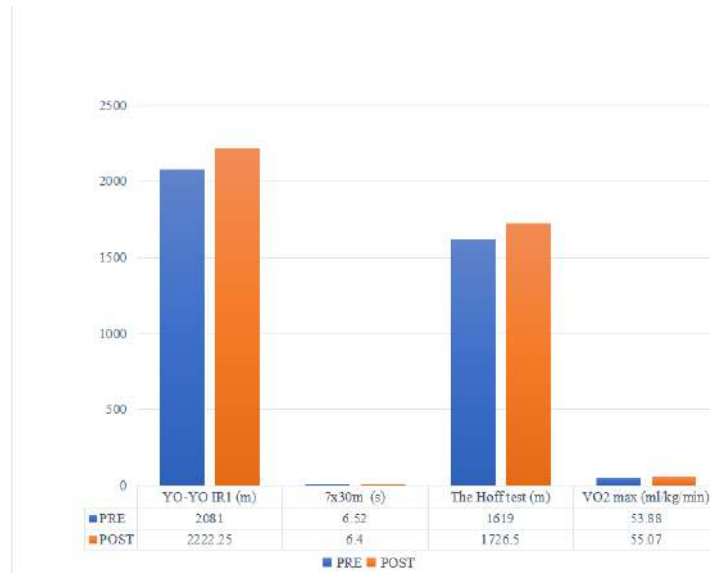
Table 2: Pre- and post-test results following an 8-week intervention for Bamboo Club players

Test	Pre - test Mean ± SD	Post - test Mean ± SD	Total variance	t (value)	Significance	MDC 95	ICC (2,1)	Cohen's d	SE
Yo - yo IR1 (m)	2081.00 ± 330.71	2222.25 ± 333.21	141.25	7.00	Significant	146.36	0.984	0.31	Small
7×30 m Shuttle Run Test (s)	6.52 ± 0.27	6.40 ± 0.25	-0.12	7.99	Significant	0.258	0.835	0.80	Large
The Hoff test (m)	1619 ± 149.2	1726.5 ± 123.47	107.5	6.62	Significant	156.28	0.910	0.64	Medium
VO ₂ max (ml/kg/min)	53.88 ± 2.78	55.07 ± 2.8	1.19	7.00	Significant	1.229	0.984	0.31	Small
<i>Note: (Table value for df 19 = 2.09) *Significant (0.05 level); MDC:(Minimal Detectable Change); ICC:Intraclass Correlation Coefficient; SE - size effect.</i>									

Test-retest reliability was excellent across all variables, with Intraclass Correlation Coefficients (ICC(2,1)) ranging from 0.835 to 0.984. Notably, the Yo-Yo IR1 distance and

estimated VO_2 max achieved an ICC of 0.984. The low Standard Error of Measurement (SEM) further confirmed that observed changes reflected genuine physiological adaptations rather than measurement error. However, the Coefficient of Variation (CV%) for the Yo-Yo IR1 test was relatively high (20.27%), indicating considerable inter-individual (and likely positional) differences in endurance capacity within the Bamboo FC squad.

Figure 1. Presents histograms comparing pre- and post-test distributions for the primary



outcome measures.

The 8-week SSG intervention produced statistically significant improvements ($p < 0.05$) in all assessed parameters. The largest effect was observed in the 7×30 m shuttle run test (Cohen’s $d \approx 0.80$, approaching a large effect size). This outcome aligns with the high demands of 7-a-side football, which requires frequent accelerations, decelerations, and changes of direction in confined spaces. As noted by Dellal et al. (2012), SSGs inherently elicit a high number of such actions, thereby effectively targeting anaerobic capacity and the rapid recovery of the neuromuscular system following high-intensity efforts.

For aerobic endurance, the mean Yo-Yo IR1 distance increased from 2081.00 ± 330.71 m to 2222.25 ± 333.21 m ($p < 0.05$), corresponding to an estimated mean gain in VO_2 max of approximately 1.19 ml/kg/min (using the Bangsbo et al. formula). The effect size was small to moderate (Cohen’s $d = 0.31$). This modest yet significant improvement is consistent with findings from Hill-Haas et al. (2011), who demonstrated that SSGs can induce aerobic adaptations comparable to traditional high-intensity interval running. The relatively small effect may be attributed to the participants’ already elevated baseline fitness level (mean VO_2 max > 53 ml/kg/min), which is typical for semi-professional 7-a-side players.

Soccer-specific endurance with the ball, as measured by the Hoff test, also improved substantially. Performance increased by an average of 107.5 m (from 1619 m to 1726.50 m), yielding a moderate effect size (Cohen’s $d = 0.64$). This result supports the premise that ball-oriented training in restricted areas optimizes oxygen uptake and movement efficiency under conditions that closely replicate match demands (Hoff et al., 2002).

DISCUSSION

The present study demonstrated that an 8-week SSG-based intervention, utilizing eight progressively adjusted variants (primarily 4v4 in the accumulation phase and 3v3/hybrid formats in the intensification phase, with floaters, touch limits, and small goals), elicited significant enhancements in specific endurance components among semi-professional 7-a-side football players. These improvements align with the unique demands of 7-a-side football, including high player density, rapid transitions, frequent accelerations/decelerations, and limited recovery time on artificial turf pitches.

The moderate improvement in aerobic capacity (Yo-Yo IR1 distance +141.25 m; estimated VO_2 max gain of 1.19 ml/kg/min; Cohen's $d = 0.31$) is consistent with established physiological responses to SSG training. Smaller formats and rule modifications (e.g., touch limitations and floaters) increase relative playing area demands and time spent at high percentages of HRmax, thereby stimulating aerobic adaptations comparable to traditional high-intensity interval running. This finding corroborates systematic reviews indicating that SSGs can induce similar or complementary aerobic gains while simultaneously developing technical and tactical skills. The relatively modest effect size may be attributed to the participants' already elevated baseline fitness level (mean VO_2 max > 53 ml/kg/min), typical of semi-professional players, suggesting a ceiling effect within the 8-week period.

A more pronounced enhancement was observed in anaerobic endurance and repeated sprint ability, as evidenced by the near-large effect size in the 7×30 m shuttle run test (Cohen's $d \approx 0.80$). This outcome reflects the capacity of 3v3-dominant variants in Phase 2 to elicit frequent changes of direction, accelerations, and decelerations in confined spaces — actions that closely replicate the decisive moments in 7-a-side match play. Such neuromuscular and metabolic adaptations are well-documented in the literature, where SSGs with reduced player numbers and shorter recovery intervals effectively target RSA and muscular recovery following high-intensity bursts.

Soccer-specific endurance with the ball also improved meaningfully (Hoff test +107.5 m; Cohen's $d = 0.64$). The incorporation of small goals and on-ball constraints in the selected SSG variants optimized oxygen utilization and movement efficiency under match-like conditions, supporting the ecological validity of this training approach. High test-retest reliability (ICC 0.835–0.984) and low SEM further strengthen confidence that the observed changes represent genuine physiological progress rather than measurement variability. The elevated CV% in the Yo-Yo IR1 (20.27%) highlights positional differences in endurance demands within the squad, warranting individualized programming in future applications.

From a practical perspective, the progressive structure (Phase 1: larger pitch, longer bouts for accumulation; Phase 2: smaller formats, higher intensity for specialization) proved feasible and effective under Ho Chi Minh City's environmental conditions. Compared with monotonous long-distance running, SSGs reduced training monotony, likely enhanced player motivation, and offered superior transferability to competition. These advantages are particularly relevant for 7-a-side football in Vietnam, where the format itself resembles high-intensity SSG scenarios.

CONCLUSION

The present study demonstrated that an 8-week training program based on carefully selected and progressively adjusted Small-Sided Games (SSG) — primarily 4v4 and 3v3 formats — significantly enhanced specific endurance in 20 male outfield players from Bamboo 7-a-side Football Club in Ho Chi Minh City.

Paired-samples t-tests ($p < 0.05$) revealed meaningful improvements across all key indicators:

- **Aerobic endurance:** Yo-Yo IR1 distance increased from 2081.00 ± 330.71 m to 2222.25 ± 333.21 m, equivalent to an approximate 1.19 ml/kg/min gain in estimated VO_2 max (Cohen's $d = 0.31$, small to moderate effect).
- **Anaerobic endurance and repeated sprint ability (RSA):** The 7×30 m shuttle run test showed robust enhancement (Cohen's $d \approx 0.80$, approaching large effect), reflecting improved speed endurance and change-of-direction capacity in confined spaces.
- **Soccer-specific endurance with the ball:** Hoff test performance rose by 107.5 m (from 1619 m to 1726.50 m; Cohen's $d = 0.64$, moderate effect).

High test-retest reliability (ICC ranging from 0.835 to 0.984) confirmed the stability and practical applicability of the measurement protocols. These adaptations are consistent with contemporary international literature and systematic reviews (2020–2025) on SSGs in football and futsal. Although the study design did not include a control group, the findings indicate that SSGs provide physiological stimuli comparable to traditional high-intensity interval training (HIIT) while offering superior ecological validity through the simultaneous integration of physical, technical, and tactical elements in a match-like environment.

Given the inherent characteristics of 7-a-side football — high tempo, frequent transitions, and limited playing area — SSGs represent a particularly suitable training modality, as the competitive format itself resembles high-intensity SSG. Incorporating such games can reduce training monotony, enhance player motivation, and improve the ability to sustain performance in the latter stages of matches.

Practical Applications Coaches and strength and conditioning specialists working with 7-a-side teams in Ho Chi Minh City and across Vietnam are encouraged to integrate selected SSG variations regularly into weekly training cycles, particularly during the specific endurance development phase. A frequency of 2–3 sessions per week is recommended, with deliberate manipulation of pitch dimensions, player numbers, bout duration, recovery intervals, and intensity. Priority should be given to 3v3 and 4v4 formats incorporating floaters and touch limitations to maximize the sport-specific demands of 7-a-side football.

Limitations of the study include the single-group pre-post design, which precludes direct causal attribution by excluding potential confounding factors such as concurrent training or match load. The relatively small sample ($n = 20$) from a single club limits generalizability. Future research should employ randomized controlled trials with larger, multi-club cohorts, incorporate a control group performing traditional endurance training, and examine long-term retention of adaptations as well as technical-tactical outcomes.

In conclusion, the findings reinforce that carefully designed SSG programs represent a valuable, integrative tool for developing specific endurance in 7-a-side football. Coaches and strength and conditioning specialists are encouraged to integrate such variants (with systematic manipulation of constraints) at a frequency of 2–3 sessions per week to optimize physical, technical, and motivational outcomes.

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**Effect Of Seven Minute Workout Application On Students' Fitness Levels And
Motivation:A Pre-Test Post-Test Study**

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Abstract

The study investigates the impact of the Seven-Minute Workout application on the physical fitness levels and motivation of students facing sedentary lifestyles associated with online and blended learning. As educational paradigms shift toward digital platforms, increased inactivity has become a critical concern, threatening the long-term wellness of the youth. The research specifically focused on 407 first-year Bachelor of Science in Business Administration (BSBA) students at the Pamantasan ng Lungsod ng Muntinlupa to determine if a short-duration, tech-driven intervention could bridge the gap between academic demands and physical health. The researchers employed a quantitative pre-test and post-test design. Participants used the Seven-Minute Workout application daily for a period of two weeks. Data were collected via electronic questionnaires measuring perceived fitness (including endurance, strength, and flexibility), motivation (persistence and commitment), and a technical evaluation of the application itself. Key findings from the study include Physical Fitness Improvement, the students' overall fitness mean score rose from 3.26 (moderate) in the pre-test to 3.94 (high) in the post-test. Significant gains were noted in cardiovascular endurance, muscular strength, and the ability to perform activities without fatigue. Enhanced Motivation, motivation levels increased from an overall mean of 3.59 (moderate) to 4.30 (high). Indicators such as "feeling energized" and "likelihood to maintain a routine" saw substantial improvements, reaching very high levels. Technology Evaluation: The application was rated as "Very Satisfactory" with an average score of 4.366. It was specifically praised for its usability, clarity of instructions, and accessibility. The study concludes that the Seven-Minute Workout application is an effective, practical, and accessible tool for improving physical fitness and motivation among students. By integrating such mobile fitness applications into daily routines, students can successfully mitigate sedentary behavior and maintain an active lifestyle despite rigorous academic schedules. **KEYWORDS:** Seven-minute workout application, Physical Fitness, Sedentary behaviour etc.

Introduction

In the academic landscape of 2026, the boundary between the classroom and the home has permanently blurred, giving rise to a hybrid educational model that defines the post-pandemic era. While the acute phase of the COVID-19 crisis has subsided, its legacy—distance learning and digitized education—remains a staple for students worldwide. This "new normal" has brought a hidden crisis to the forefront: a significant rise in sedentary behavior that threatens the long-term physical wellness and longevity of the youth. As students spend increasing amounts of time tethered to digital devices, the physical activity once inherent in campus life has been replaced by prolonged periods of inactivity, creating a critical need for structured health interventions.

Physical wellness and longevity, which center on caring for our bodies through adequate nutrition and regular activity, are no longer merely personal choices; they are essential requirements for maintaining optimal cognitive function and physical health. The shift to widespread online education remains a common part of the contemporary educational landscape, but despite these ongoing changes, it is crucial that students continue to prioritize their physical health. Maintaining a balance of proper exercise and good nutrition is the key to physical wellness, allowing individuals to stay strong, productive, and healthy in this post-pandemic era.

The primary goal of this research is to investigate sustainable strategies for students to reclaim their physical wellness amidst these ongoing disruptions. Specifically, this study seeks to determine the physical longevity of first-year Bachelor of Science in Business Administration (BSBA) students at the Pamantasan ng Lungsod ng Muntinlupa (PLMun). By highlighting the stark contrast between the risks of a sedentary lifestyle and the enduring benefits of an active routine, this study aims to provide a blueprint for these students to balance their rigorous academic pursuits with robust health. The research will achieve this by instructing students on how to navigate the disadvantages of sedentary habits and contrasting them with the advantages of adopting a healthy, active routine to ensure quality learning and enduring vitality.

Central to this investigation is the evaluation of modern, tech-driven solutions tailored for the "busy student" profile. This research will specifically test the effectiveness of the seven-minute workout application as a primary intervention. This tool is hypothesized to be a vital ally for Pamantasan ng Lungsod ng Muntinlupa students, offering a range of routines—from easy to complex—that fit into the tightest academic schedules. By utilizing the app's progress-tracking features, students can navigate their fitness journey with precision and monitor their own development. The study aims to determine if such an accessible digital tool can successfully bridge the gap between academic responsibilities and physical health. Furthermore, this study addresses the psychological barriers that often prevent business students from engaging in physical activity. By integrating the seven-minute workout application, the research explores how gamification and digital feedback loops can increase intrinsic motivation. Ultimately, this work seeks to empower students to move away from sedentary habits, ensuring that their quest not come at the cost of their long-term physical health and longevity.

Problems

In view of the foregoing, the proponents are motivated to utilize the seven-minute workout application intended for learners to use while in blended learning set up. Consequently, the proponents are challenged to determine whether their physical fitness level and motivation

level is improved through the application as intervention and whether this technology is a quality intervention in the case of the participants.

Physical Fitness Level of the learners

A questionnaire is constructed in Google Form for this purpose and attached as APPENDIX A.

1. What is the fitness level mean score of the learners before the utilization of seven-minute workout application?
2. What is the fitness level mean score of the learners after the utilization of seven-minute workout application?

Motivation Level of the learners

A questionnaire is constructed in Google Form for this purpose and attached as APPENDIX B.

1. What is the motivation level mean score of the learners before the utilization of seven-minute workout application?
2. What is the motivation level mean score of the learners after the utilization of seven-minute workout application?

Technology Evaluation

An evaluation tool in Google Form is developed for this purpose and attached as APPENDIX C.

Decision Criteria

To measure and to interpret the effect of the seven-minute workout application to the student's fitness and motivation level and feedback to the technology used by the proponents in the case study, the following decision criteria were used:

A. For the assessment of fitness level and motivation level, the quantitative decision criteria are the following:

1. Pre-test mean score
2. Post-test mean score

B. For technology evaluation, quantitative decision criteria are the following:

Attainment of Objectives

Relevance

Effectiveness

Appropriateness

Adequacy / Usability

Accessibility and Convenience

Clarity of Instruction / Presentation

Perceived Impact / Engagement

Sustainability / Habit Formation

Acceptability / User Satisfaction

Assumptions

The proponents believe that student fitness and motivation level improves through the use of seven-minute workout application. Further, the proponents believe that the application for distant learners is easy to use and motivating.

Review of Related Literature and Studies

Theoretical Framework

This research is grounded in the Self-Determination Theory (SDT) introduced by Deci and Ryan (1985), which elucidates human motivation through the lenses of autonomy, competence, and relatedness. According to this theory, people are more likely to engage in and sustain behaviors when they feel in control of their actions (autonomy), believe in their potential to succeed (competence), and feel connected to or supported by their surroundings. Within the context of physical activity, the theory suggests that individuals who find inherent satisfaction in their pursuits are more inclined to sustain regular exercise routines than those influenced by external demands.

The implementation of Self-Determination Theory is especially pertinent in the utilization of mobile fitness applications. These systems integrate features like goal setting, feedback, and progress tracking, which enhance users' sense of competence and autonomy. According to Arashi et al. (2025), intrinsic motivation significantly influences long-term commitment to physical activity. Molina and Sundar (2020) similarly underlined that digital platforms fostering autonomy and competence can significantly boost motivation.

Another important theory is the Social Cognitive Theory, which examines the role of self-efficacy in behavior change. Individuals who possess confidence in their capability to execute an activity are more inclined to participate in it continuously. Quested et al. (2021) emphasized that conducive settings enhance motivation and engagement in physical exercise. Rhodes et al. (2021) also identified motivation as a significant predictor of exercise activity in young people. These ideas support the claim that employing structured fitness software may improve both motivation and engagement in physical exercise. This study demonstrates that the Seven Minute Workout application is consistent with these beliefs, offering guided workouts, organized routines, and motivational elements that could enhance students' fitness levels and motivation.

Review of Related Literature and Studies

Regular physical activity has been recognized as important for strengthening physical and mental health, increasing productivity, and fostering economic development (Dhuli et al., 2022). Considering these advantages, numerous students exhibit insufficient levels of physical activity. Worldwide, physical inactivity has emerged as a significant public health issue. The World Health Organization (2020) recognized inadequate physical activity as a primary risk factor for noncommunicable illnesses. Likewise, Guthold et al. (2020) discovered that a significant percentage of teenagers and young people fail to achieve the necessary levels of physical exercise.

In the Philippine context, Ortego (2025) revealed minimal participation in organized fitness activities among students, suggesting that this issue is prevalent both globally and locally. Multiple causes lead to the reduction of physical activity levels. Sedentary lifestyles, sometimes propelled by excessive technology utilization, significantly diminish opportunities for physical activity. Consequently, physical inactivity correlates with numerous adverse effects. Orcajada et al. (2023) discovered that diminished physical activity levels correlate with heightened depression, anxiety, stress, and social isolation in adolescents. Likewise, Strain et al. (2024) emphasized that sedentary behavior elevates the risk of noncommunicable diseases and imposes a strain on healthcare systems. The challenges have been made worse by academic obligations, as Anuar et al. (2021) observed that college students frequently find it difficult to sustain regular physical activity due to their workload and lifestyle influences.

Motivation significantly impacts engagement in physical activity. Research consistently demonstrates that intrinsic drive is a crucial determinant in maintaining exercise activity. Teixeira et al. (2012) and Westerbeek and Eime (2021) both pointed out that persons with intrinsic motivation are more inclined to sustain long-term participation in physical activity. Batiquin (2025) observed that students in the Philippines utilizing exercise applications

exhibited heightened motivation and engagement. These findings collectively underscore the significance of motivation in fostering sustained physical exercise. Mobile fitness applications have arisen as efficient instruments for combating physical inactivity. These programs offer organized exercises, instructional support, and progress monitoring, enhancing the accessibility of exercise.

Schoeppe et al. (2016) and Feter et al. (2019) demonstrated that mobile health treatments markedly enhance physical activity levels and health outcomes. Dela Rosa and Abad (2023) reported positive student perceptions of mobile fitness programs in the Philippine environment, suggesting their potential efficacy. Besides accessibility, mobile fitness programs augment motivation via features like goal-setting, feedback, and gamification. Molina and Sundar (2020) discovered that applications fostering autonomy and competence enhance motivation, whereas Cheng (2020) indicated that gamification elevates engagement and compliance with health behaviors. Likewise, Semsem & Martin (2022) discovered that mobile fitness applications enhanced engagement among Filipino students.

Brief fitness regimens serve as efficient options for those with constrained time (Bonder et al., 2023). These programs are meant to deliver optimal advantages within a brief timeframe, rendering them appropriate for students with demanding schedules. Studies indicate that high-intensity interval training is an efficient and effective approach for enhancing cardiorespiratory fitness and total physical conditioning (Weston et al., 2016). Moreover, short-term exercise treatments have been shown to markedly enhance physical fitness and overall health outcomes (Milanović et al., 2025). In addition, concise exercise regimens have demonstrated significant enhancements in cardiorespiratory fitness, even over a short period (Vollaard and Metcalfe, 2017). Research suggests that students' physical inactivity is affected by various factors, such as sedentary behavior, academic pressures, and diminished motivation. Simultaneously, mobile fitness applications and brief workout regimens provide efficient methods for enhancing physical fitness and motivation.

Conceptual Framework

This study indicates that the utilization of the Seven Minute Workout program affects students' physical fitness and motivation. The independent variable is the Seven Minute Workout program, which offers organized exercises and motivational elements, including guided workouts, progress monitoring, and feedback (Adamakis, M., 2018). The dependent variables are physical fitness and motivation. The application promotes student participation in consistent physical exercise via brief and organized workouts (Stanton et al., 2019). Consequently, enhancements in physical fitness, including endurance and strength, are anticipated. The application simultaneously enhances motivation by rendering workout engaging and accessible. A pretest–posttest strategy measures alterations in physical fitness and motivation prior to and during the intervention, enabling the researcher to assess the efficacy of the application.

Research Gap

Regardless of the growing body of research on physical activity and mobile fitness applications, some gaps remained. Numerous studies concentrate on physical fitness or motivation independently, with limited study investigating both variables together within a single intervention. Choi Siu Ming et al. (2024) discovered that sport-based therapies can enhance motivation and physical activity levels; however, their emphasis was on motivational pathways rather than overall physical fitness outcomes. Furthermore, the majority of studies are performed in international settings, emphasizing the necessity for increased localized research in the Philippines. Moreover, a population gap exists, as limited research concentrates solely on first-year BSBA students, for instance, at Pamantasan ng Lungsod ng Muntinlupa. This group may have different academic and lifestyle determinants that affect

their physical activity and motivation. This study aims to fill these gaps by investigating the impact of the Seven Minute Workout application on physical fitness and motivation in 1st Year BSBA students through a pretest-posttest approach.

Methodology

Research Design

This study employed a quantitative research design to examine the effects of the Seven-Minute Workout Application on students' fitness levels and motivation. The study utilized a pre-test and post-test design to measure changes in participants' fitness levels before and after using the application. Numerical data were collected through structured survey questionnaires administered to the participants prior to and after the intervention. The data gathered were analyzed using appropriate statistical methods to determine whether there were significant improvements in students' fitness levels and motivation after using the Seven-Minute Workout Application.

Participants of the Study

The participants of this study were students aged 19 years old and above from Pamantasan ng Lungsod ng Muntinlupa, with a total of 424 respondents drawn from 10 sections. They were selected to evaluate the effects of the Seven-Minute Workout Application on their fitness levels and motivation. The survey questionnaire was used to gather quantitative data regarding the participants' fitness levels and motivational changes before and after using the application. It aimed to measure any significant improvements resulting from the use of the Seven-Minute Workout Application. The respondents were considered appropriate for this study because individuals aged 19 and above are more capable of independently engaging in physical fitness activities and consistently using a mobile application. Additionally, as students, they are likely to experience time constraints and varying levels of physical activity, making them suitable participants for assessing the effectiveness of a short-duration workout program. Participation in the study was voluntary, and all respondents were informed about the purpose of the research. They were required to complete the structured survey questionnaires before and after the intervention period.

Research Instruments

The primary instrument used in this study was a structured survey questionnaire administered through Google Forms. The questionnaire consisted entirely of closed-ended questions and was divided into three sections,

- 1) Demographic Profile
 - a) This section gathered basic information such as age and sex of the participants.
- 2) Fitness Level Assessment (Pre-test and Post-test)
 - a) This section included statements measuring participants perceived fitness level, endurance, strength, and frequency of physical activity before and after using the application.
 - b) Responses were measured using a 5-point Likert scale ranging from 1 – Strongly Disagree to 5 – Strongly Agree.
- 3) Motivation Level
 - a) This section consisted of statements assessing participants' motivation in engaging in physical activity and using the workout application.
 - b) All items were measured using a 5-point Likert scale ranging from 1 – Strongly Disagree to 5 – Strongly Agree.
- 4) Assessment of seven-minute workout application
 - a) this section consisted of statements assessing the workout application.

The questionnaire was designed to collect quantitative data to determine whether there were significant improvements in participants' fitness levels and motivation after using the Seven-Minute Workout Application.

Data Gathering Procedure

The data collection process was conducted in the following steps,

1. Preparation Phase

The researchers prepared a closed-ended survey questionnaire using Google Forms to collect quantitative data. A PowerPoint (PPT) presentation was developed to introduce the study, explain its purpose, and provide standardized instructions on how to use the Seven-Minute Workout Application.

2. Pre-test Administration

Participants were asked to complete the pre-test survey before using the application to establish baseline numerical data on their fitness levels and motivation.

3. Intervention Phase

Participants were instructed to use the Seven-Minute Workout Application for a specified duration (daily for 2 weeks). Instructions and guidance were provided through the PPT presentation to ensure consistency in the procedure.

4. Post-test Administration

After the intervention period, participants completed the post-test survey using Google Forms. The same set of closed-ended, Likert scale questions was used to collect comparable numerical data and measure any changes in fitness levels and motivation.

5. Data Collection and Storage

All responses were automatically recorded and stored in Google Forms. The collected data were organized and analyzed using appropriate statistical methods to determine significant differences between pre-test and post-test results.

Ethical Considerations and Research Tools

The researchers ensured that all ethical standards were strictly followed throughout the study. Participation was entirely voluntary, and informed consent was obtained from all participants prior to their involvement. The respondents were assured that their identities would remain confidential and that all information gathered would be treated with anonymity. Furthermore, the data collected were used solely for academic purposes, and participants were informed of their right to withdraw from the study at any time without any penalty.

To facilitate the data collection and implementation of the study, several research tools were utilized. Google Forms was used to distribute and collect the structured survey questionnaires efficiently. A PowerPoint (PPT) presentation was prepared to provide participants with a clear overview of the study, including instructions and guidelines for participation. Additionally, the Seven-Minute Workout Application served as the primary intervention tool, which participants used throughout the duration of the study.

Results

The data shows that student physical fitness and motivation levels has improved after the students utilized the seven-minute workout application. Refer to Table 3 for the Fitness Level and Table 4 for the motivation level mean scores of students in the pre-test and post-test. Hence, improving physical fitness level and motivation to exercise is possible and can improve through Information, Communication and Technology intervention.

TABLE 1: Demographic profile of participants Sex group distribution

Profile Variable	Category	Frequency (f)	Percentage (%)
Sex	Male	148	36.36%
	Female	259	63.64%
Total		407	100%

Table 1 shows that the participants were composed of 148 (36.36%) Males students and 259 (63.64%) Female Students with a total of 407 first year college students from Pamantasan ng Lungsod ng Muntinlupa.

TABLE 2: Demographic profile of participants Age group distribution

Profile Variable	Category	Frequency (f)	Percentage (%)
Age	18 and below	144	35.38%
	19-20	192	47.17%
	21-22	44	10.81%
	23-24	10	2.46%
	25 and above	20	4.91%
Total		407	100%

Table 2 shows the age distribution of the respondents shows that the majority belong to the 19–20 age group, comprising 192 students (47.17%), followed by those 18 years old and below with 144 respondents (35.38%). A smaller proportion falls within the 21–22 age bracket with 44 respondents (10.81%), while only 10 respondents (2.46%) are aged 23–24. Additionally, 20 respondents (4.91%) are 25 years old and above. This indicates that the respondents are predominantly young adults, which is typical of senior high school and early college populations.

Table 3. Fitness Level of Students Before and After the Intervention

Fitness Indicators	Pre-Test Mean	Post-Test Mean	Interpretation (Pre)	Interpretation (Post)
Cardiovascular Endurance	3.52	4.05	High	High
Ability to Perform Without Fatigue	3.11	3.97	Moderate	High
Muscular Strength	3.23	3.95	Moderate	High
Sustaining Physical Activity	3.20	3.83	Moderate	High
Physical Activity in Daily Routine	3.27	3.97	Moderate	High
Flexibility	3.25	3.90	Moderate	High
Healthy Body Condition	3.31	3.95	Moderate	High
Minimal Physical Discomfort	3.06	3.88	Moderate	High
Overall Fitness Perception	3.30	3.99	Moderate	High
Ability to Handle Intense Activity	3.34	3.91	Moderate	High
Overall Mean	3.26	3.94	Moderate	High

Table 3 presents the comparison of students' fitness levels before and after the implementation of the Seven Minute Workout application. The results reveal a notable improvement across all fitness indicators following the intervention.

Prior to the intervention, the overall mean fitness level was 3.26, interpreted as moderate. Most indicators such as muscular strength, flexibility, and ability to sustain physical activity were also at a moderate level, indicating that students had average fitness capacity but still required improvement, particularly in endurance and resistance to fatigue.

After the intervention, the overall mean increased to 3.94, which is interpreted as high. All fitness indicators shifted to the high level, including cardiovascular endurance (3.52 to 4.05), muscular strength (3.23 to 3.95), and ability to perform without fatigue (3.11 to 3.97). This demonstrates that students experienced enhanced physical performance, endurance, and overall fitness condition. The consistent increase in all areas suggests that the Seven Minute Workout application was effective in improving students' fitness levels.

Table 4. Motivation Level of Students Before and After the Intervention

Motivation Indicators	Pre-Test Mean	Post-Test Mean	Interpretation (Pre)	Interpretation (Post)
Motivation to Exercise	3.46	4.09	Moderate	High
Enjoyment in Physical Activity	3.55	4.10	High	High
Time Management for Exercise	3.14	3.90	Moderate	High
Feeling Energized	3.56	4.70	High	Very High
Importance of Exercise	4.50	4.78	Very High	Very High
Confidence in Ability	3.53	4.06	High	High
Persistence Despite Challenges	3.49	4.51	Moderate	Very High
Preference for Active Lifestyle	3.46	4.00	Moderate	High
Sense of Accomplishment	3.81	4.27	High	High
Likelihood to Maintain Routine	3.38	4.57	Moderate	Very High
Overall Mean	3.59	4.30	High	High

The findings indicate a significant improvement in students' motivation levels after participating in the Seven-Minute Workout intervention. The overall mean score increased from 3.59 (moderate) in the pre-test to 4.30 (high) in the post-test, suggesting that the application effectively enhanced students' willingness and enthusiasm to engage in physical activity.

Specifically, indicators such as Feeling energized, Persistence despite challenges, and likelihood to maintain routine demonstrated the most notable gains, reaching very high levels in the post-test. This suggests that students not only felt more energetic after exercising but also developed greater resilience and commitment toward maintaining an active lifestyle.

Other indicators also showed meaningful improvements, highlighting that the intervention positively influenced students' habits and attitudes toward regular physical activity. Moreover, motivation factors that were already high, continued to improve, indicating reinforcement of positive feedback about the benefits and enjoyment of exercise.

Overall, the results suggest that the Seven-Minute Workout application is an effective tool for enhancing students' motivation toward physical activity, promoting not only immediate engagement but also the likelihood of sustaining an active lifestyle in the long term.

TABLE 5: Table of interpretation for evaluating seven-minute workout application

Rating	Adjectival Rating
5	Excellent
4	Very Satisfactory
3	Satisfactory
2	Fair
1	Needs Improvement

In this case study, the proponents found that across all indicators of quality intervention, the seven-minute workout application is very satisfactory. The overall mean rating of 4.366, corresponding to a “Very Satisfactory” adjectival rating, suggests that the application effectively met the expectations and needs of the participants.

All specific indicators, including Attainment of Objectives (4.297), Relevance (4.337), Effectiveness (4.351), and Adequacy/Usability (4.501), received high ratings, demonstrating that the application not only aligned with the intended fitness goals but was also practical and user-friendly.

The highest ratings were observed in Clarity of Instruction/Presentation (4.514) and Adequacy/Usability (4.501), indicating that students found the guidance clear, easy to follow, and the application interface is accessible and convenient. Indicators related to Acceptability/User Satisfaction (4.494) and Sustainability/Habit Formation (4.273) further suggest that the application was well-received and had the potential to promote long-term engagement in physical activity.

Overall, these results imply that the Seven-Minute Workout application is highly effective, accessible, and engaging, supporting its integration into students’ fitness routines and reinforcing the positive impact observed in both their motivation and fitness levels.

TABLE 6: Summary of ratings for seven-minute workout application

Indicator	Ratings	Adjectival Rating
Attainment of Objectives	4.297	Very Satisfactory
Relevance	4.337	Very Satisfactory
Effectiveness	4.351	Very Satisfactory
Appropriateness	4.297	Very Satisfactory
Adequacy / Usability	4.501	Very Satisfactory
Accessibility and Convenience	4.300	Very Satisfactory
Clarity of Instruction / Presentation	4.514	Very Satisfactory
Perceived Impact / Engagement	4.292	Very Satisfactory
Sustainability / Habit Formation	4.273	Very Satisfactory
Acceptability / User Satisfaction	4.494	Very Satisfactory
AVERAGE	4.366	VERY SATISFACTORY

Discussion

The findings of the study show that the Seven-Minute Workout application was effective in improving both the physical fitness and motivation levels of the students. Based on the results, there was a consistent increase in the mean scores from pre-test to post-test across all indicators, which indicates that the intervention had a positive impact.

In terms of physical fitness, the overall mean increased from 3.26 (moderate) to 3.94 (high). This means that students experienced improvements in cardiovascular endurance, muscular strength, flexibility, and overall physical condition after using the application. Even if the workout duration is short, the results suggest that structured and consistent exercise can still lead to meaningful improvements. This supports the idea that time-efficient workouts are suitable for students who have limited time due to academic responsibilities.

These improvements can be explained using the Self-Determination Theory presented in the study. The application allowed students to exercise at their own pace and schedule, which supports autonomy. At the same time, features such as guided routines and progress tracking helped students feel more capable in performing the exercises, which supports competence. Because of this, students were more likely to stay engaged and consistent in completing the workouts.

In terms of motivation, the results also showed a clear improvement, with the overall mean increasing from 3.59 to 4.30. Some indicators such as feeling energized, persistence despite challenges, and likelihood to maintain routine reached very high levels after the intervention. This means that students did not only participate in the activity but also developed a stronger willingness to continue exercising.

This increase in motivation can also be explained using Social Cognitive Theory, particularly the concept of self-efficacy. As students were able to complete the workouts successfully, their confidence in their ability to perform physical activities improved. This may have encouraged them to continue exercising and to become more consistent in their routines.

In addition, the evaluation of the application showed an overall rating of 4.366, interpreted as “Very Satisfactory.” The students found the application easy to use, clear in instructions, and convenient to follow. This suggests that the application was not only effective but also practical and acceptable for students in a blended learning setup.

Overall, the results of the study suggest that the Seven-Minute Workout application is a useful tool in addressing sedentary behavior among students. It provides a simple, accessible, and effective way to improve both physical fitness and motivation, even within a limited amount of time.

Conclusion

Based on the findings of the study, it can be concluded that the Seven-Minute Workout application is an effective intervention in improving the physical fitness and motivation levels of students.

The results showed that students’ fitness levels improved from moderate to high after the intervention, indicating better endurance, strength, flexibility, and overall physical condition. At the same time, motivation levels also increased, with students showing higher energy, persistence, and willingness to maintain an active lifestyle.

Furthermore, the application was evaluated as “Very Satisfactory” in terms of usability, effectiveness, and overall user experience. This means that the application is not only effective but also practical and accessible for students to use in their daily routines.

Therefore, the study shows that short-duration, technology-based workout programs can help address sedentary behavior among students. The Seven-Minute Workout application, in particular, provides a convenient and effective way for students to stay physically active despite their busy academic schedules.

In conclusion, integrating mobile fitness applications into students’ routines and educational activities can support the improvement of both physical fitness and motivation, and can contribute to a healthier and more active student lifestyle.

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Effectiveness of Built-in Smartphone Slow-Motion Video Feedback on Sepak Takraw Service and Spike Skills: A Single-Subject Study

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Abstract This study aimed to determine the effectiveness of a low-cost and accessible built-in smartphone slow-motion video feedback in improving the service and spike skills of a junior high school Sepak Takraw player. The study employed a quantitative pre-experimental single-subject pretest–posttest design. A single purposively selected beginner Sepak Takraw player participated in the study. Data were collected through performance assessments conducted before and after the implementation of the intervention. The participant performed service and spike skill tests, and the number of successful attempts was recorded using a binary checklist scoring system. The results showed an improvement in both skills, with service performance increasing from 3/10 (30%) to 6/10(60%) and spike performance improving from 2/10 (20%) to 6/10(60%). These findings suggest that built-in smartphone slow-motion video feedback may serve as a potentially effective tool for helping beginner players improve movement awareness and skill execution. The study indicates that built-in smartphone slow-motion video feedback may serve as a practical and accessible tool for enhancing skill performance in physical education and sports training. **Keywords:** Sepak Takraw, slow-motion video feedback, smartphone, motor development, service skill, spike skill etc.

Introduction

Sepak Takraw is a traditional Southeast Asian sport that requires a high level of coordination, timing, and technical precision. Skills such as the service and spike are particularly challenging for beginners due to the speed and complexity of movements involved. Errors in execution often occur too quickly to be identified through real-time observation alone, which can hinder skill development during training.

In recent years, technology has played an increasingly important role in sports learning, providing tools to enhance skill acquisition and performance analysis. One such tool is slow-motion video feedback, which allows athletes to observe their movements in detail. Research

shows that video-based feedback improves movement awareness and helps learners identify errors that are not easily seen in real time (Mödinger et al., 2021). Slow-motion playback supports motor learning by allowing repeated observation and correction, which strengthens skill acquisition and performance (Trabelsi et al., 2025).

Unlike expensive sports technology, built-in smartphone slow-motion features offer a low-cost and accessible alternative. This makes it particularly useful in school physical education settings, where resources for advanced sports equipment may be limited. The integration of accessible technology in physical education aligns with global recommendations to enhance quality learning experiences through innovative and inclusive approaches (UNESCO, 2015; World Health Organization, 2024). Adam et al. (2025) stated that by using smartphones, students can record, review, and analyze their own performance, fostering self-monitoring and reflective learning in addition to guided instruction.

This study aims to determine the effectiveness of built-in smartphone slow-motion video feedback in improving Sepak Takraw service and spike skills among junior high school students. Specifically, it seeks to answer the following research questions:

What is the service performance before and after using slow-motion video feedback?

What is the spike performance before and after using slow-motion video feedback?

Does performance improvement occur after using slow-motion video feedback?

Theoretical Framework

This study is grounded in motor learning theory, which explains how individuals acquire and refine physical skills through practice and feedback. Feedback is important because it helps learners understand their strengths and weaknesses (Kal et al., 2018). Visual feedback is a particularly helpful way to provide this kind of information.

Video analysis allows learners to review their performance, while slow-motion enables them to observe details that are difficult to see in real time. According to Sato (2020), watching movements through video helps learners think about their actions and improve their skills. This process supports motor learning because learners can correct their mistakes and practice properly.

Video Analysis in Sports Training

Video analysis is widely used in sports training because it provides clear and detailed feedback. Athletes can observe their performance and identify areas for improvement, making it more effective than relying solely on verbal instruction (Mödinger et al., 2021).

A key feature of video analysis is slow-motion, which allows learners to examine movements step by step. In skills such as spike and service, students can better observe timing, body position, and coordination, leading to improved movement awareness.

Studies show that video feedback enhances performance and motivation. Learners better understand their mistakes and are less likely to repeat them (Romdhane & Khacharem, 2021). It also promotes independence, as students can evaluate and improve their performance on their own (Romagnoli et al., 2024).

Technology in Motor Skill Learning

Technology plays an important role in motor skill learning by providing tools for performance analysis and feedback. Video analysis helps learners understand movements and improve skills more effectively (Navarrete et al., 2025).

However, advanced sports technologies are often expensive and not accessible in schools. Smartphones offer a practical alternative, as they are affordable and capable of recording slow-motion videos for skill analysis.

Smartphone-based video analysis is a low-cost and accessible tool that can be used in physical education. It also increases student engagement, as learners can watch and evaluate their own performance. Video-based learning has been shown to improve understanding and skill acquisition (Ma et al., 2025).

Overall, smartphone video analysis is an effective tool for supporting motor learning without requiring expensive equipment.

Skill Development in Sepak Takraw

Sepak Takraw is a sport that requires good coordination, flexibility, and timing. Skills like service and spike are difficult for beginners because they involve complex movements. Many beginners struggle because they cannot easily see what they are doing wrong. Traditional teaching methods, like demonstration and verbal instructions, are sometimes not enough.

Video analysis can help solve this problem. By watching their performance, especially in slow-motion, learners can see their mistakes clearly. Slow-motion improves movement awareness and helps students understand how to correct their actions (Brodke et al. (2023).

Practice is important, but it must be done correctly. Video feedback helps ensure that learners practice the right way. It also helps them improve faster. Since smartphones are easy to use, video analysis can be applied in school PE classes. This makes learning Sepak Takraw more effective and engaging for students.

Research Gap and Rationale

Despite the documented benefits of video analysis in mainstream sports, empirical research specifically addressing Sepak Takraw remains scarce. Current literature predominantly focuses on elite athletes, leaving a significant gap in understanding how video intervention facilitates skill acquisition in novice students. Furthermore, while slow-motion analysis is a recognized tool for enhancing movement awareness (Sato, 2020), its practical application via accessible smartphone technology in a physical education setting is under-explored. This study addresses these gaps by evaluating a low-cost, slow-motion feedback framework for beginner players.

Methodology

Research Design: This study is exploratory in nature and focuses on in-depth analysis of one learner's performance improvement. The pretest, intervention, and posttest were the three primary stages of the study's methodology. During the pretest phase, the participant was required to perform ten (10) service and spike attempts under standard conditions. These performances were recorded using a smartphone and later reviewed by the researcher. Each attempt was scored using the binary checklist system (In = 1, Out = 0). The total score served as the baseline data representing the participant's initial skill level prior to the intervention.

Population and Locale of the Study

The participant of the study was one (1) grade 7 student from Gabawan National High School. The study was conducted at Tumingad Elementary School, located in Brgy. Tumingad, Odiongan, Romblon, Philippines where the participant regularly engages in physical education activities.

Research Instruments

Smartphone with video recording capability to capture and review performance

Binary checklist scoring system (In = 1, Out = 0) to evaluate each service and spike attempt

Data Gathering Procedure

The study was conducted in three primary stages: pretest, intervention, and posttest. During the pretest phase, the participant performed ten (10) service and ten (10) spike attempts under standard conditions. These were recorded using a smartphone and evaluated using a binary checklist scoring system (In = 1, Out = 0). The total score served as the baseline data.

During the intervention phase, the participant used smartphone slow-motion video analysis to review recorded performances. Feedback was provided to help improve technique in service and spike. After the intervention, a posttest was conducted following the same procedure as the pretest. The participant again performed ten (10) service and spike attempts, which were recorded and evaluated using the same scoring system.

Ethical Considerations

Prior to data collection, informed consent was obtained verbally from the participant and the participant's parent/guardian. The purpose and procedures of the study were clearly explained, and participation was entirely voluntary. The participant was assured that all information gathered would be kept confidential and used solely for research purposes. No personal identifying information was included in the study to protect the participant's privacy. The researchers adhered to basic ethical principles in conducting research involving human participants.

Results

Table: Performance of the Participant Before and After Intervention

SKILL	PRE-TEST (Frequency)	PRE-TEST (%)	POST-TEST (Frequency)	POST-TEST (%)	IMPROVEME NT
Service	3/10	30%	6/10	60%	+3 (+30%)
Spike	2/10	20%	6/10	60%	+4 (+40%)

The implementation of smartphone-based slow-motion video feedback resulted in a measurable increase in both service and spike performance. Initial pre-test data indicated low proficiency levels, with a service success rate of 30% (3/10) and a spike success rate of 20% (2/10).

Following the intervention, post-test frequencies for both skills rose to 60% (6/10). This represents a net improvement of 30% (+3 successful attempts) in service and 40% (+4 successful attempts) in spiking. These findings suggest that the integration of slow-motion video feedback may improve a participant's ability to analyze and refine high-speed athletic movements.

Limitations

The findings cannot be generalized due to the single-subject design. Furthermore, the study only examined Sepak Takraw service and spike skills, which may limit the applicability of the findings to other sports or skill domains. In addition, the built-in smartphone slow-motion video feature may have limitations in terms of quality, frame rate, and viewing angles, which could affect accuracy of movement observation and feedback. The intervention's short duration and small number of trials may also fail to accurately reflect long-term skill development. As a result, the findings should be interpreted with caution, and further studies with more participants, diverse sports, and longer intervention periods are recommended.

The study utilized a binary scoring checklist, which only measured successful and unsuccessful attempts. This limits the assessment of qualitative components such as technique, coordination, and form. Future research may incorporate a standardized performance rubric for a more comprehensive evaluation.

Discussion

The results of the study showed improvements in both service and spike performance, with increases of 30% and 40%, respectively. These findings suggest that smartphone-based slow-motion video feedback may support the development of complex motor skills. The observed improvements may be attributed to the participant's ability to repeatedly view and analyze movements in detail, which is consistent with principles of motor learning that emphasize the importance of feedback in skill acquisition (Kal et al., 2018).

The use of slow-motion video appears to have enabled the participant to examine high-speed movements that are difficult to analyze in real time. This likely contributed to improved movement awareness, particularly in terms of timing, coordination, and body positioning. These observations are aligned with previous studies indicating that video-based feedback enhances learners' ability to identify and correct errors (Mödinger et al., 2021; Brodke et al., 2023).

Furthermore, the findings indicate that accessible technologies such as smartphones may serve as practical tools in physical education and sports training. Unlike advanced video analysis systems, which are often costly and less accessible, smartphone-based feedback provides a low-cost alternative that can be easily implemented in school settings. This supports earlier research suggesting that technology-enhanced learning tools can promote engagement, self-monitoring, and reflective practice among learners (Ma et al., 2025; Romagnoli et al., 2024).

However, the results of this study should be interpreted with caution. Since the study involved only a single participant, the findings cannot be generalized to a larger population. The observed improvements may also have been influenced by other factors such as repeated practice, familiarity with the task, or increased motivation during the intervention period. Therefore, while the results suggest potential effectiveness, further research involving a larger sample size and more rigorous experimental designs is needed to confirm these findings.

Conclusion

The findings of the study revealed that the use of built-in smartphone slow-motion video feedback suggested an improvement in the Sepak Takraw service and spike skills of the participant. The increase in successful attempts from pretest to posttest indicates that the intervention appears to be effective in enhancing the player's technical performance.

The performance improvement of the Sepak Takraw player supports the idea that the slow-motion video feedback enhances motor learning through the combined role of trainer guidance and the player's systematic self-analysis. By enabling the participant to observe, analyze, and correct movements in detail, the intervention facilitated a deeper understanding of proper technique. Therefore, video-based feedback strengthens movement awareness and promotes skill acquisition through repeated observation and correction.

The study also demonstrated that built-in smartphone technology can serve as a practical, low-cost, and accessible instructional tool in physical education and sports training. Furthermore, the use of self-review and guided feedback highlights the role of technology in promoting reflective learning and self-monitoring among learners.

Recommendations

Physical education teachers and coaches are encouraged to integrate built-in smartphone slow-motion video feedback into their training sessions, particularly when teaching complex motor skills such as Sepak Takraw service and spike. This tool can help learners better understand their movements and improve performance through immediate and visual feedback.

Future researchers are advised to conduct similar studies with larger sample sizes and experimental designs to enhance the generalizability of the findings. Additionally, extending the duration of the intervention and including different skill levels or other sports would provide a more comprehensive understanding of the effectiveness of slow-motion video feedback.

Schools and educational institutions should consider promoting the use of accessible technologies, such as smartphones, as part of their instructional strategies in physical education. Providing training for teachers on how to effectively utilize video feedback can further maximize its benefits in improving student engagement, skill development, and overall learning outcomes.

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**Enhancing The Dance Execution Of Grade 12 Students Through
Micro Learning In Tiktok**

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Abstract

This study examined the effectiveness of TikTok micro-learning in enhancing the contemporary dance execution of Grade 12 students at Ilocos Norte College of Arts and Trades. Twenty students participated, divided into an experimental group using TikTok and a control group following traditional instruction. The intervention lasted eight weeks and involved structured lesson planning, video creation, teacher feedback, and student reflection. Performance was assessed using an observation rubric evaluating Formation/Blocking, Sequence of Steps, Beat, Style, and Work Ethic on a four-point scale. Results showed significant improvement in the experimental group, with post-test means indicating excellent performance in Formation (3.33), Sequence of Steps (3.58), Beat (3.58), and Style (3.25), while Work Ethic improved moderately (2.33). The overall mean increased from satisfactory (1.59) to excellent (3.43), and independent t-test results confirmed the statistical significance of these improvements. The findings suggest that TikTok effectively supports technical skill development, creative expression, and confidence in contemporary dance. However, teacher supervision remains crucial to maintain discipline and work ethic. The study recommends integrating digital micro-learning platforms into performance-based education to enhance engagement and learning outcomes. Keyword: Dance Execution, Micro Learning, Tiktok.etc

Introduction

In the rapidly evolving landscape of education, 21st-century learners are increasingly immersed in technological advancements, notably through platforms like TikTok. This phenomenon reflects the broader shift in educational dynamics influenced by the increasing integration of digital tools and social media into students' daily lives. As learners become more digitally native, traditional teaching methods often struggle to keep pace with their communication preferences and engagement styles. The researcher observed a significant decline in students' confidence to express themselves through dance during Physical

Education and Health classes, leading to poor performance task scores. This study aims to investigate how TikTok can be leveraged as a pedagogical tool to help students regain their comfort in dancing and improve their performance standards.

The classroom scenario that prompted this study involves Grade 12 students who have experienced heightened anxiety and diminished self-expression due to the shift toward remote learning and social distancing measures. The researcher aims to use TikTok as a medium to create a more engaging and less intimidating environment for dance instruction. By integrating this familiar platform into the curriculum, the objective is to facilitate student participation and enhance their learning experience.

Many educators recognize that when utilized effectively, technology can significantly enhance teaching strategies and foster student growth. Technology encompasses a wide range of tools, including audio equipment, internet resources, video platforms, and mobile devices. According to Kwok-Wing Lai (cited in Dania et al., 2017), “technology can offer opportunities for personalized instruction, cooperation, communication, and feedback.” TikTok exemplifies this potential by allowing users to create engaging content that can be shared among peers.

TikTok is not merely a social media application; it serves as a dynamic platform for creativity and collaboration. Users can produce short videos that incorporate music, special effects, and interactive features. D’Souza (2021) highlights its addictive nature and high engagement levels, making it an ideal tool for educational settings. However, the inherently intimate nature of dance poses unique challenges; tactile feedback is essential for effective learning in this discipline (Morgan, 2020).

Despite these challenges, TikTok can be transformed from a potential distraction into a valuable educational resource. Lorenz (2020) suggests that teachers can utilize TikTok to connect with students on a deeper level, fostering engagement through creative assignments that resonate with their interests.

Educators are increasingly adopting TikTok for various classroom activities, recognizing its potential to engage students in creative and meaningful ways. One popular use is key concepts, promoting both comprehension and creativity. TikTok also facilitates peer collaboration, allowing students to work together on projects even when they are physically apart. Furthermore, schools are creating TikTok groups to foster a sense of community and encourage collaboration across different classes, enhancing school spirit and engagement (Edwards, 2021).

These applications not only promote creativity but also help students feel more comfortable expressing themselves through dance.

This research study builds on previous work conducted by the researcher in 2022. By applying the same intervention across multiple cohorts of students, the effectiveness of TikTok as a learning tool can be more accurately assessed. The goal is to enhance Grade 12 students’ execution in learning contemporary dance by utilizing TikTok as an adaptive learning resource.

Statement of the Problem

This study aimed to enhance the contemporary dance execution of Grade 12 students at Ilocos Norte College of Arts and Trades through TikTok micro-learning. Specifically, it sought to answer the following questions: What was the level of contemporary dance execution of Grade 12 students in the control group? What was the level of contemporary dance execution of Grade 12 students in the experimental group after the introduction of TikTok? Was there a significant difference between the dance execution levels of Grade 12 students before and after using TikTok?

Significance of the Study

The intervention was carried out through a structured approach that integrated TikTok into the curriculum for contemporary dance lessons. The implementation process involved the following steps:

Lesson Planning: Teachers designed lesson plans that incorporated TikTok, allowing students to create and share their dance videos. These plans included specific objectives, guidelines for video creation, and assessment criteria.

Video Creation: Students engaged in creating TikTok videos that demonstrated their understanding of contemporary dance techniques. This creative process encouraged collaboration among peers, fostering a supportive learning environment.

Feedback Mechanism: After video submissions, teachers provided constructive feedback to students, focusing on both technical execution and creative expression.

Reflection and Assessment: Students reflected on their learning experiences through journaling or group discussions, assessing their confidence and skills development.

The intervention lasted for eight weeks, with TikTok being utilized in the classroom once a week. Each session was approximately 60 minutes, allowing ample time for instruction, video creation, and feedback. The overall timeframe of the intervention included:

Weeks 1-2: Introduction to TikTok and initial training sessions.

Weeks 3-6: Active lesson implementation where students created and shared videos.

Weeks 7-8: Reflection, assessment of learning outcomes, and final presentations of dance videos.

This intervention stood out for its innovative approach to combining technology with physical education in a way that resonated with students' interests. By integrating popular culture through the use of TikTok—a platform widely used and enjoyed by students—it aligned educational strategies with contemporary trends, making learning more relatable and engaging. The creative process of video production not only enhanced student engagement but also helped reduce the anxiety often associated with traditional performance-based settings. Additionally, the platform supported collaboration, allowing students to work together and learn from one another through shared content creation. Importantly, the intervention also emphasized social-emotional learning by addressing the emotional aspects of dance education, helping students build confidence and thrive in a supportive and expressive environment.

In conclusion, this innovative approach bridged the gap between traditional teaching methods and the digital preferences of the learners. By embracing TikTok as an educational tool, the study enhanced the overall learning experience in contemporary dance classes. The effectiveness of the intervention was evaluated using a comprehensive rubric, which assessed various aspects of contemporary dance execution, including formation/blocking, sequence accuracy, rhythm and synchronization (beat), stylistic expression, and work ethic. Each criterion was rated on a scale from 1 to 5, with clear descriptors for each level to ensure objective and consistent evaluation. Assessments were based on students' TikTok video submissions, peer and teacher feedback, and self-reflections. This multi-faceted evaluation approach provided a balanced and holistic measure of both technical skill and creative expression, while also highlighting student growth over the eight-week intervention.

Scope and Limitations

The study focuses on Grade 12 students enrolled in Physical Education and Health – Dance, focusing on contemporary dance. The intervention involves using TikTok once a week over eight weeks. Limitations include possible variance in students' home access to devices and the need for supervision during video submissions.

Methodology

The study involved two Grade 12 groups from Ilocos Norte College of Arts and Trades, with one group serving as the experimental group that utilized TikTok as a learning tool, and the other serving as the control group, which followed the traditional method of learning contemporary dance. A total of 20 students participated in the research through total enumeration, meaning all students who met the inclusion criteria were automatically included. The inclusion criteria were based on prior performance in dance and the demonstrated need for skill improvement, ensuring that the participants selected were those who would most benefit from the intervention. This approach allowed the researchers to systematically observe and measure the impact of TikTok on students' dance execution while maintaining a clear comparison between the experimental and control groups.

Research Instrument

The observation rubric used in this study assessed student performance based on five key criteria: Formation/Blocking, Sequence of Steps, Beat, Style, and Work Ethic. Formation/Blocking evaluated how accurately students positioned themselves on stage, maintained spatial awareness, and executed coordinated group movements. Sequence of Steps measured the students' ability to recall and perform the choreographed movements in the correct order, reflecting their mastery of the routine. Beat assessed synchronization with the rhythm and tempo of the music, ensuring that students performed in time with the accompaniment. Style focused on the expressive and creative aspects of the dance, highlighting how well students incorporated personal interpretation and genre-appropriate movements. Finally, Work Ethic captured students' level of effort, discipline, and engagement throughout the performance, including their focus, motivation, and ability to follow instructions. Each criterion was rated on a four-point scale, where 1 represented Beginning, 2 indicated Satisfactory, 3 corresponded to Proficient, and 4 denoted Excellent. This structured approach allowed for a consistent, objective, and comprehensive assessment of the students' contemporary dance execution.

Data Gathering Procedure

During the pre-observation phase, students performed contemporary dance tasks based on prior lessons, and their performances were carefully observed and recorded. Following this, the intervention was implemented, in which the experimental group used TikTok to create and submit dance videos over a period of five days each week, with guidance and support from their teachers. After the intervention, a post-observation was conducted where students performed the dance tasks again, and their execution was assessed using the same rubric applied during the pre-observation phase. Finally, the collected data from both the pre- and post-observation phases were analysed, with comparisons made using the mean and an independent t-test to determine any significant differences in the students' contemporary dance execution.

Ethical considerations included informed consent, compliance with the Data Privacy Act of 2012, voluntary participation, and emotional support.

The observation rubric was adapted from the Department of Education (DepEd) standards and assessed five criteria: Formation/Blocking, Sequence of Steps, Beat, Style, and Work Ethic. Each criterion was rated on a 1–4 scale with descriptors as follows: 1 – Beginning, 2 – Satisfactory, 3 – Proficient, and 4 – Excellent. For Formation/Blocking, students were evaluated on their clarity and accuracy in maintaining dance formations. The Sequence of Steps criterion measured the ability to recall and execute choreographed movements in proper order. Beat assessed synchronization with the rhythm of the music, while Style evaluated students' creativity and expression within the performance. Work Ethic considered the students' enthusiasm, focus, and motivation throughout the dance task (see Figure 1).

	1	2	3	4	
	Beginning	Satisfactory	Proficient	Excellent	Remarks
Formation/Blocking	Student is not clear about the dance formation/blocking.	Student sometimes observe his/her formation/blocking.	Student gets into position for the dance most of the times.	Student clearly always demonstrate the correct dance formation at all times.	
Sequence of Steps	Student seems lost or cannot follow the sequence of steps	Student follows positions of the dance but needs more familiarity on the sequence of the steps.	Student follows the dance steps and executes the dance steps with minimal misses.	Student manages to execute well in accordance with the correct sequence of steps.	

Beat	Student is out of synchrony with the beat of the dance.	Student executes some of the steps with the correct timing but still misses in some portions of the dance.	Student executes most of the steps with correct timing and with very minimal mistakes.	Student has full mastery of the dance steps and executes the steps in perfect timing.	
Style	Student lacks a distinct style on the theme specific to the dance.	Student is able to adopt some stylistic moves in performing the dance.	Student incorporates his/her distinct style in some portions of his/her moves that show characteristic of the dance.	Student demonstrates a distinct individual style in his/her dance movement consistently throughout the who le dance.	
Work Ethic	Student shows little or no enthusiasm towards the dance activity. Cannot focus and cannot follow instructions. Gets easily distracted.	Student participates in performing the dance. However, frequent reminders are needed to maintain his/her focus on the dance.	Student approaches dance with a positive attitude. But still gets distracted a few times. Can stay focused and can follow instruction well.	Student stays totally motivated to participate in the dance activity and remains focused on the dance. In fact, encourages others to perform the task.	

Figure 1-Contemporary Dance Criteria

The range of means and descriptive interpretations used to summarize the students' performance were as follows: 1.00–1.49 – Beginning, 1.50–2.49 – Satisfactory, 2.50–3.49 – Proficient, and 3.50–4.00 – Excellent (see Figure 2). These criteria provided a structured and objective method to analyze the differences in contemporary dance execution before and after the integration of TikTok as a learning tool.

Legend:

Numeric Value	Range of Means	Descriptive Interpretation
4	3.50 - 4.00	Excellent
3	2.50 –3.49	Proficient
2	1.50 – 2.49	Satisfactory
1	1.00 – 1.49	Beginning

Figure 2-Range of Means

Statistical Tools

To analyze the data, the study employed two primary statistical tools. First, the mean (\bar{x}) was calculated to determine the average level of contemporary dance execution across the five assessment criteria: Formation/Blocking, Sequence of Steps, Beat, Style, and Work Ethic. This provided a clear understanding of the overall performance trends among the students before and after the intervention. Second, an independent t-test was conducted to compare the performance levels of the control and experimental groups, evaluating whether the integration of TikTok as a learning tool had a statistically significant effect on students' contemporary dance execution. By combining these two statistical methods, the researchers were able to measure both individual criterion performance and overall differences between groups, ensuring a robust and objective analysis of the intervention's effectiveness.

Results And Discussion

This chapter presents the results and discussion of the pre- and post-observation data from Grade 12 students at Ilocos Norte College of Arts and Trades on the execution of contemporary dance with and without the use of the TikTok application.

Pre-test Dance Executions Level of the Grade 12 Students

Table 1 presents the first problem on the level of contemporary dance execution of the respondents before the integration of TikTok as an intervention in terms of formation, sequence of steps, beat, style, and work ethics we used the table below to translate the gathered data from the pre-observation's students dance execution.

Pre-test Dance Execution (Control Group)

Table 1: Pre-test Dance Execution of Grade 12 Students (Control Group)

Dance Criteria	Mean (\bar{x})	Descriptive Interpretation
Formation	1.58	Satisfactory
Sequence of Steps	1.62	Satisfactory
Beat	1.67	Satisfactory
Style	1.33	Beginning
Work Ethics	1.75	Satisfactory
Overall	1.59	Satisfactory

The pre-test results for the control group revealed that the Grade 12 students generally struggled with executing contemporary dance tasks prior to any intervention. The overall mean score of 1.59 indicated a Satisfactory level of performance across the assessed criteria. Among the five key components, Formation/Blocking, Sequence of Steps, Beat, and Work Ethics were rated as satisfactory, with mean scores of 1.58, 1.62, 1.67, and 1.75, respectively. These scores suggested that while students were able to grasp the basic elements of the dance routines, their execution lacked consistency and precision, often showing minor errors in positioning, timing, or focus.

Notably, the criterion of Style received the lowest mean score of 1.33, categorized as Beginning, indicating that students had difficulty expressing creativity and individuality in their dance movements. This low score reflected a lack of confidence and limited personal interpretation during the face-to-face performance. Observations during the pre-test indicated that several students appeared hesitant or self-conscious, which negatively affected their ability to perform stylistically and fully engage with the choreography.

The pre-test data collectively highlighted the challenges faced by students in terms of both technical execution and expressive performance. It demonstrated that although students could follow instructions to a basic degree, they required additional support and guidance to improve confidence, mastery of dance sequences, synchronization with the beat, and overall stylistic expression. These findings underscored the need for an intervention—such as the use of TikTok videos—to provide students with a platform for guided practice, self-expression, and repeated performance, thereby enhancing their overall dance execution before formal assessment.

Post-test Dance Execution (Experimental Group)

Table 2: Post-test Dance Execution of Grade 12 Students (Experimental Group)

Dance Criteria	Mean (\bar{x})	Descriptive Interpretation
Formation	3.33	Excellent
Sequence of Steps	3.58	Excellent
Beat	3.58	Excellent
Style	3.25	Excellent
Work Ethics	2.33	Satisfactory
Overall	3.22	Excellent

The post-test results for the experimental group, who utilized TikTok as a learning tool, demonstrated a marked improvement in the Grade 12 students' contemporary dance execution. The overall mean score of 3.22 reflected an Excellent level of performance, indicating that the intervention had a significant positive impact on the students' technical skills and expressive abilities. In particular, Formation/Blocking, Sequence of Steps, Beat, and Style were all rated as excellent, with mean scores of 3.33, 3.58, 3.58, and 3.25, respectively. These results suggested that students were not only able to execute the dance routines with greater precision and coordination but also showed enhanced confidence in performing complex sequences and maintaining rhythm. The criterion of Style, which previously had the lowest pre-test score, improved substantially, reflecting increased self-expression and creativity in dance movements. The TikTok platform allowed students to practice and record their performances in a low-pressure, self-paced environment, which fostered comfort and motivation while providing opportunities for self-assessment and peer comparison. Similarly, improvements in Formation, Sequence of Steps, and Beat indicated that repeated practice through video creation enhanced spatial awareness, memorization, and timing.

Work Ethics, however, received a lower score of 2.33, categorized as Satisfactory, suggesting that despite technical improvements, students' discipline and focus were somewhat inconsistent during unsupervised practice. Observations indicated that while students were highly motivated to create videos for TikTok, their attention to detail and persistence in refining the routine depended largely on individual initiative rather than teacher supervision.

Overall, the post-test findings illustrated that integrating TikTok as a learning tool effectively enhanced students' confidence, technical execution, and stylistic expression in contemporary dance. The intervention provided a supportive and engaging environment that bridged the gap between classroom instruction and independent practice, demonstrating the potential of technology-based platforms to improve performance outcomes in physical education.

t-Test for Equality of Means

Table 3: t-Test Results

Dance Criteria	Pre-test \bar{x}	Post-test \bar{x}	Mean Difference	t-value	p-value
Formation	1.58	3.33	1.75	21.99	0.001
Sequence of Steps	1.62	3.58	1.96	6.93	0.010
Beat	1.67	3.58	1.91	3.95	0.029
Style	1.33	3.25	1.92	8.69	0.006
Work Ethics	1.75	3.42	1.67	10.00	0.005
Overall Mean	1.59	3.43	1.84	8.07	0.007

The t-test results revealed a statistically significant improvement in the dance execution of Grade 12 students who participated in the TikTok intervention. Across all five criteria—Formation/Blocking, Sequence of Steps, Beat, Style, and Work Ethics—the post-test means were considerably higher than the pre-test means. Specifically, Formation improved from 1.58 to 3.33, Sequence of Steps from 1.62 to 3.58, Beat from 1.67 to 3.58, Style from 1.33 to 3.25, and Work Ethics from 1.75 to 3.42. The overall mean increased from 1.59 to 3.43, indicating a substantial enhancement in students' performance.

The calculated t-values and corresponding p-values further confirmed these improvements as statistically significant. For instance, Formation yielded a t-value of 21.99 with a p-value of 0.001, and Style showed a t-value of 8.69 with a p-value of 0.006, both well below the 0.01 significance level. Similarly, Sequence of Steps, Beat, and Work Ethics demonstrated significant differences with p-values below 0.05, confirming that the observed improvements were not due to chance.

These results strongly suggest that the integration of TikTok as a pedagogical tool positively influenced students' contemporary dance execution. The platform enabled repeated practice, self-assessment, and creative expression, which collectively enhanced both technical proficiency and confidence. Although Work Ethics showed slightly lower improvement compared to other criteria, it still demonstrated a significant increase, reflecting that student engagement and motivation were elevated by the novelty and interactivity of TikTok-based learning. Overall, the t-test analysis supports the conclusion that the TikTok intervention was effective in improving contemporary dance performance, providing empirical evidence for the benefits of integrating technology into physical education curricula.

Discussion

The findings of this study indicate that TikTok micro-learning significantly enhanced the contemporary dance execution of Grade 12 students. By providing a platform for students to rehearse independently and creatively, TikTok allowed learners to practice at their own pace, which helped reduce performance anxiety commonly observed during face-to-face evaluations. Students were able to experiment with choreography, explore stylistic variations, and replay their videos to self-assess and refine their movements, which contributed to notable improvements in technical execution, formation, sequence, beat, and overall style.

Additionally, the intervention fostered peer collaboration and feedback, as students could view and comment on each other's performances within a supportive digital environment. This social learning component encouraged students to observe peers' strengths and strategies, thereby reinforcing learning outcomes through modeling and constructive critique.

Despite these positive outcomes, the study also highlighted that teacher guidance remains essential. Work ethics, while improved, remained slightly lower than other performance criteria, suggesting that unsupervised practice may not fully cultivate discipline, focus, or sustained motivation. Teachers play a critical role in providing structured feedback, ensuring that students stay engaged, and promoting accountability in performance tasks.

In conclusion, TikTok micro-learning proved to be an effective tool for enhancing both the technical and expressive aspects of contemporary dance. When combined with strategic teacher facilitation, this approach can create a dynamic, student-centered learning environment that builds confidence, encourages creativity, and strengthens performance standards in physical education.

Conclusions

With an overall mean of 3.43, it can be concluded that the TikTok application was effective in enhancing the dance execution of Grade 12 students. The findings reveal that the integration of technology in teaching dance serves as an effective and engaging learning tool. Utilizing platforms that students are familiar with and comfortable using allows them to better understand and execute dance steps with ease and confidence. It also promotes independent practice, creativity, and active participation among learners, making the learning process more meaningful and engaging.

Recommendations

Based on the conclusions of the study, the following are recommended:

Teachers should integrate technological tools such as the TikTok application in teaching dance to align with students' interests and enhance their learning experiences.

The use of TikTok should remain under proper teacher supervision to ensure discipline, provide guidance, and promote correct execution of dance movements.

School administrators may support the use of digital platforms by providing resources, training, and policies that encourage effective integration in instruction

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**Effect of Resistance and Normal Training and Assistance and Normal Training
on the Development of Speed among Female Sprinters of Hyderabad District**

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Abstract:

The purpose of the study was to find out the effect of Resistance and Normal Training and Assistance and Normal Training on the development of Speed among Female Sprinters of Hyderabad between the age group of 18 to 20 Years. The selected Female Sprinters N=30 were randomly assigned into 3-groups and each group consist of n=10 member. 10 Sprinters underwent treatment of Resistance and Normal Training 10 Sprinters experimental group-II Assistance and Normal Training and control group 10 Sprinters participated only their regular routine of Sprint Training for 12 Weeks. To assess the Speed 50 M Run were used in the Pre Test and Post Test of the Study. Accordingly, the results obtained showed that the intervention of Resistance and Normal Training and Assistance & Normal Training on speed significantly improved among treatment groups. Key Words: Resistance and Normal Training and Assistance & Normal Training, Sprinters etc.

Introduction:

Speed is important physical fitness component in every sport. The athletes should have high level of sprinting qualities during high tensed match competitions. There are several phases in sprinting, for instance the acceleration phase is the most important phase in a race. During this phase, after the sprinter has left the starting blocks, the athlete increases the length of their stride and decreases the amount of strides taken per second. Male sprinters usually have

a stride rate of 4.6 strides per second, with female athletes little less with 4.8 strides per second.

Elite sprinters reach their highest speed at around the 60-70-meter distance, in a 100-meter race, for men. Professional women sprinters reach their top speeds at around the 50-60-meter distance. Top runners usually cover 20-30 meters at top speed.

The 100 m sprint first officially appeared in the Modern Olympics in 1896, in Athens, Greece. In the inaugural race, Thomas Burke, of the United States, claimed victory at 12.00 seconds, and was the lone sprinter who followed a squat starting stance. During the initial decades of the Olympics, the track used in Olympic and World athletic events was predominantly made of crushed cinder, clay, or dirt. In contrast, today's tracks are made of synthetic material designed to offer enhanced cushioning and elastic recoil.

Phases of Sprinting

100 Meters divided into a few phases as follows:

- a. Starting Block (set up)
- b. Starting Block Clearance (0-5 meters)
- c. Drive Phase/Acceleration (5-15 meters)
- d. Transition (15-30 meters)
- e. Maximum Velocity (30-60 meters)
- f. Speed Maintenance (60-100 meters)

Prof. Rajesh Kumar (2020) studied the effect of plyometric and Circuit training on selected physical variables among Sprinters of Hyderabad District in Telangana State. To achieve this purpose, forty five Sprinters in the age group of 16 to 20 years those who have participated in the Hyderabad Open Sprints Athletics Championships at Gachibowli Stadium, Hyderabad for the year 2019 taken as subjects. The selected forty five subjects were divided into three equal groups of fifteen each as two experimental groups and one control group, in which group – I (n=15) underwent plyometric training for three days per week for Twelve weeks, group – II

(n=15) underwent the Circuit Training for three days per week for Twelve weeks and group – III (n=15) acted as control who are not participate any training apart from their regular activities. The selected Physical variables such as abdominal strength, speed and leg explosive power were assessed before and after the training period. Sit Up Test, 50 M Dash and Standing Broad Jump are the Tests were used to conduct the pre test and post for Measuring the Physical Variables such as Abdominal Strength, Speed and explosive power of legs. The results of the study it was found that there was a significant difference of performance due to Plyometric and circuit training when compared with the control group

Purpose of the study:

The purpose of the study was to find out the effect of Resistance and Normal Training and Assistance and Normal Training on the development of Speed among Female Sprinters of Hyderabad between the age group of 18 to 20 Years

Methodology:

The selected Female Sprinters N=30 were randomly assigned into 3-groups and each group consist of n=10 member. 10 Sprinters underwent treatment of Resistance and Normal Training 10 Sprinters experimental group-II Assistance and Normal Training and control group 10 Sprinters participated only their regular routine of Sprint Training for 12 Weeks. To assess the Speed 50 M Run were used in the Pre Test and Post Test of the Study

Results and Discussion:

TABLE – 1 ANALYSIS OF VARIANCE OF EXPERIMENTAL GROUPS AND CONTROL GROUP ON SPEED OF FEMALE SPRINTERS

(Units in Seconds)

Test	RNT	ANT	CG	SV	SS	df	MS	'F' Ratio	P-Value
Pre Test									
Mean	6.84	6.94	6.92	Between	0.18	2	0.09	1.88	0.16
SD	0.18	0.24	0.23	Within	4.16	87	0.05		
Post Test									
Mean	6.25	6.49	7.12	Between	12.03	2	6.01	386.84*	0.00
SD	0.11	0.11	0.15	Within	1.35	87	0.02		

*Significant (P<0.05).

Pre-test: The M ± SD of the Group – 1,2 & 3 pre-test speed scores are 6.84 ± 0.18, 6.94 ± 0.23 and 6.92 ± 0.23 respectively. The 1.88 pre-test F value obtained was less than the required table value at 0.05 level of significance needed. “As a result, the pre-test men's importance of Resistance and Normal Training and Assistance and Normal Training and control group of speed prior to the start of the respective treatments were found to be insignificant at 0.05 level of trust for degrees 2 and 87 of freedom, this study therefore confirms that the random allocation of subjects into three groups has been successful”.

Post-test: The $M \pm SD$ of the Group - 1, 2 & 3 post-test scores are 6.25 ± 0.11 , 6.49 ± 0.11 and 7.12 ± 0.15 respectively. The 386.84 value obtained after test F was greater than the 0.00 p-value. For the degrees of freedom 2 and 87, thus, the mean speed after the test showed significant confidence at 0.05.

Conclusion:

Accordingly, the results obtained showed that the intervention of Resistance and Normal Training and Assistance & Normal Training on speed significantly improved among treatment groups

Recommendations:

The study also helps the physical educationists and coaches understanding the knowledge and performance of the players. The Resistance and Normal Training and Assistance and Normal Training is useful for the Sprinters.

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Effect of Core Strength Training and Own Body Exercises on the development of Explosive Power among Women Kho Kho Players of Andhra Pradesh

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Abstract:

The Purpose of the Study is to find out Effect of Core Strength Training and Own Body Exercises on the development of Explosive Power among Women Kho Kho Players of Andhra Pradesh between the age group of 18 to 25 Years. The study was formulated as a true random group design consisting of a pre-test and post-test. The subjects 45 Women Kho Kho Players were randomly selected from the Andhra Pradesh State and divided into three equal groups of Fifteen each. The groups were assigned as experimental group I – (Core Strength Training exercises), Experimental Group II (Own body exercises) and control group respectively. Pre tests were conducted for all the 45 subjects on selected on Explosive Power by Using the Standing Broad Jump Test. After the experimental period of twelve weeks post-test were conducted and the scores were recorded with Standing Broad Jump Test.It was concluded that 12 weeks Core Strength training and own body exercises training significantly improved explosive power among women kho-kho players. Key Words: Core Strength Training, Own Body Exercises, Explosive power,

INTRODUCTION:

Sports training aims at improving sports performance through physical, physiological, psychological, social intellectual and moral aspects thus contributing to development of all-round personality of the sports person.

Kho-Kho is a traditional Indian sport that dates back to ancient India. It is the second-most popular traditional tag game in the Indian subcontinent after kabaddi. Kho-Kho is played on a rectangular court with a central lane connecting two poles which are at either end of the court. During the game, nine players from the chasing team (attacking team) are on the field, with eight of them sitting (crouched) in the central lane, while three runners from the defending team run around the court and try to avoid being touched.

Suraram Suresh Kumar, Prof. Rajesh Kumar (2023) Studied Effect of Core Strength Training for development of Explosive Power among Kabaddi Players of Osmania University. The objective of the study is to determine the effect of Core Strength Training for development of explosive Power among Kabaddi Players of Osmania University between the age group of 18 to 25 Years..The sample for the present study consists of 20 Male Kabaddi Players out of which 10 are experimental group and 10 are controlled group. Core Strength training exercises were given to the Experimental Group along with general training of Kabaddi and control group has doing general Training of Kabaddi for eight weeks..To assess the explosive power in legs Standing Broad Jump Test were used in the Pre Test and Post Test of the Study. This study shows that the Experiment Group increase the explosive power compare to the control group. It is concluded that due to core strength training there is a improvement of explosive power among Kabaddi Players.

Purpose of Research:

The Purpose of the Study is to find out Effect of Core Strength Training and Own Body Exercises on the development of Explosive Power among Women Kho Kho Players of Andhra Pradesh between the age group of 18 to 25 Years

Methodology:

The study was formulated as a true random group design consisting of a pre-test and post-test.

The subjects 45 Women Kho Kho Players were randomly selected from the Andhra Pradesh State and divided into three equal groups of Fifteen each. The groups were assigned as experimental group I – Core Strength Training exercises i.e. Reverse body plank, trunk extension, sit ups, front plank, side plan etc were given to experimental group on alternate days i.e. three sessions per week for 12 weeks and general training of Kho Kho Experimental Group II i.e. Own body exercises such as Push ups, Sit ups, Burpees, Squat jumps, Lunges, Mountain Climbers were given to experimental group on alternate days i.e. three sessions per week for 12 weeks and general training of Kho Kho and control group will be given general training of Kho Kho. Pre tests were conducted for all the 45 subjects on selected on Explosive Power by Using the Standing Broad Jump Test. After the experimental period of twelve weeks post-test were conducted and the scores were recorded with Standing Broad Jump Test.

Results and Discussion:

Table – I Computation of “t” ratio between pre-test and post-test means of Experimental and Control groups on Explosive Power.

Groups ↓	Pre-Test for Explosive Power		Post-Test for Explosive Power		“t”-Test
	Mean	SD	Mean	SD	
Own Body exercises	2.07	0.201	2.15	0.167	2.964 *
Core Strength Training	1.87	0.298	2.28	0.142	7.509 *
Control group	1.62	0.089	1.62	0.09	1.980

The mean values of Own body Exercises is 2.07 in Pre Test, The mean values of Core Strength Training is 1.87 in Pre Test and Control Group Mean Values is 1.62. In Post Test the Own body Exercises is increased 2.07 to 2.15 and Core Strength Training Group is increased from 1.87 to 2.28 and Control Group from 1.62 to 1.62 in Post Test. There is a significant improvement of Explosive Power in two experimental groups i.e. core strength training and own body exercises.

Conclusion:

It was concluded that Core Strength Training group performs better than own body exercises group and control group. In this study due to the Core Strength Trainings exercises there is a improvement in Explosive power of legs among Kho Kho Women players

Recommendations:

It is recommended that similar studies can be conducted on other events in other events and also male kho kho players. This type of study is useful to coaches to give proper coaching for development of motor qualities for improvement of performance Sports and Games.

References:

Prof. Rajesh Kumar and Prof. Erika Zemkova, *Appl. Sci.* 2022, The Effect of 12 Week Core Strengthening and Weight Training on Muscle Strength, Endurance and Flexibility in School Aged Athletes – P12(24), 12550; <https://doi.org/10.3390/app122412550> indexed within Scopus, SCIE (Web of Science), Inspec, CAPlus / SciFinder, and other databases. Q2 (Engineering, Multidisciplinary) / CiteScore - Q2 (General Engineering) Impact Factor: 2.838 (2021); 5-Year Impact Factor: 2.921 (2021) ISSN: 2076-3417

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Effectiveness Of ICT Integration In Sports Psychology Support And Physical Education Administration In Nigeria: Implication For Health And Sports Performance

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Abstract:

This study investigated the effectiveness of Information and Communication Technology (ICT) integration in sports psychology support services and physical education administration in Nigeria. Specifically, it examined the influence of ICT on sports psychology services, its relationship with administrative efficiency, differences based on levels of ICT adoption, and the predictive role of ICT competence among personnel. A descriptive survey design was adopted. The population comprised sports psychologists, physical education lecturers, coaches, and administrative staff in public universities in Nigeria, from which a sample of 300 respondents was selected using a multistage sampling technique involving stratified and simple random sampling methods. Data were collected using a researcher-developed instrument titled ICT Integration in Sports Psychology and Physical Education Administration Questionnaire (ICT-SPEAQ), structured on a 4-point Likert scale. The instrument was validated by experts, and a reliability coefficient of 0.82 was obtained using Cronbach's alpha. Data collection was conducted through both online and face-to-face methods in line with ethical standards. Descriptive statistics were used to answer research questions, while inferential statistics tested the hypotheses at the 0.05 significance level. The findings indicated that ICT integration significantly enhances sports psychology support services and is strongly associated with improved administrative efficiency. Institutions with higher levels of ICT adoption demonstrated greater effectiveness, while ICT competence emerged as a significant predictor of performance outcomes. The findings highlight ICT as a critical tool for improving psychological well-being, athlete performance, and health-related outcomes in sports systems. The study concludes that ICT integration enhances both service delivery and administrative processes in physical education. It recommends increased investment in ICT infrastructure and continuous capacity building for personnel to optimize its benefits. **Keywords:** ICT integration, sports psychology, physical education, administration, Nigeria etc.

Introduction

The rapid advancement of Information and Communication Technology (ICT) has significantly transformed educational practices and professional fields worldwide. In contemporary education systems, ICT is widely recognized as a critical tool for enhancing instructional delivery, improving administrative efficiency, and fostering innovation. Within physical education and sports sciences, ICT integration has extended beyond traditional teaching methods to include performance monitoring, data analytics, and psychological support systems for athletes. Recent global developments indicate that digital technologies—such as artificial intelligence, wearable devices, and virtual platforms—are reshaping pedagogical practices and athlete support systems (Tahanean, Vulpe, Mijaica, & Alexe, 2025).

Sports psychology, which focuses on the mental processes influencing athletic performance, has particularly benefited from ICT innovations. Digital tools now facilitate real-time psychological assessment, remote counselling, and personalized interventions, aligning with the growing demand for data-driven approaches in athlete management. Similarly, the administration of physical education programmes has evolved through ICT-enabled systems such as electronic record management, communication platforms, and decision-support tools, enhancing organizational efficiency.

Despite these advancements, ICT integration in developing countries such as Nigeria remains uneven and constrained by systemic challenges. While ICT has been widely reported to enhance teaching, learning, and administrative processes, its effectiveness remains contingent on contextual factors such as infrastructure, policy support, and user competence (Dada, Atte, & Diana, 2025). In many Nigerian institutions, limitations such as inadequate technological infrastructure, insufficient training, and weak implementation frameworks continue to hinder optimal utilization.

Furthermore, disparities in access to ICT resources have contributed to a persistent digital divide within the field of physical education and sports. Rural and under-resourced institutions face significant barriers, including poor internet connectivity, unreliable electricity supply, and limited access to digital tools (Popoola, Adeyemi, & Akin, 2025). These challenges not only affect instructional delivery but also limit the effectiveness of sports psychology services and administrative processes.

Although existing studies have examined ICT integration in general education contexts, there is limited empirical evidence focusing specifically on its role in sports psychology support and physical education administration in Nigeria. More importantly, there is insufficient understanding of how ICT integration simultaneously influences psychological service delivery and administrative efficiency. This gap necessitates a comprehensive empirical investigation into the effectiveness of ICT integration within this specialized field.

ICT in Education Systems: The integration of ICT in education has been extensively studied, with evidence suggesting improvements in teaching effectiveness, learner engagement, and institutional management. ICT tools such as learning management systems, multimedia platforms, and digital communication technologies have been widely adopted to enhance instructional delivery. However, while these technologies offer significant benefits, their effectiveness varies across contexts. Studies indicate that successful ICT integration depends

on factors such as infrastructure availability, institutional support, and user competence (Dada *et al.*, 2025). Thus, the impact of ICT is not uniform but shaped by the readiness of educational systems to adopt and sustain technological innovations.

ICT in Physical Education and Sports Performance: In the domain of physical education, ICT has introduced innovative approaches to teaching and performance enhancement. Digital tools—including fitness applications, video analysis software, and virtual simulations—have been used to improve student participation, motivation, and skill acquisition. Isaiah and Sambo (2025) reported increased engagement among students exposed to ICT-based learning environments, while Chorlime and Emmanuel (2025) highlighted the role of multimedia resources in creating interactive and learner-centered experiences. Nevertheless, while ICT has been associated with improved performance outcomes, its effectiveness remains dependent on the availability of appropriate facilities and the competence of instructors. Without adequate support systems, the integration of technology in physical education may not yield the expected benefits.

ICT in Sports Psychology and Athlete Health: ICT has significantly influenced sports psychology by enabling more efficient and accessible psychological support systems. Technologies such as mobile applications and wearable devices facilitate continuous monitoring of athletes' mental and physiological states, allowing for timely interventions and personalized support strategies (Tahanean *et al.*, 2025). These innovations contribute to improved psychological well-being, stress management, and overall athlete performance. However, the effectiveness of ICT in sports psychology is contingent upon data accuracy, user trust, and professional competence. In contexts where digital literacy is limited or technological tools are not readily available, the potential benefits of ICT-driven psychological support may not be fully realized.

ICT in Administration and Management: ICT plays a critical role in enhancing administrative efficiency in educational institutions. Digital systems for data management, communication, and decision-making streamline organizational processes and improve coordination. Research indicates that ICT integration facilitates efficient record keeping, faster information dissemination, and improved institutional governance (Dada *et al.*, 2025). Despite these advantages, the successful application of ICT in administration depends on institutional commitment, adequate funding, and staff training. Inadequate implementation strategies may lead to underutilization of available technologies, thereby limiting their impact on administrative performance.

Challenges of ICT Integration in Developing Countries: One of the most significant barriers to ICT integration is the digital divide, which creates disparities in access to technological resources across institutions and regions. In Nigeria, infrastructural deficiencies, socioeconomic inequalities, and inconsistent policy implementation continue to limit ICT adoption, particularly in rural areas (Popoola *et al.*, 2025). In addition to infrastructural challenges, human factors such as ICT competence, self-efficacy, and motivation significantly influence technology adoption. Igbozuruike *et al.* (2025) found that ICT competence mediates the relationship between technology use and performance outcomes, emphasizing the need for capacity building. Similarly, Obi and Berkhout-Nwaobi (2025) reported that users' confidence and motivation are critical determinants of ICT utilization.

While ICT has been widely acknowledged as a transformative tool, these challenges highlight the need for context-specific strategies to ensure effective integration. Addressing infrastructural deficits, enhancing user competence, and strengthening policy frameworks are essential for maximizing the benefits of ICT in physical education and sports-related disciplines.

Link to Present Study: The reviewed literature underscores the transformative potential of ICT across educational, psychological, and administrative domains, while also revealing significant contextual limitations. Notably, there is a scarcity of empirical studies that simultaneously examine ICT integration in sports psychology support and physical education administration within the Nigerian context. This study, therefore, seeks to bridge this gap by providing a comprehensive analysis of ICT effectiveness, taking into account factors such as utilization, competence, and institutional conditions. Introduction

The rapid advancement of Information and Communication Technology (ICT) has significantly transformed educational practices and professional fields worldwide. In contemporary education systems, ICT is widely recognized as a critical tool for enhancing instructional delivery, improving administrative efficiency, and fostering innovation. Within physical education and sports sciences, ICT integration has extended beyond traditional teaching methods to include performance monitoring, data analytics, and psychological support systems for athletes. Recent global developments indicate that digital technologies—such as artificial intelligence, wearable devices, and virtual platforms—are reshaping pedagogical practices and athlete support systems (Tahanean *et al.*, 2025).

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Despite these advancements, ICT integration in developing countries such as Nigeria remains uneven and constrained by systemic challenges. While ICT has been widely reported to enhance teaching, learning, and administrative processes, its effectiveness remains contingent on contextual factors such as infrastructure, policy support, and user competence (Dada *et al.*, 2025). In many Nigerian institutions, limitations such as inadequate technological infrastructure, insufficient training, and weak implementation frameworks continue to hinder optimal utilization.

Furthermore, disparities in access to ICT resources have contributed to a persistent digital divide within the field of physical education and sports. Rural and under-resourced institutions face significant barriers, including poor internet connectivity, unreliable electricity supply, and limited access to digital tools (Popoola *et al.*, 2025). These challenges not only affect instructional delivery but also limit the effectiveness of sports psychology services and administrative processes.

Although existing studies have examined ICT integration in general education contexts, there is limited empirical evidence focusing specifically on its role in sports psychology support

and physical education administration in Nigeria. More importantly, there is insufficient understanding of how ICT integration simultaneously influences psychological service delivery and administrative efficiency. This gap necessitates a comprehensive empirical investigation into the effectiveness of ICT integration within this specialized field.

Literature Review

ICT in Education Systems: The integration of ICT in education has been extensively studied, with evidence suggesting improvements in teaching effectiveness, learner engagement, and institutional management. ICT tools such as learning management systems, multimedia platforms, and digital communication technologies have been widely adopted to enhance instructional delivery. However, while these technologies offer significant benefits, their effectiveness varies across contexts. Studies indicate that successful ICT integration depends on factors such as infrastructure availability, institutional support, and user competence (Dada *et al.*, 2025). Thus, the impact of ICT is not uniform but shaped by the readiness of educational systems to adopt and sustain technological innovations.

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lead to underutilization of available technologies, thereby limiting their impact on administrative performance.

Challenges of ICT Integration in Developing Countries: One of the most significant barriers to ICT integration is the digital divide, which creates disparities in access to technological resources across institutions and regions. In Nigeria, infrastructural deficiencies, socioeconomic inequalities, and inconsistent policy implementation continue to limit ICT adoption, particularly in rural areas (Popoola *et al.*, 2025).

In addition to infrastructural challenges, human factors such as ICT competence, self-efficacy, and motivation significantly influence technology adoption. Igbozuruike, Nwankwo, & Eze (2025) found that ICT competence mediates the relationship between technology use and performance outcomes, emphasizing the need for capacity building. Similarly, Obi and Berkhout-Nwaobi (2025) reported that users' confidence and motivation are critical determinants of ICT utilization.

While ICT has been widely acknowledged as a transformative tool, these challenges highlight the need for context-specific strategies to ensure effective integration. Addressing infrastructural deficits, enhancing user competence, and strengthening policy frameworks are essential for maximizing the benefits of ICT in physical education and sports-related disciplines.

Link to Present Study: The reviewed literature underscores the transformative potential of ICT across educational, psychological, and administrative domains, while also revealing significant contextual limitations. Notably, there is a scarcity of empirical studies that simultaneously examine ICT integration in sports psychology support and physical education administration within the Nigerian context. This study, therefore, seeks to bridge this gap by providing a comprehensive analysis of ICT effectiveness, taking into account factors such as utilization, competence, and institutional conditions.

Statement of the Problem:

The integration of Information and Communication Technology (ICT) has transformed professional practices across sectors, including education, health, and sports. In physical education and sports sciences, ICT offers considerable potential for enhancing sports psychology support services and improving administrative efficiency. Sports psychology plays a vital role in strengthening athletes' mental resilience, motivation, and performance, and increasingly depends on digital tools for assessment, monitoring, feedback, and intervention. Similarly, effective administration of physical education programmes requires efficient data management, communication systems, and evidence-based decision-making processes, all of which can be enhanced through ICT integration.

Despite these potentials, the application of ICT in sports psychology support and physical education administration in Nigeria remains limited, inconsistent, and largely underutilized. Many institutions continue to rely on traditional, manual approaches to psychological support and programme management, thereby restricting timely intervention, accurate data tracking, and overall operational efficiency. In addition, disparities in ICT infrastructure, accessibility, and user competence among sports psychologists, lecturers, coaches, and administrators further constrain effective adoption and utilization.

While existing studies have examined ICT integration in general educational contexts, there is a clear gap in empirical research focusing specifically on its effectiveness within sports psychology support and physical education administration in Nigeria. Furthermore, limited attention has been given to understanding how ICT integration simultaneously influences psychological service delivery, administrative efficiency, and the predictive role of ICT competence in these domains.

The consequences of this gap are significant. Failure to integrate ICT effectively may compromise athlete mental health support and administrative decision-making efficiency, ultimately affecting performance outcomes and the quality of physical education programmes. Without empirical evidence to guide policy and practice, efforts to modernize sports systems through technology may remain fragmented and ineffective.

It is against this backdrop that this study seeks to empirically investigate the effectiveness of ICT integration in sports psychology support and physical education administration in Nigeria. The study aims to provide evidence-based insights that will inform policy formulation, enhance professional practice, and support capacity development for improved service delivery and performance outcomes in the sports sector.

Hypotheses:

1. ICT integration has no significant effect on sports psychology support services in physical education programmes in Nigeria.
2. There is no significant relationship between the level of ICT utilization and administrative efficiency in physical education programmes in Nigeria.
3. There is no significant difference in the effectiveness of sports psychology support between institutions with high ICT integration and those with low ICT integration in Nigeria.
4. ICT competence of sports psychologists and physical education administrators does not significantly predict the effectiveness of sports psychology support and programme management in Nigeria.

Methodology:

This study adopted a descriptive survey research design to examine the effectiveness of ICT integration in sports psychology support and physical education administration in Nigeria. The choice of this design was justified by its suitability for collecting data from a large and diverse population and for analyzing existing conditions without manipulation of variables. It also enabled the examination of relationships, group differences, and predictive effects among variables as reflected in the stated hypotheses.

The population of the study comprised all sports psychologists, physical education lecturers, coaches, and administrative staff involved in physical education programmes in public universities in Nigeria. The sampling frame included selected federal and state universities drawn from different geopolitical zones to ensure adequate representation of institutional and regional variations in ICT integration.

A sample size of 300 respondents was selected using a multistage sampling procedure. At the first stage, a stratified sampling technique was employed to categorize participants into four

strata: sports psychologists, physical education lecturers, coaches, and administrative staff. In the second stage, simple random sampling was used to select participants proportionately from the identified institutions within each geopolitical zone. This approach ensured representativeness and minimized sampling bias.

Data were collected using a researcher-designed questionnaire titled ICT Integration in Sports Psychology and Physical Education Administration Questionnaire (ICT-SPEAQ). The instrument consisted of four sections: demographic information, ICT integration, sports psychology support effectiveness, and administrative efficiency. Responses were structured on a 4-point Likert scale ranging from Strongly Agree to Strongly Disagree.

To ensure the quality of the instrument, face and content validity were established through expert review in sports psychology, educational technology, and measurement and evaluation. Their feedback informed the refinement of the instrument for clarity, relevance, and construct adequacy. A pilot study was conducted using 30 respondents outside the main sample, and the data obtained were analyzed using Cronbach’s alpha, yielding a reliability coefficient of 0.82, which indicates acceptable internal consistency.

Data collection was carried out through a combination of online (Google Forms) and face-to-face administration. Respondents were given sufficient time to complete the questionnaire. Ethical standards were strictly adhered to, including voluntary participation, informed consent, and confidentiality of responses. Ethical approval was obtained from the relevant institutional review board.

For data analysis, descriptive statistics (mean and standard deviation) were used to answer the research questions, while inferential statistics were employed to test the hypotheses at a 0.05 level of significance. Specifically, simple linear regression, Pearson Product Moment Correlation (PPMC), independent samples t-test, and multiple regression analysis were utilized. All analyses were conducted using appropriate statistical software, and decisions were based on p-values and calculated test statistics.

Results:

Hypothesis 1: ICT integration has no significant effect on sports psychology support services in physical education programmes in Nigeria.

Table 1: Simple Linear Regression Analysis of ICT Itegration and Sports Psychology Support

Variables	B	Std. Error	Beta (β)	t-value	p-value
(Constant)	12.43	1.32	-	9.43	.000
ICT Integration	0.68	0.09	0.62	7.56	.000

Table 1 shows that ICT integration significantly predicts sports psychology support services ($\beta = 0.62$, $p < .05$). Since $p < 0.05$, the null hypothesis is rejected. This implies that ICT integration has a significant positive effect on sports psychology support services

Hypothesis 2: There is no significant relationship between the level of ICT utilization and administrative efficiency in physical education programmes in Nigeria.

Table 2: Pearson Product Moment Correlation

Variables	N	r-value	p-value
ICT Utilization & Admin Efficiency	300	0.71	.000

The correlation coefficient ($r = 0.71$) indicates a strong positive relationship between ICT utilization and administrative efficiency. Since $p < 0.05$, the null hypothesis is rejected. This means that higher ICT utilization is associated with improved administrative efficiency.

Hypothesis 3: There is no significant difference in the effectiveness of sports psychology support between institutions with high ICT integration and those with low ICT integration in Nigeria.

Table 3: Independent Samples t-test

Group	N	Mean	SD	t-value	p-value
High ICT Integration	150	78.45	6.12		
Low ICT Integration	150	65.30	7.05	12.84	.000

Table 3 shows that there is significant difference in sports psychology support effectiveness between institutions with high and low ICT integration ($t = 12.84$, $p < 0.05$). Therefore, the null hypothesis is rejected. Institutions with higher ICT integration perform.

Hypothesis 4: There is no significant difference in the effectiveness of sports psychology support between institutions with high ICT integration and those with low ICT integration in Nigeria.

Table 4: Multiple Regression Analysis

Variables	B	Std. Error	Beta (β)	t-value	p-value
(Constant)	10.21	1.45	-	7.04	.000
ICT Competence	0.55	0.08	0.48	6.88	.000
ICT Utilization	0.31	0.07	0.29	4.43	.000

Table 4 shows that ICT competence significantly predicts effectiveness of sports psychology support and programme management ($\beta = 0.48, p < .05$). since $p < 0.05$, the null hypothesis is rejected. ICT competence is a strong predictor of effectiveness

Discussion:

The findings of this study revealed that all four null hypotheses were rejected, indicating that ICT integration plays a significant role in enhancing sports psychology support services and physical education administration in Nigeria. These results are consistent with existing empirical literature and provide further insight into the mechanisms through which ICT influences service delivery and organizational effectiveness.

The result showed that ICT integration significantly predicts sports psychology support services. This outcome may be attributed to the capacity of ICT tools to enable real-time psychological assessment, continuous monitoring, and personalized intervention strategies. Digital platforms facilitate timely feedback and interaction between practitioners and athletes, thereby improving the quality and responsiveness of psychological support services. This finding aligns with Dada, Adeyemi, & Ogunleye (2025), who reported that ICT tools enhance communication and service efficiency, and with Ruija, Wenling, & Xuemei (2025), whose meta-analysis highlighted the positive impact of ICT-based interventions on psychological outcomes. In the context of sports psychology, tools such as mobile applications, wearable technologies, and virtual simulations enhance assessment accuracy and intervention effectiveness. The findings suggest that ICT-mediated psychological interventions may enhance athletes' mental resilience and well-being, thereby contributing to improved emotional stability, motivation, and performance readiness.

The study also found a strong positive relationship between ICT utilization and administrative efficiency. This result likely reflects the ability of ICT systems to streamline data management, improve communication flow, and support evidence-based decision-making processes. Automated systems reduce administrative workload, minimize errors, and enhance coordination among stakeholders. This finding is consistent with studies by Dada et al. (2025) and Nuhu and Onyema (2024), which emphasize the role of ICT in improving institutional management processes. The implication is that efficient administrative systems enable timely planning, resource allocation, and programme monitoring, all of which are critical for effective physical education delivery and sports programme management.

Furthermore, the findings revealed a significant difference in effectiveness between institutions with high and low ICT integration, with high-integration institutions demonstrating superior outcomes. This may be explained by the availability of advanced technological infrastructure and greater exposure to digital tools in such institutions, which enhance both instructional delivery and support services. Institutions with higher ICT integration are better positioned to implement innovative teaching methods, provide comprehensive psychological support, and manage programmes efficiently. This aligns with findings by Ahmed, Odidi, & Musa (2025) and Gonfa, Birhanu, & Gendo (2024), who reported improved performance outcomes in technology-rich environments. In terms of sports performance, this suggests that athletes in ICT-enabled environments benefit from improved training support, enhanced feedback mechanisms, and better psychological preparation.

The study further revealed that ICT competence significantly predicts the effectiveness of sports psychology support and programme management. This finding highlights the critical role of human capacity in technology integration. The observed effect may be due to the fact that individuals with higher ICT competence are better able to utilize digital tools effectively, interpret data accurately, and implement appropriate interventions. This is supported by Badmus, Jita, & Jita (2026) and Li (2025), who emphasized that users' skills, confidence, and readiness significantly influence ICT adoption and outcomes. The implication is that without adequate competence, even well-established ICT systems may be underutilized or misapplied.

From a broader perspective, these findings have important implications for athlete mental health, sports performance, and policy development. Improved ICT integration enhances access to psychological support services, enabling early detection and management of mental health challenges such as stress, anxiety, and burnout among athletes. This contributes to better psychological well-being and sustained performance. In terms of sports performance, ICT facilitates data-driven training, performance tracking, and personalized coaching, leading to improved outcomes and competitive advantage.

At the policy level, the results underscore the need for strategic investment in ICT infrastructure, training, and institutional support systems. Failure to address these areas may limit the potential benefits of ICT integration and widen existing disparities between institutions. Therefore, policymakers and stakeholders must prioritize digital transformation initiatives that support both technological access and human capacity development.

Overall, the findings reinforce the argument that while ICT integration offers significant benefits, its effectiveness is influenced by contextual factors such as infrastructure, competence, and institutional support. Addressing these factors is essential for maximizing the impact of ICT in sports psychology support and physical education administration.

Implications of the Findings:

The overall findings of this study are consistent with the growing body of empirical literature that emphasizes the transformative potential of ICT in education and related fields. ICT integration enhances service delivery, improves administrative efficiency, and promotes data-driven decision-making. However, the effectiveness of ICT largely depends on the level of utilization and the competence of users. In the Nigerian context, these findings highlight the need for improved ICT infrastructure, continuous professional development, and institutional support for digital transformation. By addressing these factors, institutions can fully leverage ICT to enhance sports psychology support services and physical education administration. The results of this study corroborate recent empirical evidence that ICT integration is a significant determinant of effectiveness in educational and support systems. The rejection of all null hypotheses indicates that ICT is not only relevant but essential for modernizing sports psychology and physical education practices in Nigeria. The study therefore contributes to existing literature by providing empirical evidence specific to this specialized field while reinforcing broader findings on ICT in education.

Conclusion:

This study examined the effectiveness of Information and Communication Technology (ICT) integration in sports psychology support services and physical education administration in Nigeria. The findings revealed that ICT integration has a significant positive effect on sports psychology support, enhances administrative efficiency, and contributes to improved overall effectiveness of physical education programmes. Consequently, all null hypotheses were rejected, confirming the relevance of ICT as a critical tool in modern sports systems.

The study demonstrated that ICT tools facilitate more effective psychological assessment, monitoring, and intervention, thereby improving the quality of support provided to athletes. This contributes to enhanced mental resilience, motivation, and overall psychological well-being, which are essential components of optimal athletic performance. In addition, the integration of ICT in administrative processes was found to improve data management, communication, and decision-making efficiency, enabling institutions to operate more effectively and respond promptly to emerging needs.

Furthermore, the findings indicated that institutions with higher levels of ICT integration achieve better outcomes in both psychological support services and programme management. This suggests that ICT-enabled environments provide a more structured, data-driven, and responsive framework for managing sports programmes and supporting athlete development. The role of ICT competence was also highlighted as a key determinant of effectiveness, emphasizing that the benefits of technology integration depend largely on the skills and readiness of personnel. However, the study also established that the effectiveness of ICT integration is influenced by contextual factors such as infrastructure availability, user competence, and institutional support. In settings where these enabling conditions are inadequate, the potential benefits of ICT may not be fully realized. In conclusion, ICT integration is a critical driver of improved sports psychology support, administrative efficiency, and athlete performance in Nigeria. Its successful implementation requires strategic investment in infrastructure, continuous capacity development, and supportive institutional policies to ensure sustainable and effective utilization.

Recommendations:

Based on the findings of this study, the following recommendations are made to enhance ICT integration in sports psychology support services and physical education administration in Nigeria:

- **Strengthen ICT Infrastructure in Sports and Educational Institutions:** Government and relevant stakeholders should prioritize large-scale investment in ICT infrastructure to support effective sports psychology services and physical education administration. This includes reliable internet connectivity, stable electricity supply, and modern digital facilities to ensure sustained ICT utilization.
- **Establish ICT Laboratories for Sports Analytics:** Institutions should develop specialized ICT laboratories equipped for sports data analysis and performance monitoring. These labs will support evidence-based decision-making in training, athlete assessment, and programme evaluation, thereby improving sports performance outcomes.

- **Adopt Digital Psychological Support Platforms:** Universities and sports institutions should implement digital psychological support systems such as mobile counselling applications, tele-psychology platforms, and online mental health monitoring tools. These platforms will enhance access to psychological services and promote continuous mental health support for athletes.
- **Promote Wearable Technology Adoption in Sports:** Sports organizations should integrate wearable technologies such as fitness trackers, heart rate monitors, and GPS-based performance systems. These devices will enable real-time monitoring of athletes' physiological and psychological states, thereby improving training efficiency and injury prevention.
- **Develop Sports Data Management Systems:** Institutions should adopt centralized digital sports data management systems to improve record keeping, performance tracking, and administrative coordination. Such systems will enhance efficiency, reduce errors, and support evidence-based sports programme management.
- **Institutionalize Continuous ICT Training for Personnel:** Regular professional development programmes should be implemented to enhance ICT competence among sports psychologists, lecturers, coaches, and administrators. This will ensure effective utilization of digital tools in both psychological support and administrative processes.
- **Enhance Digital Literacy Among Athletes and Students:** Structured digital literacy programmes should be introduced to ensure that athletes and students can effectively use ICT tools for learning, training, and self-monitoring. This will maximize the benefits of ICT-enabled sports environments.
- **Ensure Effective Implementation of ICT Policies:** ICT-related policies in education and sports should move beyond formulation to full implementation, monitoring, and evaluation. This will ensure that investments in ICT translate into measurable improvements in performance and administration.
- **Promote Blended and Technology-Enhanced Learning Models:** Institutions should adopt blended learning approaches that integrate traditional physical education methods with ICT-based training, simulation, and analysis tools to improve learning and performance outcomes.
- **Address Structural and Contextual Barriers to ICT Use:** Challenges such as inadequate funding, poor electricity supply, and limited internet access must be addressed to ensure that ICT integration achieves its intended impact on sports psychology support and administrative efficiency.
- **Encourage Continuous Research and Innovation in Sports Technology:** Further empirical studies should be conducted to evaluate emerging technologies in sports psychology, athlete performance, and sports administration. This will support evidence-based innovation and continuous improvement.
- **Foster Strategic Partnerships for Sustainable ICT Development:** Collaboration with private sector organizations, technology companies, and international agencies should be strengthened to provide funding, technical expertise, and innovation in sports ICT deployment.

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Understanding Sport Injury Anxiety Among Runners in Vietnam

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Abstract

In recent years, Vietnam has witnessed a rapid growth in community running events, with dozens of large-scale road and trail races organized annually and participation expanding across age groups, reflecting the increasing popularity of recreational running. The SIAS-21 was selected due to its concise structure, multidimensional coverage of cognitive, emotional, and social aspects of injury anxiety, and its demonstrated reliability across different sport contexts [1]. Results showed that anxiety about reinjury and pain were most salient, followed by concerns about loss of athleticism and loss of social support; in contrast, worries about being perceived as weak and an impaired self-image were comparatively lower. Younger runners reported significantly higher anxiety regarding loss of social support and letting down important others compared with older groups. Overall, these findings extend injury-anxiety evidence beyond professional athletes to recreational runners in Southeast Asia and inform targeted psychological and educational supports to enhance perceived safety, coping efficacy, and sustained participation. **Keywords:** SIAS-21, running, injury, anxiety etc.

Introduction

Participation in sport is widely regarded as a cornerstone of physical health, psychological well-being, and social connectedness. Yet these benefits coexist with an inherent risk of injury that is, to a considerable extent, inseparable from athletic engagement. Beyond the somatic damage, injuries often precipitate complex psychological responses that shape rehabilitation trajectories and performance upon return [2], [3]. Injured athletes may contend not only with pain but also with elevated stress, diminished confidence, and fears of reinjury, all of which underscore the critical role of psychological processes in recovery and return-to-sport [4].

In Vietnam, large-scale community running events, such as the Vietnam Mountain Marathon in Sa Pa and the Dalat Ultra Trail in Lam Dong, attract thousands of participants across age groups and nationalities, highlighting the rapid expansion of recreational running and sport tourism [5]. Beyond these flagship events, road races and community-based running programs have proliferated in major cities, indicating that running has become a widely accessible and increasingly popular form of recreational sport nationwide. This surge has not only contributed to public health promotion and the expansion of sport tourism, but has also raised growing concerns regarding the safety and psychological well-being of runners.

Although the physiological mechanisms of sport injuries have been extensively investigated, the psychological dimension, particularly anxiety related to injury, has received comparatively less scholarly attention. This form of anxiety, commonly referred to as Sport Injury Anxiety (SIA), reflects an individual's cognitive, emotional, and behavioral responses to the threat or consequences of being injured [1]. Earlier studies in sport psychology tended to mention fear of injury only in a general sense without conceptual clarity [6], [7]. Later, Reneman et al. (2003) offered a more systematic definition, describing injury anxiety as an excessive fear that restricts one's physical performance due to perceived vulnerability to pain or reinjury [8]. Additionally, closely related to injury anxiety, kinesiophobia refers to an excessive fear of movement due to concerns about pain or reinjury [8, 15]. Although conceptually distinct, both constructs reflect maladaptive cognitive-emotional responses that may influence rehabilitation and return-to-sport behaviors. This conceptualization helped distinguish the cognitive component of fear from the behavioral avoidance patterns that often emerge after an athlete's injury.

Anxiety responses may manifest as distraction and attentional deficits [9], heightened muscular tension, momentary hesitation during performance, and avoidance tendencies such as pulling back or withdrawing from contact situations [10]. These reactions can impair performance and may elevate the likelihood of reinjury, particularly when they disrupt technique or decision-making under pressure [4].

Notwithstanding these risks, most empirical work on sport-injury anxiety has centered on elite or professional athletes, whereas recreational participants who often lack consistent medical, coaching, and psychological support have received comparatively less attention despite facing similar challenges.

Within this population, running is among the most prevalent forms of physical activity globally and is sustained by millions of adults as a means of maintaining health and well-being [11]. Epidemiological syntheses suggest that the annual incidence of musculoskeletal injury among runners ranges widely from approximately 19% to 79%, reflecting variation in definitions, samples, and follow-up periods; commonly affected sites include the knee, lower leg, Achilles tendon, and plantar fascia [12].

Despite this expansion, little research has examined the level and manifestation of sport injury anxiety among runners in Vietnam, a context characterized by a fast-developing participatory sport culture but limited access to psychological support and sport medicine services.

Building upon the above context, the present study aims to assess the level and characteristics of sport injury anxiety among runners in Vietnam by employing the Sports Injury Anxiety Scale-21 (SIAS-21) developed by Rex and Metzler (2016) [1]. Specifically, the study examines differences in injury anxiety across gender, age, and running experience.

This study contributes to sport psychology in three interrelated ways. First, it broadens inquiry beyond elite athletes to the rapidly growing population of recreational runners, a cohort that has received comparatively limited empirical attention. Second, it supplies context-sensitive evidence from Southeast Asia, where running has become a salient social phenomenon but where psychological aspects of safe participation remain underexamined. Third, it distills practical implications for coaches, event organizers, and sport-medicine practitioners by informing the design of educational and psychological supports that foster safer training and sustained motivation.

Taken together, the findings are expected to clarify the role of injury anxiety as a psychological correlate of the sustainability of running participation. By linking physical and mental dimensions of injury prevention within Vietnam's running community, the study aims to support a more integrated approach to enhancing safety and performance..

Materials And Methods

Participants

Data were collected through a self-administered online questionnaire between November 2023 and April 2024. Facebook and Zalo were selected as distribution platforms, as they host large, active, runner-specific communities in Vietnam and are commonly used to share training information, race registration details, and injury-related discussions. Participation was voluntary and anonymous; no personally identifiable information was

collected. Informed consent was obtained prior to participation. The study involved no intervention and did not include vulnerable populations.

A total of 208 recreational and semi-professional runners in Vietnam voluntarily participated in this study. After data screening, 196 valid responses were retained for analysis, consisting of 65.8% male and 34.2% female participants. Eligibility criteria included: (1) being 18 years of age or older, (2) having a consistent running routine for at least three consecutive months, and (3) having participated in at least one running event (e.g., 3 km, 5 km, 10 km, half marathon, or longer distances). All participants provided informed consent after receiving a full explanation of the study's purpose and procedures.

Research Instrument

A structured questionnaire consisting of demographic items and the Sport Injury Anxiety Scale-21 (SIAS-21) was employed as the primary research instrument. Originally, the Sport Injury Anxiety Scale (SIAS) included 51 items, developed based on Lazarus's (1991) cognitive motivational relational theory of emotion and the cognitive appraisal model proposed by Wiese-Bjornstal et al. (1998) [3], [13]. As noted by Schwarz (1999), the measurement of sport-injury anxiety is undertaken under the assumption that respondents have encountered sport-related injuries before, which motivates item stems that start, for example, with phrases such as "When experiencing an injury". The primary purpose of the scale is to assess the degree of anxiety related to physical, psychological, and social consequences that people perceive when facing sport-related injuries.

Then, in 2016, Rex and Metzler further developed a condensed version of the scale comprising 21 items across seven validated facets: (1) Loss of Athleticism, (2) Being Perceived as Weak, (3) Experiencing Pain, (4) Loss of Social Support, (5) Letting Down Important Others, (6) Reinjury, (7) Impaired Self-Image. Participants rated their agreement with each statement on a five-point Likert scale ranging from strongly disagree to strongly agree, with higher scores indicating higher levels of injury-related anxiety. The translation of the questionnaire from English to Vietnamese was conducted by ten English language specialists from the South-East Asian Ministers of Education Organization (SEAMEO) Regional Training Centre (Vietnam). The Vietnamese version was subsequently reviewed and refined by a panel of experts in linguistics, psychology, and sport sciences to ensure conceptual and cultural equivalence. A pilot test involving ten recreational runners was then carried out to examine the clarity and comprehensibility of the items. Minor modifications were made based on the participants' feedback prior to the full-scale data collection.

Data Analysis

The data were processed using SPSS version 26.0. Descriptive statistics (mean and standard deviation) were calculated for the total score and each factor of the SIAS-21. Independent-samples t-tests were applied to compare levels of injury anxiety across gender, age groups, and injury history. In addition, a one-way analysis of variance (ANOVA) was conducted to determine differences among groups with different running experience durations.

RESULTS

Scale Reliability Test of SIAS-21

The reliability analysis of the SIAS-21 scale showed a Cronbach's Alpha coefficient of 0.912, exceeding the acceptable threshold of 0.70 indicating excellent internal consistency [14]. All 21 observed items demonstrated Corrected Item–Total Correlations greater than 0.3, confirming strong associations among the items and the overall construct. Given that the SIAS-21 has been theoretically grounded and psychometrically validated in prior research, we assessed internal consistency reliability to evaluate its applicability in the Vietnamese running context. Accordingly, no exploratory factor analysis was performed.

Overall injury anxiety level among runners

The results of the descriptive statistical analysis indicated that, among the seven dimensions of the Sport Injury Anxiety Scale (SIAS-21) (Rexa & Metzler, 2016), the factor with the highest mean score was Reinjury ($M = 4.03 \pm 1.036$), reflecting the athletes' greatest concern about the possibility of experiencing another injury during training or competition. This was followed by Experiencing Pain ($M = 3.86 \pm 0.970$), suggesting that participants continued to exhibit considerable anxiety toward pain associated with previous injuries. Three other dimensions showed moderately high levels of anxiety, including Letting Down Important Others ($M = 3.60 \pm 0.992$), Loss of Athleticism ($M = 3.59 \pm 1.086$), and Loss of Social Support ($M = 3.57 \pm 1.010$). In contrast, two dimensions had lower mean values, namely Being Perceived as Weak ($M = 3.28 \pm 1.140$) and Impaired Self-Image ($M = 3.34 \pm 0.886$). Overall, these findings indicate that the runners in the sample experienced the highest anxiety related to fear of reinjury and pain, whereas social-related concerns, such as self-image and perceived evaluation by others, were rated at comparatively lower levels.

Differences in Sports Injury Anxiety by Demographic Factors

Differences by gender

Table 1. Differences in Sports Injury Anxiety Levels by Gender

	Group	N	M	SD	p
Loss of Athleticism	Male	129	3.55	1.079	.415
	Female	67	3.68	1.103	
Being Perceived as Weak	Male	129	3.31	1.129	.076
	Female	67	3.23	1.168	
Experiencing Pain	Male	129	3.90	0.972	.136
	Female	67	3.77	0.966	
Loss of Social Support	Male	129	3.47	1.083	.051
	Female	67	3.77	0.825	
Letting Down Important Others	Male	129	3.55	0.957	.313
	Female	67	3.70	1.057	
Reinjury	Male	129	4.04	0.997	.755
	Female	67	4.00	1.114	
Impaired self-image	Male	129	3.33	0.906	.779
	Female	67	3.36	0.854	

The results of the Independent Samples t-test revealed no statistically significant differences between male and female runners in any of the seven dimensions of the Sport Injury Anxiety Scale (SIAS-21) ($p > .05$). Specifically, the mean scores of male runners ranged from $M = 3.31 \pm 1.129$ to $M = 4.04 \pm 0.997$, while those of female runners ranged from $M = 3.23 \pm 1.168$ to $M = 4.00 \pm 1.114$. Across most dimensions, female runners tended to report slightly higher mean scores than males, except for the Being Perceived as Weak dimension ($M_{ma} = 3.31$; $M_{fe} = 3.23$). However, these differences were not statistically significant.

Among the seven dimensions, Loss of Social Support ($p = .051$) and Being Perceived as Weak ($p = .076$) yielded p-values approaching the conventional .05 threshold, suggesting a possible trend toward gender differences. Specifically, female runners reported slightly higher anxiety regarding the potential loss of social support and the perception of being seen as weak by others.

Differences by age group

The results indicate that age is a potential factor influencing sport injury anxiety, with the runners aged below 30 years showing greater sensitivity to social and emotional aspects

related to injury or reinjury. Specifically, runners under 30 years old reported significantly higher anxiety levels than those aged 30 and above on two dimensions: Loss of Social Support ($p = .017$) and Letting Down Important Others ($p = .002$). This suggests that younger runners tend to worry more about losing social support or disappointing others when experiencing an injury.

Table 2. Differences in Sports Injury Anxiety levels by age group

	Group	N	M	SD	p
Loss of Athleticism	Below 30 years old	156	3.60	1.132	.842
	30 years and above	40	3.57	0.900	
Being Perceived as Weak	Below 30 years old	156	3.34	1.122	.177
	30 years and above	40	3.07	1.196	
Experiencing Pain	Below 30 years old	156	3.86	0.957	.986
	30 years and above	40	3.85	1.029	
Loss of Social Support	Below 30 years old	156	3.66	0.946	.017
	30 years and above	40	3.23	1.182	
Letting Down Important Others	Below 30 years old	156	3.71	0.953	.002
	30 years and above	40	3.18	1.040	
Reinjury	Below 30 years old	156	4.08	1.027	.150
	30 years and above	40	3.82	1.054	
Impaired self-image	Below 30 years old	156	3.40	0.879	.076
	30 years and above	40	3.12	0.892	

For the remaining dimensions Loss of Athleticism, Being Perceived as Weak, Experiencing Pain, Reinjury, and Impaired Self-Image no statistically significant differences were observed between the two age groups ($p > .05$). Nevertheless, the under-30 group consistently exhibited higher mean scores across most dimensions, reflecting a general tendency toward greater injury-related anxiety among younger runners compared with their older counterparts.

Differences by injury history

The results of the Independent Samples t-test showed no statistically significant differences in injury anxiety levels between runners with previous injury experience and those without any injury history across all seven dimensions of the Sport Injury Anxiety Scale (SIAS-21) ($p > .05$). The mean scores of runners with a history of injury ranged from $M = 3.31 \pm 1.104$ to $M = 4.03 \pm 1.026$, whereas those without prior injuries ranged from $M = 3.23 \pm 1.224$ to $M = 4.02 \pm 1.066$. In most dimensions, runners with prior injuries reported slightly higher anxiety levels, particularly in Experiencing Pain ($M_{\text{with injury}} = 3.89$; $M_{\text{no injury}} =$

3.79) and Reinjury ($M_{\text{Yes}} = 4.03$; $M_{\text{No}} = 4.02$), yet these differences were not statistically significant ($p > .05$).

Table 3. Differences in Sports Injury Anxiety Levels by injury history

	Group	N	M	SD	p
Loss of Athleticism	Yes	135	3.56	1.108	.468
	No	61	3.68	1.042	
Being Perceived as Weak	Yes	135	3.31	1.104	.654
	No	61	3.23	1.224	
Experiencing Pain	Yes	135	3.89	0.943	.507
	No	61	3.79	1.031	
Loss of Social Support	Yes	135	3.51	1.034	.196
	No	61	3.71	0.948	
Letting Down Important Others	Yes	135	3.55	1.005	.332
	No	61	3.70	0.964	
Reinjury	Yes	135	4.03	1.026	.961
	No	61	4.02	1.066	
Impaired self-image	Yes	135	3.32	0.887	.726
	No	61	3.37	0.893	

Overall, the findings suggest that previous injury experience did not lead to significant differences in current levels of sport injury anxiety among runners. This implies that runners' perceptions of injury-related anxiety may be influenced more by individual characteristics, degree of involvement in running, or rehabilitation experience rather than by injury history alone.

Differences by running experience

A One-Way ANOVA was conducted to examine differences in sport injury anxiety among runners with varying levels of running experience. Participants were categorized into five groups based on their duration of running participation: less than 1 year, 1–2 years, 2–3 years, 3–4 years, and more than 4 years. Descriptive analysis showed that the mean scores of injury anxiety ranged from $M = 3.43 \pm 0.73$ (less than 1 year) to $M = 3.73 \pm 0.69$ (2–3 years). Overall, runners with 2–3 years of experience exhibited the highest anxiety levels, while those who had been running for less than 1 year reported the lowest.

Table 4. Differences in Sports Injury Anxiety levels by running experience

Group	N	M	SD	F	p
< year	22	3.43	0.733		
1-2 years	42	3.66	0.795		
>2-3 years	33	3.73	0.686	0.539	.708
>3-4 years	41	3.59	0.774		
>4 years	58	3.63	0.806		

The results also confirmed that there were no significant differences among the groups ($F(4,191) = 0.539, p = .708$). Post-hoc comparisons using the Tukey HSD test also indicated no significant pairwise differences ($p > .05$). These findings suggest that running experience does not significantly influence injury anxiety levels. Overall, whether beginners or long-term runners, participants tended to experience similar levels of anxiety regarding the risk of injury or reinjury.

Discussion

This study provides an empirical examination of sport injury anxiety among Vietnamese runners using the Sport Injury Anxiety Scale – 21 (SIAS-21) [1]. The findings revealed that participants reported the highest anxiety levels in the dimensions of Reinjury and Experiencing Pain, followed by Loss of Athleticism and Loss of Social Support, whereas anxiety related to Being Perceived as Weak and Impaired Self-Image was relatively lower. This pattern reflects the cognitive–emotional process runners typically undergo when facing the threat of injury, where the anticipation of pain and fear of reinjury represent the most immediate threats to sustained participation and performance.

These results align with the Stress-Injury Model proposed by Andersen and Williams (1988), which suggests that individuals' appraisal of injury-related stressors and their coping abilities determine both psychological responses and the likelihood of reinjury [2]. Similarly, Wiese-Bjornstal et al. (1998) emphasized that sport injury triggers a multidimensional psychological reaction, including cognitive threat appraisal, emotional response, and behavioral adaptation that influences recovery and return-to-play outcomes [3]. Within this framework, the fear of reinjury observed among Vietnamese runners may represent an adaptive yet exaggerated self-protective response [15]. If left unmanaged, this fear may lead to avoidance behaviors and prolonged rehabilitation, a phenomenon well-documented in studies on kinesiophobia among injured athletes [8, 15].

The findings of the present study are consistent with those of Rex and Metzler (2016), who also identified reinjury and experiencing pain as the primary sources of injury-related anxiety across different sport disciplines. This suggests that the perception of physical threat lies at the core of the injury anxiety experience, regardless of the athlete's skill level or type of sport.

However, unlike studies conducted on professional athletes [16], the participants in this study were recreational runners, a group that generally lacks specialized medical and psychological support. This limitation may heighten their sense of vulnerability and fear of reinjury during training and participation.

Examined by demographic characteristics, runners under 30 years old reported significantly higher anxiety levels in the dimensions of Loss of Social Support and Letting Down Important Others. This finding highlights the prominent role of social recognition and relationship maintenance needs among younger running communities. The systematic review by Renton, Petersen, and Kennedy (2021) on athletic identity indicated that a strong identification with the "athlete" role often intensifies negative emotional responses to injury, particularly fears of social exclusion or disappointing significant others [17]. Therefore, social identity processes may play a key moderating role in shaping injury anxiety among younger Vietnamese runners.

From these findings, three key practical implications can be drawn. The first, reducing anxiety related to reinjury and pain should be prioritized in training and rehabilitation programs. Integrating pain neuroscience education and graded exposure therapy can help runners reinterpret pain signals and rebuild confidence in movement [15]. The second, enhancing social support within running clubs can mitigate anxiety associated with social evaluation. Establishing positive group norms, such as encouraging adequate rest, avoiding the stigmatization of injuries, and reinforcing safe training behaviors may reduce feelings of isolation [3]. The last, implementing regular psychological screening using brief tools such as the SIAS-21 can help identify high-risk runners early, especially those returning from injury or exhibiting prolonged fear of movement.

Limitations and Future Research Directions

Although this study provides meaningful contributions, several limitations should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships between injury anxiety and running behaviors. Second, the use of self-reported data may be subject to social desirability bias, particularly within Asian cultural contexts, where acknowledging anxiety may be perceived as a sign of weakness. Third, the study did

not incorporate other potentially influential variables such as kinesiophobia, coping efficacy, and athletic identity, which could serve as mediating or moderating factors in the relationship between anxiety and behavioral outcomes. Future research should adopt longitudinal designs and mixed-method approaches to better capture the psychological dynamics of runners before, during, and after injury events.

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**Effect of Resistance Training for development of Upper Body Muscle Strength
among Wrestlers of Karimnagar District**

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Abstract:

The Purpose of the study is to determine the effect of Resistance Training for development of Upper Body Muscle Strength among Female Wrestlers of Karimnagar District between the age group of 14 to 16 Years.. The sample for the present study consists of 20 Female Wrestlers out of which 10 are experimental group and 10 are controlled group.. Own Body Exercises, Rope climbing exercises and Dumbell exercises . were given to the Experimental Group along with general training of Wrestling and control group has doing general Training of Wrestling for eight weeks..To assess the Upper Body Muscle Strength Pull-ups Test were used in the Pre Test and Post Test of the Study. This study shows that the Experiment Group of Wrestlers increase the Upper Body Muscle Strength compare to the control group. Key words: Upper body muscle strength, Pull ups, Wrestlers etc.

Introduction.

Resistance training exercises, such as squats, lunges, push-ups, and rows, increase muscle mass, strength, and bone density by making muscles work against a weight or force. Effective workouts can be done using body weight, free weights, or resistance bands, aiming for 2–3 sets of 10–15 repetitions.

Ramandeep Kaur and Bajrang Lal (2025) The present study aimed to examine the effect of different resistance training methods weight training and theraband training on the handgrip strength of male state-level wrestlers. Forty-five wrestlers aged 15 to 23 were randomly assigned into three groups (N=15 each): Group A (weight training + routine training), Group B (theraband training + routine training), and Group C (control, routine training only). Handgrip strength was assessed using a dynamometer both before and after an 8-week intervention period. Statistical analysis was performed using SPSS 21.0, including

paired t-tests for within-group comparisons and ANCOVA for intergroup comparisons. Both Group A and Group B showed significant improvements in handgrip strength post-intervention (P=0.000). Group C also showed a statistically significant but smaller improvement (P=0.023). Intergroup comparison revealed a significant difference in handgrip strength among the three groups (P=0.022), with Group B showing the highest gain, followed by Group A and Group C. Both weight training and theraband resistance training significantly enhanced handgrip strength in wrestlers, with theraband training showing slightly superior effects. These findings support the inclusion of structured resistance training programs in wrestler conditioning routines to improve performance

Methodology:

The sample for the present study consists of 20 Female Wrestlers of Karimnagar out of which 10 are experimental group and 10 are controlled group.. Own Body Exercises, Rope climbing exercises and Dumbbell exercises . were given to the Experimental Group along with general training of Wrestling and control group has doing general Training of Wrestling for eight weeks..To assess the Upper Body Muscle Strength Pull-ups Test were used in the Pre Test and Post Test of the Study

Results:

Table 1: Showing the Mean values and Independent Samples Test of Pull ups between experimental and control groups of Female Wrestlers

Variables	Group	Pre Test	Post Test	t	P - Value
		Mean \pm SD	Mean \pm SD		
Pull Ups	Experimental	9.67 \pm 3.055	13.07 \pm 4.975	4.67	0.001
	Control	8.70 \pm 2.366	8.87 \pm 1.995		

*Significant at 0.05 level

In Table 2 the Mean values of Experimental Group of Wrestlers in Pre Test is 9.67 and Control Group Wrestlers Players is 8.70.. Due to Resistance training the Experimental Group has increased the mean values in post test is 13.07 and due to general training the Control group has Performance is 8.70 to 8.87 The Results of the Study shows that Experimental Group of Wrestlers has increased in the Performance of Pull ups This study shows that the Experimental Group of Wrestlers increase sthe upper body muscle strength compare to the control group.

Conclusions:

It is concluded that due to Resistance training there is a improvement of upper body muscle strength among Female Wrestlers.. Building a strong core is an important aspect of training, with core stability providing the foundation for optimal movement for the body for enhancing the performance in spors and games.

Recommendations:

This type of Study is useful to the Wrestlers , Coaches and Physical Education teachers for enhancing the Performance among Wrestling Sport.

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