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RESEARCH ARTICLE

Factors Influencing User Adoption of Online Sports Training Services: A Systematic Review

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ABSTRACT

This research endeavors to perform an in-depth review of literature concerning the propensity of individuals to utilize online sports learning and training services. The investigation delves into both quantitative and mixed-methodological studies that explore user behavior in relation to online sports training apps. By using the PRISMA guidelines, an analysis of 28 scholarly articles, retrieved from the databases of Science Direct and Scopus up until August 2023, was conducted. By proposing a detailed framework, this research illuminates several aspects that influence the adoption of sports training technologies via applications or online services from multiple angles. The findings validate that theoretical frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) remain dominant in these studies. However, more diverse theories and models are being considered within the context of online sports training. Moreover, this study constructs a cause-and-effect model illustrating key influencers, along with potential moderators and mediators within this framework. These findings can help online sports training developers increase user engagement, enhance physical performance, improve user retention for virtual training programs, and refine the features and services offered by online sports education platforms.

INTRODUCTION

The rise of mobile devices like smartphones, tablets as well as other recent technological breakthroughs have profoundly altered our understanding of convenience and practicality (Y. Kim et al., 2017). There is no doubt that these gadgets have become a part of modern consumers' daily lives. Internet World Stats estimates that there are now 5.57 billion internet users worldwide over 67% of

the world's population. Applications, also referred to as Apps, are pieces of software designed for use on smartphones or tablets that give users an easy way to complete particular tasks. (Eshet & Bouwman, 2015). In comparison to internet services accessed via desktops or laptops, mobile health and fitness applications enable more dynamic and adaptable user interactions that are not constrained by geographic or time constraints (Angosto et al., 2020). Moreover, the sector of health and fitness applications is recognized for its significant download rates, showcasing remarkable growth (Chiu et al., 2020). Research reveals that nearly one fifth of all smartphone users possess at least one application on their device that is dedicated to online sports training (Fox & Duggan, 2012).

Online sports training uses digital platforms to deliver sports coaching and training programs. This approach leverages technology to provide virtual instruction, guidance and feedback to athletes and fitness enthusiasts wherever they are (Glang et al., 2010). With the rise of the internet and advances in digital technology, online sports training now encompasses a variety of formats, including live streaming lectures (Mocanu et al., 2021), pre-recorded video sessions (M. Kim, 2022), interactive mobile apps (Angosto et al., 2020) and virtual reality settings (Liu et al., 2022).

A key benefit of online sports training is its accessibility. It eliminates geographical constraints, enabling individuals to participate in training programs from their homes or while on the go, ensuring they can practice consistently (Tsourela, 2024). Moreover, online sports training provides flexible scheduling, allowing users to train whenever it suits them best, which is especially advantageous for those with hectic or unpredictable schedules.

Another major benefit is the ability to personalize training. Inspirun platforms offer customized running plans that cater to individual fitness levels, objectives, and preferences. These programs are optimized for effectiveness using advanced algorithms and data analytics (Janssen et al., 2020). Additionally, online training tends to be more cost-effective than traditional in-person coaching (Pérez-Camarero et al., 20220101), as it eliminates the need for physical facilities and travel costs, thereby making top-quality training available to a wider audience.

The COVID-19 pandemic has posed significant obstacles for the worldwide health (Abdullah et al., 2022) and fitness education sector, including childhood obesity (Q. Wang & Hassim, 2022), social segregation policies, and school and gym closures (Du et al., 2021). Therefore, global organizations like the World Health Organization have emphasized the value of exercises done at home as a result of the imposed lockdowns and decreased physical activity (Angosto et al., 2020). The suspension of daily activities has stimulated people's attention to esports (Marta et al., 2021). Additional societal advantages of the expanding popularity and accessibility of health and fitness education applications linked to physical training (Angosto et al., 2020). Recently, there has been a growing focus on investigating the usability of applications and the willingness of consumers to adopt them across various industries. (M. T. Alshurideh et al., 2019; Franque et al., 2020). However, there has not been much investigation into the elements influencing technology users' intents, particularly concerning smartphones and applications within the online sports training context. This study underscores the importance of such developments by concentrating on contemporary research into the adoption of online sports training applications.

MATERIALS AND METHODS

Search Strategy

This analysis adopted the PRISMA framework, introduced by Moher et al. (2009), to structure systematic reviews in the field of social sciences. PRISMA emphasizes the importance of defining

research questions clearly, applying precise criteria for screening (including both inclusion and exclusion factors), and conducting searches limited by specific timeframes. These core advantages of PRISMA facilitate an exhaustive exploration of scientific literature and the targeted use of findings in the domain of online sports training applications.

The search was conducted specifically within the ScienceDirect and Scopus databases. ScienceDirect stands out as a premier full-text scientific database, providing comprehensive access to a vast array of academic journals, books, and conference proceedings. It is run by Elsevier and offers a sizable library of academic works in several fields, such as the social sciences, engineering, and natural sciences. The database hosts millions of articles and publications from reputable publishers and academic institutions worldwide. Scopus, available only via institutional subscriptions, encompasses a global collection of 36,377 journals across 11,678 publishers. It covers a wide variety of literature genres from the social sciences, biological sciences, health sciences, and more, including book series, scholarly journals, and conference proceedings. Moreover, it has an advanced visual tool designed for doing systematic literature reviews. The selection of ScienceDirect and Scopus as the primary sources for this review was strategic, aiming to leverage their unique functionalities crucial for enhancing the research quality. The methodology for database searching is detailed in Table I, where papers were chosen based on the presence of specific search terms in their titles, abstracts, or keywords.

Table 1: Keywords and Information Search Strategy

Category	Search terms
Platform	(app OR apps OR "mobile application*" OR "online training")
Purpose	("online sports education" OR training OR sport OR "sport*" OR "physical activit*" OR exercise OR "active living" OR "weight maintenance" OR "maintaining weight" OR "weight management")
Outcome	("intention to use" OR "app* usage" OR "intent* to use" OR usage OR "behavioral intention*" OR "behavior* change" OR "attitude toward")

Inclusion and Exclusion Criteria

For the purposes of this analysis, Table II specifies the criteria for including and excluding studies, targeting solely empirical research published in journals subjected to peer review. Excluded from this review was grey literature, which includes evaluation reports, annual reports, non-peer-reviewed journal articles, and publications disseminated via unconventional methods. The criteria for selecting articles for the search included: (i) published between 2015-2023; (ii) engagement with health and fitness mobile applications; (iii) journal articles; (iv) publications in English; (v) using a questionnaire to assess the intention to utilize specific application or technology.

The exclusion standards that were used: (i) Review papers, theoretical studies, books, preprints, book chapters, series, theses, and conference proceedings (ii) no information systems(IS) were used in the health and fitness context; (iii) articles written in non-English language; (iv) only use qualitative approach; (v) duplicate articles.

Table 2: Inclusion and Exclusion Criteria

Criterion	Included	Excluded
Timeline	2015-2023	
Context	Health and fitness related	Non-IS related
Literature type	Journals (research articles)	Review papers, theoretical studies, books, preprints, book chapters, series, theses, and conference proceedings
Language	English	Non-English
Research method	Quantitative, mixed methods	Qualitative

Data Extraction and Synthesis

The process of collecting data involved a threefold method: beginning with an initial review of each article's title and abstract, followed by an in-depth analysis of the full text, to affirm its significance in relation to the research question being addressed. In this phase of the review, the researchers methodically aligned the information extracted from the articles with the specified research themes. A systematic review may encompass a wide array of research methodologies, including quantitative and mixed-methods designs. This strategy permitted the development of a detailed cause-and-effect framework, enabling a systematic assessment of the various theories, models, and conceptual frameworks that had been applied in previous research.

Following the PRISMA methodology in all aspects typical of a systematic review with the characteristics, the Flow Diagram that Moher et al. (2009) proposed is shown in Figure 1. The preliminary database search generated 513 outcomes, subsequently reduced to 337 following the elimination of duplicates. The primary reviewer carefully scrutinized titles, assessed abstracts, and performed a detailed full-text analysis based on the defined inclusion and exclusion criteria. Subsequently, a secondary reviewer independently examined the abstracts of the remaining publications to verify their suitability and ensure alignment with the initial reviewer's conclusions.

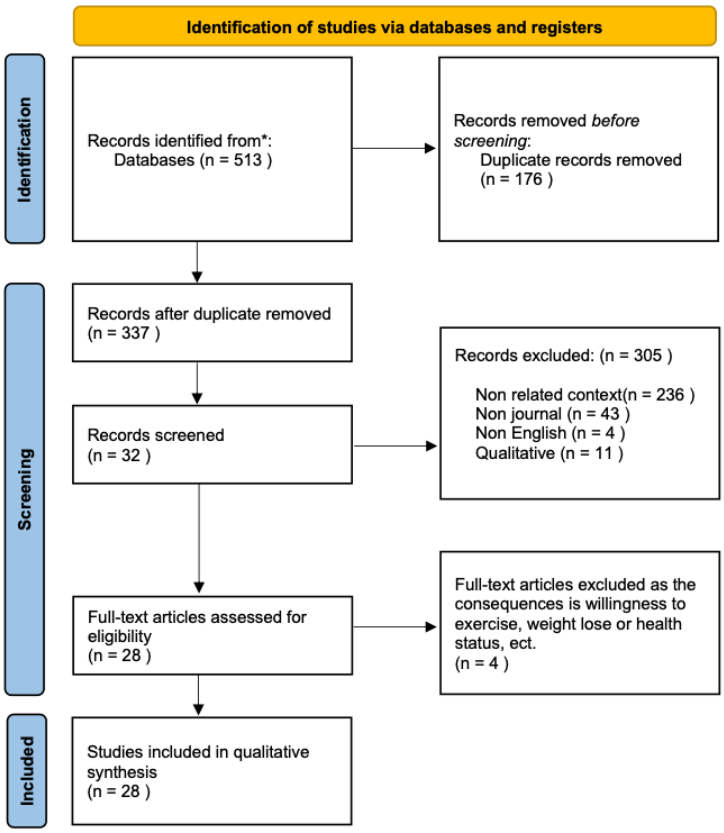

Figure 1: Flow diagram of this review study

RESULTS

A systematic review helps researchers find currently available data regarding further research and offers significant comments to spur future action for industrial managers to comprehend the most current and comprehensive condition (Angosto et al., 2020). The present research systematically reviews mobile fitness technology, utilizing the PRISMA protocol items to mitigate bias and validate the accuracy of data collected from past studies. A total of 28 papers have been thoroughly retrieved and carefully examined.

Descriptive analysis of the reviewed papers

Refer to Appendix A for the descriptive data analysis findings derived from the article analysis. The analysis uncovered that the exploration of users' intentions to use mobile technology in the context of online sports trainingis relatively nascent, encompassing 28 investigations carried out using online surveys and self-administered questionnaires. The majority of the scrutinized articles were published in 2021 (n = 6) and 2020 (n = 6), with 2023 (till June, n = 4), 2022 (n = 3), and 2019 (n = 1) following in frequency. Notably, only eight articles were identified in the period before the pandemic, spanning from 2015 to 2018. China leads in publication output with a total of fourteen articles, of which three originated from Taiwan, making it the most prolific country in this research area. The United States follows, contributing four publications, including one study that gathered data from both the United States and Canada. Germany and Korea each presented three studies, with one of Germany's studies involving participants from Germany, Austria, and Switzerland.

Additionally, countries like Spain, the United Kingdom, and Saudi Arabia each contributed one publication to the field.

After the samples from various research were examined, 19,972 people in total, an average of 714 subjects per study were included. The study by Lim & Noh (2017) had the smallest sample size (n = 100), while Wei et al., (2021) presented the largest sample, incorporating a total of 8,840 subjects. Sixteen studies demonstrated a higher representation of females, with two studies indicating an equal distribution between genders. In contrast, a majority of nine studies indicated a predominance of male participants. However, one study did not specify the gender composition of its sample (Chen & Lin, 2018). Except for the work by Wei et al. (2021) every study reported at least some information on participants' ages. Sixteen studies specified age ranges for their subjects, whereas four studies opted to report the mean age. It was noted that participants in the study were mostly between the ages of 20 and 45. About a quarter of the studies (n = 7) specifically focused on university students as their research sample, while the remainder (n = 21) considered the broader general population. Notably, only a few studies addressed the elderly demographic, pointing to a gap that warrants further exploration in future research endeavors focused on older populations.

In terms of the specific applications evaluated, health and physical exercise App (n=6) and fitness training App (n=12) constituted more than half of the studies. Three studies delved into the usage intentions behind diet and sports service applications, while another four studies evaluated sports information Apps. Furthermore, three studies explored the user intent regarding social networking services (SNS) or sports community apps, specifically for the purpose of sharing training-related information.

The technology perspective predominantly utilized TAM (n = 8) as the primary theory for designing and assessing intent of use in online sports training technology. UTAUT and UTAUT2 were used in seven studies, whereas three articles adopted the Expectation-Confirmation Model (ECM). From a user-centered perspective, uses and gratifications theory (U&G) was most commonly used for analyzing users' intentions (n=3). The remaining theories are listed in Table III.

Table 3: Related theory of the analysis of the selected studies

Theory/model	References	No. of articles
Technology Acceptance Model (TAM)	(Al Ansari et al., 2023) (Yu et al., 2021) (Birkmeyer et al., 2021) (Huang & Ren, 2020) (Cho et al., 2020) (Chen & Lin, 2018) (Beldad & Hegner, 2018) (Cho et al., 2015)	8
Unified Theory of Acceptance and Use of Technology (UTAUT) and UTAUT2	(Wang et al., 2022) (Damberg, 2022) (Wei et al., 2021) (Birkmeyer et al., 2021) (Seol et al., 2017) and (Yuan et al., 2015) (Westmattelmann et al., 2021)	7
Uses and gratifications theory (U&G)	(Zhang & Xu, 2020) (Chen et al., 2020) (Stragier et al., 2016)	3
Expectation Confirmation Model (ECM)	(Zhang & Xu, 2020) (Chiu et al., 2020) (Li et al., 2019)	3

Theory of Reasoned Action (TRA)	(Tseng et al., 2023) (Cho et al., 2015)	2
Theory of Planned Behavior (TPB)	(Yu et al., 2021) (Wang, 2015)	2
IS Continuance Model	(Perez-Aranda et al., 2023) (Yan et al., 2021)	2
Investment Model (IM)	(Cho et al., 2020) (Chiu et al., 2020)	2
Information Systems Success Model (ISSM)	(Chen et al., 2020)	1
Technology Readiness (TR)	(Seol et al., 2017)	1
Self-Determination Theory (SDT)	(Stragier et al., 2016)	1
Cognitive Appraisal Theory	(Kim, 2022)	1
Social Support Theory	(Yin et al., 2021)	1
Social Comparison Theory	(Li et al., 2019)	1
Health Belief model (HBM)	(Wei et al., 2021)	1
Theory of Consumption Values (TCV)	(Zhu et al., 2023)	1
Theory of Perceived Risk (TPR)	(Zhu et al., 2023)	1
Non		2

The variables employed exhibited substantial heterogeneity across the studies, with a consistent factor observed in all of them being the intention to utilize the App. Given that this systematic review primarily focuses on online sports and fitness app-based investigations, each study incorporated distinct variables. This study will subsequently organize and categorize these variables in forthcoming articles.

APPLIED THEORIES AND INFLUENCING FACTORS

Related theories

Investigations into global user engagement with online sports and fitness service have utilized a range of theoretical approaches and models to decipher user behaviors. The findings reveal that the theoretical approaches and models employed are mainly sourced from four distinct disciplines, encompassing theories of information systems, theories of communication, psychological theories, and marketing theories.

Information System Theory: The Technology Acceptance Model (TAM), frequently applied within the Information System (IS) field, forecasts technology adoption and usage by analyzing user behavior towards emerging media technologies (Davis, 1989). The Unified Theory of Acceptance and Use of Technology (UTAUT) identifies performance expectancy, social influence, effort expectancy, and facilitating conditions as key drivers of technology adoption, with age, gender, experience, and voluntariness of use acting as moderators (Venkatesh et al., 2016). According to the Expectation Confirmation Model (ECM), the continuation of IT usage hinges on the confirmation of initial expectations, along with perceived usefulness and satisfaction (M. Alshurideh et al., 2020). The Theory of Reasoned Action (TRA) articulates that an individual's behavioral intention, shaped by their attitude and subjective norms, is a direct precursor to their actual behavior. Adding to TRA, the Theory of Planned Behavior (TPB) incorporates perceived behavioral control as an additional factor predicting intentions (Luqman et al., 2018), commonly applied in forecasting behaviors related to health and society. Building on TRA, the IS Continuance Model elucidates the reasons behind ongoing technology usage, integrating Expectation Confirmation Theory (ECT) to account for post-adoption perceptions like perceived usefulness (M. Alshurideh et al., 2020). The Information Systems Success Model (ISSM) evaluates an information system's efficacy through metrics like system quality, information quality, and user satisfaction. Lastly, Technology Readiness (TR) gauges an individual's predisposition to embrace and utilize novel technologies, influenced by attributes such as optimism, innovativeness, insecurity, and discomfort.

Communication theory: The Uses and Gratifications theory (U&G) posits that people actively choose and interact with media channels based on their unique requirements (Ruggiero, 2000). Although the significance of these needs or gratifications may differ across various media types, the primary ones consist of diversion (offering an escape from problems or emotional release), personal relationship (utilizing media for social information in conversations or as a companion substitute), personal identity (reinforcing values and promoting self-understanding), and surveillance (McQuail, 1972).

Psychological theory: The Investment Model (IM) delves into how individual commitment in relationships is influenced by satisfaction, the magnitude of investment, and the availability of alternatives. This model finds application across various areas, such as the dynamics between consumers and brands and the utilization of fitness apps. The Cognitive Appraisal Theory examines how an individual's emotional response to a stimulus is shaped by their cognitive assessment of it, highlighting the role of different appraisal dimensions in shaping emotional reactions. The Self-Determination Theory (SDT) focuses on the inherent tendencies for personal growth and psychological needs of individuals, emphasizing the importance of competence, autonomy, and relatedness (Luqman et al., 2018). Social Support Theory underlines the benefits of social support in enhancing individuals' ability to manage health challenges, noting its positive impact on health outcomes and its application in digital health communities and fitness apps. Social Comparison Theory explores the notion that individuals engage in comparisons with others to gauge their own performance, a concept particularly relevant to mobile applications with social networking features that enable such comparisons and provide support. The Health Belief Model (HBM) employs

constructs such as self-efficacy, perceived advantages, barriers, and threats to elucidate behavioral intentions in areas like weight management, while also addressing risk perceptions related to data security and privacy.

Marketing theory: The Theory of Consumption Values (TCV) elucidates the behavior of consumers' decisions, attributing this to five distinct values: functional, emotional, epistemic, social, and conditional. This theory posits that the evaluation of these values, whose importance may shift with context, guides an individual's choice to engage with a particular product or service. On a related note, the Theory of Perceived Risk (TPR) suggests that the apprehension of potential losses associated with the use of a product or service sways consumers' buying choices. This theory highlights the critical role of perceived risks in the process of making decisions, emphasizing aspects such as privacy and security concerns.

Exogenous variables for online sports training app usage intention

The growing importance of online sports training technology in the physical education industry has led to a strong interest in exploring the factors that influence individuals' use of this technology. Starting in 2015, a large number of relevant literatures began to emerge, covering a variety of research angles and methods, from psychology, sociology, marketing to health sciences.

Without covering different perspectives, the understanding of the influencing factors is fragmented. Therefore, a comprehensive understanding necessitates a thorough review of previous studies. Researchers aligning with diverse fields and topics, often concentrate on distinct research constructs. Consequently, the depiction of several factors in the study framework can lead to the manifestation of the same concept. A total amount of 12 factors is generalized to influence the intention of use mobile fitness learning technology among users (see Table IV). Grouping influencing factors based on their characteristics, they fall into three categories, including the technological factors (perceived usefulness, perceived ease of use, intrinsic quality, customizing), user-orient factors (fitness achievement, perceived enjoyment, health consciousness, attitude, physical appearance, perceived cost), and social factors related to the usage of social media (social interaction, emotional support).The categories and relevant factors are outlined here to enhance comprehension of the factors driving intention to use online sports training technology.

Table 4: Influencing factors employed in articles selected for analysis

Influencing Factors	No.	Articles
perceived usefulness	13	(Zhu et al., 2023)(Perez-Aranda et al., 2023)(Al Ansari et al., 2023)(Damberg, 2022)(Yu et al., 2021)(Yan et al., 2021)(Zhang & Xu, 2020)(Huang & Ren, 2020)(Cho et al., 2020)(Chiu et al., 2020)(Chen et al., 2020)(Chen & Lin, 2018)(Beldad & Hegner, 2018)
perceived ease of use	11	(Zhu et al., 2023)(Perez-Aranda et al., 2023)(Al Ansari et al., 2023)(Yu et al., 2021)(Yan et al., 2021)(Zhang & Xu, 2020)(Huang & Ren, 2020)(Cho et al., 2020)(Chen et al., 2020)(Chen & Lin, 2018)(Beldad & Hegner, 2018)
intrinsic quality	8	(Zhu et al., 2023)(Tseng et al., 2023)(Al Ansari et al., 2023)(Kim, 2022)(Yin et al., 2021)(Birkmeyer et al., 2021)(Chen et al., 2020)(Lim & Noh, 2017)

customizing	3	(Yan et al., 2021)(Westmattelmann et al., 2021)(Birkmeyer et al., 2021)
fitness achievement	8	(Perez-Aranda et al., 2023)(Wang et al., 2022)(Westmattelmann et al., 2021)(Zhang & Xu, 2020)(Oyibo & Vassileva, 2020)(Li et al., 2019)(Lim & Noh, 2017)(Stragier et al., 2016)
perceived enjoyment	7	(Zhu et al., 2023)(Tseng et al., 2023)(Damberg, 2022)(Huang & Ren, 2020)(Chen et al., 2020)(Lim & Noh, 2017)(Stragier et al., 2016)
health consciousness	5	(Zhu et al., 2023)(Damberg, 2022)(Westmattelmann et al., 2021)(Birkmeyer et al., 2021)(Cho et al., 2015)
attitude	5	(Al Ansari et al., 2023)(Kim, 2022)(Zhang & Xu, 2020)(Chen & Lin, 2018)(Seol et al., 2017)
physical appearance	5	(Zhu et al., 2023)(Kim, 2022)(Yin et al., 2021)(Chen & Lin, 2018)(Cho et al., 2015)
perceived cost	5	(Wang et al., 2022)(Damberg, 2022)(Cho et al., 2020)(Chiu et al., 2020)(Yuan et al., 2015)
social interaction	10	(Zhu et al., 2023)(Tseng et al., 2023)(Wang et al., 2022)(Kim, 2022)(Damberg, 2022)(Westmattelmann et al., 2021)(Birkmeyer et al., 2021)(Oyibo & Vassileva, 2020)(Chen et al., 2020)(Stragier et al., 2016)
emotional support	3	(Zhu et al., 2023)(Yin et al., 2021)(Chen et al., 2020)

Technological factors: Technical factors are important exogenous variables in the study of sports learning software users' willingness to continue using the software. Nineteen articles identified technical factors as the primary exogenous variable. While variations exist in authors' interpretations and categorizations of technological factors, there is a broad consensus on the perception of technological factors as the predominant exogenous elements. For instance, using the TAM as a basis, researchers used the perceived utility and perceived ease of use of the platform as exogenous factors and suggested analyzing their link with the intention to continue using (Al Ansari et al., 2023; Beldad & Hegner, 2018; Birkmeyer et al., 2021; C.-C. Chen et al., 2020; M.-F. Chen & Lin, 2018; Chiu et al., 2020; H. Cho et al., 2020; J. Cho et al., 2015; Damberg, 2022; Huang & Ren, 2020; Perez-Aranda et al., 2023; Yan et al., 2021; Yu et al., 2021; Zhang & Xu, 2020; Zhu et al., 2023).

Besides, examined by 8 papers, the intrinsic quality of the App is the third widely used factor. The innate qualities and attributes of online sports training applications are referred to as their intrinsic quality that contribute to their effectiveness, usability, and overall value in promoting health and fitness. Several key intrinsic qualities in online sports training Apps were confirmed by scholars to be related to the user's willingness to use. For instance, user-friendly interfaces (Birkmeyer et al., 2021), reliable information (M. Kim, 2022; Tseng et al., 2023), complete functionality (Tseng et al., 2023), and smooth network connection (Yin et al., 2021). Moreover, Personalized Apps has ability to

tailor workouts, nutrition plans, and goals to individual preferences and fitness levels is crucial. Personalization helps users stay engaged and motivated by addressing their specific needs and adapting to their progress over time (Birkmeyer et al., 2021; Westmattelmann et al., 2021; Yan et al., 2021).

User-oriented factors: Simultaneously, user-oriented factors are also regarded by researchers as exogenous variables in the model. Such as fitness achievements, play a crucial role in influencing a user's continuous intention to use a online sports training App (Li et al., 2019; Lim & Noh, 2017; Oyibo & Vassileva, 2020, 2020; Perez-Aranda et al., 2023; Stragier et al., 2016; C. Wang et al., 2022; Westmattelmann et al., 2021; Zhang & Xu, 2020). Setting a fitness goal increases motivation. When users see tangible results, such as weight loss, improved endurance, or muscle gain, they are more likely to stay motivated and committed to their fitness journey. In addition, previous studies confirm that perceived enjoyment in information system significantly affect users' willingness to conduct the behaviors. Similarly this has been confirmed in mobile fitness technologies (C.-C. Chen et al., 2020; Damberg, 2022; Huang & Ren, 2020; Lim & Noh, 2017; Stragier et al., 2016; Tseng et al., 2023; Zhu et al., 2023). Furthermore, health awareness, appearance, perceived cost, and attitude, each of these factors have been shown to be related to user intentions in five articles. For details, please refer to Table IV.

Social factors: Researchers argued that social interaction is directly related to continued use intention and behavior. This social interaction contributes to a broader social identity related to fitness learning. Users who identify with the values and behaviors promoted within the App's community are more likely to integrate the App into their lifestyle as a means of reinforcing that identity (Birkmeyer et al., 2021; C.-C. Chen et al., 2020; Damberg, 2022; M. Kim, 2022; Oyibo & Vassileva, 2020; Stragier et al., 2016; Tseng et al., 2023; C. Wang et al., 2022; Westmattelmann et al., 2021; Zhu et al., 2023). Meanwhile, the social context enriches the user experience and gives the emotional supports to users. Such as providing the motivation, support, and sense of belonging that contribute to sustained engagement and adherence to fitness goals (C.-C. Chen et al., 2020; Yin et al., 2021; Zhu et al., 2023).

Moderators and Mediators

Moderation in research refers to the influence of moderating variables on the interaction between independent and dependent variables, this influence is described as interaction. Moderating variables can take the form of either categorical or continuous variables, possess the ability to influence both the direction and strength of the connection between external and internal variables (Memon et al., 2019). In the realm of social media, scholars have examined the impact of demographic profiles on the dynamics between input and outcome variables. Both Zhu et al.(2023) and Wang et al.(2022) find out that gender different have significant moderating effect between exogenous variables and user behavior. Exercise self-efficacy (Huang & Ren, 2020), service quality (Tseng et al., 2023), health consciousness (Yan et al., 2021) and user experience (Stragier et al., 2016) are all characteristics that have been confirmed to have a moderating influence in researcher frameworks.

Mediating variables play a crucial role in elucidating the essence and mechanisms underlying relationships between external and internal variables (MacKinnon, 2012). A number of scholars test user satisfaction as the mediator between exogenous variables such as: intrinsic quality (Birkmeyer et al., 2021; C.-C. Chen et al., 2020; M. Kim, 2022), social interaction (Birkmeyer et al., 2021; C.-C. Chen et al., 2020), emotional support (C.-C. Chen et al., 2020), perceived usefulness (C.-C. Chen et al., 2020; Zhang & Xu, 2020), perceived ease of use (C.-C. Chen et al., 2020; Zhang & Xu, 2020), and endogenous

variable intention for continued use. In addition attitude (Birkmeyer et al., 2021; M.-F. Chen & Lin, 2018; Tseng et al., 2023; C. Wang et al., 2022; Yu et al., 2021), habit (C.-C. Chen et al., 2020; Westmattelmann et al., 2021) and user experience (M. Kim, 2022; Yin et al., 2021) also confirmed as a mediator in the context.

Building on the preceding discussion, it becomes evident that a diverse array of factors plays a role in influencing the intention to use online sports training technology. This study aims to develop a comprehensive framework (refer to Figure 2) encompassing various perspectives to enhance our understanding of motivations. The goal is to encourage a broader adoption of online sports training technology among individuals in the future.

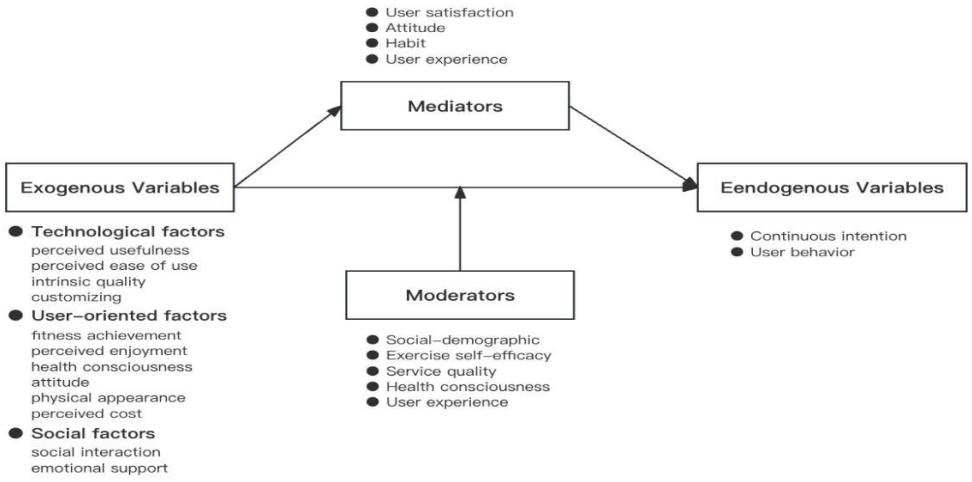

Figure 2: Conceptual framework for research on online sports training technology

LIMITATIONS AND RECOMMENDATIONS

One of the drawbacks of this review study is that it only examined articles that had been published within the last nine years. Additionally, the study's research years may have been constrained to the period following the rise in popularity of smartphones and Apps, leaving out a significant portion of the study's initial findings.

The researchers did not conduct a document search in the grey literature either because they set a requirement that the studies be gathered in the various databases they examined. The study exclusively concentrated on research that assessed fitness and physical activity Apps, omitting examinations that could have involved wearables or sports websites. This restriction may have impacted the outcomes by limiting the scope of previous studies on the intention to use within the fitness and sport context. In reality, they might have more access to technology in general given that not only smartphones but also tablets, laptops, and even wearables should be taken into account. This is an important consideration because there are currently various technical gadgets (such as tablets, I-watches, etc.) that might use online sports training Apps. Just as not all applications are accessible on the two primary operating systems currently in use (Android and iOS), the operating system itself can also influence outcomes.

Furthermore, the sample for every study is chosen based on accessibility. Convenience sampling is used when more appropriate sampling should have been used to enable results to be generalized to a wider universe. This limitation has been mentioned in a few studies. A widely discussed limitation across multiple studies is the age of participants, particularly as the samples predominantly comprise young individuals born into the digital age. The beliefs of younger individuals, who were raised in a digital environment, can significantly diverge from those of middle-aged adults who did not grow up surrounded by digital technologies and might find it more challenging to adopt new technological advancements.

Regarding other methodological facets of the studies, it should be mentioned that every one of them used a cross-sectional methodology; no longitudinal study was discovered to assess the subject's development and actual intention to keep using the App. Future research should also be done longitudinally so that it can be determined whether the subject's preconceived intention to utilize the application actually results in that use or not.

CONCLUSIONS

Given the novelty of this research area, a critical evaluation of existing studies on the purposes behind using online sports training platforms was essential. The scarcity of scholarly works, combined with methodological shortcomings evident in analyzing the risk of research bias and gathered evidence, hindered a more rigorous critique. These findings emphasize the necessity for deeper, more systematic investigations by specialists in the domain, integrating aspects that facilitate a comprehensive understanding of how new technologies are applied within the online sports education industry. Concurrently, these insights have equipped the research team with the groundwork to suggest recommendations for online sports training providers and scholars. Such guidance aims to enhance future research endeavors, fostering improved growth and development in evaluating the intent behind the use of online sports training platforms, stemming from these conclusions.

By focusing on the unique aspects of online sports training, such as the integration of interactive digital platforms, virtual coaching, and the flexibility of accessing training programs remotely, the research provides a comprehensive overview of the current landscape and highlights areas for future exploration. This shift in focus not only aligns with the broader trends in digital education but also underscores the importance of personalized and accessible training solutions in promoting physical fitness and well-being.

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Appendix A: Characteristics of the Articles Selected for Analysis

Study	Antecedents	Platform type	Region	Gender/Age	Sample size	Key theories
(Zhu et al., 2023)	physical appearance, general health, enjoyment, learning, social interaction, affiliation, condition	Health and physical exercise	China	Male (48.9%) Female (51.1%) 18-49 (78.3%)	613	TCV and TPR
(Tseng et al., 2023)	technological functions, intrinsic quality, perceived enjoyment, social connections,	Fitness training	China (Taiwan)	Male (33.6%) Female (66.5%) 21-45 (85.2%)	170	TRA
(Perez-Aranda et al., 2023)	commitment, competence	Sports	Spain	Male (58%) Female (42%) <35 (70%)	362	IS continuance model
(Al Ansari et al., 2023)	perceived usefulness, perceived ease of use, app subjective quality, app specific	Health and physical exercise	Saudi Arabia	Male (37.4%) Female (62.6%) <40 (60.5%)	195	TAM
(Wang et al., 2022)	perceived cost, perceived risk, performance expectancy, effort expectancy, social influence, facilitating condition	Fitness training	China	Male (51.3%) Female (48.7%) students	994	UTAUT
(Kim, 2022)	social interaction, information quality, visual content, social attractiveness, physical attractiveness, attitude homophily	SNS (Fitness Chanel)	United States	Male (58.7%) Female (41.3%) 18-39 (59%)	378	Cognitive Appraisal Theory
(Damberg, 2022)	perceived performance, social influence, price value, perceived playfulness, habit, health consciousness	Fitness training	United Kingdom	Male (42.8%) Female (57.2%) 18-44 (81.9%)	591	UTAUT
(Yu et al., 2021)	perceived usefulness, perceived ease of use, perceived behavioural control, subjective norms	Fitness training	China	Male (35%) Female (65%) students	634	TAM and TPB

(Yin et al., 2021)	appraisal support, tangible support, information support, network support, emotion support, esteem support	Fitness training	China	Male (48.8%) Female (51.2%) 19-45 (91.2%)	328	Social Support Theory
(Yan et al., 2021)	perceived usefulness, perceived ease of use, subjective norm, flow experience, bahavioural change techniques	Fitness training	China	Male (29.7%) Female (70.3%) 18-34 (86.2%)	397	IS continuance model
(Westmattelmann et al., 2021)	health consciousness, training, customizing, competition, socializing, privacy concerns, unacceptance of cheating	Sports (Cycling)	Germany, Austria and Switzerland	Male (85.2%) Female (14.8%) Ave. age 39.8	284	UTAUT2
(Wei et al., 2021)	perceived benefits, perceived barriers, perceived threats, self-efficacy, risk perception	diet and sports service	China	Male (24.45%) Female (74.55%) /	8840	UTAUT and HBM
(Birkmeyer et al., 2021)	perceived disease threat, health consciousness, personalization, interaction, mobile app design, social networking	Health and physical exercise	Germany	Male (29.4%) Female (70.6%) 18-44 (80.4%)	249	TAM and UTAUT.
(Zhang & Xu, 2020)	perceived usefulness, perceived ease of use, entertainment, fitness achievement, social connection	Fitness training	China	Male (31.1%) Female (69.9%) students	379	ECM and U&G
(Oyibo & Vassileva, 2020)	reward, goal-setting/self-monitoring, social learning, social comparison, competition, cooperation	Fitness training	United States and Canada	Male (57.9%) Female (41.7%) Others (0.4%) 18-44 (89.9%)	279	/

(Huang & Ren, 2020)	instruction provision, self-monitoring, self-regulation, goal-attainment, self-efficacy, perceived ease of use, perceived enjoyment	Fitness training	China	Male (43%) Female (57%) Ave. age 31.85	449	TAM
(Cho et al., 2020)	perceived usefulness, perceived ease of use	Health and physical exercise	China	Male (45.4%) Female (54.6%) 25-35 (65.3%)	346	TAM and IM
(Chiu et al., 2020)	confirmation,	Health and physical exercise	China	Male (45.6%) Female (54.4%) 21-35 (80.1%)	342	ECM and IM
(Chen et al., 2020)	perceived usefulness, perceived enjoyment, sense of belonging, social interaction, system quality, information quality	Sports (Cycling)	China (Taiwan)	Male (87.1%) Female (12.9%) <49 (87.3%)	356	U&G and ISSM
(Li et al., 2019)	activity amount ranking, activity frequency ranking	Fitness training	China	Male (45%) Female (55%) 25-35 (89.6%)	211	ECT and Social Comparison Theory
(Chen & Lin, 2018)	optimism, innovativeness, discomfort, insecurity, health consciousness	diet and sports service	China (Taiwan)	/ 20-29 (56.14%)	994	TAM
(Beldad & Hegner, 2018)	descriptive social norm, injunctive social norm, perceived ease of use	Fitness training	Germany	Male (50%) Female (50%) Ave. age 26.7	476	TAM
(Seol et al., 2017)	optimism, innovativeness, discomfort, insecurity	Sports (Golf)	Korean	Male (66.1%) Female (33.9%) 20-49 (76.7%)	534	UTAUT and TR
(Lim & Noh, 2017)	gain-framed messages	Fitness training	Korean	Male (50%) Female (50%) students	100	/

(Stragier et al., 2016)	self-regulation, enjoyment, social interaction	Fitness Community	/	Male (89%) Female (11%) Ave. age 42	394	U&G and SDT
(Yuan et al., 2015)	performance expectancy, effort expectancy, social influence, facilitating conditions, price value, hedonic, habit	Health and physical exercise	United States	Male (21.1%) Female (78.9%) students	317	UTAUT2
(Wang, 2015)	descriptive social norm, injunctive social norm, self-efficacy, ego-defensive function	SNS (Sport event)	United States	Male (51.3%) Female (48.7%) students	466	TPB
(Cho et al., 2015)	appearance evaluation, fitness evaluation, appearance orientation, fitness orientation	diet and sports service	Korean	Male (33%) Female (67%) students	294	TAM and TRA