

## Research Paper

# Comparison of the Effect of Video Games, Catalogs, and Face-to-face Training Regarding the FIFA +11 Warm-up Program on the Level of Acceptance and Belief of Soccer Players



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## ABSTRACT

**Purpose:** The purpose of this research was to compare the effect of video games, training with catalogs, and face-to-face training of the FIFA +11 warm-up program on the level of acceptance and belief of football players.

**Methods:** The current semi-experimental research was done on 240 male players and coaches present in the premier soccer league of Khorasan Province who were randomly divided into four groups: 11+ face-to-face exercises, catalog, video games, and control (60 people in each group). Electronic questionnaires on acceptance and knowledge were filled by players and coaches. Then, the subjects of the training groups performed the exercises in three 15-minute sessions per week for eight weeks. Kruskal-Wallis test and marginal mean were used to check differences between the groups.

**Results:** After eight weeks of training, there was a significant difference in the knowledge and awareness of the players between the four groups ( $P < 0.05$ ). Also, the marginal average test results showed that the effect of these exercises on the level of knowledge and awareness of the players was greater in the face-to-face group than in other groups. Also, 33.3% of the players considered these exercises to be boring and 23.7% of the players considered the limitation of time to do other exercises and soccer skills as one of the factors that prevent them from doing the exercise.

**Conclusion:** Football players had low levels of knowledge and awareness of 11+ exercises, which increased after eight weeks of 11+ exercises using face-to-face exercises, catalogs, and videos.

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## Highlights

- Football players had low levels of knowledge and awareness of 11+ exercises, which increased after eight weeks of 11+ exercises using face-to-face exercises, catalogs, and videos.

## Plain Language Summary

Soccer stands out as the most popular sport around the world. Due to the high prevalence of injuries in soccer, the necessity of injury prevention exercises cannot be overstated. Nevertheless, there is debate over the acceptability and knowledge of these exercises. To examine this issue, 240 male players and coaches present in the premier soccer league of Khorasan Province, Iran, were selected and randomly divided into four equal groups: 11+ face-to-face exercises, catalog-based training, video game-based training, and control. Players and coaches filled out electronic questionnaires about acceptance and knowledge. Then, the subjects of the exercise groups performed three 15-minute practice sessions per week for eight weeks. The results showed that soccer players had a low level of knowledge and awareness regarding 11+ exercises before the intervention. However, their knowledge increased after eight weeks of training using catalogs and videos, and face-to-face training. Notably, the knowledge and acceptability of the face-to-face group players were superior to those of the video games and catalog groups.

## Introduction

**S**occer is the most popular sport worldwide; about 265 million players, professionals, and amateurs practice soccer [1]. Although soccer offers many health benefits for its players, it also ranks as one of the most dangerous sports [2]. A review of all matches played in the 2015 America's Cup revealed that a soccer player spent an average of 233 minutes on the field, with one injury occurring every 58 minutes [3]. Five seasons of research on elite soccer players showed that the average number of days an athlete was unavailable was 10.5±4 days due to injury during practices or competition [4].

In soccer, it is difficult to control some external factors, such as collision injuries [5, 6]. However, some predictable internal factors that cause non-collision injuries can be fixed via exercises [3, 7]. Also, some epidemiological studies have reported preventable injuries for professional soccer players [8, 9], and some studies have emphasized injury prevention protocols [6, 9, 10]. Consequently, to bolster the safety and health of the players, prevent financial resources, curb early retirement, avoid losses of the teams, and mitigate the psychological fallout caused by injury, injury prevention programs seem essential [11].

The [FIFA Medical Research and Evaluation Center](#) designed the FIFA 11+ comprehensive warm-up pro-

gram to prevent injury in soccer. [FIFA](#) has expanded and developed this program throughout the countries of the world. More than 50 countries have incorporated this injury prevention initiative in the educational curriculum of their coaching courses [12]. The 11+ warm-up program has been expanded to more than 70 countries using a multifaceted approach involving scientific lectures, workshops, video equipment, and instructional manuals [12, 13].

Certainly, a significant knowledge and awareness gap about injury prevention is seen among coaches and athletes. To determine whether the knowledge and awareness about the risk of knee injuries and its prevention methods have been transferred to the athletes by the parents and coaches, a study showed that 63.8% of the athletes had never received any information about knee injuries [14].

Regarding sports-related injuries, coaches and players have different opinions and knowledge, highlighting a divergence in their beliefs [15]. A study also examined the soccer coaches' information on the awareness and use of the 11+ warm-up program at the amateur level and reported that almost half of the coaches (42.6%) were aware of this prevention program [16].

Another study showed that 75% of management behavior in injury prevention is contingent on receiving training in that field [17]. For example, after training skiers and snowboarders to use helmets, helmet use in-

creased to 95% [18]. Reports have shown the immediate benefits of exercise programs to prevent sports injuries among athletes [19-24]. Also, long-term learning was observed due to the implementation of preventive training programs among athletes [19, 20, 25].

Al Attar et al. in their research entitled “the FIFA 11+ injury prevention program still not implemented by the majority of professional and semi-professional soccer players and coaches globally”, investigated the level of awareness, implementation rate, and opinions of coaches and players about the effect of these exercises on professional and semi-professional players and soccer coaches. A total of 2000 professional and semi-professional players and soccer coaches worldwide were surveyed, of whom 1690 people (84%) completed the questionnaires and participated in the research. Of 1690 subjects, about 824(48%) knew the effect of these exercises, and 680 out of the 824 subjects (84%) stated that they used them in their exercise sessions as warm-ups and expressed a favorable attitude toward them. Finally, they concluded that more than half of the professional and semi-professional coaches and players lack information regarding these exercises. Therefore, they suggested educational interventions for the awareness of the players and coaches [26].

Serious video games are digital games used to teach and influence behavior and are not essentially regarded as entertainment [27, 28]. Video game technology has a significant effect on education [29]. Some video games have been designed to improve children’s healthcare, such as the educational game of Packy and Marlon, which improves self-care skills in children and adolescents with diabetes. This educational video game is well designed and its interventions are effective [30]. In addition, it can change the strategy of providing an injury prevention program for trainers and players.

Through video games, soccer coaches and athletes can understand and accept the injury prevention program. Rubio and Olmedilla reviewed the impact of low-intensity psychological interventions in software- and web-based games on preventing injury in soccer players. They considered unwillingness and reluctance a critical challenge for people using this type of exercise [31].

A significant knowledge and awareness gap about injury prevention persists among coaches, athletes, and their parents. Coaches and players are unaware of sports injuries, and their perspectives differ. The results of a review of the effectiveness of video games stated that game users got better results than people who experience

traditional learning processes. Also, they acquire more skills than traditionally trained users, showing that the game could increase their interest in learning [32].

The teaching skills were also successful, exemplified by the games designed for pilot training, medical education, and physiotherapy training. In the sports injury prevention strategy, most exercises have been performed face-to-face and in the presence of the coach and players. Only a few cases have been performed in the form of virtual training as videos and online educational courses. In this field, injury prevention programs are not provided in educational games. Hence, this research was conducted to compare the effect of the video games, training with catalog, and face-to-face training of the FIFA 11+ warm-up program on the level of acceptance, belief, and performance of soccer players in the context of sports injury prevention.

## Materials and Methods

The current research employed a quasi-experimental approach with a pre-test and post-test design incorporating control and experimental groups. The statistical population included all the male players and coaches in the premier soccer league of Khorasan Province, Iran, and the Soccer School of Kashmar and Khalil Abad Cities, aged 18 to 28 years. From this pool, 240 people were selected based on the inclusion criteria. They were randomly (by throwing dice) assigned to four equal groups of 60 people each (three intervention groups and one control group). To determine the sample size, we used G\*Power software, version 3.1.9.4. The sample size was estimated at 240, considering the test power of 0.80 and the effect size of 1.02, according to previous research [16, 33-37]. However, during the research and according to the exclusion criteria, five people from the face-to-face group, six from the video group, and five from the catalog group were excluded for reasons, such as catching COVID-19 and not participating in two consecutive training sessions. Thus, in the post-test, the subjects were 55 in the face-to-face training group, 54 in the video training group, 55 in the catalog training group, and 60 in the control group.

The inclusion criteria comprised body mass index (BMI) greater than 18 and less than 25 kg/m<sup>2</sup>, voluntary consent of the subjects to participate in the research, male gender, the age range of 18 to 28 years, no familiarity with the FIFA 11+ program, informed participation, and the absence of injury in the past six months. Additionally, participants were asked to practice at least three practice sessions a week with the team during the

research and a minimum of three years of playing experience in practice and competitive events. The exclusion criteria included the researcher's call that the subject had not cooperated during the study and doing the exercise program appropriately [38], being absent for more than two exercise sessions [39], and suffering from COVID-19 while conducting the research.

The subjects of the experimental groups started their exercises within one day after their initial measurement session. During this period, they were also asked to refrain from practices other than the prescribed training program. They were also allowed to do their normal daily activities.

Before the training program, the team coaches were invited to participate in a briefing session to familiarize themselves with the research procedure and the training program. Before the intervention, research questionnaires were completed by players and coaches. The groups performed the warm-up program in three sessions per week for eight weeks on the grass field of their exercise place under the supervision of the trainer and tester.

### Level of players' acceptance

The level of players' acceptance was assessed by a questionnaire collecting information about the actual use of the intervention for each player, the total number of injury prevention program sessions completed by the player, the proportion of exercise sessions and matches, in which the player completes the prevention program, as well as the average presence of players in each team during the injury prevention program [40].

### Examining attitudes and beliefs toward injury prevention

All players and coaches in all groups were asked to document their attitudes and beliefs through an electronic questionnaire. This questionnaire first evaluated coaching/playing experience, injury history and attitudes, beliefs, and knowledge about injury risk and prevention in soccer. After the research, the changes in attitudes and beliefs after exposure to the FIFA 11+ warm-up program were evaluated by the same electronic questionnaire, and only the order of the questions was changed [41].

### Educational software content

First, the algorithm of 11+ educational games was formulated in 47 steps. Then, the game and software were

made based on that algorithm. The 11+ warm-up program was introduced to the users at the beginning of the game. Before the game, a video about the benefits of injury prevention, the injury rate of soccer according to the latest research, and an educational video of the FIFA 11+ warm-up program was played for users. Next, the user entered the game environment. The game consisted of 47 stages, like the warm-up program of FIFA 11+. The game has 27 exercises; the user must complete one training out of 27 exercises in each stage.

The content of the game was primarily based on the correct execution of exercises in this warm-up program. In the educational game, the user learns the points that must be followed during the implementation of the warm-up program. The game consisted of three parts. The first part had six exercise sessions, including slow jogging, active stretching exercises, and controlled collisions. The second part included 18 exercises, focusing on strengthening the core and leg muscles, balance, and explosive power. Finally, the third part comprised three types of exercises, including running at medium and high speed and changing the path. In this program, the principle of overload is emphasized to progress in the exercises offering three difficulty levels: Primary, intermediate, and advanced.

### Warm-up program (11+)

The warm-up program (known as 11+) was designed based on the main three parts. The first part of this program contains slow running, controlled collisions, and active stretching for 8 minutes. The second part of the program includes six sets of exercises focusing on strength, balance, muscle control, and core stability for 10 minutes. Each of the exercises in this section has three levels of difficulty. All the players first did level 1, and then according to their progress, after four to six weeks, level 2, and after six to eight weeks, and according to the players' progress, level 3 was performed. The third part of this program also includes high-speed running with a change of direction for 2 minutes.

The program (11+) was designed with attention and focus on the awareness of the players about the natural alignment of the organs and maintaining the correct posture of the body while doing various exercises and relying on increasing the stability of the central region of the body, neuromuscular control, increasing the eccentric strength of the hamstring muscles, and the explosive power of the lower limbs and agility. The duration of the program was 20 minutes, and according to Soligard et al., its injury prevention effectiveness increased with

Table 1. 11+ training program

Parts	No.	Exercise	Repetition
1 <sup>st</sup> part: Running exercises: 8 minutes	1	Running forward and straight	2
	2	Running with hip external rotation	2
	3	Running with hip internal rotation	2
	4	Running with spinning around the exercises exercise load	2
	5	Running along with jumping and hitting each other's shoulders	2
	6	Fast forward and backward running	2
2 <sup>nd</sup> part: Ten minutes of strength, plyometric, and balance exercises (one of three levels is performed based on the level of players' readiness)	Bench	Level 1: Stationary bench	3- 20 to 30 s
		Level 2: Bench with alternate replacement of legs	3- 40 to 60 s
		Level 3: Bench with raising a leg and keeping it	3- 20 to 30 s
	Side bench	Level 1: Static side bench	3- 20 to 30 s (each side of the body)
		Level 2: Side bench with hip up and down	3- 20 to 30 s (each side of the body)
		Level 3: Side bench with raising the legs	3- 20 to 30 s (each side of the body)
	Nordic hamstring extensor contraction movement	Level 1: Beginner-level hamstring movement	3-5
		Level 1: Medium-level hamstring movement	7-10
		Level 1: Advanced level hamstring movement	12-15
	Balance on one leg	Level 1: Standing on one leg and holding the ball	2-30 s (for each leg)
		Level 2: Standing on one leg and throwing a ball for exercise load	2-30 s (for each leg)
		Level 3: Standing on one leg and disrupting the balance of the exercise load	2-30 s (for each leg)
Squat	Level 1: Squat with rising on the toes	2-30 s	
	Level 2: Walking in the form of a lunge	2-30 s	
	Level 3: Squat on a leg	2-10 (each leg)	
Jumping exercises	Level 1: Vertical jump	2-30 s	
	Level 2: Side jump	2-30 s	
	Level 3: Jumping in different directions (box jump)	2-30 s	
3 <sup>rd</sup> part: Running exercises, 2 minutes	13	Running across the field	2
	14	Running and jumping	2
	15	Jumping movements	2

greater frequency of implementation during the week. Soligard et al. suggested a minimum repetition of this program to be two sessions per week [42].

According to the results obtained from previous studies, a much more practical model with a higher operational capability can be designed and provided to the soccer community by modifying the program's structure (11+) and replacing some exercises with efficient exercises [43-45]. Since the speed of development and progress in soccer is much faster than in other sports, it can be expected that this program's efficiency will evolve over time. Table 1 presents a comprehensive chart of 11+ and how to perform it.

It should be noted that after the necessary exercises, the researcher and four trainers, along with the subjects, performed eight weeks of exercises (in three groups). All ethical principles were observed in the current research.

Finally, the data related to the characteristics of the subjects, such as age, height, and weight, in addition to the research variables, were analyzed by descriptive and inferential statistics using SPSS software, version 20. Due to the non-normality of the data, the Kruskal-Wallis test was used to investigate the differences in the level of beliefs and attitudes of the players between the four groups in the post-test. This research set the significance level and  $\alpha$  values at 0.95% and 0.05%, respectively.

## Results

Table 2 presents the demographic information of the participants.

**Table 2.** Anthropometric characteristics of the subjects

Group	Mean±SD				P
	Control	Catalog Training	Video Training	Face-to-face Training	
Age (y)	25.31±3.66	23.85±4.06	25.04±2.36	24.19±3.84	0.31
Height (cm)	178.10±5.71	176.02±4.15	175.95±4.81	177.27±38.3	0.64
Weight (cm)	76.14±3.61	75.98±6.18	73.75±3.45	74.20±4.37	0.42
BMI (kg/m <sup>2</sup> )	24.09±0.31	24.58±0.09	24.1±0.16	23.70±0.39	0.95

PHYSICAL TREATMENTS

**Table 3.** Intergroup differences in the post-test between the four groups

Variable	Kruskal-Wallis Test Result	df	P
Level of beliefs and attitudes of the players	194.93	3	0.001

PHYSICAL TREATMENTS

The analysis of the variance showed that the subjects were homogenous in terms of demographic variables ( $P<0.05$ ).

Table 3 presents the background of players of a team who used a specific exercise program in their training to improve performance and fitness and prevent injuries. The results showed that 151 players (64.8%) had not used a particular exercise program to improve performance and physical fitness, and 85% had not used any specific exercise program to prevent injuries. Table 3 reports the test results of the Kruskal-Wallis test.

The results of the Kruskal-Wallis test showed a significant difference between groups in the post-test and after eight weeks of 11+ exercises. Therefore, the null hypothesis was rejected, and the research hypothesis was confirmed. The results of the Bonferroni test showed a significant difference in players' beliefs and attitudes between all research groups ( $P<0.05$ ) (Table 4).

The estimated marginal averages also indicated a greater impact of 11+ exercises on the level of players' beliefs and attitudes in the face-to-face group (5.56) compared to other groups (Table 5).

## Discussion

This research was conducted to compare the effect of three different training methods for the FIFA 11+ warm-up program (video games, catalog, and face-to-face training) on the level of acceptance, belief, and performance of soccer players. This research showed a significant difference between the four groups in the level of

**Table 4.** The Bonferroni test results on the beliefs and attitudes of the players

Variables	Group	Mean Difference	P
The level of players' beliefs and attitudes	Face-to-face vs video	0.24	0.01
	Face-to-face vs catalog	1.38	0.001
	Face-to-face vs control	2.92	0.001
	Catalog vs video	-1.14	0.001
	Catalog vs control	1.54	0.001
	Video vs control	2.68	0.001

PHYSICAL TREATMENTS

**Table 5.** Estimated marginal mean scores of the players' beliefs and attitudes

Group	Mean±SE
Face-to-face	5.56±0.05
Video	5.32±0.04
Catalog	4.17±0.04
Control	2.63±0.04

PHYSICAL TREATMENTS

beliefs and attitudes of soccer players in the post-test and after eight weeks of 11+ exercises. As such, 11+ exercises were more effective on the level of beliefs and the players' attitude in the face-to-face group compared to the other groups. However, 33.3% of the players considered these exercises boring, and 23.7% believed that the time constraints hindered their ability to perform other exercises and soccer skills. The results of this research are consistent with the results of Geertsema et al. [34], Al Attar et al. [26], Nuhu et al. [46], Shamlaye et al. [41], Slauterbeck et al. [47], Wilke et al. [16], and Zech et al. [48].

In the study by Geertsema et al. entitled "injury prevention knowledge, beliefs and strategies in elite female footballers at the FIFA Women's World Cup France 2019", 552 female players were initially involved, with 196 cases ultimately participating in the research. Their research showed that more than 90% of the players recognized the significance of injury prevention in soccer. Also, two-thirds of them believed in the coaches' motivation in facilitating injury prevention training for the players. More than 80% of the players in their teams had implemented an injury prevention program, and two-thirds used the 11+ injury prevention program in their routine practices. Only one player did not perform any injury prevention program. Finally, they concluded that the level of motivation of players and the attitude of

coaches toward injury prevention training hold substantial importance [34].

Al Attar et al. investigated the level of awareness, implementation rate, and opinions of coaches and players regarding the effectiveness of these exercises in professional and semi-professional players and soccer coaches and concluded that more than half of the professional and semi-professional coaches and players lacked the desired information regarding these exercises [26], which is consistent with the present research results. Nuhu et al. reported a 77% acceptance rate of the exercise program among their study subjects [46].

Shamlaye et al. conducted a study investigating the attitudes, beliefs, and factors affecting the adherence of soccer coaches regarding the 11+ injury prevention training. Almost 158 trainers and coaches answered all the questions of the used questionnaire. About 94% of them believed that injury prevention training is one of the most important duties of coaches. About 96% believed that warm-up is one of the crucial stages of a training session, and 92% believed that 11+ exercises are practical for them. Also, subjects with more experienced trainers were more willing to use injury prevention training. In addition, the time limit of the coaches during the warm-up in a training session and the long duration of these exercises were among the critical obstacles to the

acceptance and adherence of the coaches in using these exercises. At the same time, increasing the players' performance was the vital reason for coaches to use this program [41]. This finding was consistent with the results of the present study.

Among the physicians and trainers of a team, it is quite evident that trainers play a crucial role in implementing an injury prevention program in their exercises. Also, Shamlaye et al. [41] reported a significant relationship between the age of coaches and the use of injury prevention training. As coaches get older and more experienced, their need to use injury prevention training also increases. In addition, the level of competition emerges as another factor in using exercises. As the level of the games gets higher, the coaches are more willing to use these exercises. Also, coaches with higher levels of coaching knowledge and qualifications are more inclined to use these exercises than lower-level coaches. Focusing on the training of coaches in this field can be one of the most useful strategies for using these exercises and improving players' attitudes toward these exercises.

In this research, the obstacles mentioned by the subjects to use these exercises in the questionnaire included lacking enough time, the long duration of these exercises, and not using the ball in these exercises. These problems are not confined to soccer and the 11+ program [40]. Based on these results, shortening the duration of these exercises or changes in the program, such as adding a ball and modifying them to real soccer to encourage more players and coaches, can be future strategies to increase adherence to these exercises.

In their research, Bizzini et al. pointed out that informing and training coaches through educational courses and soccer sports associations affect their use of injury prevention training [12]. They highlighted that coaches and players advise very few sports teams about injury prevention. Also, according to coaches, the importance of injury prevention training is rarely mentioned in soccer coaching courses [12].

Furthermore, McKay et al. concluded that players and coaches with extensive backgrounds and experience are less willing to use injury prevention training because they believe these exercises are unsuitable for high-level players [15]. Soligard et al. pointed out that one of the motivations for coaches to use injury prevention training during the competitive season is to reduce the injury rate of the players after doing these exercises and ultimately, the team's success [49]. Soligard et al. also considered the relatively long duration and non-specialty (not using

a ball) of these exercises as the reasons for the low acceptability of these exercises [49].

Bakare et al. achieved the same results as the current research. In their opinion, coaches, as the leaders of each team, play a crucial role in informing and increasing players' adherence to injury prevention training. A coach who is eager to do an exercise program can transfer this enthusiasm to his team players [33].

## Conclusion

According to the results obtained in the present research, we concluded that soccer players have low knowledge and awareness toward 11+ exercises. However, this knowledge increases after eight weeks of 11+ face-to-face, catalog, and video training exercises.

This study had some limitations, such as the problems of coordinating many players and encouraging soccer coaches to perform 11+ exercises as part of their main exercises.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by [Research Institute of Physical Education and Sports Sciences](#) (Code: IR.SSRI.REC-2308-2377).

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### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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