

EXERCISE AND NATURE: A RELEVANT COMBINATION TO HEALTH AND WELL-BEING**Susana Veloso & Ana Loureiro****Lusófona University, Portugal**

ABSTRACT: Physical inactivity and disconnection from natural environment are motives for worry to public health, due to their contributions to the prevalence of non-communicable diseases, mortality and several psychological problems. The paper aims to identify and describe the benefits of outdoor exercise and physical activity to health and well-being. Theories are described to explain the relationship between nature and physical activity, which leads to the proposal of 'green exercise' concept. Studies carried out in Portugal analyse the relationship between green exercise, well-being, vitality, mindfulness, stress, anxiety and depression, as well as relatedness to nature. The research about benefits of physical activity in contact with nature allows the identification of green exercise recommendations. Finally, the article explores the implications of green exercise to health and active lifestyles promotion, indicating several actions as public campaigns, accessibility, or training programs for professionals, in order to raise the time spent in contact with nature.

KEYWORDS: green exercise, contact with nature, well-being, health implications.

EL EJERCICIO Y LA NATURALEZA: UNA COMBINACIÓN RELEVANTE PARA LA SALUD Y EL BIENESTAR

RESUMEN: La inactividad física y la desconexión del entorno natural son motivo de preocupación para la salud pública, ya que contribuyen a la prevalencia de las enfermedades no transmisibles, la mortalidad y diversos problemas psicológicos. El objetivo es describir los beneficios de la actividad física y ejercicio *outdoor* para la salud y el bienestar, así como las teorías que explican la relación entre la naturaleza y la actividad física, llevando al concepto del "ejercicio verde". Estudios realizados en Portugal analizaron la relación entre ejercicio verde y bienestar, vitalidad, atención, estrés, ansiedad, depresión y conexión con la naturaleza. La investigación sobre los beneficios del contacto con la naturaleza y el ejercicio verde permite identificar recomendaciones. Por último, se exploran las implicaciones del ejercicio verde en la promoción de estilos de vida activos y la salud, con acciones como campañas, accesibilidad y formación de los profesionales para aumentar el contacto con la naturaleza.

PALABRAS CLAVE: ejercicio verde, contacto con la naturaleza, el bienestar, consecuencias para la salud.

EXERCÍCIO E NATUREZA: UMA COMBINAÇÃO RELEVANTE PARA A SAÚDE E BEM-ESTAR

RESUMO: A inatividade física e desconexão do ambiente natural são motivos de preocupação para a saúde pública, pois contribuem para a prevalência de doenças não transmissíveis, mortalidade e vários problemas psicológicos. Pretende descrever-se os benefícios da actividade física e exercício *outdoor* para a saúde e bem-estar. Descrevem-se as teorias que explicam a relação entre natureza e actividade física, conduzindo à proposta do conceito de "exercício verde". Estudos realizados em Portugal analisaram a relação entre o exercício verde e bem-estar, vitalidade, atenção, *stress*, ansiedade e depressão, bem como a ligação à natureza. A pesquisa sobre os benefícios do contacto com a natureza e também do exercício verde permite também a identificação de recomendações. Finalmente, o artigo explora as implicações do exercício verde na promoção da saúde e de estilos de vida activos, indicando várias ações como campanhas, acessibilidade, ou formação para profissionais, de forma a promover o tempo passado na natureza.

PALAVRAS CHAVE: exercício verde, contacto com a natureza, bem-estar, implicações para a saúde.

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Background

Nowadays, we are living our lives in totally different ways from what we have done as humans for more than 99 per cent of our existence. The prehistoric man, totally immerse in natural environment, depended on hunting, fishing and exploitation of wild resources to survive, so physical activity had a major role in his daily life (Biddle & Mutrie, 2008). Humans were living as hunter-gatherers for almost 300.000 generations, as agricultures for 600 generations, but as citizens of an industrialised society for only 6-8 generations. In fact, since the industrial revolution we are reducing our physical activity, reaching a huge contradiction: a human body biologically prepared for high levels of energy expenditure left at the mercy of the modernization with a lifestyle increasingly sedentary (Spence & Lee, 2003).

Physical inactivity levels are a problem in many countries and represent the fourth leading risk factor for overall mortality, contributing significantly to the prevalence of noncommunicable diseases (NCDs). On the other hand, the physical activity contributes to higher fitness levels, decreasing the risk of developing a number of diseases, and the level of premature death (Janssen & LeBlanc, 2010). The World Health Organizations (WHO) and several scientific organizations highlight the need to support efforts to increase physical activity levels in all age groups of the population (ACSM, 2013; European Commission, 2014; Katzmarzyk, 2011; WHO, 2010, 2014).

Although the level of physical inactivity is already epidemic, there are occurring some positive changes in human lifestyles. The reasons that European citizens identify to adopt an active lifestyle are firstly, to improve health (62%), secondly to improve fitness (40%) and then for relaxing (36%) and for fun (30%). These are important motives to face the barriers for the practice of physical activity: the shortage of time (42%), the lack of motivation or interest (20%) and only 13 and 10 per cent for disability or illness and for the cost, respectively (European Commission, 2014).

A Portuguese study based on accelerometry that assessed the moderate-to-vigorous physical activity of 5231 young, adult and elderly individuals with an independent physical functioning, showed that some groups already perform satisfactory and healthy levels of physical activity. Considering sex, men spend more time on activities of moderate-to-vigorous intensity than women in all age groups. However, boys still don't meet the recommendations related to level of physical activity neither girls nor older women (Instituto do Desporto de Portugal, 2011).

The 2014 Eurobarometer presents the trends of physical activity practice between 2009 and 2013 (European Commission, 2014). About 40 per cent of Europeans practice exercise or sport in a regular, or with some regular basis. But a more favourable scenario came up in physical activity associated with the lifestyle. The results revealed that about 48 per cent of people in Europe practice activities such as cycling from one place to another, dancing or gardening on a regular or with some regular basis. These data show that Europeans have a greater ability to integrate regular physical activity in their lifestyle, than to perform physical exercise or sport in a regular basis. Considering contexts for physical activity, Europeans prefer outdoor places such as a park (40%). Then, Europeans also practice at home (36%), on the way between home and school, work or shops (25%), at a health or fitness centre (15%), at a sport club (13%)

and at work (13%) (European Commission, 2014). So people are active in different ways and outdoor contexts are relevant for their choices. These data support the interest and relevance of the research about health benefits of outdoor physical activity, namely in natural environments.

The combination of nature and exercise gave rise to the concept of "green exercise", defined as the practice of exercise or physical activity in the natural environment (Pretty, Peacock, Sellens, & Murray, 2005). This and other forms of outdoor recreational activities promote physical and psychological health and well-being in several ways (Bowler, Buyung-ali, Knight & Pullin, 2010; Pretty et al., 2005; Thompson-Coon et al., 2011). Green exercise could be useful to face the physical inactivity epidemic, through the effect on adherence to physical activity and motivation. A lower perception of fatigue, less experience of stress and mental fatigue, and improvements in mood, self-esteem and health perception, are very positive indicators of the potential application of physical activity in natural environments, whether its objectives are promoting health, stress relief or just recreation (Gladwell, Brown, Wood, Sandercock, & Barton, 2013).

A model proposed by Hartig and colleagues presents ways in which the natural environment may influence health and well-being (Hartig, Mitchell, De Vries, & Frumkin, 2014). People engage in physical activities mainly because it helps them to feel good in the short term and, secondly, because it will benefit their health in the long term. So people seeking natural spaces regularly to the recovery of fatigue and stress, could engage in some form of physical activity for extended benefits (Hartig et al., 2014). The sort of environment (urban park, forest, and beach), the quality (diversity of species of plants and animals) and the quantity (tree canopy or the presence of water) can influence directly air quality (reducing allergies) and stress (reducing exposure to stressors). Also, contact with nature (the frequency, duration and type of activity, pure observation, walking or other) may promote social connections (promoting interactions with neighbours and community feeling) and physical activity (increasing the walk for leisure and outdoor recreation). These four paths promote health and well-being in several ways including improvement of academic and professional performance, the subjective well-being and several physiological indicators (Hartig et al., 2014).

In this paper we will seek to enhance the path through contact with nature and physical activity to promote health and well-being, which expresses the green exercise concept. The aim of this paper is to identify and describe the evidence of the benefits from nature and outdoor based exercise and physical activity to health and well-being.

Nature and physical activity: benefits and theoretical explanations

Health benefits from contact with nature have been presented by several studies, identifying multiple factors at different levels as environment, psychological and physiological variables or behaviours (Kuo, 2015). A wide amount of studies, following different theories and applying to several types of context and behaviour (forest or urban park, walking or running), show that active experiences of contact with nature promote a set of benefits such as positive emotions, stress reduction, vitality or cognitive functioning (cf. for reviews Bowler et al., 2010; McMahan & Estes, 2015).

Scientific evidence of the benefits of green exercise at psychological level recognizes the promotion of well-being, positive emotions (also reduced anger and sadness), as well as increased attention span and concentration. At physiological level, the benefits are the improvement of blood pressure and cortisol, as well as other physiological health markers (Bowler et al., 2010). In this paper we highlight environmental factors (characteristics of natural places), psychological factors and behaviours (physical activity) as having a potential to promote physical and mental health.

The predominance of people living in urban areas and the increasing separation of humans from other living species is recognized as giving place to a great physical and psychological disconnection of people from nature. The biophilia hypothesis argues that, despite the growing predominance of urban contexts in human's life, a connection to nature remains crucial and an innate aspect of human existence (Wilson, 1984). The disconnection from natural environment is critical and motive for worry because the access and contact with natural settings is acknowledged to be responsible for relevant benefits for human health and well-being (e.g. Hartig et al., 2014). Some scholars tried to describe this separation from nature and its psychological consequences as the "nature deficit disorder", a range of behavioural problems resulting from the less children's time spent outdoors and in nature (Louv, 2005). For children and also for adults, being disconnected from the wider and natural world make them more desensitized and less completed human beings, also with consequences for the planet sustainability (Nisbet, Zelenski, & Murphy, 2011; Olivos, Talayero, Aragonés, & Moyano-Díaz, 2014).

A reconnection to the natural world with an increase in opportunities to experience nature is of extreme importance to physical and psychosocial health (Van den Berg, Hartig, & Staats, 2007). This evidence comes from the finding of many areas of science from psychology, ecology, landscape architecture or medicine (Pretty et al., 2007). These health benefits and advantages associated to the contact and connection to nature happen because of the restorative and healthy power of nature, which has been well documented and different paths identified (e.g. Frumkin, 2001; Hartig et al., 2014; Sullivan & Kaplan, 2016).

The attention restoration theory (Kaplan, 1995; Kaplan & Kaplan, 1989) states that contact with natural environment helps regain the attentional focus, especially in subjects suffering from fatigue or mental fatigue (Joye, Pals, Steg, & Evans, 2013). Emphasizing the cognitive effects of contact with nature, this theoretical approach highlights that restorative importance of nature is due to its capacity to recover direct attention while individuals are performing tasks that demand focus and concentration.

The superior alluring power and restorative capacity of nature compared to urban environment has been proven, as well as the increased vitality, improvement of mood and general well-being when comparing these two contexts (Capaldi, Passmore, Nisbet, Zelenski, & Dopko, 2015). Another theory, more focused on mood effects - stress recovery theory (Ulrich, 1984; Ulrich et al., 1991) - argues that nature has the ability to promote the reduction of psychophysiological stress responses and thus improve human functioning.

The concept of green exercise, proposed by authors from Essex University, was originally defined as "a physical activity in green places that may bring both physical and mental health benefits" (Pretty, Griffin, Sellens, & Pretty, 2003; Pretty et al., 2005). The physical and psychological benefits of physical activity and exercise are well known (ACSM, 2013; Biddle & Mutrie, 2008). The synergistic benefit to health from exercise combined with contact or exposure to nature environments is represented by green exercise (Gladwell et al., 2013).

Several forms of exercise or physical activity that occurs in the presence of nature may be called green exercise. Some sports as climbers, hill-walkers, mountain bikers and endurance athletes all experience enjoyment the great outdoors and green space. Also aquatic sport as surf, kite surf, windsurf, rowing, and canoeing have a large impact on practitioners since green spaces with water show greater health effects (Barton & Pretty, 2010). These activities seem to be experienced by more sportive or active people, more motivated by the challenge and overcoming feelings. However, 'green activities' as tracking, cycling in the countryside or walking in an urban park, several forms of active transport through the pedestrian or cycle paths zones, integrated in cities and neighbourhoods, more moderate-to-vigorous activities, are more likely to engaging a majority of individuals. Paradoxically, the growing trend for people to undertake outdoor endurance challenges, contrasts with a higher proportion of the population with insufficient levels of physical activity to meet current health guidelines (Townsend et al., 2012). Furthermore, living near a more natural environment available usually is related with higher levels of physical activity in different forms besides sport, such as walking, playing or gardening (Calogiuri & Chroni, 2014; WHO, 2014). This increase in physical activity can be motivated only by stress relief or also with seeking recreation (Gladwell et al., 2013). So, green exercise and its synergistic combination of benefits could be used as a powerful tool to improve health by preventing physical inactivity tracks from childhood, and further decrease non-communicable diseases (Gladwell et al., 2013) and decrease risk of mental ill-health (Barton & Pretty, 2010).

Barton and Pretty (2010) discussed on what would be the best dose of natural and green exercise for improving health and well-being. Positive outcomes for individuals' mental health (self-esteem and mood) obtained from the green exercise are observed even from short-term periods of practice. Regarding the duration of activity, although an active whole day results in great improvements in mood and self-esteem, improvements on self-esteem and mood are observed from only five minutes of green exercise. The intensity of green exercise practice should be light to increase self-esteem; however, mood increases with both light and vigorous activity. Relative to the location/natural space or the type of green exercise, both mental health markers improved from practice in several green environments, but the presence of water (e.g. beach or river) or the participation in water-based activities improve the effects (Barton & Pretty, 2010). Finally, gender, age, and health status moderate the relations between green exercise practice and self-esteem and mood status. Improvements in self-esteem were observed in both genders, however men showed better mood. Youngers report more self-esteem improvements after green exercise and middle-age group report greater mood. However, mentally ill

people get the greatest changes in self-esteem (Barton & Pretty, 2010).

The presence of streetscape greenery (i.e., all kinds of vegetation that give the street a green appearance) might have several benefits for urban population (Vries, Dillen, Groenewegen, & Spreeuwenberg, 2013). In a study in four Dutch cities, relationships between the quantity and the quality of streetscape greenery on stress and social cohesion were found. Despite for total physical activity no relationship with either quantity or quality of greenery could be shown, for 'green activity' was found a relationship with the quality of greenery (Vries et al., 2013). Thus, nearby natural places are important to stimulate physical activity namely by promoting more green exercise and the use of natural spaces for exercise practice and higher physical activity. The potential of use of natural spaces is even better shown and understood if, besides evaluation of type of use of space, intrinsic experiences and fruition are evaluated (Asah, Guerry, Blahna, & Lawler, 2014).

Green exercise and research in Portugal

The relationship between green exercise, health and well-being was analysed with some studies carried out in Portugal with active adult who practice in indoor and outdoor contexts. Variables as positive and negative emotions, subjective well-being after exercise, vitality, mindfulness, stress, anxiety and depression, as well as relatedness to nature were measured. The relations between these variables and the environment for practice of physical activity were also analysed. Data collection for the different studies was carried out in health clubs (indoor exercise) and in different outdoor contexts as riverside, sea wall, parks and forest areas within and around the city of Lisbon.

Well-being associated with exercise and positive and negative emotions were measured in a study with 282 practitioners of outdoor and indoor physical activity (Loureiro & Veloso, 2014). The two groups, one combining outdoor and indoor physical activity (56.4%) and the other performing exercise in indoor environment (43.6%) answered a self-report questionnaire. More positive affect and exercise subjective experience found among those with outdoor exercise practicing suggest that important health and well-being benefits may come from outdoor physical activity. Results also shown connectedness to nature as positively predicting positive affect and psychological well-being related to exercise, and negatively predicting psychological distress related with exercise. These results were significant only for out mixed environments exercise practice (indoor and outdoor group).

Green exercise was compared with indoor exercise practitioners in another study with 40 individuals with lower to moderate regular physical activity practice (Loureiro & Veloso, 2015). Individuals performing a nature based physical activity showed better levels of well-being and a significant association between well-being and vitality. These results denote the revitalising effect of physical activity in a natural environment (Ryan et al., 2010).

A study carried out with 120 active Portuguese adult analysed the association between green exercise and well-being through mindfulness (i.e., the awareness of the present moments without judgment but with acceptance of the experience as they are) and vitality (i.e., the individual physical and psychological

energy available), two variables correlated with health and well-being (Brown & Ryan, 2003; Ryan et al., 2010). The collection of outdoor data (65%) identified a majority of mixed exercise practitioners (who exercise simultaneously in both indoor and outdoor settings) and insufficient practitioners of exclusively green exercise (9%). However, the positive association between mindfulness and vitality can only be found in mixed group of practitioners and not in indoor group (25%). This result suggests that the practice of exercise in mixed environments (indoor and outdoor green) could contribute to levels of vitality and mindfulness that an exclusively indoor practice does not allow (Lobo & Veloso, 2015).

Other study with the same participants correlated the mindfulness with stress, anxiety and depression levels (Diogo, 2014). A similar result was found because the negative association between mindfulness and anxiety and depression was significant only for the mixed group, not for the indoor group. This result was replicated with 167 participants divided in indoor (23.4%), outdoor (16.8%) and mixed (59.8%) groups (Neto, 2015). The relatedness with nature was also measured and revealed a positive association with mindfulness and a negative one with anxiety and depression symptoms. The outdoor group indicated a higher relatedness with nature (in experiential dimension) than indoor group.

The summarized research shows the current growing interest in the concept of green exercise due to its "instorative" benefits and in the potential of natural environments to promote health and well-being. Could this new approach fulfil, in part, the need to promote the adherence to physical exercise and active lifestyles?

Green exercise implications for health and well-being promotion

Despite research suggesting that interventions connecting people to nature could bring a plethora of positive changes across multiple domains of functioning, nature-based interventions are understudied and underutilized as a mental health strategy (Capaldi et al., 2015). On the other hand, the economic investment in programs to promote physical activity among children, youth, adults and seniors, is less than needed to treat and cure health problems caused by epidemic inactivity, such as those related to obesity or cardiovascular disease (WHO, 2010).

Taking advantage that people of all ages and abilities enjoy contact with nature nearby in several forms (eg. parks, gardens, greenways, naturalized schoolyards and playgrounds, and natural landscape around homes and workplaces), health policy and interventions should be designed to protect and restore access to nature in different spheres of people's lives, because it can alleviate some of the most important problems in public health, including obesity, stress, mental illness, social isolation, or violence (American Public Health Association, 2013).

Although some parks are quite used extensively while others lack visitors (Cohen et al., 2007), maintenance and improvements can change its use and promote physical activity within the park (Cohen et al., 2009). In fact, parks located in most communities across the most modern cities provide an extensive network of free or low-cost options for physical activity and green exercise.

Reviewing the motivational process underlying the relationship between the physical activity behaviours and being in natural environments or outdoor places with attractive views of nature, two different roles emerged (Calogiuri & Chroni, 2014). On one hand, the elements of nature integrated within people's living environments, such as views in the neighbourhood with trees, can encourage active living through leisure physical activity and modes of transport such as walking, jogging or cycling. On the other hand, natural environment are contexts for outdoor recreation that imply a closer relationship between the individual and the nature itself, such as gardening, hiking, fishing, etc. In both cases, experiences in natural environment influence individual attitudes toward physical activities, and strengthen motivation to embrace an active lifestyle, whereas personal and environmental factors either positively or negatively influence the process (Calogiuri & Chroni, 2014).

Public campaigns should encourage visits to natural environments and an active living, by focusing individual beliefs that sustain people's intention to engage in physical activity such as health benefits and stress-relieving effects of being in contact with nature, as well as the advantages of being outdoors as a strategy to sustain physical activity for fitness and aesthetic purposes (APHA, 2013; Calogiuri & Chroni, 2014). The campaign 30x30 Natural Challenge encouraged Canadians from some companies to spend 30 minutes per day in nature during a month using a website with tips and suggestions on how to incorporate more nature contacts into daily life (Nisbet, 2014).

The benefits of green exercise, personal and community gardening, and nature-based play and recreation should be advised by health professionals (APHA, 2013). Particularly, family doctors could provide information about health benefits of being in contact with nature and simultaneously being active so that it would impact people behaviour by subjective norms as well as attitudes towards nature recreation via feelings about nature (Calogiuri & Chroni, 2014).

Group programs such as walking, cycling or running groups, should be implemented in natural environments, allowing positive experiences in natural places and encouraging people to engage in active behaviour when visiting natural environments (Calogiuri & Chroni, 2014). This will additionally promote social interactions. A group of 98 veterans involved in four to seven days of wilderness experience emphasizing various outdoor activities, such as backpacking, canoeing, white-water rafting, and fly-fishing, showed improvements in psychological well-being, social functioning and life outlook (Duvall & Kaplan, 2014). Mood Walks (2015) is another nature-based intervention aimed to promote physical activity, mental health and social connection for older adults dealing with serious mental illness.

Finally, ecological interventions in urban infrastructures should promote the accessibility, safety and aesthetics qualities of the natural environment to guarantee its use for physical activity purposes (Calogiuri & Chroni, 2014). Alliances with parks and planning-design departments or other greening organizations should be established by public health officials to promote access to green spaces where people live, work, and play and to raise awareness about their value. Funding should be allocated for the construction and maintenance of parks, gardens, and other outdoor active environments (e.g., safe playgrounds) especially in areas that currently lack these

resources. Also, to provide safe active commuting to work, school, and services as well as recreation areas, trails and greenways should be networked, as well as support to investment in safety to prevent violence, unintentional injuries, and falls (APHA, 2013).

Nevertheless, to encourage people to visit natural parks and other green environments and promote their healthy and active lifestyles it is necessary to inform them (Calogiuri & Chroni, 2014). So, people of all ages, income levels and abilities should be considered in land use decisions about access to natural areas and productive landscapes. Otherwise professionals of health, education and social areas, as community leaders or residents, students and educators, should receive training programs about the importance of promoting nature contact and physical activity in green areas available (APHA, 2013).

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