

Differences between leisure-time physical activity, health-related quality of life and life satisfaction: Al Ritmo de las Comunidades, a natural experiment from Colombia

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Abstract: Physical inactivity is one of the major public health problems worldwide. Community-based interventions have been pointed out as a promising strategy to increase physical activity (PA) levels and impact population health. *Recreovía* is a community program with a potential to promote PA. There is growing evidence for two benefits derived from the practice of PA: an increased perception of health-related quality of life (HRQoL) and life satisfaction (LS). The purpose of this study was to assess differences between leisure-time PA and perceptions of both HRQoL and LS, as well as to assess differences between perceptions of both HRQoL and LS for *Recreovía* and non-*Recreovía* participants. Data were obtained using the baseline cross-sectional survey of 1533 participants (501 belonged to the intervention group) as part of the natural experiment *Al Ritmo de las Comunidades*. HRQoL was measured with the European Organization for Research and Treatment of Cancer 30-item questionnaire, LS was measured with Questions on Life Satisfaction Scale, and self-reported minutes of leisure-time PA were measured with the long version of the International Physical Activity Questionnaire. The mean age of participants was 41.7 years (standard deviation (SD) = 16.3). The participants had a good overall HRQoL and LS. The mean minutes of leisure-time PA were 158.1 min (SD = 230.2) a week. Results showed that those participants who reported higher leisure-time PA levels also reported a significantly higher LS ($M = 41.9$, $SD = 35.0$) relative to participants with lower levels ($M = 37.6$, $SD = 34.2$, $t(1532) = -2.36$, $p < 0.01$). There were no statistical differences in the perception of HRQoL and leisure-time PA ($t(1532) = -1.03$, $p = 0.30$), although active people had higher scores. Both HRQoL and LS scores were higher in individuals who were participating in *Recreovía* ($p < 0.001$). Higher LS scores were found in the group with higher leisure-time PA, while HRQoL showed no differences. Better psychological well-being indices were found in the *Recreovía* group.

Keywords: physical activity, health-related quality of life, life satisfaction, community programs, *Recreovía*

Introduction

Physical inactivity has been identified as the fourth leading cause for mortality and morbidity worldwide, and it represents nearly 6% of all registered deaths globally (1). In this sense, if the

prevalence of physical inactivity is high in a population, it becomes a serious public health problem that could impact individuals' quality of life (QoL) (2).

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Physical inactivity has been linked to the growing problem of chronic non-communicable diseases (NCDs) (3) and studies that examined the relationship between physical inactivity and risk of mortality suggest that people with higher levels of inactivity have an increased risk of mortality (4).

For this reason, the regular practice of physical activity (PA) has been considered a cost-effective strategy to prevent the onset of chronic diseases, as the regular practice of PA helps to reduce the likelihood of suffering from chronic diseases such as cardiovascular disease, type 2 diabetes, hypertension, and the appearance of some cancers such as colon cancer or breast cancer (1). A recent analysis of the effect of physical inactivity on major NCDs showed that around the world, physical inactivity causes nearly 6% of the burden of disease for coronary heart disease, 7% for type 2 diabetes, around 10% for breast cancer and 10% for colon cancer (5).

Physical activity and health-related quality of life

QoL has been defined as the perception that individuals hold about their life in relation with their value system and cultural context. The concept refers to peoples' goals and expectations and includes physical as well as psychological health issues. Also, an important aspect of the construct is that it refers to a subjective rather than an objective evaluation of peoples' lives (6).

In recent years, a more specific but still multidimensional definition has emerged, the health-related QoL (HRQoL). This concept includes physical, mental, emotional and social functioning domains and emphasizes the impact of health status on an individual's perceived QoL (7). Additionally, it assumes that different areas in people's lives can be affected by chronic disease or other health issues, different from the typical epidemiological morbidity and mortality measures (8,9).

Many studies have related PA levels to HRQoL, and a systematic review on PA and HRQoL in the general adult population presented important evidence about the positive relationship between both constructs (10). In the review, the cross-sectional studies analyzed showed a consistently positive association between reported PA levels and perceived HRQoL (10).

In another study on PA and HRQoL with a dose-response emphasis, participants that achieved World Health Organization (WHO) recommended levels of PA perceived fewer physical or mental unhealthy days in a follow up after 30 days. However, PA levels both below and above the recommendations were both associated with poorer levels of HRQoL (11). Similarly, in a study in the general population in the United States, the relationship between levels of PA and perceived HRQoL was evaluated in 175,850 adults who participated in the Behavioral Risk Factor Surveillance System survey. The results showed a positive and a statistically significant association between PA levels and HRQoL (8). For leisure-time PA specifically, it was shown that the accomplishment of recommended daily levels of PA was associated with higher HRQoL scores, with no sex differences (12).

In Colombia, a study that assessed HRQoL in relation to PA levels among adult women reported that leisure-time and walking-for-transportation PA were positively associated with both physical and mental health dimensions of HRQoL. Also, an important conclusion of the study was a need for more evidence on the relationship between PA and HRQoL in the urban areas of Colombia (13). Another study with a Colombian population showed that adults with recommended levels of PA reported higher levels of HRQoL and a better overall health status (14).

PA and life satisfaction

Life satisfaction (LS) is described as a measure of subjective well-being (15,16). A national representative survey in Sweden showed a positive relationship between levels of PA and LS: those participants who were active in some kind of sport or exercise showed higher levels of LS (17). Similarly, a study with young adults (aged 18–25 years) found that LS could be improved by increasing daily levels of PA, and emphasized the positive consequences of this behavior (15). Another study with high school students also showed that the absence of PA was associated with reduced LS (18). In a population with associated morbidity (physical disability), those who participated in adapted sports perceived higher satisfaction with life, compared with those who did not participate in such activities (19). Again, we emphasize a lack of research relating PA and LS in the general population, especially for a dose-response link between such variables.

PA community interventions

Because of multiple benefits that PA can have on the physical and mental health of individuals, some public health guidelines have been published with the aim of providing a minimum requirement of intensity, duration and frequency of PA. Recommendations on PA practice suggest that for the adult population (i.e. persons aged 18–64 years) appropriate levels of PA would be the performance of at least 150 min accumulated throughout the week of *moderate-to-vigorous* PA or the performance of *vigorous* PA for 75 min per week. This activity should be performed in periods of at least 10 min and distributed throughout the seven days of the week (1). The regular performance of PA, considering these minimum levels, can mean a significant decrease in risk factors, and lead to important health benefits (1).

Despite the global efforts to promote the practice of PA, there is a worldwide tendency for populations to become more and more sedentary and not to engage in the recommended levels of PA. In Colombia, only 53.5% of adults between 18–64 years comply with PA recommendations. For the specific domain of leisure-time PA and in the same population, the prevalence of compliance with these recommendations is only 19.9% (20).

Therefore, given the health benefits of PA and the low rates of PA behavior, it is important to design interventions that reach the entire population. There is increasing evidence that community-based programs to promote PA are among the most effective interventions; the goal of these programs is to promote the adoption of healthier lifestyles through changes in the physical environment, social networks, as well as initiatives to make changes at the organizational and public policy levels (21). A systematic review of the literature showed that environmental and policy approaches to increase PA are effective in getting people to exercise more, to increase their PA levels around 48%, and to have people reporting loss of weight and body fat (21). Also, a more recent summary of the evidence carried out by the WHO noted that community-wide interventions designed to promote healthy lifestyles, which are part of a national public policy, are considered moderately effective interventions to promote PA (22).

An example of a massive community program is the *Recreovía* program in Bogotá, Colombia, which

aims to promote leisure-time PA in general population around 38 points in the city (23). The program offers free classes every weekend and holidays (between 8 a.m. and 1 p.m.), mainly in parks but also in some shopping centers. The points are logistically prepared with a platform, columns and enough space for the attendees. Also, there is a teacher specialized in physical education who is responsible for guiding classes such as rumba, aerobics, strength stimulation or psychophysical gymnastics exercises; and each class lasts approximately 45 minutes (23).

Recreovía can be characterized as an initiative that operates at macro levels from a public health ecological point of view (24), with a special emphasis in the environmental and policy approaches. The initiative promotes leisure-time PA through the delivery of classes, the use of public space for recreational and exercise activities and at the same time it motivates the creation of public policy and the integration of different sectors of the society (25). Hence, the program contributes to diminishing the social and health inequity in such a way that it provides recreation, as well as the opportunity to be physically active and the enjoyment of leisure time, in all segments of the population (25).

The positive results from being physically active and attending PA community programs are well documented in the literature (26) but there is a need for more evidence regarding physical and psychological outcomes from the attendance of PA promotion programs in community settings. In other words, there is a need to look more closely for the potential effects of community interventions like *Recreovía* in PA levels and general well-being. Also, there is a need for more evidence related to mental health and QoL in general. To date, although there is good evidence about PA benefits, the dose–response relationship between PA and HRQoL remains unclear (10,11). Additionally, most of the studies that explore the relationship between PA and HRQoL use non-randomized studies (10), which limit further conclusions. Also, research in PA and HRQoL has worked mostly with older participants who present health afflictions and/or chronic disease (8,10). Similarly, there are few studies exploring the relationship between leisure-time PA and LS (27), and the majority of the studies addressing these issues tend to focus on non-healthy (19) or older populations (28). This again highlights the need for more evidence in the general population.

To date, research on the differences between PA and psychological variables have rarely inquired about HRQoL and LS at the same time. And to our knowledge, there are no studies relating leisure-time PA with HRQoL and LS at the same time.

Therefore, this study aims to explore the difference of HRQoL and LS perception between participants with high and low leisure-time PA levels. An additional aim is to explore differences of HRQoL and LS perceptions between *Recreovía* participants and non-participants.

Research design and methods

Study type and inclusion criteria

This study was a natural experiment undertaken in 2013 in *Al Ritmo de las Comunidades* to evaluate the effectiveness of a community intervention, both at the individual and community level, in nine parks of the city of Bogotá, Colombia. HRQoL and LS measures were included in the questionnaire among other scales to assess psychosocial variables. The inclusion criteria in the present study were to be an adult (18 years or older) without cognitive or self-reported physical impairment, to agree to participate in the study and to sign the informed consent. An additional inclusion criterion for the participants in the intervention group was to express willingness to participate in the program in the future, in case the program was to be implemented in their area of residence. This study was approved by the Ethics Committee for Research at the Universidad de los Andes (Act number 208 of 2013) and was classified as a minimal-risk study in accordance with Resolution Number 008430 of 1993 from the Colombian Ministry of Health. The research was funded by Colciencias (Contract Number: 453-2012).

Sample selection

Parks

A total of nine parks in the city of Bogotá were selected; three types of groups were created and the parks were classified according to the presence of the *Recreovía* program. Overall, three parks were selected by IDR (Instituto Distrital de Recreación y Deporte) and included in the intervention group, which had no intervention at the beginning of the study and where the program was subsequently

established according to the needs of community. A second group of parks (control group) was created. In this group three parks without *Recreovía* were randomly selected, previously matched by socioeconomic status (SES) of the neighborhood, size of the parks and potential PA target areas. Finally, the third group included three parks with an existing *Recreovía* program: one metropolitan park with high attendance and where the program was inaugurated 20 years ago; one park with low attendance by participants and randomly selected; and one park with high attendance and randomly selected from a list of parks.

Participants

The final study population was 1533 adults – residents in the city of Bogotá. Participants were selected in each park: 501 participants from three parks with *Recreovía* currently active at the beginning of the study; 523 participants from three parks without *Recreovía*; 509 participants from three parks without *Recreovía* at the beginning of the study, but where IDR planned to introduce the program during the study. Different types of methodology were used to select participants, depending on the type of park. Thus, in the intervention and control groups participants were selected from parks, households, and groups from the community. In the case of parks, park area was divided into target areas and participants selected from every four people, counted in a clockwise direction. For the households selection, a radius of 500 meters around the park area was marked off and a household selected every four houses and counted in a clockwise direction. For the community groups setting, those were identified (church community, National Service for Learning, elderly socialization groups, parents of children who accompany them in swimming lessons) and people who used to attend the weekly meetings was selected from every fourth person using the clockwise direction technique. Lastly, participants in the parks with *Recreovía* were selected from the program setting during breaks from classes and using the clockwise direction technique and selecting one participant from every fourth person in the area.

Data collection

Overall, four interviewers worked on the project and received 15 hours of training on all instruments

and questionnaires used for data collection. In every field session, a senior interviewer and research team members supervised the work. In each park, participants were asked to respond to a battery of tests. After obtaining a participant's informed consent, answers to the questionnaire and some anthropometric measures (weight and height) were collected.

Instruments

HRQoL

To evaluate HRQoL, the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-30 questionnaire was used. This uses a 4-point Likert scale varying between 'not at all' and 'very much'. The instrument asks participants about their physical, cognitive, role, emotional and social functions. Also, the scale inquires about QoL in general, fatigue and nausea signs and six other items related to health status (29). A study of the instrument found good internal consistency for the subscales with the Colombian general population (Cronbach's Alpha between 0.65–0.88) and global HRQoL ($\alpha = 0.84$), which points to good reliability (29).

LS

To evaluate LS, the Questions on Life Satisfaction questionnaire was used (30). This uses a 5-point Likert scale with questions about QoL and LS that mixes general questions with health-related questions. The questionnaire asks participants to remember the last 4 weeks in order to differentiate the LS construct from momentary mood. Psychometric studies showed good internal consistency ($\alpha = 0.82$) for this questionnaire (30).

Self-reported PA

To gather information on self-reported total minutes of leisure-time PA (excluding walking and only including moderate-to-vigorous physical activity), the long version of the International Physical Activity Questionnaire (IPAQ) was used (31). The questionnaire allows collecting information on PA in relation to frequency levels, duration time, and intensity of the practice, in the main PA domains. Also, the questionnaire allows the measurement of both moderate and vigorous PA (32). The instrument

was adapted and validated for the Colombian population and the results were compared with accelerometry data (32). The correlation between IPAQ results and accelerometry data was 0.42 and the test-retest reliability showed a Spearman correlation of 0.69 (32).

Statistical analysis

For data analysis purposes, data obtained were organized into two different groups: (a) one group of parks with Recreovía ($n = 3$); and (b) one group of parks with no Recreovía by the time of the assessment, which included both control parks ($n = 3$) and parks to be intervened in the near future ($n = 3$), and which had been previously matched with control parks by SES of the neighborhood, size of the parks and potential PA target areas.

The statistical analysis included three stages. At first, a descriptive analysis was performed with demographic and anthropometric data, as well as with total minutes of leisure-time PA and QoL variables. Secondly, *t*-test analyses were performed to understand differences in total minutes of leisure-time PA, HRQoL and LS. Thirdly, additional *t*-test analyses were conducted to compare differences in HRQoL and LS for Recreovía and non-Recreovía participants.

Results

Descriptive analysis

The mean age of our participants was 41.7 years (SD = 16.3) in a survey with 451 men and 1082 women. Most respondents were single (31.8%), married (28.6%) or cohabiting (25%). The other participants were divorced/separated (9.7%) or widowers (4.8%). Additionally, 34.4% of our respondents were currently employed, 27.1% were self-employed or freelancers and 21.5% were housewives. Also, 39.7% of the respondents had a high school diploma, 38.3% had a university or technological degree and 17.2% a primary school degree. In regards to socioeconomic level, 51.1% of the participants were of low (strata 1 and 2), 25.7% were of middle income (strata 3 and 4) and 0.4% were high income (strata 5), which corresponds to the income distribution in Colombia (33).

Table 1. Sociodemographic, anthropometric and leisure-time PA data.

	<i>Total group</i>	<i>Men</i>	<i>Women</i>
N	–	451	1082
Age (year)	41.7 (SD = 16.3)	37.4 (SD = 15.0)	43.4 (SD = 16.5)
Height (cm)	158.5 (SD = 9.2)	168.3 (SD = 7.0)	154.4 (SD = 6.4)
Weight (kg)	66.0 (SD = 11.4)	71.5 (SD = 11.8)	63.7 (SD = 10.5)
IPAQ (N = 1533)			
Total leisure-time PA levels	158.1 (SD = 230.2)	187.7 (SD = 245.3)	145.8 (SD = 222.6)
Moderate leisure-time PA levels	81.9 (SD = 154.5)	104.4 (SD = 176.8)	72.5 (SD = 143.2)
Vigorous leisure-time PA levels	76.2 (SD = 160.2)	83.2 (SD = 160.9)	73.2 (SD = 159.8)

IPAQ: International Physical Activity Questionnaire; PA: physical activity; SD: standard deviation.

Table 2. Summary of QoL variables.

<i>Psychological variables</i>	<i>Total group</i>	<i>Men</i>	<i>Women</i>
HRQoL Total	83.6 (SD = 15.7)	86.0 (SD = 14.1)	82.6 (SD = 16.3)
Physical function	96.6 (SD = 7.3)	95.5 (SD = 4.6)	95.9 (SD = 8.0)
Role function	95.1 (SD = 14.1)	96.2 (SD = 13.6)	94.7 (SD = 14.3)
Cognitive function	91.7 (SD = 14.4)	95.2 (SD = 10.2)	90.3 (SD = 15.7)
Social function	96.0 (SD = 13.2)	96.2 (SD = 14.1)	95.4 (SD = 13.3)
Emotional function	89.8 (SD = 15.0)	92.0 (SD = 13.2)	88.9 (SD = 15.6)
LS (total score)	39.2 (SD=34.5)	44.0 (SD=37.1)	37.2 (SD=33.2)

HRQoL: health-related quality of life; LS: life satisfaction; QoL: quality of life; SD: standard deviation.

Regarding international recommendations for moderate-to-vigorous PA for health benefits, 62% of participants reported not meeting PA recommendations for at least 150 min of moderate-to-vigorous PA during the week. Further demographic and anthropometric data as well as moderate-to-vigorous leisure-time PA levels found in the sample can be consulted in Table 1.

The mean score for global HRQoL was 83.6 (SD = 15.7) in a 0–100 scale, which indicated a good overall HRQoL. This is also true for EORTC subscales of physical function, role function, cognitive function, social function and emotional function. Regarding LS scores, the mean score was 39.2 (SD = 34.5). Men showed higher scores (44.0, SD = 16.3) compared with women (37.2, SD = 33.2) for LS perception.

In Table 2 the mean values for global and each dimension of HRQoL (physical, role, cognitive, social and emotional) and LS scores can be found.

Differences in total minutes of leisure-time PA, HRQoL and LS

The *t*-test analyses were conducted to better understand the differences between total minutes of leisure-time PA performed by the respondents, HRQoL and LS. For these analyses, the groups created were based on the international recommendations from the WHO to perform a minimum of 150 min per week of moderate-to-vigorous PA for a positive impact on an individual's health, and so the participants were dichotomized into: physically inactive or physically active. A self-reported PA measure of 'total minutes of leisure-time PA per week' was used. In Table 3 are the results of these analyses.

The results showed that people who were physically active also had a higher perception of LS ($M = 41.9$, $SD = 34.0$), compared with those who reported to be physically inactive ($M = 37.6$, $SD = 34.2$, $t(1530) = -2.367$, $p < 0.01$). No significant differences

were found in all HRQoL measures when using the results of the IPAQ.

Differences in HRQoL and LS for Recreovía versus non-Recreovía participants

In order to compare participants in the Recreovía group versus participants in the group without Recreovía, additional *t*-test analyses were performed. Results can be found in Table 4.

Results showed higher values for both HRQoL and LS in individuals who participated in the Recreovía program, and those results were statistically significant ($p < 0.001$).

Discussion

In this study, we found a predominance of women ($n = 1082$) in the sample, compared with men ($n = 451$). This may be related to the

Table 3. Differences in leisure-time PA levels, HRQoL and LS.

Average (SD)	<i>t</i>
<i>IPAQ</i> ($N = 1532$)	
<i>HRQoL Total</i>	
Inactive ($n = 943$) 83.3 (16.1)	-1.033
Active ($n = 598$) 84.1 (15.3)	
<i>LS</i>	
Inactive ($n = 943$) 37.6 (34.2)	-2.367**
Active ($n = 589$) 41.9 (34.0)	

** $p < 0.01$.

HRQoL: health-related quality of life; IPAQ: International Physical Activity Questionnaire; LS: life satisfaction; PA: physical activity; SD: standard deviation.

characteristics of the classes offered in the program. To be more specific, most of the classes delivered are based in aerobic exercises, which might lead to a sex effect regarding the decision to attend the program. In relation to this, a study whose objective was to relate the preferences to perform physical activity (PA) with the sex of the participants, found that adolescent men and women reported different preferences when choosing PA activities in which to be involved (34). However, this allows us to account for the potential of the Recreovía program to reduce the sex gap with respect to the practice of PA, in which women tend to be less likely to comply with PA recommendations.

Regarding psychological variables, the results showed that those who participated in Recreovía showed higher levels in the HRQoL and LS scales, comparing with those not involved in the program. This might be related with the higher leisure-time PA levels shown in Recreovía participants. Related to this, there are several studies which relate higher levels of PA with better perception of well-being (9,10,15,19). On the other hand, although the Recreovía program aims to promote PA, it also contains some characteristics (e.g. social support, social capital) that could have the ability to improve these psychological well-being measures. In this regard, some studies have pointed to a relationship between community-based programs like Recreovía and a higher perception of social capital (23,35). In the same vein, relationships between community-based programs and social support have been previously found, due to the ability of the former to develop social networks (36). In this regard, a positive association between social capital, social support and mental health has also been reported in

Table 4. Differences in HRQoL and LS by group (Recreovía versus non-Recreovía).

Average (SD)		<i>t</i>
<i>HRQoL Total</i>		
Recreovía ($n = 501$)	85.7 (15.3)	-3.618***
Non-Recreovía ($n = 1032$)	82.6 (15.9)	
<i>LS</i>		
Recreovía ($n = 1032$)	43.8 (37.1)	-3.605***
No Recreovía ($n = 501$)	37.0 (33.0)	

*** $p < 0.001$.

HRQoL: health-related quality of life; LS: life satisfaction; SD: standard deviation.

the literature (37,38) and may explain some of the results found in the present study.

In this study, high levels of HRQoL and LS were found in the participants. The average scores for HRQoL were higher than reference values in the general Colombian population (29). Male scores were higher in the HRQoL global score and for every domain except for physical function. It is of great relevance to evaluate the HRQoL and LS of participants in community programs, such as *Recreovía*, since it allows us to have a better understanding about the potential of these programs to improve well-being in the population. Also, it allows us to account for the differences between levels of leisure-time PA and the perception of HRQoL and LS, which can lead to the design of more informed interventions in the area of PA and health.

Study results further indicated that a large number of the respondents were in compliance with the international recommendations for moderate-to-vigorous PA and an average of 158 min of moderate-to-vigorous leisure-time PA per week (excluding walking and only including moderate-to-vigorous leisure-time PA) was found, which is a good indicator for PA practice. The results also indicated that males were more physically active as demonstrated by the greater number of leisure-time PA minutes accumulated per week. This corresponds with extensive evidence in the literature pointing out sex differences in PA performance, with women being less active compared with men (39).

The contrary happened with perceived LS, since higher levels of leisure-time PA were related with a better perception of LS. Therefore, these results support the evidence linking higher PA levels with greater LS both in clinical and non-clinical populations (17,34,35). Regarding psychological variables and their relation with PA performance levels, results showed no differences for HRQoL by levels of PA in the participants of the study.

Limitations and future directions

One limitation of the study was the use of cross-sectional data only, which limits further conclusions on causality. Another limitation was the use of a self-report measure for physical activity, which could overestimate PA levels (40). Future research should include other possible variables of mental health to be affected by the program *Recreovía*.

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Conclusions

The first aim of this study was to assess the differences between different leisure-time PA levels (high and low) and HRQoL and LS. Participants reported high levels of both HRQoL and LS. Those participants who reported higher scores of LS also reported higher leisure-time PA levels. No differences were found between HRQoL scores and leisure-time PA.

The second aim of the study was to differentiate HRQoL and LS levels between *Recreovía* participants versus non-participants. *Recreovía* participants showed better psychological well-being indices, which highlights the potential of the program to also impact on aspects of mental health, beyond its potential to improve physical health.

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