Promoting Physical Activity and Quality of Life in Vitoria, Brazil: Evaluationof the Exercise Orientation Service (EOS) Program

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Background: The purpose of this study was to evaluate associations between exposure to the Exercise Orientation Service (EOS) program and physical activity (PA) and quality of life (QoL) in adults from Vitoria, Brazil. *Methods*: A phone survey was conducted with 2023 randomly selected participants (≥ 18 years) to measure awareness about the program, participation in the program, PA levels, and QoL. The associations were tested using Poisson and Linear regression models. *Results*: 31.5% reported awareness about the program, 1.5% reported current participation, and 5.8% reported previous participation. Participation was higher among women (2.1%), older subjects (2.8%), and those reporting morbidities (2.4%). Awareness was higher among middle-aged persons (36.0%) and highly educated participants (37.1%). Current participation (PR = 2.22; 95% CI = 1.65–2.99) and awareness (PR = 1.15; 95% CI = 1.02–1.30) were associated with leisure-time PA (LTPA). *Conclusion*: Exposure to the program was not associated with QoL but was consistently associated with sufficient levels of LTPA among adults from Vitoria, Brazil.

Keywords: leisure, health promotion, evaluation studies

Strong evidence exists about the role of physical activity (PA) in the prevention of multiple noncommunicable diseases (NCDs) and its role in promoting a healthy lifestyle.[1] In spite of this evidence, high levels of physical inactivity are consistently observed in different regions of the world. Particularly concerning are the NCD burdens in low- and middle-income countries,[2] where rates are higher compared with high-income settings.[3] This scenario has led some governmental and nongovernmental agencies to include PA interventions in their health promotion agendas.[3]

In Brazil, several initiatives for PA promotion are taking place, some of them with very promising results. Analyses of the Program "Academia da Cidade," for example, which offers PA classes for communities, revealed that both current and former participants of the program were more active in their leisure time compared with nonparticipants.[4] A similar result was observed when the same strategy was adopted in Aracaju (another city in northeastern Brazil).[5] In the city of Curitiba, a combination of environmental and policy strategies for PA promotion facilitated increased levels of PA among people engaged in programs offered to the community.[6] Lastly, the spread of short messages through networks in many public spaces has also been shown to be effective for increasing PA.[7]

Engagement in such programs may also result in benefits for general well-being and quality of life for the community as a whole. For example, group activities have been shown to improve social support which may lead to boosts in self-esteem.[8] Also, in regions with large social inequalities, community programs are likely to improve neighborhood relationships and thus may lead to positive self-perceptions of health among participants.[9] Previous literature has also shown consistent associations between PA (especially LTPA) and quality of life in adults and elderly people;[10] however, previous investigations on the effectiveness of physical activity interventions in Brazil did not assess their impact on quality of life.[4–6]

The Exercise Orientation Service (EOS) began in 1990 in an attempt to promote community-level engagement in regular PA. The intervention takes place in parks, squares, and other places where PA can be performed.[11] The program is conducted by physical education professionals and includes regular PA classes and monitoring

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of PA intensity along with health variables (ie, blood pressure, waist circumference, and body mass index).[11] In concordance with the ecological model of active living, this program addresses multiple levels of influence. Specifically, this program includes a combination of behavioral and educational strategies and capitalizes on existing environmental infrastructure (ie, use of public spaces and seashore facilities). This program is designed to primarily reach the poorest citizens, but its reach covers nearly all city neighborhoods. This specific multilevel approach has not been observed in other Brazilian Programs. EOS was launched more than 2 decades ago and, to this date, no empirical evaluation has assessed the impact of this program on physical activity and health. The aim of this study was to evaluate the association between exposure to the EOS program and PA levels and quality of life in adults living in Vitoria, Brazil.

Methods

The data for this cross-sectional study was obtained using telephone surveying. The target population included Vitoria residents who had access to a home phone by the time of the interview (2009), aged 18 or older. Nearly 4/5 (79.2%) of the residents in Vitoria have phone lines, the second highest coverage among the Brazilian state capitals. Based on this population and phone coverage, 2023 subjects were randomly sampled. Initially, 5,000 telephone lines were sampled, followed by random selection of 25 twin sets of 200 lines, in compliance with the proportion of telephone lines distributed in neighborhoods (1) with EOS units (44.4% of neighborhoods) and (2) without EOS units (55.6%). In each selected household, a first contact was made and following verbal consent, 1 occupant was randomly selected to respond to the questionnaire.

The telephone interviews, coding, and quality control were performed by interviewers of a phone surveying company who[12] were trained by members of the research team. Data collection occurred from September 2009 to October 2009 with a per survey average length of 12 minutes and 45 seconds. Institutional Review Board approval was obtained before data collection from Pontifíca Universidade Católica do Paraná.

Interviews included questions about awareness and participation in the EOS program, sociodemographic characteristics, PA engagement, and perceived quality of life. To assess awareness about EOS, subjects were asked if they had ever heard about EOS (yes/no). Program participation was assessed using the following question-response options: "Do you attend or have you attended EOS activities?" "Yes, I attend," "Yes, I have attended but haven't gone in the last month," and "No, I have never attended." These questions have been used in similar studies and are considered adequate measures of awareness and participation in PA community programs.[4–6]

Physical activity behavior was assessed using the International Physical Activity Questionnaire (IPAQ); however, only leisure-time domains of activity were used for this analysis. The LTPA section of IPAQ includes questions about walking behavior and frequency/ duration of moderate and vigorous activities during leisure hours. Participants were dichotomized as either meeting PA recommendations versus not meeting PA recommendations. In concordance with established guidelines, meeting physical activity recommendations was defined as $\geq$ 150min/week of MVPA or $\geq$ 75min/week of vigorous PA.[3] Inactive or insufficiently active people were all those not attaining this criterion.

Quality of life was assessed using WHOQOL-8, an 8-item questionnaire developed for brief evaluations.[13] The 8 items were chosen from the WHOQOL-Brief through Rasch modeling and structural equations. These items have demonstrated adequate internal consistency and acceptable converging validity for mental and physical health.[13] For this analysis, the sum of the 8 questions generated a score between 8 (minimum) and 40 (maximum), indicating lower or higher quality of life, respectively.

Participants also reported sex, age, education, height, and weight. Morbidities such as hypertension, diabetes, osteoporosis, and infarction or cerebral vascular accident were also reported by subjects. Age was classified into 3 groups (18–34, 35–54, 55 or older) and education classified into 2 groups (incomplete high school or high school/ graduated). Height and weight were used to calculate body mass index (BMI) and dichotomized according to international standards ($<$ 25 kg/m^2 low weight/normal and $\geq$ 25 kg/m^2 overweight/obesity). Reported morbidities were summed and grouped according to absence or presence of 1 or more morbidities.

Categorical variables were described by absolute and relative frequencies and numeric variables by mean and standard deviation. The association between sociodemographic variables and morbidities with exposure to the program (ie, awareness and past/present attendance) was analyzed using the chi-square test for proportions. The association between being exposed to the program and LTPA was measured by Poisson regression in 2 models. The first model was a bivariate analysis and was followed by a multivariable model where exposures were adjusted for all other variables in the previous model. A linear regression model was used to evaluate the association between exposure to the program and quality of life. Categorical variables (ie, age, education, and exposure to the program) were included in the model as dummy variables. All estimates were weighted considering the probability of selection for telephone lines and population characteristics (ie, age and sex) based on the population count performed by the Brazilian Institute of Geography and Statistics in 2009, available in DATASUS (http://www2.datasus.gov.br/). All analyses were done in STATA 9.2 with significance set at 5%.

Results

Sample characteristics are presented in Table 1 according to categories of EOS exposure. PA outcome models

included 1981 participants and QoL models included 1844 participants. This dissonance is due to missing values. The sample was composed mostly of women (62.0%), young adults (18–34 years; 45.2%), and people with graduate degrees (46.5%). More than one-half of the sample was not overweight/obese and nearly one-third (31.3%) reported having at least 1 morbidity.

One out of 3 study participants reported awareness of the EOS program. More specifically, awareness was higher among middle-aged and more educated people. Current participation in the program was reported by 1.5% of the sample and was higher among women, people with no morbidities, and almost twice as higher in younger age groups. Furthermore, past participation in the program was reported by 5.8% of the sample, mostly among women, more educated, and overweight/obese persons.

Crude analysis (ie, bivariate) revealed LTPA in recommended levels was higher among men, younger age groups, those without morbidities, those with more education, and those reporting participation and awareness about the EOS; however, after controlling for all covariates (multivariable analysis), age was no longer associated with LTPA (Table 2).

Crude analysis revealed that the highest QoL scores were observed among men, more educated persons, those without morbidities, those with low/normal BMI, and those not attending EOS in the past. In the adjusted model, all variables remained associated with quality of life (Table 3).

Discussion

Community PA programs have been developed in Latin America employing distinct strategies. Moreover, there is evidence of association with higher levels of population PA related to program exposure.[4–6] This study aimed at measuring the association between the EOS program with LTPA and quality of life in adults living in Vitoria, Brazil. As the results suggest, attendees of the program are mostly women, those with lower education, older individuals, and those reporting at least 1 morbidity. Awareness and participation were consistently associated with higher levels of LTPA; however, past participation was inversely associated to higher scores of quality of life. The results also indicate that quality of life and exposure to EOS are moderated by sex, age, and education. In addition, QoL is moderated by those reporting better health indicators.

One out of 3 citizens from Vitoria are aware of the EOS program, which may suggest lower levels of popularity compared with similar programs developed in Brazil. 39% of residents in the state of São Paulo are aware of the "Agita São Paulo," which is accompanied with broad promotional efforts.[14] On the other hand, almost 9 out of 10 people are aware of or have heard about the programs developed by municipality in Curitiba City.[6] EOS's characteristics differ relative to these examples. As such, interpreting evaluation comparisons across

programs should be viewed with caution. However, even if similar programs are considered, such as "Academia da Cidade" from Recife[4] and Aracajú,[5] the figures in the current study are less robust.

The EOS program implements activities in fixed and transient stations installed in public spaces such as squares, beaches, and parks.[11] Although this is a potentially high-reach strategy for the community, the effectiveness of the program depends on the quantity and availability of these spaces. In fact, crowding in such places is inversely associated to distance and amount of spaces.[15] Even though Vitória has many green areas, parks, and squares, the distribution of this infrastructure is uneven and concentrated in few regions of the city.[16] Consequently, this may result in lower dissemination of the program in the community, partially explaining low awareness about the program. Nevertheless, awareness was higher among middle-aged and more educated individuals. Such findings are consistent with similar studies[4,6] and other health indicators including self-reported health[17] and PA,[18] suggesting inequities on health-related awareness.

Interestingly, despite the higher awareness about the EOS program among more educated people, participation is higher among those with less education. Studies have consistently shown higher levels of LTPA in wealthier and more educated persons.[19] Hence, our results point to the importance of this program for shortening the gap in PA levels among people from different educational backgrounds.

Similar to previous results, current and past participation in EOS was below the reported amount in other community-level PA Programs in Brazil[6,14] but closer to amounts reported in the "Academia da Cidade" Program.[4,5] Such results endorse the notion that programs focusing on behavioral change (ie, PA classes and guidance for health) reach less people than those employing broader strategies[3] such as educational interventions[14] or environmental and policy changes.[6] EOS relies on 2 components—PA classes and monitoring of individual health parameters (blood pressure, waist circumference and body mass index),[11] focusing on individual behavior changes. Nonetheless, participation in EOS was higher among women and the elderly, similar to other Brazilian programs.[4–6]

Meeting PA recommendations, as measured by self-reported LTPA, was associated with EOS engagement even after controlling for confounders. Similar results have been observed in cross-sectional[4,6] and prospective studies,[20,21] suggesting the positive effects of community programs on PA levels of its participants. Awareness about EOS, although relatively low, was also associated with PA, similar to what has been reported in other Brazilian studies.[4,6,14]

Although exposure to EOS was associated with LTPA, no consistent associations were found with QoL. What may be perceived as a potential lack of program effectiveness, these results highlight the known complexity involving the multiple social determinants and pathways to QoL. The participants of the program were mostly low-income women. Improvements in QoL for

Table 1 Sociodemographic Characteristics, Body Mass Index (BMI), Reported Health, and Morbidities According to Exposure, to Exercise Orientation Service (EOS) Categories (Vitória, 2009; n = 1981)

Variable	Categories	Overall		Knows EOS			Current participant			Past participant		
		N	%	n	%	P	n	%	P	n	%	P
Sex	Male	738	38.0	221	28.2	0.25	3	0.6	<0.01	25	3.5	<0.01
	Female	1243	62.0	403	29.5		32	2.1		96	7.1	
Age group	18–34	609	45.2	138	21.5	0.00	6	1.1	0.01	33	5.0	0.49
	35–54	785	34.9	295	36.0		10	1.3		54	6.5	
	55+	587	19.8	191	33.9		19	2.8		34	6.1	
Education	Incomplete high school	472	20.0	104	21.0	0.00	14	2.4	0.06	16	2.5	<0.01
	High school	639	33.6	166	22.6		7	0.9		29	4.0	
	Graduated	870	46.5	354	37.1		14	1.6		76	8.4	
BMI	Low weight/Normal	1096	58.3	328	26.5	0.09	20	1.5	0.83	53	4.5	0.01
	Overweight/Obese	885	41.7	296	32.6		15	1.5		68	7.4	
Morbidities	None	1270	70.8	392	28.1	0.42	15	1.2	<0.01	70	5.0	0.14
	At least 1	711	29.2	232	31.3		20	2.4		51	7.5	
Total		1981	100.0	624	31.5		35	1.5		121	5.8	

Table 2 Association Between Sociodemographics, Body Mass Index (BMI), Reported Health, and Morbidities According to Exposure to Exercise Orientation Service (EOS) Categories and LTPA (Vitória, 2009; n = 1981)

Variable	Categories	LTPA (≥150min/wk)		Bivariate analysis			Multivariable analysis†		
		N	%*	PR	CI	P	PR	CI	P
Sex	Male	354	48.7	1.00			1.00		
	Female	440	35.8	0.74	(0.65–0.83)	0.00	0.72	(0.64–0.82)	0.00
Age group	18–34	268	44.4	1.00			1.00		
	35–54	293	37.5	0.85	(0.74–0.97)	0.02	0.95	(0.83–1.09)	0.44
	55+	233	38.0	0.86	(0.74–1.00)	0.06	1.11	(0.94–1.31)	0.21
Education	Incomplete high school	125	26.6	1.00			1.00		
	High school	233	34.7	1.30	(1.05–1.60)	0.01	1.28	(1.04–1.58)	0.02
	Graduated	436	51.3	1.93	(1.60–2.32)	0.00	1.81	(1.49–2.21)	0.00
BMI	Low weight/normal	457	42.7	1.00			1.00		
	Overweight/obese	337	38.2	0.90	(0.79–1.01)	0.08	0.91	(0.80–1.03)	0.14
Morbidities	None	551	44.1	1.00			1.00		
	At least 1	243	32.5	0.74	(0.65–0.85)	0.00	0.84	(0.72–0.98)	0.02
Program awareness	No	500	38.4	1.00			1.00		
	Yes	294	46.8	1.22	(1.08–1.37)	0.002	1.15	(1.02–1.30)	0.026
Program attendance	No	739	40.6	1.00			1.00		
	Yes	55	45.1	1.11	(0.88–1.40)	0.19	1.08	(0.86–1.36)	0.49
Currently attending	No	765	40.2	1.00			1.00		
	Yes	29	81.0	2.01	(1.64–2.47)	0.00	2.22	(1.65–2.99)	0.00

* Weighted estimates; † Model adjusted for all variables in the model.

Abbreviations: LTPA, leisure-time physical activity.

Table 3 Association Between Sociodemographics, Body Mass Index (BMI), Reported Health and Morbidities According to Exposure to Exercise Orientation Service (EOS) Categories and Quality of Life (Vitória, 2009; n = 1844)

Variable	Categories	Quality of life		Bivariate			Multivariable†		
		Mean*	SD*	Beta	SE	*P*	Beta	SE	*P*
Sex	Male	31.55	3.96						
	Female	30.01	4.51	–1.54	0.22	0.00	–1.58	0.22	0.00
Age group	18–34	30.66	4.02						
	35–54	30.20	4.77	–0.46	0.26	0.08	0.18	0.26	0.48
	55+	31.14	4.39	0.47	0.28	0.09	1.86	0.32	0.00
Education	Incomplete high school	29.63	4.22						
	High school	30.10	4.65	0.47	0.32	0.14	0.63	0.33	0.06
	Graduated	31.31	4.10	1.69	0.28	0.00	1.66	0.31	0.00
BMI	Low weight/normal	30.91	4.10						
	Overweight/obese	30.15	4.69	–0.77	0.23	0.00	–0.70	0.24	0.00
Morbidities	None	30.97	4.11						
	At least 1	29.62	4.86	–1.35	0.26	0.00	–0.13	0.30	0.00
Program awareness	No	30.51	4.32						
	Yes	30.78	4.48	0.27	0.24	0.27	0.03	0.24	0.91
Program attendance	No	30.65	4.35						
	Yes	29.60	4.55	–1.05	0.48	0.03	–0.97	0.46	0.04
Currently attending	No	30.59	4.38						
	Yes	30.98	3.69	0.39	0.72	0.58	0.86	0.78	0.27

* Weighted estimates; † Model adjusted for all variables in the model.

these individuals is complex and demands social and structural changes that, unfortunately, depend on many other aspects that cannot be feasibly addressed by this intervention in isolation. But, considering the characteristics of the participants (low-income older women with morbidities), it is expected that QoL scores were not high. Under those circumstances, the fact that current participants are not different in QoL compared with nonparticipants, would indicate program efficacy. For example, those reporting past participation reported lower scores in QoL, confirming this hypothesis. It must also be considered that the study design may explain this lack of association, as the reference group in this sample includes participants that have never joined the program. In addition, the global QoL assessment may evaluate, more specifically, domains that were not changed by the program, as EOS focused on psychological, physical, and social domains; however, different designs may help to understand these causal links. In addition, more specific QoL measures can be carried out to examine this relation thoroughly.

Some limitations of the study must be considered when interpreting the results. PA was measured by self reports which may overestimate PA levels. However, the instrument (IPAQ) has been used widely in Brazil and in other Latin American countries for more than a decade with adequate reliability and validity,[22] specifically for LTPA.[23] Causality between exposure to the program with PA levels and QoL could not be determined because of the cross-sectional design of the study; thus, limiting evidence of program impact. Nevertheless, the association between EOS attendance and awareness EOS and LTPA was observed regardless of sex, education, and other potential confounders. Still, the exposure covariates that were analyzed (current/past attendance and awareness), have been used in similar investigations and demonstrate consistent results.[4–6] Finally, the sample size was large enough to allow for complex analysis and to control for confounders.

Conclusion

This study suggests that EOS awareness and participation was consistently associated with beneficial LTPA levels; however, exposure to the EOS program was not associated with QoL. These results contribute to the field of PA

promotion because, to date, there have been no reports evaluating the impact of longstanding programs such as EOS. In addition, programs focusing on individual health monitoring in public environments have not been previously evaluated. Finally, similar to previous studies, program awareness and participation differed according to sex, age, and level of education, reinforcing the need for tailored strategies. This evidence highlights the importance of PA promotion on the community level but also emphasizes the need for evaluations measuring the impact of large-scale health programs on the population. Such efforts become even more important with the recent launching of the program "Academia da Saúde," which expects to expand to 4,000 cities across Brazil up to the year 2014.[24]

Acknowledgments

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