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Pamukkale J Sport Sci, 13(1), 1-21, 2022 Research Article

Occupational Health and Safety in Sports: Risk Analyses and Consumer's Point of View for a Sports Center

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ABSTRACT

The occupational health and safety law in Turkey was enacted in 2012. Work areas are classified as very dangerous, dangerous, and less dangerous in the context of labor law. Sports centers in the less dangerous class have the obligation to act according to the law until July 2023. This study aims to determine how the application of the law for a public university sports center is. The situation of the sports center was examined both from the users' point of view with the application of a questionnaire and by using the risk analysis method with expert evaluation. In the light of the results obtained, the precautions to be taken within the framework of the accepted risk levels in the facilities and the harmful effects of these measures are not taken are emphasized.

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INTRODUCTION

Occupational Health and Safety (OHS) emerges as an important area in all sectors today. OHS activities have become a systematic structure that aims to protect both workers and the environment. The fact that the developed countries such as Canada, the U.K., Germany, America, etc., have adopted the practices in their working environments has proved the low number of occupational accidents and diseases. The practices in the industrial area are going on afterward with developing OHS culture at workplaces with all kinds of employees such as private and public sector, office areas, personal working and living areas. Unfortunately, approximately 77,000 occupational accidents occur every year in Turkey, more than 1000 workers lose their lives, and more than 5,000 workers become permanently disabled. Employers who are rule-makers in workplaces are mainly responsible for occupational accidents and diseases (Yürük, 2012). Considering the developments in Turkey, it seems the applications for OHS were seriously inadequate until the law was prepared. Indicators of OHS also represent the state of fundamental human rights, working life, and the development of countries (Karadeniz, 2012).

Due to these important issues and a need for the European Union's harmonization process, the Occupational Health and Safety Law number 6331 was adopted for the first time in 2012 in Turkey, which aimed at protecting both employees and the environment. This law began to be implemented in 2014, and nowadays, it is adopted in very dangerous, dangerous, and less dangerous workplaces. All areas in the public sector and single-employee workplaces must be under this law by 2023. But OHS applications conducted outside the industrial area (Kılkış, 2013) are still insufficient in Turkey.

During the European Union harmonization process, adopting new and current practices in all areas also includes the sports sector, which is rapidly growing. Sports halls have been more preferred than outdoor sports (Kuburlu, 2014). So, the increase in per capita income at sports centers (Kuburlu, 2015) is a driving force for new sports centers. In this case, the country's sports economy is also affected. However, it is not fully known that these new centres' designs, equipment, and processes are under the OHS law. There are no studies on OHS for sports facilities in Turkey yet. This study is a preliminary study that evaluates people's awareness and perceptions of using sports facilities.

Many people have been at work during their most productive period of daily life. The environmental conditions we encounter while working brings significant challenges and hazardston the work areas. Systematic solutions for hazardous behaviors and hazardous

environments are essential to ensuring a safe working area. Work safety training for employees and binding sanctions for employers should be applied based on safe conditions. Therefore, each country must establish Occupational Health and Safety legislation to establish a safe working structure for its production and work areas. Occupational accidents caused by unfavorable working conditions cause occupational health and safety concepts to occur more frequently. Measures on occupational health and safety are for taking form; government, non-governmental organizations, employers, and employees need to work together (Durdu, 2014).

Looking at occupational health and safety studies, it can be seen that the biggest issue is primarily in small and medium-sized enterprises. This definition describes workplaces with fifty or fewer employees (Kılkış, 2014). Sports facilities and complexes can often be evaluated within this group regarding many employees and physical capacity.

The Ministry of Youth and Sports (MYS), a government agency responsible for sports activities and investments, built 25 big stadiums still 2020 in Turkey (MYS, 2014). According to a Ministry of Youth and Sports report, local (cross-street) sports facilities reached 1000. At the same time number of sports halls and swimming pools is increasing. Another important point is the number of facilities, especially in the fitness sector, which is the majority of the private sector's investment in sports, has exceeded 1500, according to 2019 data. Members of those facilities have reached two million, and the trade volume increased to 850 million Turkish Liras (Kuburlu, 2014). These figures concern our concept, which is an important economy in terms of the construction and operation of sports facilities and the human communities. The absence of standards in the construction, use, and inspection of facilities leads to very risky environments, especially for occupational health and safety. In the light of this view, stadiums, gyms, sports centers (fitness and wellness), etc. show the status of the facilities in terms of healthy and safe environments for athletes and users and offer solutions.

Sports facilities and businesses are areas that enable individuals to exercise in various sports and help shape their social lives. Nowadays, many sports centers are operated by the public and private sectors, and they enable watching competitions live and provide healthy living and recreational activities.

Considering social security sports athletes should be divided into two categories such as professionals and amateurs (Öztuna, 2015). Federations, clubs, and employees can be grouped depending on this classification. But it is different for the sports facilities because amateurs and professionals may use the facilities simultaneously. Due to the nature of the sports, no matter who risks using the facilities, there are some risks (Corbett, 2002). Sports-related risk factors are grouped into for (Çobanoğlu, 2013).

- Finance-related risk factors: problems are related to the financial support such as; audience revenue, broadcasting sales revenue, sponsorship revenue, transfer revenue, and other income (Dorukkaya et al., 1998).
- Insurance-related risk factors: In sports clubs, a liability insurance policy is generally applied. Sports clubs transfer important risks that they do not want to take over to others through insurance or contracts (Gök, 2006).
- Health-related risk factors: Training, trainer, and general health-related problems.
- Facility related risk factors: Competition security problems, failure to take measures against natural disasters, indoor and outdoor heating and/or cooling problems, inadequate lighting of the field or hall, hygiene problems, game field ground problems, basic security problems, lack of experts in the facilities (Miller, 1997).

When the literature is examined, the risk studies related to sports, are mostly associated with sports injuries (Steinbrück, 1999; Conn et al., 2003). In the UK, more than 29 million sports injuries per year in professional and recreational activities result in a loss of 9.8 million working days and spending of £ 590 million (Conn et al., 2003). This indicates the importance and priority of sports injuries in public health.

One of the significant shortcomings of sports facilities and complexes is the lack of consciousness about the health and safety of employees and users. At this point, the trainers' awareness is also important in raising the understanding of the consumers. People who have not been trained and have not gained sufficient experience in work can cause insecure behaviors and work accidents (Erdoğan, 2004). The training's planning, completion, delivery, and control should be done within the study areas. The machinery and equipment used in the sports areas should be the property that can be adjusted according to the person's usage. Ergonomics, one of the critical areas of work health and safety, must be considered at this stage. Regulations that will provide optimum benefits in sports should also be recommended from an ergonomic point of view (İşler, 2013). Ergonomics explores human compatibility with the equipment used and the relationship between employees' work, work tools, and work environment. The goal is to get the highest yield from the human body by lowering the risk of injury. Learning to make simple adjustments to the working environment and habits will significantly increase the comfort and productivity of the person (Atalay et al., 2014). In sports activities, the controlled operation of the targeted muscle group under suitable conditions is important to prevent health problems that may occur. Both active and productive working conditions in sporting activities are discussed today. Therefore, ergonomic regulation should be given importance in every area of sport to ensure the performance of the person connected

to it and the security of the equipment. Especially those working in sports facilities may face occupational diseases due to the risks associated with the lack of ergonomic regulations. Occupational diseases caused by working conditions are regulated by law depending on the performance exhibited. In Turkey, occupational diseases have identified the No. 6331 Occupational Health and Safety legislation with the 5510 Social Security and General Health Insurance Law (Şen, 2019).

Considering the studies carried out for sports facilities, insufficient numerical data are obtained regarding work accidents. The main reason for the lack of sufficient data is that in Turkey many sports facilities do not have the obligation to work in the context of occupational health and safety laws yet.

False and prolonged physical work in the sport can cause a musculoskeletal disease due to permanent deformation. It is usually easy to detect the occurrence of work accidents. In addition, the fact that the assessment criteria are not known in the case of occupational accident conditions and the causes of work accidents that may occur in the facilities is also a negative result for the data. It should also be noted that if the working environment and working conditions are physically, chemically, and biologically insufficient, the employees are at the same risk.

METHODS

In examining the facility's compliance with the occupational health and safety law, the L-type matrix analysis method (one of the risk analysis methods) was used. This method is a quantitative technique and applied by an academician occupational health and safety expert and one of the authors of this study.

Study Groups

The sample of the study is Pamukkale University Sports Center. Pamukkale University Sport Center was established in 2007 and it has an Olympic pool, gymnastic court, two fitness halls, Pilates zone, spinning cardio zone, squash court, climbing wall, and SPA. It has more than 10.000 members and approximately every month more than 1000 children take the course in several sports branches.

Study Design

This study was conducted in a quantitative descriptive research design. Data were collected in two different ways. Gender, job, age, physical and mental differences, and other demographical features of people may also create differences in their occupational health and

safety culture (Ahn and Jaeouk, 2019). Therefore, in this study, firstly users' evaluations were obtained through a questionnaire as a quantitative data collection technique, and frequency analysis was performed with the results. The results also summarize the awareness of the user's occupational health and safety culture. The questionnaire was arranged in line with the checklist published by the Ministry of Labor and Social Security (2018) to monitor the compliance of sports centers and swimming pools with occupational health and safety measures. Based on the checklist, 30 questions were determined under four main headings (Conformity/Suitability, Warning and Informing, Safety Measure, Occupational Hygiene). Responses were received as "yes", "no" and "no idea".

Risk analysis was carried out to determine the current danger based on analytical-numerical data. Analytical system; use algorithms and normative rules such as probability calculation, formal logic, and risk assessment. This system, which is relatively slow and laborious, requires conscious control (Slovic et al., 2004). The risk analysis method, a hazard assessment criterion for Occupational Health and Safety, was used to determine the precautions in the sports center where the research was conducted.

Risk Analysis Methods

Risk analysis generally provides information about the dangers facing management in any business environment. Continuous analysis and control of the unstable situation encountered may result in reductions in the uncertain state. The risk analyst can recommend additional data collection methods to achieve the desired level of sensitivity. Within the scope of this study, research has been made within the framework of the information that the user has. Following the risk analysis, the acceptability of the situations in which the existing hazards turned into risks was examined. Numerical data and this information are clarified.

Risk analysis can provide clear information about the exact level of risk that the hazard in a working environment can turn into. Risk assessment can be done quantitatively and qualitatively. In quantitative risk analysis, the risk value is calculated using mathematical theorems when calculating risk. In qualitative risk analysis, numerical values are given to values such as the probability of the threat, effect of threat, and these values are processed by mathematical and logical methods and the risk value is found.

The risk value is reactive in occupational health and safety and compensatory. It has to be proactive in occupational health and safety and include measurable preventive activities. It is necessary to be proactive and not reactive in occupational health and safety. There is no risk analysis method to suit all workplaces.

The occupational health and safety specialist should decide which method to apply according to the characteristics of the current workplace and apply it. The experience of the occupational safety specialist during the risk assessment will affect the risk assessment results. In this study, definite results were obtained with numerical data for risk values using L Type Matrix Analysis Method.

There are different application methods for risk analysis (Nilgün, 2019).

- L-Type Matrix Analysis Method.
- X Type Matrix Analysis
- Fine-Kinley Method.
- Failure Mode and Effect Analysis (FMEA)
- Preliminary Hazard Analysis (PHA)
- Fault Tree Analysis (FTA)
- Hazard and Operability Analysis (HAZOP)
- Event Tree Analysis (ETA)
- Cause and Effect Analysis
- What if Analysis
- Preliminary Hazard Analysis (PHA)
- Job Safety Analysis (JSA)

L-Type Matrix Analysis Method

The L-type matrix is used to evaluate cause-effect relationships. This method is ideal for analysts who have to perform simple, stand-alone risk analysis. The success rate of the method varies according to the analyst's accumulation. This method should be used to detect the dangers which require urgency and measures should be taken as soon as possible.

Risk = Violence X Probability (1-6: Low risk / 8-12: Moderate risk / 12-25: High risk)

X Type Matrix Analysis

It is not suitable for an analyst to do it alone. Five years of past accident research is needed. It requires disciplined teamwork led by an experienced team leader. The likelihood of a recurrence of a previous accident or related event is also evaluated. As a result of the evaluation, the cost analysis of the measures to be taken to eliminate the risk is performed and the cost of the risk is compared with the two costs if it is possible to transfer the risk.

Fine-Kinley Method

The results of possible risks are graded with this method. In case of danger, the severity of the damage or damage to humans, the workplace, and the environment is evaluated. It is

an easy-to-use and widely used method. It allows the use of workplace statistics. The urgency of the measures to be taken according to the high-risk value is determined, and importance ranking is made according to the risk level.

Failure Mode and Effect Analysis (FMEA)

It is one of the most widely used methods. The basis of the method depends on parts of any system; which can be affected by failures that may occur in parts, tools, and components.

Preliminary Hazard Analysis (PHA)

Its purpose is to identify and assess potentially hazardous parts of the system or process and to determine the probability of more or fewer accidents for each identified potential hazard. An analyst conducting a preliminary hazard analysis relies on checklists that show dangerous parts and situations. These lists are organized according to the technology used and the need. The hazards identified in these lists are evaluated in the risk assessment form. This method is not designed to provide comprehensive details. Preliminary hazard analysis is a qualitative risk assessment analysis that can be used in the final design stage of the plant or as a model for more detailed studies and can be prepared quickly. It is formulated with possible corrections and preventive measurements for each adverse event or hazard. This analysis determines which types of hazards occur frequently and which analysis methods should be applied.

Fault Tree Analysis (FTA)

As a quantitative technique, examines the error by sub-components. The purpose of FTA is to identify the mechanisms of errors which can be the mechanical, physical, chemical, or human origin. The FTA schematizes possible sub-events with a logical diagram; reliability and probability theorems.

Hazard and Operability Analysis (HAZOP)

It is applied in processes and critical systems in the chemical sector. It has been developed by the chemical industry, considering the specific hazard potentials of this industry. It is applied by a multidisciplinary team to detect, analyze and eliminate accidents. It is a systematic brainstorming study using specific guidewords. The participants are asked questions in a specific structure and they are asked what consequences would arise in the event of these events or not.

Event Tree Analysis (ETA)

The event analysis method is selected to see where an accident will proceed with operator errors and system failures. It is a quantitative analysis system. Logic calculation system is used. It is the main technique used in the result analysis because it shows pre-accident and post-accident situations. The left side of the diagram is connected with the initial event, the right side is connected with the damage state in operation and the top defines the system. If the system is successful, the path goes up and if it fails, it goes down.

Cause and Effect Analysis

This technique was created in the Danish RISO laboratories for use in the risk analysis of nuclear power plants. It can also be adapted to determine the security level of the systems of other industries. Cause and Effect Analysis is a blend of Error Tree Analysis and Event Tree Analysis. The purpose of Cause-and-Effect Analysis is to identify the undesired consequences when defining the chain between events. A detailed cause-and-effect diagram is in the form of a fishbone, so it is also called Fishbone Diagram. The reasons for drawing the diagram are generated by brainstorming or by using simple control charts prepared by team members.

What if Analysis

This method is useful during factory visits and reviews of procedures. It increases the detection rate of the inevitable potential hazards that already exist. This method can be applied at any stage of the process and may be carried out by less experienced risk analysts. It starts with the general question, "What if it happens?" and is based on the answers to these questions. Possible consequences of failures are identified and recommendations for each situation are identified by the responsible persons. The downside of the system is that the attention of the risk analyst focuses only on one point or that the analyst's experience does not allow him to see the danger at that point.

Preliminary Hazard Analysis (PHA)

Its purpose is to identify and assess potentially hazardous parts of the system or process and to determine the probability of more or fewer accidents for each identified potential hazard. An analyst conducting a preliminary hazard analysis relies on checklists that show dangerous parts and situations. These lists are organized according to the technology used and the need. The hazards identified in these lists are evaluated in the risk assessment form. This method is not designed to provide comprehensive details. Preliminary hazard analysis is a rapid qualitative risk assessment analysis that can be used at the final design stage of the plant or as a model for more detailed studies. It is formulated with possible corrections

and preventive measurements for each adverse event or hazard. The result of the analysis determines which types of hazards occur frequently and which analysis methods should be applied.

Job Safety Analysis (JSA)

It focuses on work tasks performed by individuals or groups. This methodology is appropriate if jobs and tasks in a business or factory are well defined. The analysis directly examines the nature of the hazards arising from a job assignment.

Occupational Safety Analysis consists of four stages; 1) Structure, 2) Hazards identification, 3) Assessing risks, 4) Security measure analysis.

There are two important concepts in determining risk. First of all, the possibility of an existing accident is evaluated. The effect of the probability according to the occurrence of the situation also indicates the severity of the hazard to calculate the risk. Accordingly, for the analysis of the situation in the environment, the risk occurrence is calculated by multiplying the probability of the occupational accident with the severity.

There are many methods for risk analysis that can be used with or without numerical data. The risk analysis and the level of danger caused by the situation are observed in the environment (Vose, 2008).

As can be seen, many risk analysis methods are available. Less dangerous when the features of risk assessment methods are examined L type matrix and Fine Kinney that can be used in workplaces in the classroom. By comparing the methods, the risks that may be encountered in a public institution part of it has been evaluated. (Tok et al.,2018). In this study, since the analyst performing the risk analysis has to work alone and it is aimed to obtain more simple information with clear numerical data, risk analysis has been performed with L type matrix method.

RESULTS

Results of Questionnaire

Implementing the OHS law of the high-capacity sports complex of a public university, which has about 5500 members and trainees, serving in many different sports has been examined. The complex has units such as swimming pools, changing rooms, fitness areas, and a spa. A 30-item questionnaire was developed in the framework of the law describing four sub-scales; conformity (suitability), warning and informing, safety measure, and occupational hygiene (Table 2). To make the items understandable to consumers the views of two OHS

experts and two sports experts have been consulted. This questionnaire has been implemented for four weeks and has reached 321 persons (Table 1). According to the data obtained; the users are generally aware of the center's conformity. But 71 respondents (51,1%) startlingly indicate having "no idea" about the fire escape. One-third of the respondents don't have an idea about the warning and informing. A considerable majority of the responses show the users don't have ideas about the safety measure issues. After all, most users indicate that the center is good at occupational hygiene.

Table 1. Demographics of Participants

Age		**Membership Duration**	
18	3 (%1)	1 year	154 (%47.9)
19-22	108 (%33.6)	2 years	111 (%34.7)
23-30	108 (%33.6)	3 years	33 (%10.3)
30+	102 (%31.8)	4 years	23 (%7.1)
Total	**321**		**321**

Table 2. Questionnaire Items

Sub-dimension	**Item No**	**Questionnaire Items**	**Yes**	**No Idea**	**No**
Conformity (Suitability)	1	Suitability and safety of the floor	263		
	2	Suitability and safety of glass surface	274		
	3	Suitability of stairs	296		
	5	Availability of water	144		
	6	Suitability of utilization of materials	224		
	7	Taking the precaution of using materials	225		
	10	Leakage of water			183
	14	Availability of fire escape		155	
	19	Hygienic measures of the pool	220		
	25	Sufficiency of changing room. restroom. air conditioning etc.	237		
	26	Conveying through the pool	204		
	29	Noise pollution			214
Warning and Information	4	Precaution of wet floor	230		
	11	Availability and apparency of emergency plan	118	137	
	12	Availability and apparency of emergency telephone numbers	105	125	
	18	Apparency of the temperature control system of the spa	156	127	
	21	Sufficiency of caution signs	216		
	27	Sufficiency of informing about the pool depth	227		
	28	Informing employees and customers about safety machine utilization	172		

Table 2. (Continued)

Sub-dimension	Item No	Questionnaire Items	Yes	No Idea	No
Safety Measure	13	Availability of lifeguard	269		
	15	Suitability of fire escape and emergency exit for use		191	
	16	Availability of extinguisher	140	141	
	17	Broken or/and damaged cables. sockets etc.			196
	20	Availability of safety mechanism to entire the pool	237		
Occupational Hygiene	8	Providing hygiene requirements	286		
	9	Collecting trashes and waste regularly	287		
	22	Availability of shower and foot disinfection at the pool	263		
	23	Cleaning of changing rooms. restrooms etc. regularly	291		
	24	Availability of hygienic lockers in changing rooms	253		
	30	Complying hygiene requirements by carrying trashes	240		

The users are generally aware of the center's conformity. But 155 respondents (48.3%) startlingly indicate having "no idea" about the fire escape. One-third of the respondents don't have an idea about the matter of the warning and informing. A considerable majority of the responses show the users don't have ideas about the safety measure issues. After all most users indicate that the center is good at occupational hygiene.

In addition, the government must be committed to the full implementation of the law. To reach more accurate data informal employment should be prevented. At the beginning version of this study, the aim was to improve the scale for OHS implementations at sports centers. But the questions have to be determined from the regulation and so the subjects are already definite. During the analyzing process, the answers were not parametric. For example, most of the items are about the same subject, and differentiating them from each other is not efficient.

Moreover, the questions are not suitable to measure a behavior or an attitude. They are only suitable to present the situation. When the workplaces are classified, the service sectors are especially important for the consumer.

Results of Risk Analysis

For the risk analysis, the fitness center shower room, dressing room, other areas of the facility, and the halls used as course areas were examined under the supervision of an expert. The regions where risk analysis is conducted have been selected especially considering the areas where sports facility users are dense at the end of the study. It is aimed to reach the numerical data of the risk analysis of the facility and to obtain a simple result.

Because of this reason, risk analysis was performed using an L type 5X5 matrix. Results of the analysis are given in Figure 1. In the hazard classification used for analysis, the risk analysis assessment in Table 3 and Table 4 was used. Looking at the details of the study, it is seen that the wall-mounted climatic cabins used in two different fitness rooms are placed above a certain height. None of the climatic cabins are fixed to the wall. There are seven climatic cabins used in two very spacious fitness areas. Each cabin poses a high risk in seven separate areas, 22 electric treadmills, six bicycles, and all other equipment are used in fitness, and cables are scattered. There is equally low risk in all areas where these devices are located. A storage area was created for some hand, body working equipment, and weights used in the hall. However, after users have completed their sporting activities scattered for and dangerous areas are created because this equipment is not placed in the right place.

Although the dressing rooms have a large capacity, the humidity in the environment is above the optimum moisture level due to intensive use. In addition, high-temperature formation with humidity prevents the user in the comfort zone. Ventilation systems in locker areas are insufficient. Due to the hygiene conditions in the dressing areas, measures should be taken to prevent the formation of bacteria. Chemical cleaners and cleaning cloths and sponges are stored in open-air areas. The present situation poses a high risk for hygiene conditions.

This sporting facility features lounges for sports courses. In the risk analysis process, it was seen that the open-end electrical cables were removed in the electrical connection part of the card reader of the spinning area. Especially in a sports facility with a high concentration of child users an area left in such a way next to the dressing halls poses a serious risk. It is necessary to take urgent measures in this area and use the necessary warning signs in such areas. The measures to be taken at this sports facility are indicated in the risk analysis. The results of the study were shared with the managers of the sports facilities and the information about the determination and risk levels were given. In this study, it is emphasized that the regulation of high-risk areas should be a priority.

Figure 1. Risk Management Matrix Template for Sport Center

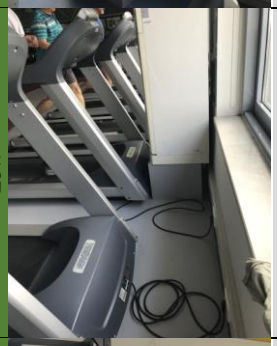
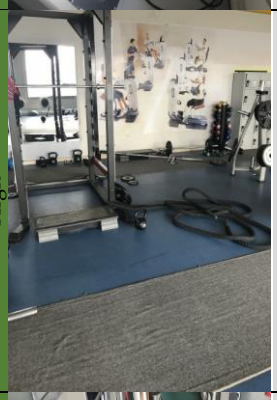
Risks For User And Personnel							
Pamukkale University Sport Center	**Likehood**	**Severity**	**Risk Factor**	**Risk Rating**	**Photo**	**Precautions To Take**	**Activities To Reduce Risk**
Climatic cabin systems in the fitness room are placed on a high step without being fixed.	3	4	12	High		In such a facility. there is continuous human circulation. Depending on any emergency (earthquake. vibration. etc.) or human error. there is a possibility that the climatic cabinet. which is not fixed and raised by stepping. may fall on the person.	Climatic cabinets should be fixed to the stair and wall where they are placed. Instead of such systems ceiling air-conditioned cabins can be recommended as more convenient and safer.
All electrical sports equipment cables are tangled in front of the glass.	3	3	9	Low		Regarding the safe environment in the work areas the risk of falling due to the danger of falling should be reduced. The danger arising from the environment prepares the environment for the occupants to encounter an occupational accident.	All cables in the environment must be safely collected. If possible creating invisible lines and passing them under the ground will reduce the risk level.
There should be storage areas reserved for all equipment used in the facility. After the equipment is used it is not placed in a place reserved for that equipment. No such area has been created for the equipment and is not indicated by visual warnings.	3	4	12	High		The lack of instructions for machinery and equipment used in the work area is an important hazard. especially for new students. Instructions for using the systems must be written in clear and understandable language. Also. during use around parts. sawdust. and so on. For machines with high disposal potential. transparent protective covers must be created.	The operating instructions of all machinery and equipment shall be prepared in a clear and understandable manner and hung in areas where users can easily see. The machine will be assembled by making appropriate protection covers considering the chip disposal situation.
The equipment used in the fitness room is located in a mixed area. Also, no instructions for use are available.	2	4	8	Low		The equipment used in the work areas should have a proper storage area. In addition, understandable instructions for its use must be in the stock space reserved for each product.	The operating instructions of all machinery and equipment shall be prepared in a clear and understandable manner and hung in areas where users can easily see them. The machine will be assembled by making appropriate protection covers considering the chip disposal situation.

Figure 1. (Continued)

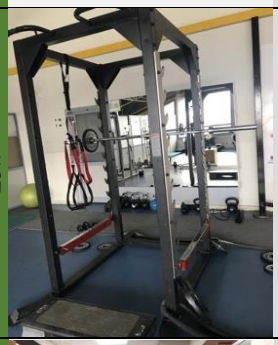
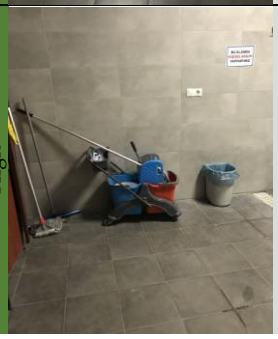
Pamukkale University Sport Center	Risks For User And Personnel				Photos	Precautions To Take	Activities To Reduce Risk
	Likehood	Severity	Risk Factor	Risk Rating			
The equipment used in the fitness room is located in a mixed area. Also, no instructions for use are available.	3	3	9	Low		Due to the narrow usage area. scattered equipment such as weight that is not related to the equipment etc. there are hazards such as the collision of the users during operation and falling into the weights.	The location of the equipment will be changed. In addition the necessary arrangement for the weight. etc. equipment that is located around and creates clutter will be provided.
The arrival of the closet doors in the used locker rooms is left open beautifully. There is a danger of injury to persons by hitting the edges and corners of the cupboard due to the narrow distances between the cupboards during opening and closing.	3	3	9	Low		Intermediate spacing of cabinets and locker cabinets should be adjusted more accurately. In addition, people should be informed of the instructions they should use for the use of lockers.	Necessary instructions will be prepared and technical controls will be carried out to increase the distance.
The doors used in the shower areas are made of glass. Too intense use can cause glass doors to close quickly and break doors. The user is in danger if the glass breaks. In addition, due to the intensity of the shower there is a lot of moisture in the interior. Ventilation is insufficient.	3	4	12	High		The use of glass doors creates a situation of harm to the user due to the danger of breakage where intensive use occurs. Instructions for careful use of the user must be prepared and posted. The technical controls of the ventilation systems for what is occurring in the environment must be carried out at appropriate time intervals.	Necessary instructions will be prepared. Appropriate technical controls shall be carried out.
All cleaning materials used in the dressing areas remain open. In terms of work and environmental hygiene there is an area open to bacterial distribution.	4	3	12	High		If the hygiene of the environment is not ensured. bacterial growth and epidemics occur in areas with intensive use.	The cleaning tools and equipment used. and cleaning materials will be placed in appropriate cabinets. It will be kept in locked areas so that no one other than the personnel who uses it can reach this vehicle and the reason.

Figure 1. (Continued)

Pamukkale University Sport Center	Risks For User And Personnel				Photos	Precautions To Take	Activities To Reduce Risk
	Likehood	Severity	Risk Factor	Risk Rating			
The entrance card reading area of the spinning hall was dismantled and electrical cables were hanging out.	4	5	20	Extreme		Electrical tools and equipment should be kept away from areas where there may be possible water (dirty-clean) floods. In case of malfunctions in electrical devices the relevant company employees/installation workshop should be informed by the department responsible and the malfunctions must be corrected as soon as possible. It must be identified with the warning letter 'DO NOT USE CAUTION'. Electrical safety precautions must be observed.	Regular maintenance and calibration of electrical appliances shall be ensured. Technical personnel will receive electrical safety training.

Table 3. Risk Analyses Assessment Matrix

		Severity				
		Acceptable	**Tolerable**	**Undesirable**	**Unacceptable**	**Intolerable**
		Minor injury. Insignificant property or equipment damage	Non-reportable injury. Minor loss of process or slight property damage	Reportable injury. Moderate loss of process. Limited property damage	Major injury. Single fatality. Critical process loss. Critical property damage	Multiple facilities. Catastrophic business loss
Likehood	1 Remote	None 1	None 2	None 3	None 4	None 5
	2 Unlikely	None 2	None 4	Low 6	Low 8	Low 10
	3 Possible	None 3	Low 6	Low 9	High 12	High 15
	4 Probable	None 4	Low 8	High 12	Extreme 16	Extreme 20
	5 New Certain	None 5	Low 10	High 15	Extreme 20	Extreme 25

Table 4. Risk Assessment Matrix Template (Modarres. 2016)

	None	Low	Moderate	High	Extreme	0-5 None Risk
Risk Rating Key	**1**	**2**	**3**	**4**	**5**	6-10 Low Risk
	Acceptable	Partially Applicable	Mostly Unacceptable	Unacceptable	Intolerable	11-15 High Risk
	Ok To Proceed		Take Mitigration Efforts	Seek Support	Place Event On Hold	16-25 Extreme

DISCUSSION

Occupational health and safety studies in European countries have been ongoing for many years. Especially countries such as England, Germany, and Italy work primarily in industrial areas within the framework of important laws and rules. In addition, technical measures had a positive effect on social life. Thus, the concept of a safety culture was created. When the technical accidents in Europe are examined, the rates of occupational accidents resulting in the least death are first in England that 0.6 people after 100 thousand work accidents, then in Germany and Italy, after 100 thousand work accidents, 2 and 3 people lose their lives, respectively. In Turkey, this value is 7 people after 100 thousand occupational accidents, according to the latest statistical data. In terms of the number of work accidents and fatal work accidents in European countries, Turkey has the highest loss (Kaner, 2017). For these reasons, in this study, the situation of sports centers, which are required to make occupational health and safety practices ready according to the law, has been tried to be evaluated from both the perspective of the customer and the expert.

At first user, comments were collected and examined. Then risk analysis was made. Finally, risk analysis and user comments were compared. According to the tables of the user evaluation results, it is stated that the activity materials used during sports are appropriate and the necessary precautions are sufficient. However, in the risk analysis, especially the clutter of the equipment used in the fitness room poses a risk.

In addition, the lack of safe installation of climatic cabin systems in the work area, and the clutter in the electrical connection areas of the equipment used pose a risk in the environment. However, users are unaware that these situations cannot be considered by the expert. Therefore, pieces of training should be carried out to increase the user's safety awareness (Doğan, 2007).

Another issue asked to the user is the fire escape and its exits. The user has not commented on this topic. Because the facility does not have a fire escape designed for emergency use. In emergency situations, users and employees at the facility are at high risk. Necessary arrangements should be made by the management quickly.

There was positive feedback on the user's questions about dressing areas and ventilation. However, in the risk analysis, high humidity and temperature were determined in the locker rooms.

This causes the user to be away from the comfort zone under unfavorable climatic conditions. Furthermore, the fact that cleaning materials are not stored in hygienic conditions creates a dirty atmosphere that will cause bacteria formation. This was evaluated in the risk analysis. The user's comments at this stage also indicate that he is not aware of the danger.

Emergency action schedules, which should be in the facility, are posted in the appropriate places. However, 42% of the users (n = 137) answered that they had “no idea”. Fire-fighting equipment is also installed in the facility. However, 44% (n = 141) of the users responded that they had “no idea”. For this reason, awareness studies should be carried out on emergency and equipment issues. At this stage, the visibility of plans and devices should be increased.

In this process, information about the dangers that may be encountered in the working environment should be given to the new members of the sports centers through informative brochures and information meetings. In addition, the dangers and risks they will encounter in the working environment should be explained to the sports center employees within the planned training processes to be determined. Pieces of training on solution methods for dangerous situations should also be defined. The most important concept in the work to be done on behalf of Occupational Health and Safety should be to eliminate the dangerous behaviors of people and to intervene in time against dangerous situations that will occur.

CONCLUSION

As a result, it has been observed that the sports facility is not suitable and ready yet in terms of OHS law. Occupational Health and Safety Culture will take time to be feasible and acceptable, because of the Turkish nation’s fatalistic structure.

It is a matter to be investigated from this point of view that the service is expected to be in a secure environment. To detect that the concept of security is adequate, methods including prevention and protection policy should be used. Among these methods, risk analysis is the most effective solution. Risk analyses will ensure efficient data for a safe and

comfortable service. On the other hand, user evaluations should always be considered from a customer relationship management perspective. Therefore, in this study, in addition to user comments, risk analysis was performed by the expert.

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Authors' contributions

The authors have designed the research together. The third and the corresponding author collected data from consumers. The second author collected data for risk analyses and made the risk analyses. The first author made the demographic analyses and analyzed the data and interpreted the results. All authors contributed equally to the introduction and discussion sections. The authors read and approved the final manuscript.

Declaration of conflict interest

The authors declare that there is no conflict of interest with any financial or non-financial organization regarding the subject matter or materials discussed in the manuscript.

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Pamukkale J Sport Sci, 13(1), 22-35, 2022 Research Article

Investigation of Sunk Cost Fallacy in European Football – Empirical Evidence from English Premier League and German Bundesliga

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ABSTRACT

Sunk cost fallacy is a behavioral decision-making concept that leads to biased decisions and sub-optimal outcomes. Although academics have shown some interest in this phenomenon, only a few studies investigate the presence of sunk cost fallacy in European football. This study investigates whether the sunk cost fallacy exists in Europe's top two football leagues using transfer fees and playing time. The presence of sunk cost fallacy would indicate a faulty decision-making process. The conducted regression continuity design results suggest that the coaches in the English Premier League make biased decisions due to sunk cost fallacy, whereas the coaches in German Bundesliga do not. The biased decisions of Premier League managers indicate managerial inefficiency, which might lead to undesired outcomes.

INTRODUCTION

Decision-making is a critical process for both day-to-day activities and long-term projects. Conventional decision-making theories suggest that people are rational; hence they make the choices that lead to the best possible outcome. However, in practice, that is often not the case. People make irrational and biased decisions from time to time, leading to the emergence of behavioral economics. A field that uses psychological insights to explain the irrationalities in decision-making behavior (Hursh, 1984). Behavioral economics is a relatively new field of economics however, it has been used to explain the behavior of economic agents in many different fields of economics.

Several sports economics literature studies have used behavioral concepts, especially for player contracts (Hinton & Sun, 2020; Farah & Baker, 2021). It is common to see erroneous and biased decisions in a field such as sports, where rationality is often lost by players, coaches, owners, and fans. Due to sports' dynamic nature, decision-making is a critical process that determines the winners and losers. Organizers, club owners, coaches, managers, and athletes constantly make short-term and long-term decisions. Although there have been important studies regarding sports decision-making processes, there is still a huge gap in the literature.

In professional sports, it's quite common to see managers who try to make better use of their most promising players however the question is whether these players are promising because they are the most talented or because they are the most paid ones. In the behavioral economics literature, two phenomena are often used to define the cost-oriented biased decisions: escalation of commitment and sunk cost fallacy.

This paper examines whether sunk costs are influential on the playing time decisions made by the managers in the English Premier League and German Bundesliga. If evidence can be provided regarding sunk cost fallacy, it would be an indicator of managerial inefficiency. The English Premier League and German Bundesliga are investigated for the existence of sunk cost fallacy in new transfers between the 2013/2014 and 2017/2018 seasons.

With the increasing number of in-game statistics for football, it is easier to measure player performance. More data is available for managers ~ however, managing and interpreting the newly available data is another expertise than managing a team. Occasionally managers fail to make good use of the new data. The objective interpretation of the data would enable the determination of best performing players however, often people tend to overweigh the negative attributes than the positive ones. As Oliva and his colleagues (1995) and Anderson

and Sullivan (1993) argue there is an asymmetry in the perception of the influence of negative and positive externalities on the outcome.

In the light of the studies in the literature, it can be foreseen that managers will be able to distinguish between "bad" performing players due to the asymmetry in the perception of positive and negative externalities. The initial hypothesis suggests that distinguishing between "bad" performing players will be easier, so it is expected to have a sunk-cost fallacy in the playing times of the players performing "good".

The investigation is done by conducting an RDD (Regression Discontinuity Design) to illustrate the shift in the playing time of the players that cost more than average compared to the ones who cost less. Illustrating biased playing times, due to higher financial commitment in terms of higher transfer fees, would provide empirical evidence for the sunk cost fallacy phenomenon. Other than the contribution to sports economics and behavioral economics literature such evidence would also contribute to professional football. Portraying the biased decisions would be an indicator of managerial inefficiency which is a problem to be fixed especially for smaller-scale clubs where funds are scarce and much more valuable.

Theoretical Background

Sunk cost fallacy is a decision-making bias that occurs when individuals make future decisions under the effect of previous expenditures. Neoclassic economists believe that sunk costs should be ignored hence decision-making should only be based on marginal benefits and marginal costs. There are numerous studies (Arkes, 1996; Bazerman et al., 1982; Garland, 1990; Thaler, 1980) that provide evidence of the sunk cost fallacy bias in making real-life decisions however it should be noted these are all experimental evidence. These studies are often criticized for being small stake decisions and not being generalizable as in the case for all other experimental evidence.

Sports leagues are large sums of data that are also high-stake decisions, making it an appropriate data source for sunk cost fallacy studies. So far, several studies have been conducted regarding the sunk cost fallacy phenomenon in professional sports, specifically basketball. There are studies conducted regarding sunk cost fallacy in the National Basketball Association (Camarer and Weber 1999; Leeds et al., 2015; Staw and Hoang, 1995). In recent years, other studies have been published regarding different types of sports such as Keefer's two papers (2015a; 2015b) regarding the sunk cost fallacy in the National Football League.

Staw (1976), Teger (1980), Shubik (1971), and many other studies illustrate the escalation of commitment. This phenomenon argues that sometimes people commit to a

position more than its value as in the case of the playing minutes of the NBA players. Players with higher contracts are given more playing minutes by the coaches regardless of their performance. Staw and Hoang (1995) demonstrate that NBA players who have higher draft rankings are given more minutes than they have deserved in terms of performance. Rational decision-making suggests a losing course of action however behavioral research suggests that it might not be the case.

Keefer (2015a) conducted a similar study for the NFL and found similar results such that escalation of commitment exists in the National Football League furthermore Keefer can associate the draft ranking with costs due to the structure of NFL drafts. Higher round picks in the draft are paid more than the picks in the lower rounds of the drafts which creates natural cutoff points in Keefer's data therefore very suitable for conducting a regression discontinuity design. The shift in playing time around the threshold level illustrates the sunk cost fallacy in the NFL.

Hackinger (2019) investigates the existence of sunk cost fallacy in the German Bundesliga between the seasons 2008/2009 and 2012/2013. The author concludes that there is no evidence of sunk cost fallacy in the investigated period.

It should be kept in mind that players have contracts therefore additional costs along with transfer fees. However, the data for the contracts are not publicly available for all the players/teams which makes them impossible to be used in this study. Also, some players change teams when their contracts end so there is no transfer fee paid to them. When Zlatan Ibrahimovic moved to Manchester United from Paris Saint-Germain in the 2016/2017 season, he was a free transfer however he was paid about 19 million pounds per season (Dailymail, 2017) which makes him costlier than many other newcomers to the Premier League. There are not many players like Zlatan Ibrahimovic therefore a few outliers do not distort the results in several hundred observations.

METHODS

Data Collection

Three bits of data are required to estimate the effect of financial commitment on playing time. The first one is the data regarding transfer fees gathered from the well-known website "Transfermarkt.co.uk". Secondly, data for the playing time for each player is needed, which is gathered from "Whoscored.com", a website that uses OPTA's data to provide statistics. For each player; appearances and minutes played to determine the playing time. Third, to control the differences in performance players with similar performance should be compared in terms

of cost and playing time relation. As an indicator of performance Whoscored.com ratings are used. The website underlines that their rankings are used by media giants, bookmakers, and football clubs hence a very well-known and respected performance indicator. WhoScored.com (2018) define their rating as a "unique, comprehensive statistical algorithm, calculated live during the game. There are over 200 raw statistics included in the calculation of a player's/team's rating, weighted according to their influence within the game. Every event of importance is considered, with a positive or negative effect on ratings weighted with its area on the pitch and its outcome."

Data for 1200 players have been collected, who have been transferred between the 2013/2014 and 2017/2018 seasons to the English Premier League and German Bundesliga. 624 of 1200 are transfers made by the clubs in English Premier League and 576 by the clubs in German Bundesliga.

To enhance the depth of the investigation, transfers have been examined in different sub-groups. First, players are grouped following their performances as "good" and "bad" using WhoScored.com's ratings. Since performing "good" is challenging in a "bad" team, relative performance ratings are used instead of absolute ratings. Relative performance is the player's rating to his team's rating.

Later the players are categorized into "defensive" and "offensive" by their playing positions. Transfermarkt's player positions are used for categorizing the players into defensive and offensive sub-groups. The defensive positions are: Centre-Back, Right-Back, Left-Back, and Defensive Midfield and the offensive positions are: Attacking Midfield, Central Midfield, Centre-Forward, Left Midfield, Right Midfield, Left Wing, Right Wing, and Secondary Striker. Then, these six subgroups are investigated for sunk cost fallacy in terms of appearances and minutes played. There are two transfer windows in European football, one in mid-season and one in the end season break. The players transferred in mid-season have than those transferred at the beginning of the season. To overcome this bias, the percentage of minutes and matches played are used instead of the number of minutes and matches played.

Finally, the free transfers are removed from the dataset to prevent any distortion in the data. Free transfers are often players which are either promising youngsters who do not get much playing time or veterans who are at the end of their careers transferred just as a contingency. There are occasional exceptions, but if a player is valuable, his club will not be letting him go freely.

Study Design

Regression Discontinuity Design was introduced by Thistlethwaite and Campbell (1960) to illustrate the causal effects of interventions by determining a threshold above or below which an intervention is assigned. The observations close to the threshold on both sides are compared and contrasted so an average treatment effect can be estimated. Using regression discontinuity design produces the highest internal validity among all quasi-experimental designs which estimate the local average treatment effect at the cutoff point hence it is the most favored one (Radoman, 2015).

$(Y_i(0), Y_i(1), X_i), i = 1, 2, \dots, n, \qquad X_i \; continous$

$T_i \in \{0,1\}, \qquad T_i = 1(X_i \geq \bar{x})$

$(Y_i, T_i, X_i), i = 1,2, \dots, n, with$

$$Y_i = \begin{cases} Y_i(0) & if \quad T_i = 0 \\ Y_i(1) & if \quad T_i = 1 \end{cases}$$

$$\tau_{SRD} = \mathbb{E}[Y_i(1) - Y_i(0) | X_i = \bar{x}] = \lim_{x \downarrow \bar{x}} \mathbb{E}\,[Y_i | X_i = x] - \lim_{x \uparrow \bar{x}} \mathbb{E}\,[Y_i | X_i = x]$$

(Sebastian, Cattaneo, & Titiunik, 2013)

We are investigating whether there is a discontinuity in playing times after a certain transfer fee threshold. The threshold is the average transfer fee paid to the players in the sample and we believe that there will be a sharp shift in playing times around the cutoff point. Following Radoman's (2015) methodology, a regression discontinuity design should be characterized by a set of assumptions that are relevant to this study:

- Two sets of players in terms of transfer fee around to cutoff point are represented by a dummy variable T.
- Players' transfer fees are constant therefore they cannot manipulate assignment, called exchangeability, which causes the treatment effects to be random around the cutoff point.
- Treatment indicator is T.
- Control variable (X) continuous around the cutoff point.

The existence of sunk cost fallacy can be tested through the estimation of the following regression.

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \varepsilon_i$$

Where $T = 0$ for the player who cost less than the average transfer fee and $T = 1$ for players who cost more. Y_i is the playing time measured in terms of percentage of minutes and percentage of matches played. X_i is the transfer fee and ε_i is the error term. For Stata, statistical software for data science, a package has been developed by Calonico et al. (2014) for conducting regression discontinuity designs. A robust package has been used and the present results are the output of the used package. The variance estimators are used as the ones suggested by Calonico et al. (2014) and the method for the bandwidth selection process is the one used in the same study.

RESULTS

The main purpose of this study is to investigate whether there is a decision-making fallacy in the English Premier League and the German Bundesliga. This section provides the results of the attempts to illustrate the sunk cost fallacy in different leagues. The table below provides the results of the different regression discontinuity designs for the subgroups mentioned earlier using Premier League's data.

Table 1 presents the results of the RDD and as can be seen, Transfer Fee is significant for some of the sub-groups indicating the presence of a decision-making bias. Sunk cost fallacy is present in the subgroups a), d), and e) when the playing is measured in both Percentage of Minutes Played and Percentage of Matches Played.

The following figures illustrate the shifts in the playing times between the players who were paid more and less than the average transfer fee.

Figures 1, 2, and 3 visualize the increase in playing times both in Percentage of Minutes Played and Percentage of Matches Played. Figure 1 illustrates the sunk cost fallacy in players performing "good" without any positional segregation whereas Figures 2 and 3 illustrate offensive players which perform "bad" and defensive players which perform "good".

Table 1. RDD Results for the English Premier League

	Dependent Variable	**Percentage of Minutes Played**
	Independent Variable	**Transfer Fee**
a)	All Players / Good	0.277 (2.064)**
b)	All Players / Bad	-0.77 (-0.653)
c)	Offensive Players / Good	-0.011 (-0.127)
d)	Offensive Players / Bad	0.595 (3.516)***
e)	Defensive Players / Good	0.307 (1.954)*
f)	Defensive Players / Bad	Not Enough Observations

Table 2. (Continued)

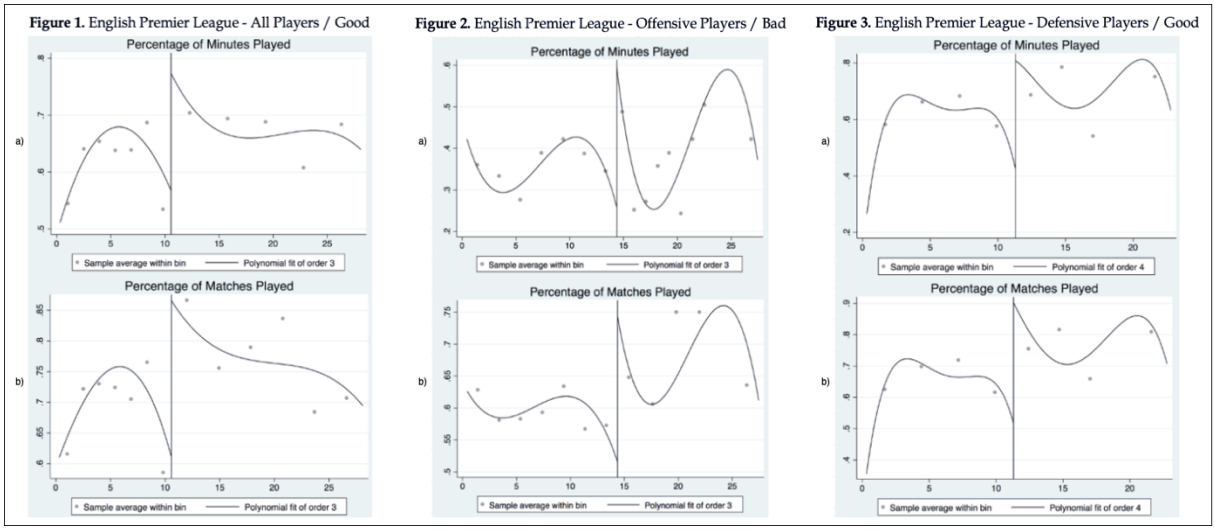
	Dependent Variable	Percentage of Matches Played
	Independent Variable	**Transfer Fee**
a)	All Players / Good	0.355 (2.578)***
b)	All Players / Bad	-0.055 (-0.055)
c)	Offensive Players / Good	-0.035 (-0.127)
d)	Offensive Players / Bad	0.595 (3.516)***
e)	Defensive Players / Good	0.279 (2.037)*
f)	Defensive Players / Bad	Not Enough Observations

Z-statistics are in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 2 provides the results for German Bundesliga as Table 1 did for the English Premier League. It can be seen that the explanatory variable Transfer Fee is not significant for any of the subgroups so it cannot be used to explain the variation in playing times. There is no empirical evidence that sunk cost fallacy is present in the German top-flight.

Table 3. RDD results for the German Bundesliga

	Dependent Variable	Percentage of Minutes Played
	Independent Variable	**Transfer Fee**
g)	All Players / Good	0.277 (2.064)**
h)	All Players / Bad	-0.77 (-0.653)
i)	Offensive Players / Good	-0.011 (-0.127)
j)	Offensive Players / Bad	0.595 (3.516)***
k)	Defensive Players / Good	0.307 (1.954)*
l)	Defensive Players / Bad	Not Enough Observations
	Dependent Variable	**Percentage of Matches Played**
	Independent Variable	**Transfer Fee**
g)	All Players / Good	0.355 (2.578)***
h)	All Players / Bad	-0.055 (-0.055)
i)	Offensive Players / Good	-0.035 (-0.127)
j)	Offensive Players / Bad	0.595 (3.516)***
k)	Defensive Players / Good	0.279 (2.037)*
l)	Defensive Players / Bad	Not Enough Observations



The next section will discuss the results presented in this section. First, the two leagues will be compared and contrasted in terms of managerial efficiency later the results for each league will be interpreted separately.

DISCUSSION

Managerial efficiency has been subject to numerous studies in the literature (Scully, 1994; Dawson et al., 2000; Kern & Süssmuth, 2005; Frick & Simmons, 2008) both for football and other team sports. Frick and Simmons (2008) use coaching experience and the percentage of points collected as measures reflecting managerial ability. Even the most successful manager of a low reputation team will not collect as many points as the manager of one of the league's giants hence the percentage of points collected could be misleading in measuring managerial efficiency or inefficiency. Providing empirical evidence for the presence of the sunk-cost fallacy could be used for illustrating managerial inefficiency since it would indicate a manager's failure to make the best use of his/her team.

This study compares the managerial efficiencies using the existence or non-existence of the sunk-cost fallacy in the English Premier League and German Bundesliga. As empirical evidence suggests there is no sunk-cost fallacy in the German Bundesliga unlike the case of the English Premier League. The findings regarding the German Bundesliga coincide with the findings of Hackinger (2019). Table 1 and Table 2 provide the results of the regression discontinuity designs for the cases of England and Germany. As can be seen from the tables, the Transfer Fee is significant as an explanatory variable for both the Percentage of Minutes Played and the Percentage of Matches Played in some of the sub-groups for England. In contrast, it is insignificant in all sub-groups for Germany. There is evidence that managerial inefficiency is present in the form of sunk-cost fallacy in the English Premier League. Managers

in the English Premier League make biased decisions for offensive players that are performing poorly and defensive players that are playing well. In these two subgroups managers' decisions regarding playing times are affected by the cost of the transfers. Providing more playing time to players that cost more, even though they are performing poorly, is an inefficient usage of resources. Managers should be susceptible to sunk costs and act accordingly.

For amplifying the depth of the discussion regarding managerial inefficiencies the number of manager changes in the two leagues is compared for the period. Manager change is a result of poor managerial execution therefore the average number of manager changes could be used as a proxy for managerial inefficiency. The average number of manager changes in the Premier League between the season 2013/2014 and 2017/2018 is 16.8 whereas it is 14.6 for the Bundesliga also the average number of manager changes during seasons for the same periods are 11.8 and 9.8 respectively. English teams change managers more than German teams, both between and during seasons, which is an indication of a higher degree of unsatisfactory managerial performance in the Premier League. The higher number of manager changes in England coincides with the results presented in Tables 1 and 2. The managers that are making biased decisions have shorter spells therefore the number of manager changes is higher.

On the other hand, Garland and Newport (1991) argue that the size of the sunk cost increases the sunk cost effect. The average transfer fee for the five-season period is 10.56 million Pounds in England whereas it is 5.16 million Pounds in Germany. Since the costs of transfers are higher in England when compared to Germany, so are the sunk costs. It could be another explanation why the sunk-cost fallacy can be observed in the English Premier League but not in German Bundesliga.

As expected, due to the asymmetry in the perception of negative and positive stimulators, sunk cost fallacy is present in players performing "good" but not in players performing "bad". Figures 1 a) and b) illustrate the shift in the playing times of the players performing "good" which cost more than the average both in terms of Percentage of Minutes Played and Percentage of Matches Played. Table 1 presents that Transfer Fee has a higher degree of significance on Percentage of Matches Played and it is significant even in 99.9% confidence interval whereas for Percentage of Minutes Played, it is significant in 99% confidence interval. The explanatory variable is highly significant in both cases and has a positive coefficient hence can be used as empirical evidence for the presence of the sunk-cost fallacy. The coefficient for the Transfer Fee is positive in all the cases where the explanatory

variable is significant which means that playing time increases as the transfer fee increases. For the offensive players, the sunk-cost fallacy cannot be observed in "good" performing players however there is empirical evidence for its presence among the "bad" performing ones. The Transfer Fee is significant for both the Percentage of Minutes Played and the Percentage of Matches Played as can be seen from Table 1. The effect of Transfer Fee can visually be observed relatively easier in Figure 2 b), the expensive transfers are subbed in even if it is for the last 5-10 minutes therefore their Percentage of Matches Played is high even though they get to have only a few minutes to play.

In the case of the defensive players, the ones performing "good" are again victims of the biased decisions. The sunk-cost fallacy is present among the defensive players. Managers tend to play players more, which costs more than the average compared to the ones which cost less. Transfer Fee is a significant explanatory variable in 95% confidence interval as Table 1 presents. Figures 3 a) and b) illustrate the high playing times of defensive players which cost more than the average transfer fee.

The presence of sunk cost fallacy in "good" performing players was expected as mentioned earlier however in the case of offensive players the decision-making bias is present among the "bad" performing players. Offensive performance is relatively easier to observe than defensive performance. Scoring and assisting goals, creating chances, successful dribbles, and key passes are even visible to the naked eye whereas defensive performance indicators are less captivating so distinguishing between offensive players that are performing "good" is relatively easy compared to the ones performing "bad". Among the offensive players with low performance, the ones who cost more are given more minutes and matches to play which is quite common. More is expected from expensive forwards generally and often they are on the pitch even though they do not contribute to the team.

CONCLUSION

The sunk cost fallacy indicates that the decisions made are irrational and the outcomes are suboptimal. In European football, where stakes have grown enormously high, reaching suboptimal or undesired outcomes are very costly. Often teams and coaches reach undesired outcomes due to bad decision-making in critical times. The empirical evidence provided in this study would help the coaches to understand the distinction between making transfers and making use of these transfers.

The total transfer expenditure between the seasons 2013/2014 and 2017/2018 is 6.69 billion Pounds and 2.28 billion Pounds respectively for the English Premier League and

German Bundesliga (Transfermarkt, 2018). Among the Top five Leagues of Europe, Premier League clubs have the highest income hence the highest transfer expenditures. The previous studies in the literature suggest that as the size of the sunk-cost increase the effect increases and since the Premier League has the highest transfer expenditures it was the most probable league to observe the sunk-cost fallacy in playing times. The investigation of sunk cost fallacy in English and German leagues provided valuable insight. As aligned with the initial hypothesis players which cost more, in the English Premier League, are given more games and minutes to play even though they do not perform better. There is empirical evidence that biased decisions are made in playing times therefore there is managerial inefficiency. For German Bundesliga, it is not possible to talk about the sunk-cost fallacy in the five-season period between 2013/2014 and 2017/2018. It could be because the transfers cost less on average therefore sizes of the sunk costs are smaller, or it could be because of efficient management or a combination of both.

It is important to remind that this study investigates five years and two major leagues in Europe. The extension of the period and addition of other leagues in Europe might provide different results and English clubs' higher income might be causing English clubs to be reckless spenders compared to the teams from other leagues. Another reason why English clubs are giving more playing time to players who cost more, despite their poor performance, might be their attempt to make use of their expensive transfers which is very understandable. Nonetheless, the empirical evidence provided here enables us to state that sunk cost fallacy is indeed present in the English Premier League.

Illustrating the existence of sunk cost fallacy in European football could help the club owners' ability to assess their coaches as well as improve coaches' performance. It is a concept that has been often disregarded in sports literature and could have disastrous consequences.

Authors' contributions

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Declaration of conflict interest

The author declares that there is no conflict of interest.

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The Relationships Between the Job Attitudes in the Sports Leadership: A Meta-Analysis

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ABSTRACT

The main objective of this research is to examine the interrelationships between job attitudes in the sports sector. Scopus, Web of Science, and ProQuest databases were used to find 3,844 studies. Three data sets were formed regarding the surveyed relationships. The data sets regarding these relationships included 5622, 3716, and 3798 subjects consecutively. According to the meta-analysis technique, the Comprehensive Meta-Analysis Software (CMA) was used to analyze the collected studies. The data of this meta-analysis includes 21 correlation values collected from the chosen studies. As the findings revealed, each data were heterogeneous. None of the data sets included publication bias. Results showed that all the effect sizes of the surveyed relationships are large. The most significant effect size is the relationship between job satisfaction and organizational commitment (r= .631). The correlation between job satisfaction and intent to quit is also significant, and its effect size is -.600, and the correlation between organizational commitment and intention to quit is also significant (r= -.508). The present research would be important for managers to successfully improve strategies for creating employee loyalty in the sports industry.

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INTRODUCTION

In the sports industry, intent to quit is relatively essential for organizations. They strive to employ the best coaches and instructors to increase the teams' performance (Go'mez et al., 2019). Moreover, some organizations need to collect the best athletes, and therefore intent to quit their employees can ruin the performance and balance of such organizations.

Employees evaluate the working conditions and the job attitudes before they decide to leave their job (Xu et al., 2018). The job attitudes affect intent to quit significantly. İntent to quit is also a job attitude, and it is mainly affected by organizational commitment and job satisfaction (Choi & Kim, 2016). Thus, the managers should monitor their relationship with intent to quit to keep intent to quit under control.

Intent to quit is an emotional state that forces the employee to leave (Porter & Steers, 1973). It is a challenging task, and many scholars have revealed that plenty of different variables significantly affect intent to quit (Park & Min, 2020). But the most effective human resources or management policies attempting to reduce intent to quit can be formed by using the main antecedents of intent to quit because the primary ancestors have the most substantial effect on intent to quit.

Managers attempt to prepare the most suitable organizational policy for their organizations. Each organization has different features. For example, the managers working in the sports industry strive to keep the best or most experienced employees in a sports organization. Therefore, intent to quit is a relatively significant job attitude for the managers, especially those working in the sports industry. There is a shortage of experienced or skilled employees in the sports industry (Terason, 2018).

Another important job attitude is job satisfaction, and it has a significant effect on both organizational commitment and intent to quit (Freund, 2005). Some meta-analysis studies found that job satisfaction has a higher effect on intent to quit than organizational commitment (Kim & Kao, 2014; Tett & Meyer, 1993), but Park and Min (2020) found different results as this study determined organizational commitment as the strongest antecedent of intent to quit. Choi and Kim (2016) suggested that the relationship between these variables is higher than their impact on intent to quit.

There are many factors affecting the employee's job satisfaction, and these factors are classified as financial and non-financial factors. The Two Factor Theory of Herzberg (1966) brought a new insight to this concept and classified these factors differently as motivational factors and hygiene factors. This understanding also supported the distinguishment between

satisfaction and dissatisfaction (Weitz, 1952). New perspectives of satisfaction and commitment were shaped upon this understanding.

Since organizational commitment is described as the 'relative strength of an individual's link to the organization' (Mowday, Steers, & Porter, 1979: 226), it is also a psychological attachment resulting from the positive emotions created by the organization (Meyer and Herscovitch, 2001). The employees prefer to experience positive emotions and stay in the organizations providing such opportunities to experience positive emotions (Cho, Rutherford, & Park, 2009). Becker (1960) classified organizational commitment as occupational commitment and organizational commitment. But this perspective was closer to the perspective of job satisfaction (Ritzer & Trice, 1969).

The closer stand of commitment to job satisfaction caused some difficulties of measurement. But three-component model solved such problems to a certain extent and classified organizational commitment as affective commitment, continuance commitment, and normative commitment (Meyer & Allen, 1991). The scales used to measure organizational commitment in this manner were successful. The effect of organizational commitment on intent to quit was consistent, as confirmed by the meta-analysis studies (Park & Min, 2020; Choi & Kim, 2016; Kim & Kao, 2014; Tett & Meyer, 1993).

The workplace is another important factor for the employees. The workplace significantly impacts job satisfaction and turnover intention (Dickey, Watson, & Zangelidis, 2011. Organizational commitment is also affected by the workplace (Humborstad & Perry, 2011). Different workplaces have different bylaws and structures. Such components can change the effect of the constructs as mentioned above.

This paper aims to elaborate on the correlations between job satisfaction and intent to quit, between organizational commitment and intent to quit, and between organizational commitment and job satisfaction in the sports industry. These variables and relationships are very popular, and there was no meta-analysis study surveying them in the past. All meta-analysis studies aim to determine the effect size of the surveyed relationships. Furthermore, these relationships are vital for sports organizations. Thus, this is the first meta-analysis study surveying them in the sports industry.

Hypothesis Development

Employees can shape and guide an organization's operations; therefore, the success or performance of an organization has strict ties with the employees. Especially sports organizations are the most labor-intensive organizations, and unlike capital-intensive

organizations, they use more labor instead of capital (Erfanian & Neto, 2008). Such organizations cannot neglect the variables related to the employees. Observing the relationships between job satisfaction, organizational commitment, and intent to quit is crucial for sports organizations quantitatively (Hedges and Olkin, 1985).

Kim and Kao (2014) suggested that job satisfaction and organizational commitment have a significant and negative effect on quitting. Tett and Meyer (1993) supported these findings. But there are also some other important antecedents of intent to quit. Most other researchers also confirmed these findings (Huang, 2006; Yang, 2010; Humborstad and Perry, 2011; Gieter, Hofmans, & Pepermans, 2011; Guchait & Back, 2016). Choi and Kim (2016) determined a positive and large effect size between job satisfaction and organizational commitment, the strongest effect size of this study. Thus the hypotheses below will be tested: (H1) Job satisfaction has a negative effect on intent to quit, (H2) organizational commitment has a negative effect on intent to quit, (H3) Job satisfaction has a positive effect on organizational commitment.

The distinctive characteristics are chosen as moderators in a meta-analysis. This can be the workplace or department, for example (Choi & Kim, 2016). The influence of the workplace on the relationship between job satisfaction and intent to quit is surveyed (Decker, Kojetin, & Bercovitz, 2009; Dickey, Watson, & Zangelidis, 2011), and it is found that different occupations affect the relationship as mentioned above (Frenkel, Sanders, & Bednall, 2013). Hence we test the moderating effect of occupation or workplace type within the hypotheses: (H4) Type of workplace (occupation) is a moderator for the effect of job satisfaction on intention to quit, (H5) type of workplace (occupation) is a moderator for the effect of organizational commitment on intent to quit, (H6) type of workplace (occupation) is a moderator for job satisfaction on organizational commitment.

METHODS

Analysis Part

The heterogeneity and publication bias of the data is tested. The General version of Comprehensive Meta-Analysis software (CMA) is used. This software did not use Cohen's D as standard deviations are not added, and it transformed the correlations into Fisher's Z value and back to compute the effect sizes.

Study Design

The main steps of a meta-analysis are used to design this study. The collected studies are analyzed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al, 2009). The steps before the analysis were also arranged by these guidelines. This meta-analysis research included the studies in the sports industry, which included correlation values for the relationships between job satisfaction and intent to quit, the correlation between organizational commitment and intent to quit, and the correlation between job satisfaction and organizational commitment. Thirteen studies provided 21 correlations values for this meta-analysis.

Search Strategy

This study aimed to reach high quality, reliability, and validity studies. Therefore, Scopus, ProQuest, and Web of Science were the databases chosen to search for the eligible studies. The articles, master's theses, doctoral dissertations, and the proceedings were reviewed. No time interval was chosen. The authors used the quality scale of Zangaro and Soeken (2007). This quality assessment scale includes 10 different quality level scores. It has nine different levels and a total score therefore, it is said that it has 10 items. All the studies were scored as "high-quality studies". The authors evaluated the studies according to the nine criteria determined by the quality assessment scale.

The PRISMA flow chart of this meta-analysis study is shown in figure 1.

Figure 1 shows each step of forming the suitable data for this study. The screened 3,844 studies are eliminated eventually to reach the eligible studies. The final data included 12 articles and a doctoral dissertation. The articles are in Scopus and WOS, and the doctoral dissertation is listed in Proquest. The participants of these studies were coaches, fitness instructors, and football referees. The inclusion criteria were chosen as: a) The studies should include correlation values regarding the surveyed relationships. b) The studies should be conducted in the sports industry.

Coding Process

The authors designed a coding process to determine the possible moderators affecting the surveyed relationships in the sports industry. The study's coded characteristics are also transformed into some common characteristics to discover new moderators for these relationships. In the beginning, the authors every distinctive characteristic of the studies. The country was also determined as a distinctive characteristic. Aftermath, it was noticed that

another feature could be added to the studies, and therefore the studies are coded again according to the new variable "continent".

After the coding process, the authors determined the possible moderator variables together. Moderator variables are the variables that are expected to make the effect size distribution becoming heterogeneous. Table 1 shows the characteristics of the collected studies.

Figure 1. *Flow chart of the study selection process*

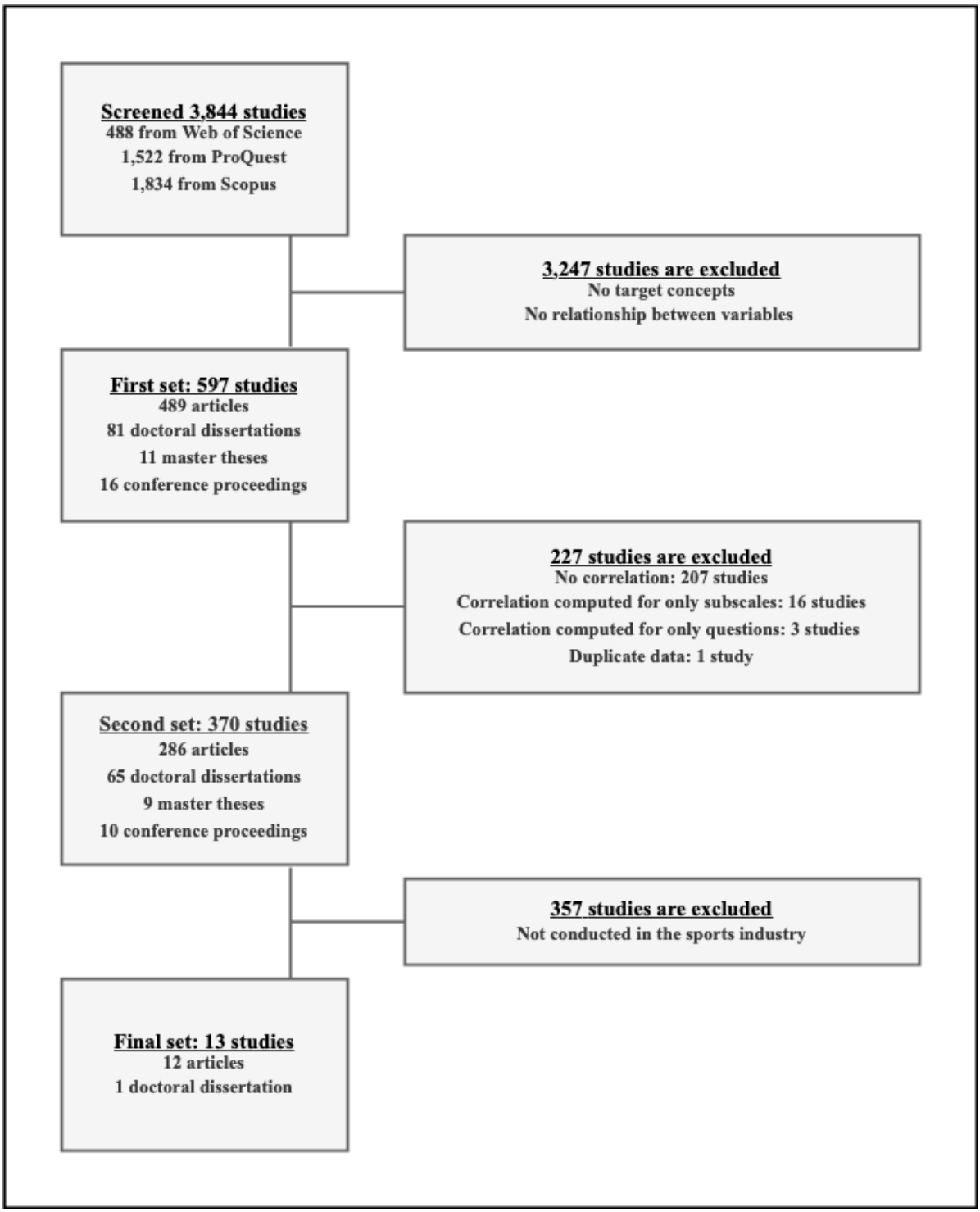


Table 1. Summary of Studies

No	Researchers and publication year	Sample Size	Type of Facility	Occupation/ position	Country
1	Bravo et al., 2019	383	University	Coach	USA
2	Cho and Lee, 2021	519	Various	Coach	Singapore
3	Choi and Chiu, 2017	172	Football league	Football referee	South Korea
4	Cunningham and Sagas, 2004	300	University	Coach	USA
5	Gullu et al., 2020	117	School	Physical education and sports teacher	Turkey
6	Kim, 2009	2627	University	Coach	USA
7	Kim and Kim, 2020	187	Community Sport Facility	Employee	South Korea
8	Kim et al., 2011	196	Gym	Fitness instructor	South Korea
9	Lee and Chelladurai, 2018	324	University	Coach	USA
10	Macintosh and Doherty, 2010	416	Gym	Fitness instructor	Canada
11	Peachey et al., 2014	196	University	Senior athletic administrator	USA
12	Terason, 2018	356	Gym	Fitness instructor	Thailand
13	Yildiz, 2014	142	Gym	Fitness instructor	Turkey

RESULTS

Data and Publication Bias

According to the surveyed relationships, three data sets were formed:

1. Group (job satisfaction-intent to quit): 10 samplings-10 studies

2. Group (organizational commitment-intent to quit): 6 samplings-6 studies

3. Group: (job satisfaction-organizational commitment): 5 samplings-5 studies

Table 2. Heterogeneity Analysis Results

Heterogeneity	Q	I^2
1st set	139.665	94.988*
2nd set	1207.973	99.752*
3rd set	5.482	45.274*

*: significance at .01 level

The heterogeneity of each data set was tested, as shown in Table 2. The Q values and I2 values of each data set are also shown in this table. The analysis results confirmed that each data set was heterogeneous at .01 level. I2 statistic of the first two data sets, which indicates the percentage of variability dues to the differences between studies compared to the variance of sampling, is over 90%. The highest I2 belongs to the second data set, which includes the relationship between organizational commitment and intent to quit. The lowest I2 belongs to the third data set, including the studies correlating organizational commitment and job satisfaction. Consequently, the random-effects model is used.

A meta-analysis study may provide more valid and reliable results by integrating more quantitative findings. But publication bias affects the reliability and validity of a meta-analysis study. When the tests detect publication bias, it is necessary to use artifact correction methods. These methods can be accepted as the techniques aiming to correct the inconsistency caused by publication bias. The funnel plot technique will be used to determine the tendency of publication bias. The first funnel plot is in Figure 2. The distribution is symmetrical. Symmetrical distributions mean no missing part of the collected studies and no sign of publication bias.

Figure 2. *Funnel Plot of 1st Data Set*

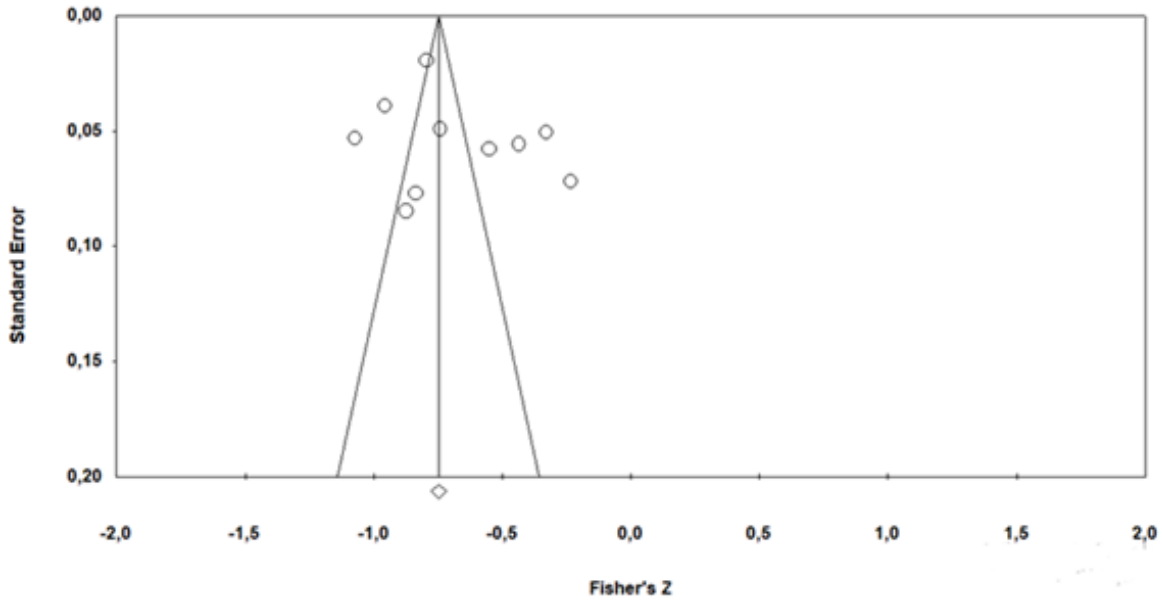
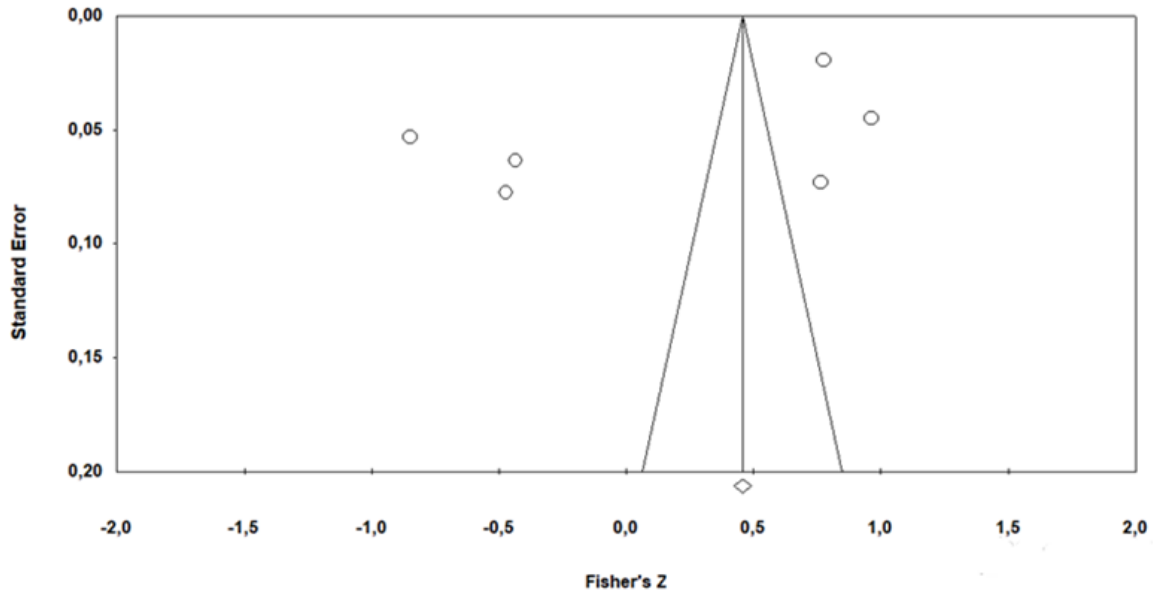
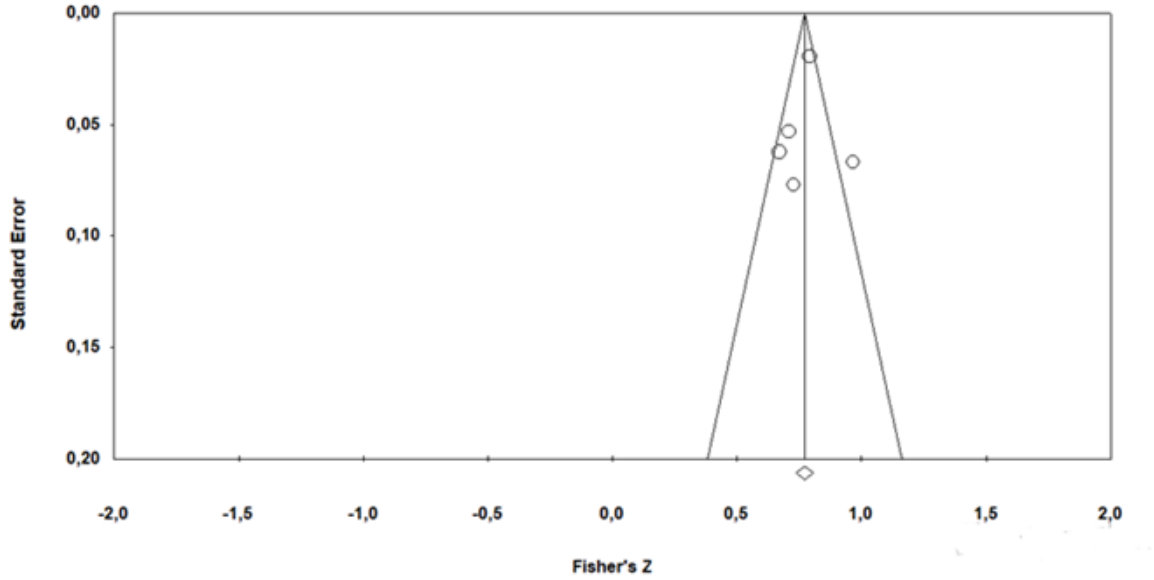


Figure 3. *Funnel Plot of 2nd Data Set*



The second data set includes studies correlating organizational commitment and intent to quit. The funnel plot of this data set is indicated in Figure 3. The distribution of the second data set is not clear. The third data is in Figure 4; it also did not indicate an asymmetrical distribution. But it is difficult to determine the symmetry and a quantitative analysis method will be used to detect publication bias.

Figure 4. *Funnel Plot of 3rd Data Set*



Duval and Tweedie's trim and fill test is another technique used to test publication bias. The results of this test are indicated in Table 3. These results did not include a sign regarding publication bias: there were no trimmed studies and difference between observed and estimated values.

Table 3. Publication Bias Test Results

Duval and Tweedie's Trim and Fill Test			**Confidence Interval (CI)**		
1st data set	**Trimmed studies**	**Point to estimate**	**Lower limit**	**Upper Limit**	**Q value**
Observed values		-.59951	-.68983	-.49083	139.66549
Adjusted values	0	-.59951	-.68983	-.49083	139.66549
2nd data set	**Trimmed studies**	**Point to estimate**	**Lower limit**	**Upper Limit**	**Q value**
Observed values		-.50812	-.56797	-.44293	254.41675
Adjusted values	0	-.50812	-.56797	-.44293	254.41675
3rd data set	**Trimmed studies**	**Point to estimate**	**Lower limit**	**Upper Limit**	**Q value**
Observed values		-.63113	-.59141	-.66779	5.48184
Adjusted values	0	-.63113	-.59141	-.66779	5.48184

Findings Related to Effect Sizes

This study used the random-effects model as all the data sets were heterogeneous. The relative weight of the studies and the forest plot of the first data set is shown in Figure 5. The standard measure of the meta-analysis is the effect size, and it is used to determine the surveyed relationship's strength and direction (Borenstein et al., 2009). Pearson correlation coefficient values are collected to find the effect size. The effect size of the first data set is negative and H1 is accepted. The effect of job satisfaction on turnover intention is -.60 (r = -.59951) and it reveals that job satisfaction has a large-level effect on turnover intention (see Cohen, 1988).

Figure 5. *Forest Plot of the 1st Data Set*

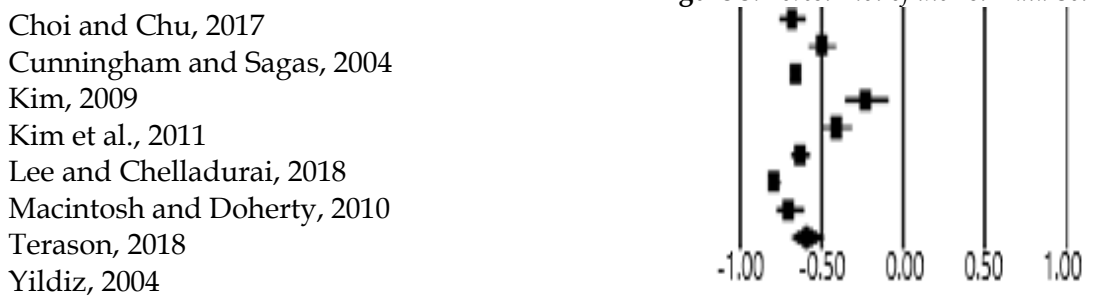


Figure 6 indicates the forest plot and relative weight of the studies in the second data set. The effect size of the second data set is also negative and H2 is accepted. The effect of organizational commitment on turnover intention is -.51 (r = -.50812) and it is almost the same a the effect of job satisfaction. This value also reveals that organizational commitment has a large-level effect on turnover intention (Cohen, 1988).

Figure 6. *Forest Plot of the 2st Data Set*

Figure 7 shows the forest plot and relative weights of the third data of the collected data. The effect of job satisfaction on organizational commitment is negative and H3 is also confirmed. The effect size is computed as .63 (r = .63113), which indicates that the power of this effect is large (Cohen, 1988).

Figure 7. *Forest Plot of the 3st Data Set*

Moderator Analyses

Table 4 showed the moderator analysis results. The coaches worked in universities and fitness instructors worked in gyms. Therefore the moderating effect of occupation and workplace is tested simultaneously. The impact of occupation was not significant for the first group (1st data set) for the second group (2nd data set). Type of workplace was not also a significant moderator for the second group (2nd data set). Accordingly, H4 and H5 is not supported. H6 could not be tested as the distribution of the data was eligible for such a moderator analysis.

Table 4. Moderator Analysis of 1st and 2nd data sets

Concepts	k	N	r	CI		Q	Q_b
				Lower Limit	Upper Limit		
Job satisfaction-intent to quit (1st dataset)	10	5622	-.600*	-.690	-.491	139.665	
Moderator (occupation)							0.411ns
Coach	5	4153	-.535	-.685	-.341		
Fitness instructor	4	1110	-.624	-.787	-.379		
Organizational commitment-intent to quit (2nd data set)	6	3716	-.508*	-.568	-.443	1207.973	
Moderator (occupation/workplace)							1.472ns
Coach/university	2	2797	.153	-.789	.880		
Fitness instructor/gym	2	606	-.567	-.781	-.235		

*p < .01; ns: not significant

DISCUSSION

The quality of the service given in the sports industry has been closely linked to intent to quit. Job attitudes, including intent to quit affect the operations of the organization. Turnover and intent to quit the employees have various costs. Moreover, job attitudes have a significant effect on the performance of both the employees and the organization (Cogliser et al., 2009).

The effect size of job satisfaction in the sports industry is larger than in other industries on intent to quit. A significant difference between the hospitality industry and the sports industry was also determined: the power of the organizational commitment's effect was higher in the hospitality industry and the opposite for the sports industry. The employees

working in the sports industry paid more attention to job satisfaction than organizational commitment than those working in the hospitality industry. These results can be the relatively less importance of the organizations in the sports industry. The tasks and duties can be more important for the employees than the organizations. This structure may make job satisfaction more important for the employees.

The first data set provided an effect size of -.60 and it reveals that job satisfaction has a large-level effect on intent to quit (Cohen, 1988). These results were higher than the other meta-analysis studies (Tett & Meyer, 1993) conducted in the health industry (Choi & Kim, 2016), in the hospitality industry (Park & Min, 2020), and in the child welfare industry (Kim & Kao, 2014).

The second data set's effect size was negative, it was -.51. The effect of job satisfaction on organizational commitment was negative. The effect size is computed as .63 (r = .63113), which indicates that the power of this effect is large (see Cohen, 1988). It is not higher than the results of previous research using the meta-analysis technique (Tett & Meyer, 1993; Choi & Kim, 2016; Kim & Kao, 2014; Park & Min, 2020).

The last effect size was .63 (job satisfaction and organizational commitment). The direction of this relationship is positive and its power is large (Cohen, 1988). This finding is almost the same as the finding of Choi and Kim (2016) that studied this relationship among Korean nurses. Their study determined this effect size as .62. This evidence showed that the employees working in the sports industry found the effect of job satisfaction on organizational commitment as high as the nurses. Consequently, H1, H2, H3 are tested and confirmed.

The moderator analysis could not determine a significant moderator affecting the surveyed relationships. The strength of the relationship between job satisfaction and intent to quit and the relationship between organizational commitment and intent to quit is lower for coaches than the instructors. But the occupation is not a significant moderator for these studies. The moderator analysis included coaches and instructors but not referees. H4 and H5, regarding the moderating effect of workplace on the relationship between job satisfaction and turnover intention and the relationship between organizational commitment and intent to quit, are not confirmed. The effect size of the coaches working in the universities was smaller than the fitness instructors working in the gyms, but this difference is nonsignificant. The allocation of the studies was not eligible to test H6.

Limitations and Future Research

The study contributes to the findings discussed above as it was the only meta-analysis study surveying such interrelationships in the sports industry. But it was not possible to

determine any moderators affecting the surveyed relationships. Future studies can test the effect of the surveyed moderators or new moderators.

CONCLUSION

The findings of this meta-analysis research found that the effect size of the correlation between job satisfaction and organizational commitment and intent to quit and the effect size of organizational commitment on intent to quit is large in the sports industry. Moreover, the effect size of job satisfaction and organizational commitment on intent to quit is negative, and the effect size of the correlation between job satisfaction and organizational commitment is positive.

The managers working in the sports industry need specific findings to form a successful management perspective in the sports industry. This study could provide such usable specific information for these managers. Furthermore, the findings of this study can be used by future researchers.

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Authors' contributions

The research is designed by the first and the corresponding author. The first and corresponding author reviewed the studies in the literature to collect the data and designed the study. He also analyzed the collected data on CMA and prepared the findings for the study according to PRISMA. All authors contributed to the introduction and discussion sections equally.

Declaration of conflict interest

There is no conflict of interest regarding this meta-analysis research.

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