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Evaluation of the perceived social impacts of the Formula E Grand Prix of Santiago de Chile

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Abstract. The aim of this study is to analyse residents' perception of the social impact of the Formula E Grand Prix of Santiago de Chile. A sample of 414 residents was collected through a questionnaire made up of 46 items regarding possible positive and negative impacts. Descriptive analysis, confirmatory factorial analysis and cluster analysis were performed. The results showed two groups with different perceptions of this sporting event: realistic (n=152) and favourable (n=162). Sociodemographic variables referring to education level, civil status, income level, location of the family residence and political orientation contribute to significantly differentiating the clusters. The variables related to interest in the event, support for the celebration, attendance, participation and frequency of contact also contributed to significantly differentiating the groups. Citizens' high degree of support for holding the sporting event could be identified by a positive social representation of the event.

1. Introduction

Sporting events are analysed from the perspective of different fields: economic, sociological or environmental. Many cities often use the rhetoric associated with "sustainable development" or "sustainable regeneration" to justify the hosting of sporting events (Smith, 2009). Within sporting events, the analysis of the impact on society and the quality of life of residents has gained special relevance in recent years, as the lack of support for the holding of sporting events can generate devastating effects on the host community, increasing social and political tensions (Gursoy, Yolal, Ribeiro and Panosso, 2017).

The social impact of sporting events has been analysed mainly through the study of residents' perception of various variables of interest (impacts on diverse areas, support for the celebration, identification with the event, linkage with the event, etc.). Papers that explore the perceptions of subgroups of host residents can facilitate a better understanding of the social impact of these events by identifying potential winners and losers (Ma, Ma, Wu and Rotherham, 2013). These kinds of works are few (Ma et al., 2013), and many insist on the need to make

more contributions along this line to identify the factors that may define these groups (Chen and Tian, 2015). In this regard, several authors have pointed to the importance of assessing the reactions of subgroups of hosts at sporting events as a way of better understanding stakeholders (Chen and Tian, 2015; Fredline and Faulkner, 2000; Ma and Rotherham, 2015; Zhou and Ap, 2009).

The Formula E championship is made up of various events held on urban circuits in which electric single-seat race cars take part. This championship was born in the 2014-2015 season with eleven races, increasing the number of races to 13 in the 2018-2019 season. Because this is a sporting event with a little history, the contributions to the analysis of the impact on the host localities are limited.

Therefore, this paper analyses the social impact of the Formula E Grand Prix held in Santiago de Chile in 2018 by identifying groups of residents with different perceptions of the impacts associated with it. In addition, the variables that define these groups are identified to be able to determine the characteristics of the residents.

2. Literature review

2.1. *Social impact of motor sport events*

The social impact of sporting events can be defined in terms of changes in the quality of life of residents as a consequence of hosting a sporting event (Parra, Calabuig, Núñez and Crespo, 2017). Studies analysing the social impact of sporting events tend to consult the perception of stakeholders affected by the event, with residents being one of the groups on which research in this area has focused the most (Parra, Alonso-Dos-Santos and Duclos, 2018a).

Many contributions in this area have focused their interest on the impact of mega-sports events (Olympic Games and Football World Cups) (e.g., Chi, Ouyang and Xu, 2018; Kim and Kaplanidou, 2019; Koenigstorfer and Preuss, 2019). Nevertheless, the social impact of other major sporting events has also been analysed, such as the Tour de France (Balduck, Maes and Buelens, 2011), the FIBA World Cup Spain 2014 (González-García, Parra, Calabuig and Añó, 2016), the Perth America's Cup (Soutar and Mcleod, 1993) and Valencia's (Llopis and Gil, 2011; Parra, Añó, Calabuig and Ayora, 2016), America's Cup Soccer Chile 2015 (Parra, Alonso-Dos-Santos and Duclos, 2018a), the Barcelona World Race (Parra, Elasri, Triadó and Aparicio, 2016), the Australian Open tennis (Fredline, 2005), Kaohsiung World Games (Ma et al., 2013) and the Super Bowl (Kim and Walker, 2012; Lee and Krohn, 2013). In this sense, motorsports events have also been the subject of analysis in various studies (Añó, Calabuig and Parra, 2012; Calabuig, Parra, Añó and Ayora, 2014; Cegielski and Mules, 2002; Cheng and Jarvis, 2010; Fredline and Faulkner, 2000; Fredline and Faulkner, 2002; Fredline, Deery and Jago, 2013; Kim, Jun, Walker and Drane, 2015; Mackellar, 2013; Mao and Huang, 2016; Zhou, 2010).

Motor sport events with cars, with the exception of rallies, in recent years, have tended to be held on urban circuits built specifically for the event or adapted for it (Lefebvre and Roult, 2011). For this reason, urban circuits tend to use public roads and resources such as parks, trails and

public areas that are not usually used for this purpose, all connected as circuits specifically designed for the motor sport events (Mackellar, 2013).

These events often generate a series of positive and negative impacts that can affect the host community. In this sense, most of the studies that have analysed the social repercussion of their celebration in urban circuits agree in highlighting the noise problems generated by single-seaters, traffic and the agglomeration of people in the areas in which they are celebrating as egregious negative impacts (Añó et al., 2012; Cegielski and Mules, 2002; Cheng and Jarvis, 2010; Fredline et al., 2013). Other significant negative impacts are related to economic costs (Kim et al., 2015) or concerns about the maintenance of public facilities (Mackellar, 2013).

On the other hand, several works highlight the positive impacts related to the improvement of the city image and its promotion as a tourist destination (Añó et al., 2012; Cegielski and Mules, 2002; Cheng and Jarvis, 2010; Kim et al., 2015; Mao and Huang, 2016; Zhou, 2010) or the stimulation of the local economy (Fredline et al., 2013). Other psychosocial and intangible aspects are related to the community's increased pride in hosting the event (Fredline et al., 2013; Mao and Huang, 2016), entertainment opportunities (Fredline et al., 2013; Kim et al., 2015), or the opportunity to meet new people (Cheng and Jarvis, 2010).

2.2. Explanatory theories of the social impact of sporting events

There are several theories that attempt to explain changes in residents' perceptions of the impacts of sporting events. In this paper, we will use the theory of social representations (Moscovici, 1984) as a theoretical frame of reference to analyse residents' perceptions of Formula E. This theory suggests that residents' feelings towards tourism and sporting events may be affected by their direct experiences, social interactions, personal and social values, and other sources of information, such as the media (Fredline, 2005, Ritchie, Shipway and Cleeve, 2009). Social representations are difficult to change because they provide a framework through which new information is interpreted (Fredline, 2005).

This theory can help explain how various groups of people understand and respond to social issues. It is particularly appropriate when the topic of study involves multiple social perspectives or accompanies conflicts associated with possible change, such as the hosting of a sporting event (Zhou and Ap, 2009). In the research on the social impact of sporting events, several works have used this theoretical framework of reference (Chen and Tian, 2015; Cheng and Jarvis, 2010; Fredline, 2005; Fredline et al., 2013; Fredline and Faulkner, 2000; Zhou, 2010; Zhou and Ap, 2009).

2.3. Cluster analysis of residents

Cluster analysis has been used to categorise residents' perceptions of the impacts of sporting events (e.g., Calabuig et al., 2014; Chen and Tian, 2015; Fredline et al., 2013; Fredline and Faulkner, 2000, 2002; Parra, Añó, et al., 2016; Parra, Calabuig, Añó, Ayora and Núñez, 2014;

Zhou, 2010; Zhou and Ap, 2009). Cluster analysis helps to identify the community and the differences between them, as well as provide the foundation for event planning and management (Chen and Tian, 2015). Prior studies have identified two groups (e.g., Ma and Rotherham, 2015; Ma et al., 2013; Zhou, 2010), three groups (e.g., Calabuig et al., 2014; Chen and Tian, 2015; Ma et al., 2013; Parra, Añó et al., 2016; Parra et al., 2014; Zhou and Ap, 2009) and five groups (e.g., Fredline and Faulkner, 2000; Fredline et al., 2013).

3. Method

3.1. Participants

In this study, 414 people living in Chile were interviewed about their perception of the impacts generated by the Formula E race in Santiago de Chile. The event being studied is the Santiago ePrix, which was attended by 25,000 spectators at the inaugural race held on February 3, 2018 at the Parque Forestal urban circuit and was the fourth race of the 2017-2018 season.

Table 1 shows the sociodemographic characteristics of the sample. The majority of those interviewed are residents of the metropolitan region of Santiago de Chile (55.1%), aged between 25 and 54 (81.6%), men (79.2%) and have university-level education (88.4%).

Table 1. Sociodemographic characteristics of the sample.

		N	%
Sex	Man	328	79.2
	Woman	86	20.8
Age	18-24 years	42	10.1
	25-54 year	338	81.6
	More than 55 years	34	7.9
Occupation	Employed	294	71.0
	Unemployed	20	4.8
	Part-time employee	50	12.1
	Student	38	9.2
	Other (housekeeper, retired, etc.)	12	2.9
Level of studies	High school	16	3.9
	Technical	32	7.7
	University	366	88.4
Civil status	Single	270	65.2
	Married	122	29.5
	Divorced/Separated	22	5.3
Income level	Less than 10.000.000 CLP	212	51.2
	10.000.001-15.000.000 CLP	66	15.9
	15.000.001-20.000.000 CLP	64	15.5
	20.000.001-25.000.000 CLP	36	8.7
	More than 25.000.001 CLP	36	8.7
Family residence	Metropolitan region of Santiago de Chile	228	55.1
	Other regions	186	44.9
Political orientation	Left	142	34.3
	Centre	170	41.1
	Right	102	24.6

3.2. Instrument

The instrument is composed of 46 items adapted from previous studies about positive and negative impacts associated with the celebration of sport events (Añó et al., 2012; Calabuig et al., 2014; Fredline et al., 2013; González-García et al., 2016; Parra, Aguado and Núñez, 2015; Parra, Añó, et al., 2016). The items proposed were classified by categories of positive and negative impacts. To make this classification, the impact categories proposed by Preuss and Solberg (2006) and Fredline (2004) were taken into account. In addition, the different contributions made to the dimensions proposed by the case studies are referred to at the beginning of this section. Thus, the proposed items were clustered, on the one hand, into five initial dimensions related to positive impacts (33 items in total), which were denominated as follows: socio-economic impact (7 items), impact on urban development and infrastructure (6 items), political and administrative impact (5 items), psychosocial impact (3 items), sports impact (6 items) and sociocultural impact (6 items). On the other hand, the negative impacts (13 items in total) were grouped into three dimensions: socioeconomic impact (7 items), environmental impact (3 items) and sociocultural impact (3 items).

A five-point Likert scale was used, where 1 means totally disagree and 5 means totally agree. The following sociodemographic variables were included: age, gender, education level, occupation, family residence, income level, civil status and political orientation. Other variables of interest were also included in the questionnaire to define the characteristics of the resident groups: interest in the sport, attendance at the event, support for the celebration, involvement in tourism or events, public participation as volunteers or workers in sporting events and frequency of contact with the area in which the event is held.

3.3. Procedure

A convenience sampling method such as that used in other work in this area was used (e.g., García-Pascual, Parra and González-García, 2019; Gursoy and Kendall, 2006; Oshimi and Harada, 2018; Parra, Alonso-Dos-Santos and Duclos, 2018b, 2019). The questionnaires were distributed and collected after the event (between February and June 2018).

3.4. Statistical analyses

First, two confirmatory factorial analyses (CFA) for the scale of positive impacts (33 items) and negative impacts (13 items) were carried out through the program for structural equation models EQS 6.2.

Several recommended goodness-of-fit indexes were used to check the overall fit of the model through the CFA (Kline, 2005): the normalised chi-square (χ^2/df), the root mean square error of approximation (RMSEA), the non-normalised fit index (NNFI), the comparative fit index (CFI) and the incremental fit index (IFI). The reliability of the scale was checked through Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE). Convergent

validity was also analysed through the significance of factor charges (p<.05) in their respective dimensions and the associated t-test values. To contrast discriminant validity, the method suggested by Fornell and Larcker (1981) was used, which consists of checking whether the square root of the AVE value of a given factor is greater than the correlation coefficients between the factor and any other factor of the proposed scale.

Second, an analysis of clusters was carried out using the statistical program SPSS version 24.0 with the items derived from the CFA. Two methods of estimation (hierarchical and non-hierarchical) of the cluster solution were combined to optimise the results. The hierarchical cluster analysis was performed using the Ward Method grouping process and as a measure of similarity, the Euclidean distance squared. Based on the groups proposed in the previous analysis, a non-hierarchical analysis was applied using the K-means method, using as initial centres the means of the variables obtained for each cluster solution of the hierarchical analysis. To define the characteristics of group profiles and to evaluate predictive validity, ANOVAs and chi-square tests were performed with sociodemographic variables and variables of interest that were not included in the initial analysis. The value of the contingency coefficient (C) was also used to check the intensity of the association or the size of the effect of the related variables.

4. Results

4.1. Confirmatory factor analysis of scales

The CFA results on the scale of positive impacts showed an adequate overall fit after several re-specifications of the initial model in which six indicators were removed from the initial 33: [(S-Bχ^2=716.99, df=309, p<.01); (χ^2=1367.85, df=309) (χ^2/df=4.42); (RMSEA=.080; IC=.07-.08); NNFI=.95; CFI=.95; IFI=.95)]. The final model consists of 27 indicators grouped into the following factors: socioeconomic impact (6 items), impact on infrastructure and urban development (6 items), political and administrative impact (5 items), psychosocial impact (3 items), sociocultural impact (4 items) and sports impact (3 items). The scale reliability indicators showed adequate values, oscillating between .95 and .96 for Cronbach's alpha, between .94 and .96 for the CR, and between .78 and .85 for the AVE.

Convergent validity was tested by observing the values of factorial loads of items oscillating between .82 and .96, being significant (p<.05) and higher than the .60 recommended by Kline (2005). Additionally, t values oscillating between 16.05 and 39.71 were significant at the level of .05 (t>1.96). These data allowed us to ensure convergent validity. Finally, to assess the discriminant validity, it was proven that all the correlations between the factors (ranging from .30 to .91) were lower than the square root of the AVE. This criterion was fulfilled in all pairs of factors except between the socioeconomic impact dimension and the sociocultural impact dimension of the positive impact scale. Nevertheless, the model with the combination of the two factors did not improve the global fit and the validity of the scale, so it was decided to maintain the initial factor structure.

In the case of the scale of negative impacts, it was also necessary to eliminate three indicators from the initial 13 to obtain an adequate global adjustment: [(S-Bχ^2=76.87, df=32, p<.01); (χ^2=102.91, df=32) (χ^2/df=3.21); (RMSEA=.083; IC=.05-.10); NNFI=.95; CFI=.97; IFI=.97)]. The final model consists of 10 indicators clustered into the following factors: negative socioeconomic impact (4 items), negative sociocultural impact (3 items) and negative environmental impact (3 items). Scale reliability indicators showed adequate values, ranging from .84 to .90 for Cronbach's alpha; .87 to .92 for CR; and .70 to .75 for the AVE. For this scale, the convergent validity criteria were also fulfilled by observing the significance of the values of t-tests (t>1.96) associated with the factorial charges of the items of every factor, oscillating between .73 and .98. Similarly, correlations between pairs of factors (oscillating between .15 and .76) showed values lower than the square root of the AVE.

4.2. Cluster analysis of differences between population groups

Cluster analysis allowed the identification of two clusters that presented a suitable theoretical interpretation for the study (see table 2). The significance level for the ANOVA results was set at p<.000, indicating significant differences and supporting the statistical validity of the research. The two identified clusters were named "favourable" (36.7%) and "realistic" (63.3%):

1. Residents labelled as favourable showed a clear positive trend in almost all the possible positive impacts analysed, as they have values higher than 4 or close to this value (see table 1): socioeconomic impact (M=4.25), impact on infrastructure and urban development (M=3.82), political and administrative impact (M=4.56), psychosocial impact (M=4.18), sports impact (M=3.67) and sociocultural impact (M=4.33). On the other hand, they tended to minimise negative impacts: negative socioeconomic impact (M=2.78), negative sociocultural impact (M=1.76) and environmental impact (M=1.79).

2. Residents labelled as realistic have variable scores depending on the dimension analysed, e.g., impact on infrastructure and urban development (M=1.57), psychosocial impact (M=1.56) and sports impact (M=1.87) show reduced scores. Nevertheless, higher scores (above 3) are observed in the factors of socioeconomic impact (M=3.30), political and administrative impact (M=3.62) and sociocultural impact (M=3.32). In the case of negative impact dimensions, the negative socioeconomic impact factor score (M=4.18) should be highlighted. This group of residents was called "realistic", along the lines highlighted by other authors such as Fredline and Faulkner (2000), due to their more realistic and neutral perception of the impacts associated with events, as they view some impacts with a positive trend, others with a negative trend and others with a neutral trend. This term has also been used in other studies that presented groups with similar characteristics (Calabuig et al., 2014; Chen and Tian, 2015; Parra, Añó et al., 2016).

Table 2. Average scores for each variable in the two clusters obtained through the K-means method.

	Realistic (n = 152)	Favourable (n = 262)
Positive impacts		
Factor 1: Socioeconomic impact	3.30 (1.36)	4.25 (.73)
Formula E brings economic benefits to the city of Santiago	3.50 (1.45)	4.59 (.69)
Due to Formula E tourism in Santiago has increased throughout the year.	2.92 (1.62)	3.83 (1.16)
Formula E increases local commerce and business.	3.38 (1.48)	4.37 (.90)
Formula E increases private investment and business opportunities.	3.61 (1.40)	4.29 (.96)
Formula E increases consumption in the city.	3.23 (1.51)	4.18 (.93)
Formula E provides great benefits in the neighbourhood where it is held.	3.17 (1.61)	4.24 (.96)
Factor 2: Impact on urban development and infrastructure	1.57 (.77)	3.82 (.88)
Formula E has improved infrastructure in the city (accesses, streets, street furniture...).	1.69 (1.09)	4.13 (.85)
Formula E has improved the public transport system in Santiago.	1.31 (.74)	3.29 (1.23)
The infrastructures created by Formula E are beneficial for citizens.	1.63 (1.06)	4.03 (1.04)
Formula E has regenerated the zone's infrastructures (streets, urban furniture, ...).	1.77 (1.17)	3.99 (1.07)
Formula E has improved social services in the city.	1.37 (.70)	3.55 (1.21)
The infrastructures created by Formula E are useful for other activities.	1.63 (.91)	3.93 (1.07)
Factor 3: Political/administrative impact	3.62 (1.30)	4.56 (.73)
Formula E has improved Santiago's image in the world.	3.56 (1.43)	4.57 (.85)
The celebration of Formula E has facilitated the opening of Santiago to the world.	3.66 (1.42)	4.63 (.72)
Santiago's Formula E increases Chile's international recognition.	3.70 (1.36)	4.55 (.84)
Formula E promotes the city as a tourist destination.	3.56 (1.44)	4.53 (.84)
Formula E shows the capacity of Santiago's inhabitants to host and organise major sporting events.	3.63 (1.42)	4.50 (.84)
Factor 4: Psychosocial impact	1.56 (.73)	4.18 (.74)
The celebration of Formula E makes Santiago a more attractive city to live in.	1.73 (1.04)	4.30 (.83)
The celebration of Formula E makes Santiago a safer city.	1.41 (.71)	3.89 (1.04)
Formula E makes me proud to live in Santiago.	1.54 (.81)	4.36 (.84)
Factor 5: Sports impact	1.87 (.60)	3.67 (.84)
I think that thanks to Formula E the sport practice of the citizens of Santiago has increased.	1.37 (.69)	3.54 (1.13)
Thanks to Formula E, the number of sports facilities has increased.	1.32 (.70)	3.34 (1.26)
Formula E has increased grants and sports support to the city's clubs.	1.37 (.72)	3.28 (1.36)
Factor 6: Socio-cultural impact	3.32 (1.36)	4.33 (.66)
Formula E is designed for the entertainment of Santiago's people.	3.37 (1.54)	4.05 (1.08)
Formula E provides citizens with an opportunity to meet new people.	3.21 (1.56)	4.33 (.73)
Formula E improves the solidarity and hospitality of citizens with visitors.	3.01 (1.65)	4.33 (.82)
Formula E promotes cultural exchange and understanding of other cultures.	3.14 (1.59)	4.45 (.72)
Negative impacts		
Factor 1: Negative socioeconomic impact	4.18 (1.01)	2.78 (1.02)
Formula E disrupts residents' daily lives excessively.	4.07 (1.25)	2.58 (1.31)
I think Formula E distorts and hinders the normal functioning of the city.	4.13 (1.21)	2.47 (1.26)
During the celebration of Formula E many citizens avoid the area in which the event was held.	4.25 (1.10)	3.14 (1.26)
Formula E causes restrictions on access to public facilities and services.	4.26 (1.07)	2.91 (1.26)
Factor 2: Negative sociocultural impact	1.82	1.76
Formula E encourages inappropriate behaviour (drug use, alcohol, prostitution, etc.).	1.88 (1.15)	1.80 (1.15)
Formula E encourages the development of dangerous driving behaviours.	1.97 (1.30)	1.78 (1.05)
Formula E increases levels of crime and vandalism in the city.	1.61 (.92)	1.70 (1.09)
Factor 3: Negative environmental impact	2.27 (1.23)	1.79 (.94)
Formula E causes damage to the environment and natural areas.	2.25 (1.41)	1.72 (1.00)
Formula E increases the pollution of the city.	2.00 (1.23)	1.64 (1.09)
Formula E increases the volume of waste in the zone.	2.57 (1.49)	1.99 (1.12)

4.3. Profile and characteristics of the groups

Table 3 shows the results of the sociodemographic variables and of interest according to the cluster of belonging. From the point of view of sociodemographic variables, the following groups contribute to significantly differentiating the identified groups: those related to the education level of studies, civil status, income level, location of the family residence and political orientation. Variables of interest related to the event were the following: interest in Formula E, support for the celebration, attendance at the event, participation as a volunteer or worker and frequency of contact with the area in which it is held.

The group of realist residents is characterised by a greater proportion of men (76.34%), those aged between 25 and 54 (82.44%), those with university studies (88.55%), those employed (70.23%), those who are single (67.18%), those with an annual income of less than 10.000.000 CLP (61.07%), those with a political orientation towards the centre (45.80%) and left (32.82%) and those with a family residence in Santiago de Chile (60.31%). This group has a higher proportion of people who are interested in Formula E (50.38%). In addition, they show their support for the celebration of this event in the city during the next race editions (67.54%) and have a lower proportion of residents who say they have attended the event (15.27%), and most have participated as volunteers or workers in sports events (63.36%). The frequency of contact with the zone in which the event is held is very high, as most indicate that they pass through the zone several days a week (70.99%).

The group of favourable residents is characterised by a greater proportion of men (84.21%), those aged between 25 and 54 (80.26%), those with university studies (88.16%), those employed (72.37%), those who are single (61.84%), those with an income of less than 10.000.000 CLP per year (34.21%), those with a political orientation towards the left (36.84%) and the centre (32.89%) and those with a family residence in other regions (53.95%). This group has a higher proportion of people who are interested in Formula E (81.58%). They also clearly show their support for the celebration of this event in the city during the next race editions (95.89%) and have a lower proportion of residents who say they have attended the event (42.11%), and the majority have participated as volunteers or workers in sports events (51.32%). The frequency of contact with the zone in which the event is held is high as a large percentage indicates that they pass through the zone several days a week (40.79%) or several days a month (21.05%).

Table 3. Sociodemographic profile of the different groups (clusters).

Variable	Alternative of response	1 Realistic (n = 152)	2 Favourable (n = 262)
Sex $\chi^2_{(2)}$=3.62, p=.06 C =.09	Man	76.34%	84.21%
	Woman	23.66%	15.79%
Age $\chi^2_{(2)}$=5.11, p=,08 C =.11	18-24 years	11.45%	7.89%
	25-54 years	82.44%	80.26%
	More than 55 years	6.11%	11.84% **(1)**
Educational level* $\chi^2_{(4)}$=6.47, p=.04 C =.12	High school education	5.34%	1.32%
	Technical	6.11% **(2)**	10.53%
	University	88.55%	88.16%
Occupation $\chi^2_{(8)}$=8.98, p=.06 C =.15	Employed	70.23%	72.37%
	Unemployed	4.58%	5.26%
	Part-time employee	9.92%	15.79%
	Student	11.45% **(2)**	5.26%
	Other (housekeeper, retired, etc.)	3.82%	1.32%
Civil state*** $\chi^2_{(2)}$=12.97, p=00 C =.17	Single	67.18%	61.84%
	Married	30.53%	27.63%
	Separated/Divorced /Widower	2.29%	10.53% **(1)**
Annual income level *** $\chi^2_{(4)}$=33.67, p=<.001 C =.27	Less than 10.000.000 CLP/year	61.07% **(2)**	34.21%
	10.000.001-15.000.000 CLP	12.98%	21.05% **(1)**
	15.000.001-20.000.000 CLP	10.69%	23.68% **(1)**
	20.000.001-25.000.000 CLP	9.16%	7.89%
	More than 25.000.001 CLP	6.11%	13.16% **(1)**
Family residence** $\chi^2_{(1)}$=7.90, p=,01 C =.14	Metropolitan region of Santiago de Chile	60.31% **(2)**	46.05%
	Other regions	39.69%	53.95% **(1)**
Political orientation** $\chi^2_{(2)}$=7,44, p=.02 C =.13	Left	32.82%	36.84%
	Centre	45.80% **(2)**	32.89%
	Right	21.37%	30.26% **(1)**
Interest in Formula E*** $\chi^2_{(2)}$=42.15, p=<.001 C =.30	Yes	50.38%	81.58% **(1)**
	No	20.61% **(2)**	3.95%
	Indifferent	29.01% **(2)**	14.47%
Support for the celebration of the event*** $\chi^2_{(1)}$=42.53, p=<.001 C =.32	Yes	67.54%	95.89% **(1)**
	No	32.46% **(2)**	4.11%
Attendance to the event*** $\chi^2_{(1)}$=36.83, p=<.001 C =.29	Yes	15.27%	42.11% **(1)**
	No	84.73% **(2)**	57.89%
Connection with events or associated activity $\chi^2_{(1)}$=.19, p=.66 C =.02	Yes	28.24%	30.26%
	No	71.76%	69.74%
Participation as a volunteer or worker* $\chi^2_{(1)}$=5.76, p=.02 C =.12	Yes	63.36% **(2)**	51.32%
	No	36.64%	48.68% **(1)**
Frequency of contact with the zone in which it is held*** $\chi^2_{(4)}$=39.98, p=<.001 C =.30	Several days a week	70.99% **(2)**	40.79%
	Several days per month	12.98%	21.05% **(1)**
	Several weeks per year	7.63%	13.16%
	A few days a year	3.82%	10.53% **(1)**
	Never	4.6%	14.5% **(1)**

Note. * Indicates statistically significant relationship or statistically significant mean differences *p<.05; **p< .01; ***p< .001; C= Contingency Coefficient; **(1) (2)** The results are based on bilateral tests with a level of significance .05. In the results table, it is shown for each significant pair the key of the group of residents with the lowest column proportion below the group of residents with the highest column proportion.

5. Discussion and conclusions

This study contributes to analysing residents' perceptions of sporting events based on segmentation into groups with different reactions to the impacts of these types of events. First, the validity and reliability of the scales of positive and negative impacts were assessed, identifying 6 factors and 3 factors, respectively.

In line with previous investigations (Calabuig et al., 2014; Chen and Tian, 2015; Ma and Rotherham, 2015; Zhou and Ap, 2009), in this work, two groups were found consisting of residents with different profiles. In the two groups identified (realistic and favourable), they show high percentages of support for the celebration of Formula E (67.5% and 95.9%, respectively). This is similar to what was observed in studies on other motorsports events, such as the Formula 1 Grand Prix in Australia or the Gold Coast Indy Car (Fredline and Faulkner, 2000, 2002). Nevertheless, in other works on this type of event, the inverse trend has been observed, as in the case of the Formula 1 European Grand Prix (Añó et al., 2012; Calabuig et al., 2014).

The residents classified within the group of realists seem to show a higher level of appreciation of the real impact of the event, highlighting some positive socioeconomic, political, administrative and sociocultural impacts. Nevertheless, there are also negative socioeconomic costs as a consequence of hosting the event. Thus, this group shows a more circumspect social representation of the event and perhaps are less conditioned or influenced by direct experiences or personal factors. In other studies, this group has been identified as realists (Chen and Tian, 2015; Fredline and Faulkner, 2000; Parra and Duclos, 2013), Ambivalent (Fredline and Faulkner, 2002) or Unconcerned (Fredline et al., 2013), Indifferent (Parra, Añó et al., 2016) or Moderate (Parra et al., 2014).

On the other hand, the residents designated as favourable show an optimistic trend in all the impact areas analysed: socioeconomic impact, impact on infrastructure and urban development, political and administrative impact, psychosocial impact, sporting impact and sociocultural impact. On the other hand, they tended to minimise negative impacts at the socioeconomic, sociocultural and environmental levels. This group presents a positive social representation of the event that is characterised by its high degree of support for the celebration of the event and interest in the sport. This group of residents has also been identified in all of the studies that analyse the perception of the impacts of sporting events (Calabuig et al., 2014; Chen and Tian, 2015; Fredline and Faulkner, 2000; Fredline and Faulkner, 2002; Fredline et al., 2013; Parra, Añó et al., 2016; Parra et al., 2014; Parra and Duclos, 2013; Zhou, 2010; Zhou and Ap, 2009). As Cheng and Jarvis (2010) point out, this type of event provides an opportunity for the enjoyment and entertainment of the members of this collective; the benefits and costs associated with the event are not perceived in the same way by other groups with lesser identification with the event.

Sociodemographic variables such as gender, age, level of education or occupation show little or no effect in determining the subgroup of each resident. This finding is consistent with previous studies, which found that gender, age, and level of education (Chen and Tian, 2015; Ma et al., 2013; Parra et al., 2014; Zhou, 2010; Zhou and Ap, 2009) do not significantly affect

such conglomerates. Nevertheless, other variables such as the level of income create significant effects in the differentiation of the groups, coinciding with what has been observed in other studies (Ma and Rotherham, 2015; Ma et al., 2013). Additionally, the civil status and the origin of the family residence generated significant effects in the differentiation of the groups, with the majority of the group with a more positive attitude towards the event having their family residence in regions other than Santiago de Chile. Finally, the political orientation variable generated significant effects in the differentiation of the groups, which is in line with what was observed in other works (Parra, Añó, et al., 2016).

Regarding the variables of interest related to the event, a significant effect was observed in the differentiation of the groups in those variables related to support, interest in sports, attendance, participation as a worker or volunteer in sports events and frequency of contact with the zone where the event is held. This result is in line with what was observed in other studies in which it was found that the variables of support, interest and attendance (Calabuig et al., 2014; Fredline et al., 2013; Ma et al., 2013; Ma and Rotherham, 2015; Parra and Duclos, 2013; Zhou, 2010), participation as a worker or volunteer and frequency of contact with the zone (Fredline and Faulkner, 2002) had a significant effect on group differences. With respect to the relationship with tourism or the economic activity derived from the events, these variables did not show a significant effect in the differentiation of the clusters, coinciding with what was observed in other works on diverse sport events (Ma and Rotherham, 2015; Parra, Añó, et al., 2016). Nevertheless, in other studies, it has been observed that these variables have an effect on the distinction between groups (Fredline and Faulkner, 2002; Parra et al., 2014).

5.1. Practical implications

From the point of view of the analysis of the social impact of events, it is important to consider residents as a heterogeneous group since the perception of a sporting event can vary according to different factors and variables (Calabuig et al., 2014). In this sense, the identification of groups of residents with different perceptions allows the organisers and the administration to improve the understanding of the different segments of citizens with the aim of better managing the impacts and trying to satisfy the needs of these groups (Deery and Jago, 2010). Accordingly, organisers and administrations must bear in mind the characteristics and behaviours that define these groups to maximise the benefits of hosting this type of event (Parra, Añó, et al., 2016).

This work shows that there is a high degree of citizens' support for the celebration of the event that could be identified by a positive social representation of the sporting events. Nevertheless, it is necessary for the organisers to pay attention to some of the costs highlighted by residents, such as those related to the inconvenience caused by the disruption of daily life, the distortion of the normal functioning of the city or restrictions on access to public facilities and services in the area. According to Ma et al. (2013), event organisers and local authorities should consciously plan events related to improving the quality of life in the host areas if they want a positive long-term relationship.

5.2. Limitations and future research lines

To conclude, it should be noted that these results should not be generalised to all city residents, as a consequence of the limitations of using a convenience sampling frame. It is therefore necessary to interpret them with caution and to increase the representation of some demographic groups in future studies.

Since the perceptions of the population may change as a consequence of various social conditioning factors, it is worthwhile to carry out consultations over time to observe possible changes in the configuration of clusters. In the same way, it would be advisable to compare perceptions about the impacts of the event in different cities that host Formula E events.

In addition, future studies could change the means of addressing some variables in a dichotomous way or with alternative responses on a Likert scale to better understand the behaviour of the population.

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