

Review Article

Perception of safety and physical activity in adults: a systematic review

Percepção de segurança e prática de atividade física em adultos: uma revisão sistemática

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Abstract

The process of urbanization observed in recent decades has brought with it some consequences for the quality of life and change in the profile of diseases, which are related to higher rates of physical inactivity. The lack of sufficient physical activity (PA) is currently being considered as a risk factor for diseases and comorbidities, especially in adult populations. Thus, the aim of the present study was to systematically review the scientific findings in the literature on the practice of physical activity among adults and its relation to the perception of safety in urban centers, published between 2005 and 2014. The search process was conducted using the PubMed, MedLine and LILACS databases, and the reference lists of selected articles used the following key words: “physical activity”, “violence” and “safety”. Initially, 303 articles related to the subject under study were found. However, after analyses and the establishment of inclusion criteria, 13 articles were included in this review. It was concluded that the reduction in crime and improvement in traffic and in the environment for walking are key factors to perceive safety in a district. Despite the evidence showing that traffic safety, adequate lighting and improvements in the aesthetics of districts contribute to the perception of safety, the results are yet inconclusive.

Keywords

Motor Activity; Violence; Safety.

Resumo

O processo de urbanização observado nas últimas décadas trouxe consigo algumas consequências em relação a qualidade de vida e modificação do perfil das doenças, os quais estão relacionados a maiores índices de inatividade física. A ausência de prática suficiente de atividade física (AF), atualmente, vem sendo considerada como fator de risco para doenças e comorbidades, especialmente nas populações adultas. Sendo assim, o objetivo do presente estudo foi analisar sistematicamente os achados científicos na literatura, publicados entre os anos de 2005 e 2014, sobre a prática de atividade física entre adultos e sua relação com a percepção de segurança nos centros urbanos. O processo de busca foi realizado utilizando-se as bases de dados PubMed, MedLine e LILACS, e nas listas de referências dos artigos selecionados, sendo utilizados os seguintes descritores em inglês: “physical activity”, “violence” e “safety”. Inicialmente, foram encontrados 303 artigos que apresentavam relação com o tema em estudo; porém, após análises e estabelecimento dos critérios de inclusão, 13 artigos foram incluídos na presente revisão. Através da análise dos artigos foi possível concluir que a redução de crimes, a melhora no tráfego e o ambiente para caminhar são fatores fundamentais para perceber-se seguro no bairro. Apesar das evidências demonstrarem que segurança no trânsito, iluminação adequada e melhora na estética do bairro auxiliam na percepção de segurança, os resultados ainda não são conclusivos.

Palavras-chave

Atividade motora; Violência; Segurança.

Introduction

The regular practice of physical activity (PA) contributes to positive changes in physical, psychological, cognitive and social aspects of human health¹. Moreover, the need to reduce the levels of morbidity and mortality worldwide shows the importance of public health actions aimed at enabling inactive individuals

to become active, thus decreasing the load of chronic diseases².

Despite the abundant evidence on the positive effects of PA practice on health, the majority of the population have not met the minimum recommendations yet³⁻⁵. According to the ecological perspective proposed by Sallis et al.⁶, PA practice and the adoption of a healthy lifestyle are complex actions that depend on the characteristics of the environment in which individuals are included. Environmental deter-

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minants have become the focus of research in recent years, in view of its interrelation with individual factors^{7,8}.

In the perspective of the environment where individuals are included, safety can be a determining factor for PA practice. Like water, air and food, safety can be considered as one of the needs of individuals. When this fails to happen and such need is not met, the practice of PA can be compromised⁹.

Variables such as crime rate and traffic and pedestrian safety can affect individuals' availability to practice PA in their district^{10,11}. The literature indicates that the relationship between these variables can be more complex than their simple direct relationship¹².

In this sense, the socioeconomic inequality experienced by low-income populations, for example, directly and indirectly influences the lifestyle of this sector/segment of society¹³. As these individuals have lower conditions to pay for services related to health promotion, safe public locations for leisure physical activity are required in the districts where they live¹⁴.

In addition, the present study aimed to systematically analyze the scientific findings in the literature associated with PA practice among adults and its relationship with the perception of safety in urban centers.

Methods

Studies that established a relationship between PA practice during leisure time and perception of safety in adults were selected. Theses, dissertations and review articles were excluded.

References that met the inclusion criteria were assessed, regardless of the periodical. The selection of descriptors used throughout the review process was performed with the Medical Subject Headings (MeSH).

The search process was conducted considering the period between 2005 and 2014, using the PubMed, MedLine and LILACS databases and the lists of references of selected articles. The following descriptors were used: "physical activity", "violence" and "safety". Aiming to combine descriptors and terms used in this search, the "AND" and "OR" logical operators were used.

Initially, a total of 303 articles related to the theme in question were found. Next, studies that met the following criteria were selected: a) the study population was comprised of adults; b) a population-based study; and c) a study performed with urban populations.

After the initial analysis, which simply consisted in title reading, 60 articles were selected for the second stage of review, abstract reading. Subsequently, the full articles from studies that had met the inclusion criteria were read. Finally, 13 articles were included in the present review, as observed in Figure 1. During the entire search process in the literature, the review was performed independently by two researchers.

The articles selected were assessed and scored in terms of quality using an adapted Downs & Black scale¹⁵. Of all 27 original items, 16 were assessed, only those that could be applied to observational cross-sectional studies, when the maximum score possible was 17 points (item 5 can have a maximum score of two points). The items assessed were as follows: (1) quality of the description of hypotheses/objectives; (2) quality of the description of the outcome to be studied; (3) characterization of the sample included; (4) quality of the description of the exposures of interest; (5) discussion about the main confounding factors; (6) quality of the description of the main study outcomes; (7) provision of estimates of random variability of the main findings; (10) presentation of the real probability

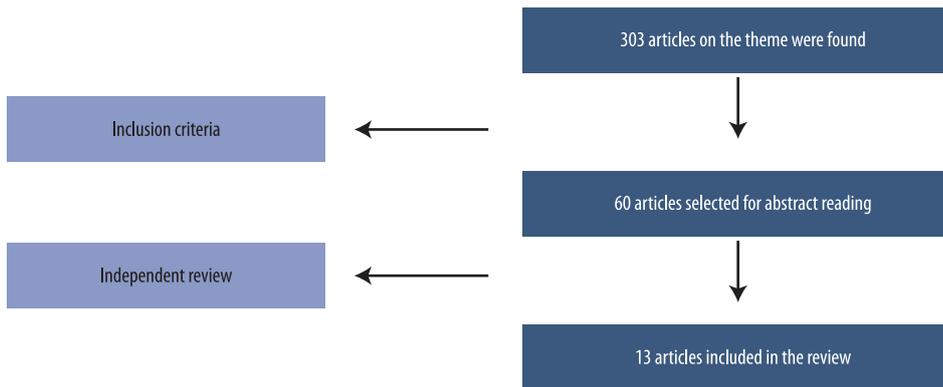


FIGURE 1 – Flow chart of the studies selected for this review.

found; (11) selection and (12) inclusion of the representative sample; (16) analysis of the main results; (18) adaptation of the statistical tests used to measure the main outcomes; (19) exposures without classification errors; (20) accuracy of the instruments used for the main outcomes; (25) adequacy of the adjustment for the main confounding factors; (27) adequacy of the statistical power to detect an important effect, with a significance level of 5%.

Initially, the score that each study had in each item selected according to the Downs & Black's instrument¹⁵ will be shown. Next, the individual data of each study will be shown: location, sample, instrument used and main results.

Results

Of all 13 articles selected, six were performed in Europe (four in Holland¹⁶⁻¹⁹, one in Germany²⁰ and one in the whole Europe²¹), six in the Americas (three in the United States²¹⁻²³ and three in Brazil^{13,24,25}) and one in Africa (Nigeria²⁶). In the studies performed by Europeans and Americans, the majority of the sample was comprised of females and the most prevalent age group was adults and elderly individuals aged more than 60 years. In contrast, in the study performed by Maiduguri²⁶, the majority of participants were males (60.7%) with a mean age of 34.9 ± 8.8 years.

With regard to the scale of quality of articles, the mean scores achieved in the present review study was 14.1 ± 1.0 , thus showing good quality. Of all 17 points possible, certain studies^{13,19,24-26} achieved a higher score (15 points) and the study by Roman et al.²³ obtained the lowest score, 12 points. The score of each item and the total score obtained in each study are shown on Table 1.

Table 2 shows the number of participants in the sample from each of the 13 studies selected, apart from the place of study, location, instruments used and main results. In order to measure the PA levels, the instruments used varied between questionnaires (IPAQ short or long form or SQUASH), pedometers and accelerometers, associated with the application of the questionnaires mentioned or not.

Regarding the results, eight studies found an association^{12, 13, 16, 18, 19, 21, 22, 26} between perception of safety and PA practice, all indicating a direct association. Nonetheless, five studies did not show an association between these variables^{17, 20, 23-25}. Perception of safety varied among the following: overall perception of safety^{12, 13, 19, 20-22, 25}, safety against crimes^{23, 24}, fear of staying at home or leaving home during the day or night^{16,17}, traffic safety¹⁸ and safety against crimes and in traffic²⁶.

Discussion

The present study aimed to systematically review the scientific findings from the literature on PA practice among adults and its relationship with perception of sa-

TABLE 1 – Scores obtained for each item of the adapted Downs & Black scale, based on the articles included in this systematic literature review.

	Items																Overall score
	1	2	3	4	5	6	7	10	11	12	16	18	19	20	25	27	
Beenackers et al. ¹⁶	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	13
Beenackers et al. ¹⁷	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	14
Bennett et al. ²²	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	14
Bracy et al. ¹²	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	14
Florindo et al. ¹³	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	15
Jongeneel-Grimen et al. ¹⁸	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	14
Kramer et al. ¹⁹	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	15
Mendes et al. ²⁴	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	15
Oyeyemi et al. ²⁶	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	15
Rech et al. ²⁵	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	15
Roman et al. ²³	0	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	12
Wallmann et al. ²⁰	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	14
Shenassa et al. ²¹	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	1	13

fety in urban centers. Our review selected 13 studies that met the inclusion criteria used. The distribution of places of study, taking continents into consideration, shows that almost all studies were performed in South America^{13,24,25}, North America^{12,22,23} and Europe¹⁶⁻²¹.

Regarding the scores obtained through the Downs & Black's scale¹⁵, of all five studies that obtained the highest score, three^{13,19,26} showed direct association between perception of safety and PA practice, whereas the other two^{24,25} did not. Following the increasing order of scores of the next best ranked group of articles in the scale, three^{12,18,22} of them were directly associated with the outcome, while the remaining ones^{17,20} were not associated at all. In the sequence, both articles^{16,21} had a direct association with the outcome. Finally, the article with the lowest score²³ was not associated. These results indicate good data reliability.

Of all 13 studies selected, eight found an association between perception of safety and practice of PA during leisure time^{12,13,16,18,19,21,22,26} and five did not reveal such association^{17,20,23-25}. Of all studies that found an association, six were performed in Europe and two in the United States, indicating that the perception of safety in developed countries and its association with PA practice during leisure time is higher than that of developing countries such as Brazil and Nigeria.

Only one study performed in Europe¹⁷ did not find an association between PA during leisure time and perception of safety. However, in a different study¹⁶, there was a strong association between sports practice and perception of safety in the district, regardless of whether such activity was performed there or not, showing that individuals felt safe to go to the place of their practice even when it was out of their district.

On the other hand, of all three studies performed in Brazil, only one of them¹³ found a positive association between perception of safety and PA practice. However, the same study revealed this association in terms of perception of safety at night, although this effect was not found in the association with overall perception of safety.

Overall perception of safety includes the occurrence of crimes, safe traffic, green areas, and good physical and social environment in a certain district. A total of seven studies analyzed the overall perception of safety of individuals^{12,13,19,20-22,25}; two analyzed safety against crimes^{23,24}; two, the fear of staying home or leaving home during the

TABLE 2 – Overall characteristics of the studies selected for this systematic literature review.

Author	Location	Sample	Instrument of measurement of PA	Results
Beenackers et al. ¹⁶	Holland	n = 2474 Men= 1168 Women = 1306 Age = 25 to 75 years	SQUASH questionnaire	Individuals who perceived their districts to be safe were two times more likely to have a positive attitude towards practicing sports than those who did not (OR = 2.00, 95%CI = 1.48-2.71).
Beenackers et al. ¹⁷	Holland	n = 4395 Men= 2054 Women = 2341 Age = 25 to 75 years	SQUASH Questionnaire	Perception of safety was not associated with minutes of walking. However, among those who felt unsafe, a positive attitude was associated with 30 minutes of walking during leisure time, compared to those who did not feel unsafe and had a positive attitude towards PA.
Bennett et al. ²²	USA	n = 1735 Men= 465 Women = 1270 Age = 49 (mean)	Pedometer	Women who felt unsafe at night showed a higher number of steps compared to those who felt safe (5.972 vs 4.865, p<0.001).
Bracy et al. ¹²	USA	n = 2068 Women = 47.6% Age = 20 to 65 years	Accelerometer	Pedestrian and traffic safety were associated with moderate to vigorous physical activity (MVPA) ($\beta=40.26$; $p<0.001$ / $\beta=17.15$; $p<0.49$).
Florindo et al. ¹³	Brazil	n = 890 Men= 368 Women =522 Age = 18 years or more	IPAQ long form	Safety at night was associated with PA practice (PR=1.10, 95%CI = 1.03-1.16). However, there was no association for overall safety.
Jongeneel-Grimen et al. ¹⁸	Holland	n = 31783 Women = 53.4% Age = 18 to 84 years	Questionnaire developed by authors	To live in districts with high levels of traffic safety was associated with PA (OR = 1.08, 95%CI = 1.025–1.139).
Kramer et al. ¹⁹	Holland	n = 20046 Men= 47.2% Women = 52.8% Age = 18 years or more	SQUASH questionnaire	Overall safety and traffic safety were associated with cycling (OR=1.40; 95%CI=1.23–1.60 / OR=1.09; 95%CI=1.02–1.17, respectively).
Mendes et al. ²⁴	Brazil	n =2838 Men= 1184 Women = 1690 Age = 18 years or more	IPAQ long form	There was no association between PA during leisure time and perception of safety (OR = 0.96; 95%CI = 0.74 – 1.23).
Oyeyemi et al. ²⁶	Nigeria	n = 219 Men= 133 Women = 86 Age = 20 years or more	Accelerometer / IPAQ short form	Individuals with a good perception of safety against crimes at night were more likely to perform MVPA, compared to those who consider safety against crime to be a problem (OR=1.68; 95%CI 1.07-3.64).
Rech et al. ²⁵	Brazil	n = 1262 Men= 481 Women = 781 Age = 18 years or more	IPAQ long form	There were no associations between physical inactivity and perception of safety, both against crimes and walking in the district.
Roman et al. ²³	USA	n = 328 Men= 18% Women = 82% Age = 20 years or more	Questionnaire developed by authors	Fear of walking on the streets was not a predictor of physical activity, not changing individuals' PA practice.
Wallmann et al. ²⁰	Germany	n = 655 Men= 329 Women = 326 Age = 20 to 70 years	IPAQ short form	Perception of lack of safety in relation to crime rate was not associated with PA practice, either during the day or at night ($\beta=-0.025$ and $\beta=-0.051$, respectively).
Shenassa et al. ²¹	Europe	n = 5338 Men= 2461 Women = 2877 Age = 40.7 \pm 13.6 years	Questionnaire developed by authors	Perception of safety was associated with the occasional PA practice, but not with frequent PA practice. (OR = 1.27; 95%CI = 1.07-1.52)

SQUASH: Short QUestionnaire to ASsess Health-enhancing; IPAQ: International Physical Activity Questionnaire. PA: physical activity.

day or at night^{16, 17}; one, only traffic safety¹⁸; and one, crime and traffic safety²⁶.

The fact that individuals do not perceive their district to be safe is an indication that they will not become active, as they can be active anywhere. However, living in an environment perceived as unsafe can become an obstacle for such practice, as they are afraid of leaving their home^{16, 17}. Brazil has high rates of violence and as an example, 10% of homicides committed worldwide occur in our country²⁷, steadily decreasing the perception of safety.

Bracy et al.¹² reported that pedestrian safety can be the most important factor for individuals to practice PA. However, Kramer et al.¹⁹ stated that individuals are more influenced by the social aspects of safety, such as crimes and social disorder.

Crime-reducing strategies can increase PA practice, as they promote walks in one's environment²⁸. The structural question in the districts is also important, as its improvement and maintenance enable an increase in social networks, better social control and increase in residents' perception of safety²⁹.

The study by Oyeyemi et al.²⁶, the only one performed in the African continent, revealed that traffic control was a potential factor for PA promotion and intervention in their country. According to the authors, based on the increasing development of Africa, the trend is towards greater use of cars, causing this aspect to become relevant.

Due to the structural and social differences and diversity of developed and developing countries, the way individuals perceive safety in their environment and the most important factor to improve it can differ. However, regardless of this, individuals prefer to practice PA outdoors, close to their home, using the facilities that are available for free³⁰.

PA practice was measured with a questionnaire in ten studies^{13,16-21,23-25}, in an objective way in two studies^{12,22}, and in a combined way in only one²⁶. The use of questionnaires makes it more difficult to obtain a good measurement, in view of the problems with estimate errors and subjective assessment. In contrast, the use of accelerometers and pedometers has a high financial cost, although it is more accurate. Taking into consideration the advantages and disadvantages of each type of instrument, whether it is direct or indirect, their combination can provide more accurate and reliable data³¹.

Although direct measurements are more consistent, questionnaires enable the PA domain to be assessed, which can provide a better association with environmental perception³². However, the way in which PA was measured did not influence the results found apparently, as the association between PA and perception of safety occurred independently from the measurement method used by the authors. The measurement of perception of safety was found to be less accurate. The definition of such perception is still subjective and it can encompass several factors. Thus, it cannot be analyzed through an isolated factor. Instead, it will need to be analyzed in both subjective and objective ways in future studies.

Finally, it can be concluded that the evidence found, although moderate, indicate that individuals' perception of factors associated with safety in their district influence PA practice. It is important that future studies specify which safety factors are being analyzed, aiming to facilitate their relationship with PA practice.

Author contributions

Eduardo Lucia Caputo participated in the conception, literature review, writing and final article version. Tanísia Hipólito participated in the conception, literature review, writing and final article version. Airton José Rombaldi contributed to the conception and critical review of the article. Marcelo Cozzensa da Silva contributed to the conception and critical review of the article.

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