



Media and Sport Participation With Emphasis on Socio-Economic Factors: An Econometric Model With Simultaneous Equations Approach

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Abstract

Media can play an effective role in promoting sports participation by the distribution of sports information. In addition, sports activities and events are important sources of information for the media. Moreover, developed countries perform better economically and socially in sports and the media. Therefore, the purpose of this study was to investigate the interactive effect of media and sport participation with an emphasis on socio-economic factors. We developed an econometric model through the simultaneous equations approach and using the 2SLS method for provinces of Iran between 2004 and 2017. The results showed that there was an interactive, significant, and positive effect between sports media and athletes' sport participation. In addition, there was an interactive, significant, and positive effect between athletes' sport participation and non-athlete sport participation (referees and coaches). Sports media had a significant and positive effect on non-athletes sport participation but the effect of non-athletes' sports participation (referees and coaches) on the media was not significant. Furthermore, Consumer Price Index (CPI) of food, clothing, housing, and unemployment rate had a significant and negative effect on athletes' sports participation. The effect of GDP on the non-athletes sport participation was significant and positive. Finally, the country's population was found to have a significant and positive effect on sports media.

Keywords: Media, Sport participation, Gross Domestic Product (GDP), Consumer Price Index (CPI), Unemployment rate

Introduction

In the present age, the interaction between the media and sport is necessary, and both affect each other. The role of social media has always been vital in sports and physical activity. The media have an important role to play in providing new information, shaping views, and live sports broadcasting. Sport in various fields such as advertising and information requires social media, while the media also feeds on sports news provided by various sports activities (Gulam, 2016). New media technology is changing the production, delivery, and consumption of sports while creating a new dynamics among sports fans, athletes, coaches, clubs, government agencies, and the mainstream media (Dart, 2012).

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The interaction between sport and the media is confirmed around the world. For example, the development of the media in the Olympic Games in the twentieth century has led to the development and promotion of these Games around the world (Sajadi, 2009). As the National Olympic Committees of Canada, Australia, Japan, Finland, and Malaysia believed that the information and communication technology had played an important role in the activities of their National Olympic Committees (Honari et al., 2012). In addition, After the Sydney Olympics, the number of participants in gymnastics due to media coverage and promotion of these games increased (Shabani & Rezaei, 2015). In addition, Ballard et al. (2009) believed the regular use and viewing of media (TV and DVD) is the best guide for exercise.

Furthermore, in Iran, various researches study the interaction of media and sports. For example, it is found that advertising programs presented by the media in the field of sport lead to the development and promotion of championship sport (80%) and sport for all (20%) (Ghiamirad & Moharamzadeh, 2009). Moreover, it has been revealed that radio and television programs produced to educate and promote of sports with an average of 3.96 have been important and influential factors in Iranians culture to increase sports participation (Shabani & Rezaei, 2015). In other words, 37% of the changes in the institutionalization of sports for all in Iran are related to the media (Roshandelrbatani, 2008).

The media, especially the national media, are the most pervasive media in Iran. They are responsible for macro-social, cultural, and economic planning by using culture-building in the country and have an important role in the realization of the 20-Year Vision Document of Iran (Pouya, 2011). On the other hand, the 20-Year Vision Document of the Islamic Republic of Iran emphasizes the development of sports in the form of cultural development, which shows a cultural or educational-moral approach to the development of sports in Iran (Ramzaninejad & Hozhabri, 2017). In addition, sports participation is the main concern of researchers for the development of sports (Kumar et al., 2018). Therefore, the media can play an effective role in the development of the 20-Year Vision Document of Iran in the sports sector. At the same time, sport has emerged as a media commodity in recent years and has provided the basis for the growth and excellence of media programs in Iran.

On the other hand, many studies have emphasized the impact of socio-economic conditions and factors on the level of sports participation and physical activity (Ball et al., 2006; Lee, 2012; Vandendriessche et al., 2012). In addition, the effect of the development of countries and GDP on media and information technology has been demonstrated in various studies (Nakamura & Soloveichik, 2015; Wurff et al., 2008; Ye, 2007).

Consequently, this study set out to investigate the interaction between media and sports participation in Iran, as well as the role of the most important socio-economic factors affecting this relationship. For this purpose, an econometric model with the simultaneous equations approach and two-stage least squares method (2SLS) was used.

Background Literature and Hypothesis Development

Media and Sport Participation

It is believed that a positive interaction relationship between sports participation and social media exists. Some research has emphasized the effective role of social media in increased performance, motivation, and opportunities for the young to engage in physical activity (Ballard et al., 2009; Lines, 2007). On the other hand, some researchers argued that sport is a good platform for the presence of social media (Horne, 2005; Pyun & James, 2011). The desire of society to participate in sports, watch sports, and strengthen it with the help of social media causes more expansion of sports activities in the thoughts and actions of people in that

society (Gray & Lotz, 2018). Television has been known as the most powerful media in the sports industry for the past 50 years, and in particular, the live broadcast of competitions has led to the widespread development of audiences and the injection of capital into sports (Rowe, 1999). On the other hand, sports in world culture form a media-oriented commodity, and broadcasting sports on television and radio is a major tool for advertising (Gray & Lotz, 2018). As sports participation increases effectively, so does the need for sports information, and as a result, sports media is increasingly being used (Witkemper et al., 2012). On this basis, we propose the following as our central hypothesis:

H1: There is an interactive and positive relationship between media and sport participation.

Sport Participation of Referees, Coaches, and Athletes

Communication between athletes and coaches is vital. In the past, coaches focused only on increasing their young players' physical, technical, and tactical skills, but now the coach is not only undertakes physical training but also tries to develop mental skills; he/she approaches the players as a supervisor, friend, and supporter (Jowett, 2007). The coach behavior can affect the quality and type of communication between the athlete and the coach, which is the central part of the coaching process. Athletes' 'evaluation of coaches' behavior is usually influenced by three factors. The first factor regards situational variables, such as the nature of the sport, the level and nature of the competition, and the atmosphere of the sports team. The second factor concerns the variables related to individual differences between athletes and coaches, such as gender, age, attitudes, and motivations. The third factor takes into account the coach's perceptions of the athletes' behavior (Kenow & Williams, 1999). Many studies have emphasized the importance of the coach-athlete relationship (Aleksic-Veljkovic et al., 2016; Bolter & Weiss, 2013). On the other hand, referees, like coaches and athletes, are exposed to a lot of pressure and excitement. The referees, after the coaches and athletes, form the third side of the sports competition and have a difficult task (Ramezaninejad et al., 2011). Refereeing mistakes reduce the fun of challenging competition in athletes (Rainey et al., 1990). In addition, referees want athletes to compete based on their abilities (Mitchell et al., 1982). Therefore, the second research hypothesis is:

H2: There is a positive and interactive relationship between non-athlete sport participation (coaches and referees) and athlete sport participation.

Consumer Price Index (CPI) and Sport Participation

The Consumer Price Index is the basis for calculating the inflation rate and is one of the most popular indicators that measures the price of a basket of goods purchased by consumers. It shows the change in the price of a certain basket defined by goods and services (Allmran & Allmran, 2011). On the other hand, rising prices have a direct impact on the future goals of sports consumers, and with the increase in the price, the satisfaction of the sports consumer decreases (Calabuig et al., 2014). Therefore, the increase in the Consumer Price Index indicates an increase in prices, especially in the basic costs of living such as food, clothing, and housing, the satisfaction of sports consumers' decreases. Many studies have emphasized the impact of the social-economics status on sports participation. For example, Vandendriessche et al. (2012) considered the socio-economic status to be positively and significantly dependent on sports participation and membership in sports clubs for both men and women. In addition, Lee (2012) argued that people living in low-income social-economic environments are at a higher risk of physical inactivity. On this basis, we propose:

H3: Consumer Price Index (CPI) has a positive and significant effect on sport participation

Unemployment Rate and Sports Participation

The recent economic crisis, coupled with declining government spending, rising unemployment, and poverty, has put financial and temporal pressures on sports participation rates. In particular, low-income families are often excluded from participating in sports because they face more difficult financial pressures (Thibaut et al., 2016). Few researches have emphasized a reduction in sports participation during unemployment (Gough, 2017; Kokolakis et al., 2012). It should be noted that unemployment is related to both free time and low income. Unemployed people, in particular, have more time but they have less income (Kokolakis et al., 2012). Parental unemployment and low family social class have reduced the sport participation of European children (Toftegaard et al., 2010). Therefore, in the present study, the effects of the unemployment rate on sports participation was investigated and based upon this collective evidence, we propose:

H4: there is a negative effect of unemployment rate on sport participation.

Gross Domestic Product (GDP) and Sport Participation

Many studies have focused on the role of economic growth and GDP in a country in increasing sports participation and it is believed that the rate of sports participation is regulated by changes in the gross domestic product (GDP). In addition, reduced GDP will reduce sports participation by less than three-quarters (Kokolakis et al., 2012). The GDP of countries shows their income. Countries with high GDP produce more support for athletes, coaches, and referees, and work to develop sport participation by improving sports infrastructure. Moreover, these countries provide more suitable facilities for their athletes and coaches and send more athletes to the Olympic Games. It should be noted that GDP is represented as the economic growth of countries (Zareian et al., 2016). Therefore, we propose:

H5: Gross Domestic Product (GDP) has a positive effect on sport participation.

Gross Domestic Product (GDP) and Media

The growth and expansion of new communication technologies and media have brought about fundamental changes in all economic spheres of the world. Economic developments in developed countries created special changes in the principles of global trade and led to the expansion of media in foreign dimensions. In addition, the development of economic investment in many Asian countries has increased the global demand for media consumer goods and created new markets, and the media has become very important in the domestic, international, and economic arenas of countries (Eskandari & Miresmailii, 2012). It is believed that GDP is shown in the economic growth of countries and increased GDP and economic growth lead to the development of social media. Some researchers have focused on the role of GDP in the media. Wurff et al. (2008) argued that Gross Domestic Product (GDP) better predicts advertising costs where newspapers are important advertising media. Moreover, Chang and Chan-Olmsted (2005) measured consumer spending trends for media products and services and total advertising costs as part of GDP. In a study on the development of mass media in China, Lee (2006) concluded that the rapid growth of

television at a time when China is experiencing its fastest economic growth might indicate a bilateral strengthening relationship. On this basis, we propose:

H6: Gross Domestic Product (GDP) has a positive effect on media.

Population and Media

When the population grows, it rapidly affects the technological change because due to large connecting nets and specialization of affairs, innovation and technology are increasing. The economics research literature confirms the relationship between population growth and innovation; throughout history, societies with higher primary populations have been more rapidly influenced by innovation and technology (Coccia, 2013). The role of technological change and globalization of information and communication technology in media consumption is important (Mahmodi et al., 2010). Therefore, with the increase in population, the media is encouraged to produce more programs and at the same time, the increase in technology due to the increase in population provides more facilities to the media. For this reason, we propose:

H7: The population has a significant and positive effect on social media.

Method

The present study has an applied aspect in terms of purpose and because the research data was collected from previous periods and without the intervention of the researcher, so it is classified in the post-event and semi-experimental research group. A simultaneous equations approach (SEA) was used to investigate the interaction effect of sports media and sports participation with the emphasis on socio-economic variables. The data in this study are of the panel data type. Therefore, in this study, the panel data was created using data used for 28 provinces of Iran and in 14 years between 2004 and 2017. The panel model is estimated based on the two-stage least squares method (2SLS) using Eviews software (version 10). Therefore, first, the variables and data in this research are described, then the pattern of simultaneous equations is specified, and finally, complementary tests before estimating the equations are described.

Data and Variable Description

The data used in this study for the variables of Sports Media (SM), Athletes' Sports Participation (ASP), Non-Athletes' Sports Participation (referees and coaches) (NASP), Consumer Price Index (CPI) of Food (CPI-FO), Consumer Price Index (CPI) of clothing (CPI-CL), Consumer Price Index (CPI) of Housing (CPI-HO), Unemployment Rate (UR), Gross Domestic Product (GDP), and Population (P) between 2004 and 2017 for 28 provinces of Iran were collected from the Iranian Statistics Center (ISC), Iranian Broadcasting Organization (IBO), Iranian Ministry of Economy and Finance (IMEF), Iranian Ministry of Youth and Sport (IMYS), and Iranian National Olympic Committee (INOC). It should be noted that the data related to the provinces of Tehran and Alborz were considered as one province, and the data related to provinces of Razavi Khorasan, North Khorasan, and South Khorasan were calculated in the form of one province that is called Khorasan. Thus, the data of all provinces of Iran were collected.

In this study, the Sports Media (SM) variable was estimated using the duration of radio and television sports programs broadcast. The variable of sports participation was considered for both athletes and referees and coaches, so the variable of sports participation was divided into

two variables: Athletes' Sports Participation (ASP) and Non-Athletes' Sports Participation (referees and coaches) (NASP). The Athletes' Sports Participation (ASP) variable was estimated using the number of organized athletes who engaged in regular sports activities (depending on the season of sport) and usually had sports club membership and insurance cards. In addition, the Non-Athletes' Sports Participation (NASP) variable was estimated using the number of referees and coaches who had a coaching certificate in different sports. The Consumer Price Index (CPI) of Food and Drinks (CPI-FO), Clothing and Shoes (CPI-CL), Housing and Fuel costs (CPI-HO) were also estimated as further variables. Moreover, the ratio of the unemployed population to the active population determined the variable of the Unemployment Rate (UR), and the Gross Domestic Product (GDP) index was collected as another variable of the research. The Population (P) variable was estimated using the number of the members of all households in the province at the time of the census. The summary of this information is given in Table 1.

Table 1. Variables, Definitions, Measurements and Data Sources

Variable	Symbol	Definition and measurement	Data source
Sports Media	SM	The duration of hours the radio and television sports programs were broadcasted	IBO
Athletes' Sports Participation	ASP	The number of organized athletes who engaged in regular sports activities with membership and insurance cards	ISC, IMYS, INOC
Non-Athletes' Sport Participation	NASP	The number of referees and coaches with coaching certificate in different sports	ISC, IMYS, INOC
CPI of Food	CPI-FO	The Consumer Price Index (CPI) of Food and Drinks	IMEF
CPI of clothing	CPI-CL	The Consumer Price Index (CPI) of Clothing and Shoes	IMEF
CPI of Housing	CPI-HO	The Consumer Price Index (CPI) of Housing and Fuel Costs	IMEF
Unemployment Rate	UR	The ratio of the unemployed population to the active population	IMEF
Gross Domestic Product	GDP	The Gross Domestic Product (GDP) index	ISC
Population	P	The number of members of all households in the province at the time of the census	ISC, IMEF

Model Specification (Simultaneous Equations Approach)

The purpose of this study was to investigate the simultaneous effects between sports media and sports participation with an emphasis on socio-economics variables. Therefore, an economic estimate in the form of simultaneous equation models was considered to achieve this goal. In the simultaneous equation model, endogenous variables interact with each other and are affected by exogenous variables. In this study, variables of Sport media (SM), Athletes' sport participation (ASP), and Non-Athletes' Sport Participation (NASP) were considered as three endogenous variables, while socio-economic variables were identified as exogenous variables. Since instrumental variables are required in the simultaneous equation model, all exogenous variables were considered as instrumental variables. An endogenous variable is one whose numerical value is determined within the model, and the exogenous variable is one whose numerical value is determined outside the equation. In addition, an instrumental variable is one used to estimate the random effect of a number of exogenous variables on endogenous variables (Soori, 2012).

Simultaneous equations differ from single-equation models. There are more than one dependent variable and more than one equation. A unique feature of simultaneous equations is that the dependent variable in one equation is an explanatory variable in the other equation of the system. For example, the sports media as an independent variable affects the dependent variable of Athletes' sports participation and at the same time, the sports media acts as a dependent variable for the independent variable of sports participation. In such cases, the ordinary least-squares (OLS) method cannot be applied due to the incompatibility of the resulting estimates. In other words, estimates, regardless of sample size, never reach actual values (Green, 2002). Single-equation and system methods are used in simultaneous equations. Some methods of single-equation include ordinary least Squares (OLS), indirect least squares method, instrumental variable method, two-stage least squares (2SLS) method, and limited information maximum likelihood method. Some of the system methods include three-stage least squares (3SLS) and full information maximum likelihood method. In single-equation methods, each equation is estimated only according to the equations of that equation and without considering the limitations of the other equations. However, in system methods, all the information in the equation system is used to estimate the coefficients (Gujarati, 2003). In this study, based on the research hypotheses, we used the two-stage least squares (2SLS) method.

Thus, for this study, three equations were considered. In the first equation, Athletes' Sport Participation (ASP) was a function of Sports Media (SM), Non-Athletes' Sport Participation (NASP), the Consumer Price Index (CPI) of Food and Drinks (CPI-FO), the Consumer Price Index (CPI) of Clothing and Shoes (CPI-CL), the Consumer Price Index (CPI) of Housing and Fuel Costs (CPI-HO), and Unemployment Rate (UR). In the second equation, Non-Athletes' Sport Participation (NASP) was a function of Athletes' Sports Participation (ASP), Sports Media (SM), Gross Domestic Product (GDP), and the Unemployment Rate (UR). Finally, in the third equation of research, Sports Media (SM) was a function of Athletes' Sports Participation (ASP), Non-Athletes' Sports Participation (NASP), Gross Domestic Product (GDP), and Population (P).

$$ASP_{it} = \alpha_0 + \alpha_1 NASP_{it} + \alpha_2 SM_{it} + \alpha_3 CPI-FO_{it} + \alpha_4 CPI-CL_{it} + \alpha_5 CPI-HO_{it} + \alpha_6 UR_{it} + \varepsilon_{1it} \quad (1)$$

$$NASP_{it} = \beta_0 + \beta_1 ASP_{it} + \beta_2 SM_{it} + \beta_3 GDP_{it} + \beta_4 UR_{it} + \varepsilon_{2it} \quad (2)$$

$$SM_{it} = \lambda_0 + \lambda_1 ASP_{it} + \lambda_2 NASP_{it} + \lambda_3 GDP_{it} + \lambda_4 P_{it} + \varepsilon_{3it} \quad (3)$$

Therefore, according to the research equations, a conceptual model for the present research was considered, which is shown in Figure 1.

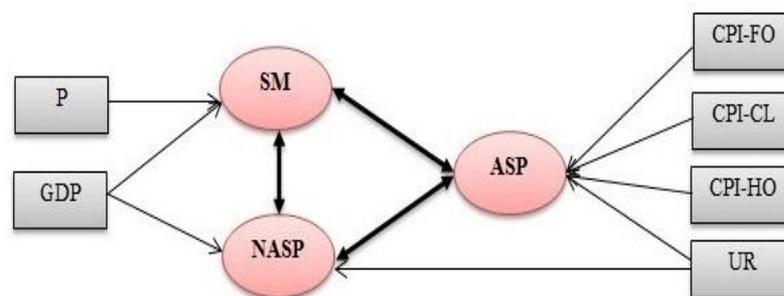


Figure 1. Research Conceptual Model

Complementary Tests

Before simultaneous equations model estimation are carried out, complementary tests – including unit root test, Cointegration Test, Identifiability, F-Limer, and Hausman tests – and the test of endogenousness of the endogenous variables are necessary.

Stationarity of variables: Before estimating the pattern, it is necessary to examine variables' reliability. A variable is stationary when its mean, variance, and self-correlation coefficients remain constant over time. In general, if the origin of the time of one variable changes, but its mean, variance, and covariance do not change, then the variable is said to be stationary; otherwise, the variable is not stationary. For this purpose, the ADF test for unit root is recommended Maddala and Wu (1999),

$$\begin{cases} H_0: & \text{The variable is not stationary} \\ H_1: & \text{The variable is stationary} \end{cases}$$

The stationarity of the variables can be examined in three states including in level, on first difference, and second difference. The H_0 hypothesis about variables whose significance levels are less than 0.05 is rejected, the variables on the level are stationary, and those variables will be accumulated from Zero ranks or $I(0)$. If the significance level is more than 0.05, the variable is not stationary; in this case, its stationarity is examined on the first difference, and if the variable is stationary after the first difference, the variable will be accumulated from order 1 or $I(1)$ (Maddala & Wu, 1999).

Cointegration Test: When there is evidence for a unit root in the data, the cointegration method can be useful to prevent the false regression and determine the long-run relationship between the variables. Panel cointegration tests have more power and validity than cointegration tests for the assessment of each section separately. In the panel data, Pedroni (2004) and Kao (1999) tests are used to examine the cointegration relationship (Baltagi, 2008). In this study, Kao test is used to investigate the cointegration relationship.

Identifiability: Two conditions – including the order condition (the necessary condition) and the rank condition (adequate condition) – should be considered for identifiability test. One of the simplest methods to check the order condition is to calculate $K-k$ and $m-1$, where m and k respectively represent the number of endogenous variables and the number of predetermined variables in the equation under study. If $K-k < m-1$, the equation is unidentified or under-identified, and if $K-k = m-1$, the equation is exactly identified. Finally, if $K-k > m-1$, the equation is over-identified. In a model with M of equation and M of endogenous variable, if we can obtain at least one non-zero determinant of degree $(M-1)$ related to the coefficients of endogenous and predetermined variables outside the equation under consideration but considered in other equations, the equation will be identified and the rank condition will be met (Gujarati, 2003).

F-Limer and Hausman tests: This research required a combination of regression analysis and the pooled or panel model. For this purpose, the F-Limer test was used. If the period or inclination of the provinces was rejected based on the Limer statistic, the panel model would be used, and if not, the pooled model would be adopted (Baltagi, 2008). If the data were selected by the panel method, the Hausman test would be used to select between one of the fixed and random-effects models. If the H_0 were rejected, the fixed-effects model would be used, and if not, the random-effects model would be used (Wooldridge, 2001).

The test of endogenousness of the endogenous variables: To accept the used model as a system of simultaneous equations, it was necessary to test the bias of endogenous variables. If the endogenousness of the endogenous variables was not achieved, simultaneous equations bias would be damaged; therefore, it could not be used with the system of simultaneous equations. Consequently, modified Hausman (1976) test was used to test the endogenousness of endogenous variables. This test was introduced by Davidson and MacKinnon (1983).

Results

First of all, descriptive statistics of research variables are presented (Table 2). The results showed that the average of Athletes' Sport Participation (ASP) in Iran from 2004 to 2017 was

88513/71 and the average ASP fluctuated from 10453 to 526235 athletes. The average of number of Non- Athletes' Sport Participation (coaches and referees) (NASP) was 10010/93, and it fluctuated from 492 to 86401 coaches and referees. The average of Sport Media (SM) was 1046/24 hours, and its average fluctuated from 32 to 25546 hours. The average of the variables the Consumer Price Index (CPI) of Food and Drinks (CPI-FO), the Consumer Price Index (CPI) of Clothing and Shoes (CPI-CL), and the Consumer Price Index (CPI) of Housing and Fuel Costs (CPI-HO) were 49/45, 48/29 and 54/74%, respectively. Moreover, the average value of Unemployment Rate (UR) was 12/63. In addition, the average Gross Domestic Product (GDP) was 4/91E+08. Finally, the average number for Population (P) was 26541199, which fluctuated from 494000 to 17429000 people (Table2).

Table 2. Descriptive Statistics of Research Variables

Variables	Mean	Median	Standard deviation	Max.	Min.	Jarque –Bera
Athletes' Sports Participation (ASP)	88513/71	57664	87341/97	566235	10453	1925/42 (0/0000)
Non-Athletes' Sport Participation (NASP)	10010/93	7585/500	10484/70	86401	492	5950/33 (0/0000)
Sports Media (SM)	1046/24	445	2968/88	25546	32	14684/41 (0/0000)
CPI of Food (CPI-FO)	49/45	33/15	35/13	116/80	10/50	44/97 (0/0000)
CPI of clothing (CPI-CL)	48/29	29/65	34/15	112/50	9/40	50/95 (0/0000)
CPI of Housing (CPI-HO)	54/74	47	29/53	110/80	14	34/45 (0/0000)
Unemployment Rate (UR)	12/63	11/60	5/13	39/90	4/10	1630/47 (0/0000)
Gross Domestic Product (GDP)	4/91E+08	1/01E+08	1/74E+09	2/82E+10	6589935	461321/8 (0/0000)
Population (P)	26541199	1735500	2781183	17429000	494000	2260/65 (0/0000)

In this study, to investigate the stationarity of variables using the combined data, The ADF-Fisher test was used and the results showed that the probability of all variables was less than 0/05. Therefore, H_0 is rejected and variables in level and first difference and second are reliable (Table 3). Due to the difference of levels in the variables, it was necessary to examine the cointegration relationship between them. In the light of these conditions, Kao cointegration test was performed for all equations and the results showed that the cointegration relationship for the research equations was not confirmed (Table 4).

Table 3. The Results of ADF-Fisher Test

Variables	Level		1st difference		2st difference		Result
	ADF statistics	Prob.	ADF statistics	Prob.	ADF statistics	Prob.	
Athletes' Sports Participation (ASP)	79/83	0/01	-	-	-	-	I(0)
Non-Athletes' Sport Participation (NASP)	41/47	0/92	126/41	0/0000	-	-	I(1)
Sports Media (SM)	59/03	0/36	151/30	0/0000	-	-	I(1)
CPI of Food (CPI-FO)	1/09	0/99	54/68	0/52	106/43	0/0001	I(2)
CPI of clothing (CPI-CL)	71/31	0/08	77/90	0/02	-	-	I(1)
CPI of Housing (CPI-HO)	29/97	0/99	57/89	0/40	129/70	0/0000	I(2)
Unemployment Rate (UR)	61/30	0/29	143/07	0/0000	-	-	I(1)
Gross Domestic Product (GDP)	0/12	0/99	39/27	0/95	126/73	0/0000	I(2)
Population (P)	38/53	0/96	107/68	0/0000	-	-	I(1)

Table 4. The Results of Kao Cointegration Test

equations	ADF	t-Statistic	Prob.
Equation 1	ADF	-1/01	0/15
Equation 2	ADF	1/56	0/06
Equation 3	ADF	-1/37	0/08

According to the investigation of the order condition of identifiability, the results showed that the first equation was exactly identified and the second and third equations were over-identified (Table 5).

Table 5. Investigation of Order Condition

Equations	K-k	M-1	Identifiability
Athletes' Sport Participation (Eq1)	2	2	exactly identified
Non-Athletes' Sport Participation (Eq2)	4	2	over-identified
Sports Media (Eq3)	4	2	over-identified

In addition, to investigate the rank condition of identifiability, the determinant of the coefficients of the variables outside the equation has been calculated. Variables outside the first equation are included Gross Domestic Product (GDP) and population (P). Moreover, variables outside the second equation include Consumer Price Index (CPI) of Food and Drinks (CPI-FO), the Consumer Price Index (CPI) of Clothing and Shoes (CPI-CL), the Consumer Price Index (CPI) of Housing (CPI-Ho) and population (P). Finally, variables outside the third equation involve Consumer Price Index (CPI) of Food and Drinks (CPI-FO), the Consumer Price Index (CPI) of Clothing and Shoes (CPI-CL), the Consumer Price Index (CPI) of Housing (CPI-HO), and Unemployment Rate (UR). As regards, the determinants of the coefficients of the variables outside equations are opposite to zero; therefore, the rank condition of identifiability is established. Thus, it is possible to calculate the structural form coefficients using the summarized form coefficients.

$$A = \begin{bmatrix} \beta_3 \\ \lambda_4 \end{bmatrix} |A| \neq 0 \quad (4)$$

$$A = \begin{bmatrix} \alpha_3 & \alpha_4 \\ \alpha_5 & \lambda_4 \end{bmatrix} |A| \neq 0 \quad (5)$$

$$A = \begin{bmatrix} \alpha_3 & \alpha_5 & \beta_4 \\ \alpha_4 & \alpha_6 & \end{bmatrix} |A| \neq 0 \quad (6)$$

Before estimating equations, F-Limer test was used to determine whether data should be used as pooled or panel. The results showed that the significance level in equations for F-Limer (Chow) test was smaller than 0.05 (Table 6). Therefore, in this study, panel data were used. In the next step, the Hausman test was used to determine the fixed or random-effects model. In all of the equations, the significance levels were less than 0.05, which allowed for the rejection of the null hypothesis. Therefore, we elected to use a fixed-effects model (Table 6).

Table 6. F-Limer and Hausman Tests: Summary Statistics

Test	Equations	statistics	Df.	Prob.	Result
F-Limer	Equation 1	25/56	27/345	0/0000	Estimation by panel
	Equation 2	6/37	27/347	0/0000	Estimation by panel
	Equation 3	139/74	27/347	0/0000	Estimation by panel
Hausman test	Equation 1	10/57	6	0/0000	Estimates with fixed effects
	Equation 2	47/02	4	0/0000	Estimates with fixed effects
	Equation 3	65/81	4	0/0000	Estimates with fixed effects

To test the endogeneity of endogenous variables, modified Hausman's test (1976) was used. In this test, two regression equations are estimated. To test the endogeneity of Eq1, Athletes' Sport Participation (ASP) was estimated using all exogenous variables of the model. Then, the residual values resulting from estimation were considered as a separate variable (RES1). Next, the first equation was estimated with RES1 (as a new explanatory variable). If the new variable's coefficient (RES1) were significant, it would show that Athletes' Sport Participation (ASP) variable in the first equation was endogenous. According to the results of Table 6, the endogeneity of Athletes' Sport Participation is confirmed. For Non-Athletes' Sport Participation (NASP) and Sport Media (SM) variables, the new explanatory variables (RES2 and RES3) were used and the endogeneity of NASP and SM in the second and third equations were confirmed (Table 7).

Table 7. The Results of Endogeneity of Endogenous Variables

Test	Equations	Endogenous variables	New Variables	Coefficient	Std. Error	t-Statistic	Prob.
Justified	Equation 1	ASP	RES1	0/88	0/01	49/77	0/0000
Hausman	Equation 2	NASP	RES2	0/95	0/02	34/49	0/0000
test	Equation 3	SM	RES3	0/91	0/01	69/53	0/0000

One of the characteristics of a simultaneous equation system is that the dependent variable in one equation appears as an explanatory variable in another equation of the system. This explanatory variable may be correlated with the residual of equation in which it is entered as the explanatory variable and it violates the classical assumption of $\text{cov}(u_i, x_i) = 0$. Therefore, in estimating system parameters – due to simultaneous equations bias that leads to inconsistent structural coefficients estimators – it is not possible to use the ordinary least squares (OLS) method (Aghaei & Rezagholizadeh, 2016). Therefore, to prevent this problem, we used the 2SLS method, and the OLS results are provided only for comparison with 2SLS estimators. Therefore, in this study, the criterion for analyzing results was comprised of 2SLS estimators.

Table 8. Estimating of First by OLS and 2SLS Methods

Independent variables	(1) $ASP_{it} = \alpha_0 + \alpha_1 NASP_{it} + \alpha_2 SM_{it} + \alpha_3 CPI-FO_{it} + \alpha_4 CPI-CL_{it} + \alpha_5 CPI-HO_{it} + \alpha_6 UR_{it} + \epsilon_{it}$							
	Coefficient		Std. Error		t-Statistic		Prob.	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Non-Athletes' Sport Participation (NASP)	4/29	1/54	0/31	0/44	13/63	3/49	0/0000	0/0005
Sports Media (SM)	13/21	28/88	1/06	3/05	12/37	9/46	0/0000	0/0000
CPI of Food (CPI-FO)	-4526/56	-9217/66	1894/74	1287/26	-2/38	-7/16	0/01	0/0000
CPI of clothing (CPI-CL)	-2166/15	-3627/68	1065/58	388/15	-2/03	-9/34	0/04	0/0000
CPI of Housing (CPI-HO)	-1208/24	-2236/15	767/99	569/34	-1/57	-3/92	0/11	0/0001
Unemployment Rate (UR)	566/003	-1484/67	533/48	488/03	1/06	-3/04	0/28	0/002

The results of the 2SLS estimate in Table 8 showed that non-athletes' sport participation (NASP) and sports media (SM) has a positive and significant effect on Athletes' Sport Participation (ASP). This shows that increasing the variables of sports media (SM) and Non-Athletes' Sports Participation (NASP) leads to an increase in the Athletes' Sport Participation (ASP). Moreover, the coefficient of the variables of the Consumer Price Index (CPI) of Food and Drinks (CPI-FO), the Consumer Price Index (CPI) of Clothing and Shoes (CPI-CL), and

the Consumer Price Index (CPI) of Housing and Fuel Costs (CPI-HO) are negative and significant. In fact, CPI-FO, CPI-CL, and CPI-HO have a significant and negative effect on Athletes' Sport Participation (ASP). Furthermore, the increased variables of CPI-FO, CPI-CL, and CPI-HO lead to decreased Athletes' Sport Participation (ASP). Finally, the unemployment rate (UR) coefficient is negative and significant, meaning that the unemployment rate (UR) has a negative and significant effect on the Athletes' Sport Participation (ASP). In fact, the increased unemployment rate (UR) leads to decreased Athletes' Sport Participation (ASP).

Table 9. The Estimation of Second Equation With OLS and 2SLS Methods

Independent variables	2) $NASP_{it} = \beta_0 + \beta_1 ASP_{it} + \beta_2 SM_{it} + \beta_3 GDP_{it} + \beta_4 UR_{it} + \varepsilon_{2it}$							
	Coefficient		Std. Error		t-Statistic		Prob.	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Athletes' Sport Participation (ASP)	0/06	0/23	0/005	0/08	13/21	2/75	0/0000	0/006
Sports Media (SM)	0/09	9/01	0/15	2/15	0/59	4/18	0/55	0/0000
Gross Domestic Product (GDP)	1/85E-06	1/87E-06	1/25E-07	6/04E-07	8/24	3/09	0/0000	0/002
Unemployment Rate (UR)	-2/76	-128/41	65/02	216/51	-0/04	-0/59	0/96	0/55

The results showed that the variables of Athletes' Sport Participation (ASP) and Sports Media (SM) have a positive and significant effect on Non-Athletes' Sports Participation (NASP). This means that increased Sports Media (SM) and Athletes' Sports Participation (ASP) lead to increased Non-athletes' Sport Participation (NASP). Gross Domestic Product (GDP) has a positive and significant effect on Non-Athletes' Sports Participation (NASP), but this effect is very weak. Finally, the Unemployment Rate (UR) has a negative effect on Non-Athletes' Sports Participation (NASP) but this effect was not significant (Table 9).

Table 10. The Estimating of Third Equation With OLS and 2SLS Methods

Independent variables	3) $SM_{it} = \lambda_0 + \lambda_1 ASP_{it} + \lambda_2 NASP_{it} + \lambda_3 GDP_{it} + \lambda_4 P_{it} + \varepsilon_{3it}$							
	Coefficient		Std. Error		t-Statistic		Prob.	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Athletes' Sport Participation (ASP)	0/005	0/01	0/002	0/009	2/49	2/009	0/01	0/04
Non-Athletes' Sport Participation (NASP)	-/008	-19	0/01	0/10	-0/55	-1/86	0/58	0/06
Gross Domestic Product (GDP)	1/32E-07	4/48E-07	7/31E-08	2/50E-07	1/81	1/79	0/07	0/07
Population(P)	0/0007	0/0007	6/57E-05	0/0001	10/65	4/62	0/0000	0/0000

The results showed that the variables of Athletes' Sports Participation (ASP) and Population (P) have a positive and significant effect on Sports Media (SM), but the effect of GDP and Non-Athletes' Sport Participation (NASP) on Sports Media (SM) was not significant (Table 10).

In summary, the investigation of research equations concludes that there is an interactive, significant, and positive relationship between Sports Media (SM) and Athletes' Sport Participation (ASP). This shows that increasing the content of Sports Media (SM) leads to an increase in the Athletes' Sport Participation (ASP). At the same time, increasing ASP leads to

the development of Sports Media (tables 8 and 10). Moreover, there is an interactive, significant, and positive relationship between Athletes' Sport Participation (ASP) and Non-Athletes' Sports Participation (NASP), and these two variables lead to an increase in each other (tables 8 and 9). Finally, the effect of Sports Media (SM) on Non-Athletes' Sport Participation (NASP) is positive and significant, but the effect of Non-Athletes' Sport Participation (NASP) on Sports Media (SM) is not significant and there is not an interactive effect between NASP and SM (tables 9 and 10).

In the investigation of socio-economic factors, results show that the variables of the CPI of Food and Drinks (CPI-FO), CPI of Clothing and Shoes (CPI-CL), CPI of Housing and Fuel Costs (CPI-HO), and Unemployment Rate (UR) have a negative and significant effect on Athletes' Sport Participation (ASP). In addition, the effect of GDP on Non-Athletes' Sport Participation (NASP) was weakly positive and significant. Finally, Population (P) had a positive and significant on Sport Media (SM).

Discussion

This study aimed to investigate the interactive effect of sports media and sport participation with an emphasis on the socio-economics factors. The study used an econometric model based on simultaneous equations approach with the 2SLS method to analyze panel data. The empirical results show interesting and new findings.

According to the first hypothesis, there is an interactive, significant, and positive effect between sports media and athletes sport participation. This shows that increasing the content of sports media leads to an increase the athletes' sport participation, and at the same time, increasing ASP leads to the development of sports media. In addition, the effect of sports media on non-athletes' sport participation (coaches and referees) is positive and significant. This result is consistent with the researches of Dart (2012), Gulam (2016), Horne (2005), and Lines (2007). These researchers emphasized the interactive effect between the media and sports participation. Gulam (2016) emphasized the role of various social media tools in various aspects of sports. Dart (2012) explores the interaction between media and sports in terms of professional sports and new media technologies. Lines (2007) investigated the effect of selected sports media events on the active participation of a group of young people aged 14 and 15. He believed that watching sports through the media would provide new opportunities for physical activity, and that sports media images and messages would enhance athletic performance. In fact, the relationship between sports media and sports participation is tense. Horne (2005) emphasizes the relationship between social media and sports and considers the importance of their role in the development of popular culture. Almost everyone in today's world deals with the phenomenon of sports. Individuals or athletes, referees, coaches, or sports fans follow sports news and content in social media such as radio, television, and newspapers. Social media leads to increased interest in sports, and this increase in audience interest is encouraging sports media such as radio and television to cover a wide range of sports programs (Gulam, 2016).

According to the second hypothesis, there is an interactive, significant, and positive effect between Athletes' Sport Participation and Non-Athletes' Sports Participation, and these two variables lead to an increase in each other. This result is consistent with the researches of Aleksic-Veljkovic et al. (2016), Bolter and Weiss (2013), and Zardoshtian et al. (2016). Bolter and Weiss (2013) evaluated the adolescent athletes' perceptions of coaches' behaviors that reinforce or inhibit of athlete behaviors and concluded that four coaching behaviors (i.e., modeling, reinforcing, teaching, and prioritizing winning) were associated with social and antisocial behaviors. In a study about the difference between athletes' perceptions of coaching

behaviors in individual and team sports, Aleksic-Veljkovic et al. (2016) concluded that the behavior of the coach directed towards improving the performance of athletes` was evaluated higher than athletes in individual sports. Zardoshtian et al. (2016) emphasized the role of coaching power resources on the success of Iranian youth boxers. Today, the coach-athlete relationship has attracted increasing attention from sports scientists. Undoubtedly, in today's sport, athletes cannot succeed without having a knowledgeable and worthy coach. A coach with good performance causes loyalty, emotional attachment, and great effort to achieve the goals of the group, believes in the values of the team and desires to join it, participates in affairs, feels proud to be a member of the club, and makes a commitment for athletes become (Zardoshtian et al., 2016).

According to the third hypothesis, CPI of Food and Drinks, CPI of Clothing and Shoes, and CPI of Housing and Fuel Costs have a negative and significant effect on athletes' sport participation. This result is consistent with the researches of Calabuig et al. (2014), Chang et al. (2009), and Vandendriessche et al. (2012). Calabuig et al. (2014) argued that increased prices have a direct impact on predicting the future goals of sports consumers. Vandendriessche et al. (2012) argued that socio-economic status (SES) affects sports participation. Chang et al. (2009) argued that the satisfaction of sports participants has a direct effect on consumer loyalty, which involves several dimensions such as reduced price sensitivity. The CPI and the inflation rate announced are calculated based on the consumption pattern (basket of goods) of the society average, so different households in the society are affected by the increases in prices due to differences in consumption patterns (i.e., differences in the cost share of items covered by the CPI basket such as food and drinks, Clothing and Shoes, and Housing and Fuel Costs) (Komijani & Ghiasvand, 2009). Sports participation is also affected by this price increase and economic inequality of households because marketing literature states that price is an important factor that determines customer satisfaction, and customers refer to valuable prices in assessing the value of services (Cronin, Jr. et al., 2000). Marketing managers need to understand how sports consumers respond to price changes. In summary, there is a relationship between consumer satisfaction and price (Calabuig et al., 2014).

According to the fourth hypothesis, the Unemployment Rate has a negative and significant effect on Athletes' Sport Participation. This shows that increasing the Unemployment Rate leads to decreased Athletes' Sport Participation. This result is consistent with the researches of Gough (2017) and Kokolakis et al. (2012). Gough (2017) concluded that for men, unemployment does not have any effect on sport participation but for women, unemployment influences increased sport participation. Kokolakis et al. (2012) stated that job status has a positive effect on sports participation, while the effect of unemployment and retirement on sports participation is negative. However, it should be noted that unemployment means more free time but less income to spend (Brochado et al., 2017).

According to the fifth hypothesis, the effect of GDP on Non-Athletes' Sport Participation is weakly positive and significant. This shows that increased GDP leads to increased Non-Athletes' Sport Participation. This result is consistent with the research of Kokolakis et al. (2018) who analyzed the sports participation legacy of the 2012 London Olympics. They concluded that participation rates were adjusted to take into account seasonality and changes in the gross domestic product (GDP), accounting in this way for the effect of the then-recent economic recession. Countries that have a high ranking in GDP are the leaders and medalists of the Olympics. De Bosscher et al. (2006) emphasize the GDP role in sports international success, and countries with high GDP have more support for different parts of the sport (Zareian et al., 2016).

According to the sixth hypothesis, the effect of GDP on Sports Media (SM) is weakly positive but is not significant. Therefore, the results of the present study are inconsistent with

the results of most studies because various studies have confirmed the role of a country's economic growth in media development. In addition, these researches argued that countries with high GDP produce more opportunities and more benefits for the media (Chang et al., 2009; Lee, 2006; Wurff et al., 2008).

Finally, According to the seventh hypothesis, Population (P) has a positive and significant effect on Sports Media (SM). The issue of population is one of the most important topics in economic development strategies. Economic experts do not consider the population to be bad or good at all, and they believe that by using it appropriately for the development of resources and the combination of capital and infrastructure, the population can be a factor for the growth of countries.

Conclusion

The media has always played a key role in covering and live broadcast of sporting major events such as the Olympics, the FIFA World Cup, and the production of sports programs in the field of leisure-time physical activity. The coverage of these events and the production of sports programs lead to generating information and news and encouraging young athletes to participate in sports. On the other hand, media benefit a lot through the coverage of sports events (as a very valuable product) in radio and television using attracting sponsors, advertisements, audiences, etc., Therefore, due to the positive effects that media and sports have on each other, there are interactive effects between them. The media plays a key role in producing the programs needed by referees and coaches. It paves the way for their greater recognition, job attraction, and more income generation, and ultimately it encourages them to try more as a key element in the sports.

Various studies have emphasized the coach-athlete relationship. On the one hand, knowledgeable, experienced, and expert coaches play an important role in the development of the athlete. The role of the coach is so important that it can determine the success or failure of an athlete in future. On the other hand, athletes shape the coaches' behavior with their relative individual differences, and it is the type of athletes' behavior that determines the type of coaches' behavior. In addition, referees are in two-way interactions with coaches and athletes. The behavior of the coach and the athlete affects the refereeing decisions, and experienced and committed referees create a fair result in the competition field. Therefore, the reasonable behavior of the coach, referee, and athlete towards each other relieves stress, fear, and failure from them, and leads to success. Therefore, in order to promote referees and coaches, various educational, financial, and spiritual support packages can be used to promote them to have a positive impact on athletes. Moreover, psychological training is necessary for athletes to appropriately communicate with referees and coaches.

Due to the background of research, the role of socio-economic factors is important in the interaction effect between media and sport. According to the results of the research, increasing the role of Consumer Price Index (CPI) in basic needs of life such as food, clothing, and housing is a very important economic factor in the continuation of sports participation of athletes because price is a determining factor in sports participation. Increased Consumer Price Index (CPI) leads to increased inflation; therefore, in this situation, the purchasing power of sports consumers for sports participation will be low because all the purchasing power of the family is focused on meeting the basic needs of living, and the share of sports expenses in the household basket is reduced. Consequently, policymakers should use actions such as the allocation of sports subsidies, the reduction of the price of sports services, the development of private sector, etc. to increase the opportunity of sports participation when

cost of living increases. Of course, the main solution is to control prices of the basic needs of life.

Unemployment rates affect sports participation. Unemployed people have a lot of time for sports, but at the same time, unemployment reduces sports participation due to the fact that it reduces the purchasing power of athletes. Nonetheless, the opportunity for sports participation can be increased by granting banking facilities such as bank loans to unemployed athletes, thus financially supporting the unemployed during the unemployment period.

Economic growth and high income shown by GDP have a key role in the sport sector of any country. Developed and high-GDP countries have more athletes, more experienced coaches, and more expert referees because countries with high economic growth provide more opportunities and facilities for this group. Economic growth also has a positive effect on the media. The developed countries will provide more hardware and software facilities to the media and will be more efficient in producing media content.

Population growth cannot always be bad. Population growth on the one hand encourages production of more sports programs on radio and television and, on the other hand, provides more human resources, technology, and equipment to the media.

In summary, on the one hand, media and sport are complementary to each other. Sport is a media-oriented commodity, and the media are interested to invest in sports, and on the other hand, coaches, referees, and athletes use sports media programs to promote their knowledge encouragement to participate more in sports. In addition, socio-economic factors such as unemployment rate, increases in cost of living through Consumer Price Index, GDP, population, and unemployment rate affect the interaction of media and sports participation. Policymakers need to plan for media development through sports and increasing sports participation through the media. They should try to strengthen the effect of socio-economic factors on this relationship.

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