IS SPORT AND EXERCISE PARTICIPATION RELATED TO THE ENVIRONMENTAL AND POLICY FACTORS OF PHYSICAL ACTIVITY IN CROATIA? A CROSS-SECTIONAL POPULATION-BASED STUDY

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Abstract:

Physical activity is a complex behaviour influenced by individual, social, environmental, and policy factors. Understanding these factors of specific populations is a prerequisite for effective public health interventions. The main aim of this study was to determine the relationship between participation in sports, exercise, and other physical activities and the perception of environmental and policy correlates of physical activity in Croatia. The sample consisted of 1031 randomly selected Croatian citizens and data were collected within the "Special Eurobarometer 472" using questions about: a) participation in sport, exercise, and other physical activities and b) the environmental and policy factors of physical activity including opportunities for engaging in physical activities, the offer of sports clubs, and level of the support from local authorities. The results of the logistic regression analysis showed that people who perceived their local sports clubs and other service providers as offering more opportunities and those who felt that their local government supported physical activity were more likely to be actively involved in sports and exercise ($p<.05$ for all). Furthermore, the perception of greater opportunities for physical activity in the local environment is associated with increased involvement in recreational physical activities that are not related to sports ($p<.05$). Future strategies aiming at encouraging citizens to engage in sports and exercise should be based on strengthening cooperation between local authorities and local sports clubs, while the promotion of other physical activities should incorporate providing adequate infrastructure for engaging in physical activities and informing citizens about the provided opportunities.

Key words: *physical inactivity, motor activity, correlates, policy impact, environmental influences, exercise engagement*

Introduction

Numerous scientific studies have demonstrated that regular physical activity can significantly reduce mortality, enhance quality of life (Posadzki, et al., 2020), and improve health in general (Wartburn & Bredin, 2017). Compared to inactive people, physically active individuals have a lower risk of cardiovascular diseases by 26% (Raza, Krachler, Forsberg, & Nilsson Sommar, 2020), malignant diseases by 10% (Liu, et al., 2016) and type 2 diabetes by 31% (Huai, et al., 2016). Moreover, physical activity can reduce symptoms of leading mental disorders such as depressive and anxiety disorders (Warburton, & Bredin, 2019; Callow, et al., 2020), and can also reduce the risk of dementia and Alzheimer's disease (Xu, et al., 2017). In addition to the proven health and psychological benefits, it has been proven that higher levels of population's physical activity can decrease working-age mortality and morbidity, boost productivity, reduce presenteeism and result in significant economic gains globally (Hafner, et al., 2020). Numerous social benefits of physical activity also have been proven such as creating active citizenship, reducing the crime rate and promoting anti-social behaviour (Eigenschenk, et al., 2019).

Regardless of the above-mentioned proven benefits of physical activity, almost half of the European Union citizens never engage in sports activities and exercise (TNS Opinion & Social, 2018; European Commission, 2022). According to the same sources, only 5-6% of Croatian citizens participate in sports and exercise regularly (5 or more times a week) (TNS Opinion & Social, 2018; European Commission, 2022). Therefore, correlates and determinants of physical activity have been widely researched in order to inform physical activity promotion campaigns. According

to the socio-ecological model proposed by Kohl and Murray (2012), physical activity is influenced by individual, social, environmental and political factors and understanding these factors is a prerequisite for effective public health interventions (Bauman, et al., 2012). In early physical activity research, individual and social factors were initially more often investigated (Eyler, et al., 2002; Rhodes, et al., 1999; Trost, Owen, Bauman, Sallis, & Brown, 2002). Recently, environmental and policy correlates of physical activity have gained researchers' attention (Dollman, 2018; Lu, 2019; Salvo, Lashewicz, Doyle-Baker, & McCormack, 2018; Yen & Li, 2019). Environmental factors are defined as extrinsic factors that can support or create barriers to engaging in physical activity, while policy factors represent written and unwritten rules as well as social norms that have an impact on the environmental or social determinants of physical activity (Kohl & Murray, 2012). A positive relation between environmental and policy factors and involvement in physical activity has been proven in numerous studies (Dewulf, et al., 2016; Smith, Jones, Houghton, & Duffell, 2016). A well-developed and organized environment creates opportunities for a physically active life (Lu, 2019), while the lack of space for physical activities can represent obstacles that lead to less involvement in physical activities and physical exercise (Bamana, Tessier, & Vuillemin, 2008). Smith et al. (2017) concluded that increasing the number of parks, playgrounds, and appropriate active transport infrastructure, which includes pedestrian and bicycle paths, leads to positive changes in the physical activity of children and adults. Furthermore, in a recent systematic review it has been confirmed that the environmental factors such as paths and access to facilities that support physical activity, public lighting, road safety, aesthetic features of the environment and the availability and proximity of spaces are related to higher levels of physical activity (Salvo, et al., 2018). Local policy orientation also affects people's involvement in physical activity and exercise (Milner & Milner, 2016). McKinnon, Bowles, and Trowbridge (2011) observed the important role of politics in promoting physical activity in the form of creating prerequisites for building an appropriate environment. In fact, building a healthy environment is an important task of the government, and decisions related to environmental remodelling can have a positive or negative impact on the level of physical activity of the population (Yen, & Li, 2019). Another important factor in creating a stimulating environment for the inclusion of citizens in physical activity are sports organizations. It has been proven that sports clubs have the potential to influence the level of physical activity of the population (Eime, Young, Harvey, Charity, & Payne, 2013; Rhodes, Janssen, Bredin, Warburton, & Bauman, 2017). For example, adolescents who are members of a sports club are more physically active than their peers who are not members of sports clubs (Telford, et al., 2016).

Although there is quite a number of published papers on correlates of physical activity in the Republic of Croatia, there are only several studies conducted on representative samples. In the general population, physical activity in different domains of daily life (work, household, transportation, and free time) is associated with socio-demographic factors (age, size of the settlement, household income, level of education) and self-perceived health (Jurakić, Pedišić, & Andrijašević, 2009). Pedišić, Rakovac, Bennie, Jurakić, and Bauman (2014) determined the positive relation between perceived quality of life and physical activity of the University of Zagreb students. According to Jurakić, Golubić, Pedišić, and Pori (2014), physical activity of middle-aged employees in Croatia is related to their level of education, size of the settlement, alcohol consumption and the perceived level of stress outside the workplace. According to Lauš (2019), physical activity of police officers in the Republic of Croatia is related to socio-demographic and psychological factors, lifestyle, and social support. The vast majority of Croatian citizens do not reach the World Health Organization's guidelines for strength exercises and the determined correlates of this type of physical activity are gender, age, size of the settlement, level of education, nutritional status and subjectively assessed health (Radašević, Čvrljak, Pedišić, & Jurakić, 2021).

Although the correlates of physical activity in the Republic of Croatia have been determined in several studies conducted on representative samples, there are no findings on the relations between environmental and policy factors and physical activity of Croatian citizens. In addition, previous research has shown that different types of physical activity have different determinants. Therefore, we conducted the research with the main aim to determine the relations of participation rate in sports, exercise, and other physical activities with the perception of environmental and policy correlates of physical activity in the Republic of Croatia.

Methods

Participants

For this study, we used the data collected through the Eurobarometer, a system for monitoring public opinion in the European Union. As part of this system, data on the physical activity of the citizens of the European Union are collected every four years. In this research, we used the latest available data from "Special Eurobarometer 472—Sport and Physical Activity", conducted in December 2017 and published in March 2018 (TNS Opinion

& Social, 2018). The research included a sample of respondents from 28 European Union member states. A total of 28,031 respondents of different demographic and social statuses participated and were interviewed face-to-face. For this research, we analysed data collected from the Croatian citizens (N=1031). The characteristics of the sample are shown in Table 1.

Table 1. Sample characteristics

Population group	***n***	***%***
All	1031	100.0
Gender		
Women	543	52.7
Men	488	47.3
Age		
15-24	135	13.0
25-34	136	13.2
35-44	174	16.9
45-54	163	15.8
55-64	163	15.8
65-74	173	16.8
75+	88	8.5
Level of education		
Not completed primary	35	3.4
Primary education	126	12.3
Secondary education	674	65.5
Bachelor level or equivalent	110	10.7
Master, doctoral degree or equivalent	84	8.2
Sport and exercise		
Never	451	43.7
At least seldom	580	56.3
Other physical activities		
Never	650	63.0
At least seldom	381	37.0
The area where you live offers you many opportunities to be physically active		
Totally agree	120	12.8
Tend to agree	460	48.9
Tend to disagree	247	26.2
Totally disagree	113	12.1
Local sport clubs and other local providers offer many opportunities to be physically active		
Totally agree	93	10.1
Tend to agree	448	48.9
Tend to disagree	253	27.6
Totally disagree	123	13.4
Your local authority does not do enough for its citizens in relation to physical activities		
Totally agree	120	13.1
Tend to agree	396	43.3
Tend to disagree	285	31.1
Totally disagree	114	12.4

Measuring instruments and variables

The data were collected through a questionnaire designed for the purposes of the "Special Eurobarometer 472—Sport and Physical Activity". The level of physical activity was assessed through two questions: "How often do you exercise or play sport?" and "How often do you engage in other physical activity such as cycling from one place to another, dancing, gardening, etc.?". The term *exercise* was described as "any form of physical activity which you do in a sport context or sport-related setting, such as swimming, training in a fitness centre or a sport club, running in the park" and the phrase *other physical activity* was described as "physical activity for recreational or non-sport-related reasons". Participants answered on a 6-point scale from "Never" to "5 times a week or more". Respondents who answered "Never" were classified as inactive and all the others were classified as active (at least seldom).

The perception of environmental and policy factors of physical activity was examined through participants level of agreement with the following statements: a) "The area where you live offers many opportunities to be physically active.", b) "Local sport clubs and other local providers offer many opportunities to be physically active. ", and c) "Your local authority does not do enough for its citizens in relation to physical activities.". Level of the agreement was expressed on a 4-point scale where 1 represented total agreement and 4 total disagreement.

Statistical analysis

To determine associations between physical activity and perception of environmental and policy variables, two multivariate logistic regression analyses were performed. In the first logistic regression analysis, the dependent variable was *Involvement in sports and exercise*, and in the second the dependent variable was *Involvement in other physical activities*. In both regression analyses the independent variables were the following: *perception of opportunities for physical activity*, *perception of support from local sports clubs and other local service providers for opportunities to engage in physical activity*, and *perception of local government support for physical activity of citizens*. Both analyses were controlled for age and gender of the respondents. The level of statistical significance was set at <.05 and data were analysed using the IBM SPSS Statistics 25 program (IBM Corp, Armonk, NY, USA).

Results

The results of the logistic regression analysis for the dependent variable *Involvement in sports and exercise* (Table 2) show that the respondents who fully agree with the statement that local sports clubs and other local service providers provide them with numerous opportunities to be physically active have a 55% (95% CI: 7, 78) greater chance for involvement in sports and exercise compared to ones who totally disagree. Compared to the participants who totally agree, the participants who totally disagree with the statement that the local authorities in the place where they live do not do enough for their citizens regarding physical activities have an 83% (95% CI: 0, 235) higher chance of getting involved in sports and exercise. No statistically significant association of involvement in sports and exercise with the perception of opportunities for physical activity in the place of residence was found.

The results for the second dependent variable *Involvement in other physical activities* (Table 3) show that the respondents who totally agree with the statement "The area where you live offers you many opportunities to be physically active" have a 50% (95% CI: 12, 72) greater likelihood of engaging in other physical activities compared to those who totally disagree with the statement. Respondents who tend to agree with the above mentioned statement have a 57% (95% CI: 24,76) higher chance, while respondents who completely agree with the stated statement have a 74% (95% CI: 47,87) higher likelihood of engaging in other physical activities. There was no statistically significant correlation between involvement in other physical activities and the perception of opportunities provided by local sports clubs and the local government.

Discussion and conclusion

Based on the population-representative sample of citizens in the Republic of Croatia, we found that the perception of a greater offer of the local sports clubs and other local service providers as well as of greater local government support is associated with higher involvement in sport and exercise. Furthermore, the perception of greater opportunities for physical activity in the local environment is associated with increased involvement in recreational physical activities that are not related to sports.

Although traditionally sport clubs are more focused on competitive and elite performance, in recent years sports clubs are becoming recognized as an important setting for health promotion and health-oriented physical activity (Kokko, 2014). It has been hypothesized that sports clubs through their offer can create opportunities for physical activity for a large part of the population (Meganck, Seghers, & Scheerder, 2017). Our finding, according to which the perception of a greater offer of the local sports clubs can foster higher population involve-

Table 2. Odds ratio and 95% confidence intervals (95% CI) for "involvement in sports and exercise"[a]

Variables	*Odds ratio (OR)[a]*	*95% CI[a]*	*p*
Perception of opportunities for physical activity in the area where you live[b]			
Totally disagree	ref	ref	
Tend to disagree	1,03	0.57 - 1.87	.917
Tend to agree	1.03	0.56 - 1.88	.926
Totally agree	0.83	0.41 - 1.69	.605
Perception of opportunities provided by local sports clubs and other local service providers[c]			
Totally disagree	ref	ref	
Tend to disagree	1.12	0.63 - 1.98	.701
Tend to agree	0.60	0.34 - 1.06	.079
Totally agree	0.45	0.22 - 0.93	**.030**
Perception of local government support for physical activity[d]			
Totally agree	ref	ref	
Tend to agree	1.14	0.69 – 1.89	.599
Tend to disagree	1.56	0.92 – 2.64	.100
Totally disagree	1.83	1.00 – 3.35	**.049**

Note. [a] Respondents were asked about involvement in sports and exercise (How often do you exercise or play sports?). The respondents who answered "Never" were classified as inactive and all the others were classified as active. [b] Level of agreement with the following statement: "The area where you live offers you many opportunities to be physically active". [c] Level of agreement with the following statement: "Local sport clubs and other local providers offer many opportunities to be physically active". [d] Level of agreement with the following statement: "Your local authority does not do enough for its citizens in relation to physical activities".

Table 3. Odds ratio and 95% confidence intervals (95% CI) for „involvement in other physical activities"[a]

Variables	*Odds ratio (OR)*	*95% CI*	*p*
Perception of opportunities for physical activity in the area where you live[b]			
Totally disagree	ref	ref	
Tend to disagree	0.50	0.28 - 0.88	**.017**
Tend to agree	0.43	0.24 -0.76	**.004**
Totally agree	0.26	0.13 - 0.53	**<.001**
Perception of opportunities provided by local sports clubs and other local service providers[c]			
Totally disagree	ref	ref	
Tend to disagree	1.22	0.71 -2.11	.468
Tend to agree	0.84	0.49 -1.46	.540
Totally agree	1.29	0.63 - 2.63	.486
Perception of local government support for physical activity[d]			
Totally agree	ref	ref	.326
Tend to agree	1.36	0.82 – 2.26	.241
Totally disagree	1.62	0.89 – 2.93	.114
Tend to disagree	1.56	0.92 – 2.66	.097

Note. [a] Respondents were asked about their involvement in other physical activities (How often do you engage in some other physical activity such as cycling from one place to another, dancing, gardening, etc.?). The respondents who answered "Never" were classified as inactive and all the others were classified as active. [b] Level of agreement with the following statement: "The area where you live offers you many opportunities to be physically active". [c] Level of agreement with the following statement: "Local sport clubs and other local providers offer many opportunities to be physically active". [d] Level of agreement with the following statement: "Your local authority does not do enough for its citizens in relation to physical activities".

ment in sport and exercise is in line with the abovementioned hypothesis. The importance of sports clubs in improving the health of the population has been recognized by the European Commission (European Commission, 2007), and at the European Union level, a movement called Sport Clubs for Health (SCforH) was founded with the idea to promote health through sports clubs (Koski et al., 2017). It has also been proven that sports clubs can contribute to the social capital of the community (Okayasu, Kawahara, & Nogawa, 2010). Accordingly, it is important to continuously support sports clubs to create and expand programmes that are specifically intended for recreational exercisers. The inclusion of a larger number of participants in sports clubs could potentially enhance the level of physical activity of the population.

According to previous research, the perception of government support for physical activity is shown to be an important correlate of physical activity (Steele & Caperchione, 2005), which is in line with our results. It has also been proven that changes in local politics contribute to the creation of opportunities for physical activity (Kelly, Burke, Waddell, & Lachance, 2019) and that support and dedication to health-related topics of local government are very important in long-term changes in the community (Steele & Caperchione, 2005). Local authorities have a great opportunity to influence the built environment (Handy & Clifton, 2007). Cities and other local self-government units make decisions on land use policy through general plans. They also plan and design street layouts, own and maintain parks and playgrounds, and often manage and maintain other recreational facilities. Finally, the local government can make a request for the construction of pedestrian and bicycle paths, green areas, and they have the option of investing public money in the maintenance of existing areas. In accordance with the above, from the aspect of promoting physical activity, it is crucial to educate representatives of local authorities about the public health benefits of physical activity as well as about possible action through policies related to the built environment and urban planning.

Furthermore, our findings indicate a positive relation between the perception of environmental opportunities and other physical activities that are not related to sports (cycling, walking, dancing, gardening, etc.), which is aligned with previous research (Arango, Paez, Reis, Brownson, & Parra, 2013; Duncan, Spence, & Mummery, 2005; Kärmeniemi, Lankila, Ikäheimo, Koivumaa-Honkanen, & Korpelainen, 2018; Panter, & Jones, 2008). For example, Arango et al. (2013) determined associations between the perception of environment and physical activity in a sample of South American citizens and pointed out that the feeling of safety

from crime and public lighting are the main environmental determinants of physical activity. In a systematic review, Kärmeniemi et al. (2018) determined that the construction of new infrastructure for walking and cycling can foster overall and transportation-related physical activity. Panter and Jones (2008) determined that the perception of opportunities for walking is related to a greater overall level of physical activity of citizens. Likewise, Fraser and Lock (2011) analysed the influence of the environment on cycling and determined that the presence of cycle paths, the separation of cycle paths and the proximity of a cycle path or green space promotes cycling. In a meta-analysis, Duncan et al. (2005) found a moderate but significant correlation between the perception of the environment and the physical activity of citizens, which is in line with our results. Therefore, to promote physical activity it is important to provide adequate infrastructure for physical activity and to inform citizens about the existing opportunities for physical activity.

The key limitation of the study is that involvement in sports and exercise and other physical activities was determined by a questionnaire and is therefore potentially subject to subjective assessment errors. It is known that subjective measures are influenced by the behaviour and personal characteristics of the individual and may not necessarily fully reflect the real situation (Kirtland, et al., 2003). The second limitation refers to the cross-sectional design of the research which prevents us from determining the causal relationship between environmental and policy factors and physical activity. Future experimental research on this topic is needed to confirm the causality of the analysed variables.

The key strength of this research was random, i.e., representative sample of the inhabitants of the Republic of Croatia, which allowed us to generalize the conclusions on the Croatian population. Secondly, the data used were collected by the Special Eurobarometer 472 questionnaire, which will enable a comparison with other European Union countries after similar analyses have been carried out in other countries. Finally, this is the first research conducted on a representative sample of the Croatian population that addresses policy and environmental correlates of different types of physical activity.

To conclude, we found that the perception of greater offers of the local sports clubs and local government support amplifies the odds of being involved in sport and exercise. In other words, people who perceive more opportunities are more likely to participate in sports and exercise. The perception of greater opportunities for physical activity in the local environment amplified the odds of being involved in recreational physical activities that are not related to sports. People who perceive fewer opportunities are less likely to engage in these activities, highlighting the significance of perceived environmental support for physical activity. Therefore, future strategies to encourage citizens to engage in sports and exercise should be based on encouraging cooperation between local authorities and local sports clubs. Furthermore, for the promotion of other forms of physical activity, which are not necessarily related to sports, it is important to provide adequate infrastructure for engaging in physical activities and to inform citizens of the provided opportunities. A comprehensive strategy for the promotion of physical activity in the Republic of Croatia should be based on cooperation between local authorities and the public health sector. The main role of local authorities is to provide opportunities for physical activity, while the role of public health is to inform and educate citizens about the means and opportunities for physical activity. Overall, our findings indicate the importance of perception of local opportunities and governmental support in shaping physical activity behaviours. However, they also suggest that these perceptions might have varying effects on different types of physical activity. Future research is required to further explore these relationships and to identify other potential correlates.

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