

WOMEN'S HURDLES

AN EUROPEAN COLLABORATIVE PARTNERSHIP TO
INCREASE WOMEN PARTICIPATION TO PHYSICAL
ACTIVITY PROGRAMS

INTELLECTUAL OUTPUT 5

Training materials



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BACKGROUND

The Erasmus+ programme

Erasmus+ is the EU Programme in the fields of education, training, youth and sport, the key areas that support citizens in their personal and professional development. The general objective of the Programme is to equip young people and participants of all ages with the qualifications and skills needed for their meaningful participation in democratic society, intercultural understanding and successful transition in the labour market through high quality, inclusive education and training, as well as informal and non-formal learning and social cohesion. Ultimately the objective is to driving innovation, and to strengthening European identity and active citizenship.

The Programme has the following specific objectives:

- promote learning mobility of individuals and groups, as well as cooperation, quality, inclusion and equity, excellence, creativity and innovation at the level of organisations and policies in the field of education and training;
- promote non-formal and informal learning mobility and active participation among young people, as well as cooperation, quality, inclusion, creativity and innovation at the level of organisations and policies in the field of youth;
- promote learning mobility of sport staff, as well as cooperation, quality, inclusion, creativity and innovation at the level of sport organisations and sport policies.

Erasmus plus is organized as follows:

- Key Action 1 - Mobility of Individuals.
- Key Action 2 – Cooperation among organisations and institutions.
- Key action 3 – Support to policy development and cooperation.
- Jean Monnet Actions.

WOMEN'S HURDLES Project is developed within the KA2: the primary goal of cooperation among organisations and institutions is to allow organisations to increase the quality and relevance of their activities, to develop and reinforce their networks of partners, to increase their capacity to operate jointly at transnational level, boosting internationalisation of their activities, and through exchanging or developing new practices and methods as well as sharing and confronting ideas.

The Actions supported under this Key Action are expected to contribute significantly to the priorities of the programme, to bring positive and long-lasting effects on the participating organisations, on the policy systems in which such Actions are framed as well as on the organisations and persons directly or indirectly involved in the organised activities.

The Actions in the field of sport are expected to result in the development of the European dimension in sport by generating, sharing and spreading experiences and knowledge about different issues affecting sport at the European level.

Ultimately, sport projects supported through Erasmus+ should lead to increased levels of participation in sport, physical activity and voluntary activity.

More specifically:

- Increased knowledge and awareness regarding sport and physical activity in Programme Countries
- Increased awareness of as regards the role of sport in promoting social inclusion, equal opportunities and health enhancing physical activity
- Strengthened cooperation between institutions and organisations active in the field of sport and physical activity
- Better participation of sport organisations and other relevant organisations from various Programme Countries in enhanced networks
- Improved sharing of good practices.

In the sport field there are the following specific priorities:

- Encouraging the participation in sport and physical activity, the focus is mainly on:
 - a) the implementation of the Council Recommendation on health-enhancing physical activity, the EU Physical Activity Guidelines and the Tartu Call for a Healthy Lifestyle
 - b) the support to the implementation of the European Weeks of Sport
 - c) the promotion of sport and physical activity as a tool for health
 - d) the promotion of all activities encouraging the practice of sport and physical activity including traditional sport and games and intergenerational sport.
- Promoting integrity and values in sport, the focus is mainly on:
 - a) combating the usage of doping
 - b) combating match fixing and corruption in sport
 - c) improving good governance in sport
 - d) promoting the positive values of sport.
- Promoting education in and through sport, the focus is mainly on:
 - a) supporting skills development in sport
 - b) encouraging Dual Careers of Athletes
 - c) promoting the quality of coaching and staff
 - d) using mobility as a tool for improving qualifications
 - e) promoting employability through sport.
- Combating violence and tackling racism, discrimination and intolerance in sport and tackling violent radicalisation, the focus is mainly on combating those behaviours that may have a negative influence over the practice of sport and society more in general. Projects

contribute to the fight of any form of discrimination and promote equality in sport, including gender equality.

For SPORT projects, there is every year a call for proposals for projects, parted in three categories:

- Collaborative partnerships
- Small collaborative partnerships
- Not-for-profit European sport events

Women's Hurdles Project in a glance

WOMEN'S HURDLES project is a Collaborative Partnerships which offer the opportunity to develop, transfer and/or implement innovative practices in different areas relating to sport and physical activity between various organisations and actors in and outside sport, including public authorities at local, regional, national and European levels, sport organisations, sport-related organisations and educational bodies.

WOMEN'S HURDLES project rationale is that even though it is well known that physical activity (PA) plays a critical role in the prevention and treatment of cardiometabolic risk factors, cardiovascular diseases (CVD), some cancer and brain health; besides, World Health Organization (WHO) estimated that 28% of the global population is physically inactive and this is higher for women (33%) than for men (23%). In the EU, data confirm this gender gap. The adherence to PA programs with women in the peak of their active life (work, household chores, care of family) is very difficult to be obtained and maintained.

This requests an increase in awareness about the risks of sedentary in women and the well-known positive effects of PA, but also a creative effort of optimization of time and opportunities to engage women and motivate them to perform PA, breaking down barriers (this is the reason why the project name is: WOMEN'S HURDLES), maintaining a good adherence to PA programs and therefore to increased levels of participation in sport and PA.

WOMEN'S HURDLES aims to develop, implement and transfer innovative practices related to PA in a high-risk and usually hard to reach population: women, especially those with family and working loads.

The project pursues innovative models that are age appropriate, culturally sensitive, and personalized to women's psychosocial characteristics.

According to the Programme Priorities WOMEN'S HURDLES:

- Encourages women's participation in sport and physical activity
- Promotes education in and through sport
- Reinforces cooperation with partners
- Increases quality of sport projects
- Creates a more dynamic, committed and professional environment

The team of WOMEN'S HURDLES Project is the following:

THE PROJECT PARTNERS



ORGANISATION	COUNTRY
Department of Prevention and Safety of National Research Council of Italy	ITALY
ISES	ITALY
Bulgarian Sports Development Association	BULGARIA
Cardioprevent Medical Foundation	ROMANIA
Hellenic Heart Foundation	GREECE
Nepriklausomu kureju gildija	LITHUANIA

The project is organized in work packages as follows:

WP1 Project management

WP2 Dissemination

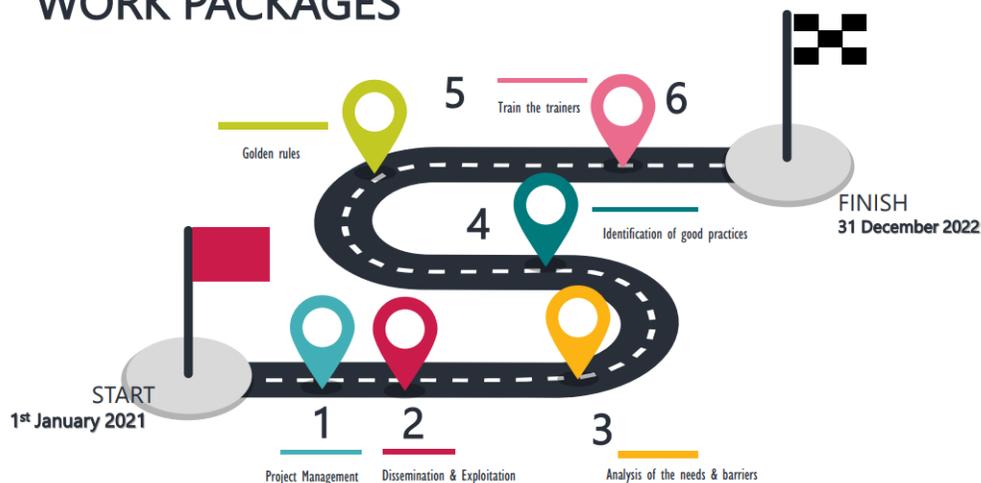
WP3 Analysis of the needs and barriers

WP4 Identification of good practices

WP5 Definition of Golden rules to increase women's participation to physical activity programs

WP6 Organisation of a train the trainers course in Rome (IT) for professionals (physical exercise professionals and sport managers) and national replications of the course

WORK PACKAGES



This present manual has been realised within WP6 but in WOMEN'S HURDLES project all the majority of the activities have been carried out in consecutive stages, while other activities, such as management, quality control and dissemination activities have been ongoing and affected every aspect of the project.

For this reason, it is important to consider the results achieved within WP3, WP4 and WP5 which have contributed to the development of the contents of this manual.

WP3 Analysis of the needs and barriers

A comprehensive analysis of the literature and the ideation and implementation of a survey to identify the barriers to physical activity, and therefore to imagine possible solutions; and, a web research to understand what women search online about "physical activity" in order to contribute in an innovative way to the understanding of the barriers was performed in all the participating countries.

The survey

The common methodological tool used by WOMEN'S HURDLES partners to collect and analyze data and information each one in their country of origin has been a questionnaire composed of 4 sections:

- 1: Demographical information
- 2: Civil and professional status data
- 3: Present and past individual sport engagement
- 4: Factors that influence renunciation and commitment to a physical activity.

Around 200 questionnaires per country were collected and the results are summarized in a report available for download on the project website www.womenshurdles.eu/

The sample pool characteristics were the following: 40 to 50 years of age, living in the urban habitat, married or in a civil partnership, mothers, with a tertiary level education completed, employed, with a sedentary type of work, with a medium to high income, a normal BMI, non-smokers, feeling both mentally and physically good, with no signs of depression.

The web search

The web search aimed to give an overview of the relationship between women and all the hurdles they find to practice physical activity.

In particular, women search online about "physical activity", but we wanted to understand why women talk about sport but do not practice it, most of the times.

To achieve this result, social networks and web pages have been scanned in order to get what barriers women face and how they could overcome them.

The final conclusions of the web search are that lack of time is acknowledged to be the main cause for the lack of physical activity in women's daily lives. However, we can say that due to COVID19 pandemic people's habits have changed because of the lockdowns. Although the pandemic has challenged the training routine in the gyms, it also gave a new opportunity to intensify home workout or outdoor training, in line with the restriction measures. Other reasons are the costs of gym membership, the lack of motivation and self-consciousness and the lack of

social support. Possible solutions to these hurdles were in some cases found online, mainly through Instagram.

More information about the web search strategy and methodology and all the results is collected in a report available for download on the project website www.womenshurdles.eu/

WP4 Identification of good practices

By scouting the literature, partners collected information to understand what are the successful actions that can support women in overcoming possible barriers to their involvement in regular sport and physical activity, what sources of inspiration, based on real actions, can be highlighted and analysed.

The identification and analysis of good practices has been performed in 2 phases: PHASE 1 - Literature review (first step) and assessment of the international interventions by the project partners (second step).

PHASE 2 – Partners' countries interventions identifications and assessment.

Each partner has explored a different methodologies / practice to promote physical activity among women through an analysis of successful and unsuccessful local experiences.

More information about the identification of good practices strategy and methodology and all the results is collected in a report available for download on the project website www.womenshurdles.eu/

WP5 Golden Rules/Manifesto

Based on the results of the survey and the analysis of good practices, the partners worked on a manifesto, with golden rules, presenting general indications to increase women's participation in physical activity programs, to be applied in the local contexts, taking in consideration different cultural, societal and health system-related contexts.

To know the Manifesto, check the dedicated chapter of this Manual.

WP6 Train the trainers

A Train the Trainers (TtT) methodology has been used to implement medical and technical educational activities through the organization of a training course for professionals (physical exercise professionals and sport managers) working in the selected countries.

Project partners selected 2 professionals who participated in October 2022 in the “master event” and who will start the cascade effect of the training.

The methodology

We have decided to have a “train the trainers” methodology because it enables experienced personnel to show a less-experienced instructor how to deliver courses, workshops and seminars in their own environment. In the TtT model, a course is cloned, and the same training materials are passed to the next trainers. The new trainer sticks to the script and in turn teaches the next trainer. This way, it can be guaranteed that a consistent training is deployed efficiently.

Profile of the trainers/trainees

PHYSICAL EXERCISE PROFESSIONAL

- Graduation in Health sciences (Medicine and Surgery, Physiotherapy, Nursing, Psychology) / Graduation in Sciences and Techniques of Sports Activities or similar (as Exercise and sport science, Sport and Exercise Sciences...);
- At least 2 years of experience in the field of Preventive Medicine and/or Physical Activity

SPORT MANAGER

- Manager or owners of gyms, sport clubs, sporting directors
- At least 2 years of experience in the field of sport activities organization and facilities management

The Manual

Our project has the aim to develop, implement and transfer innovative practices related to physical activity in a high-risk and usually hard to reach population: women, especially those with family and working loads.

A merging of the healthcare world with the fitness industry is hopeful and therefore, not only healthcare professionals, but also graduated in exercise and sport science and managers or owners of gyms, sport clubs, sporting directors are the target of our training activities.

Two are the main drivers of the information provided in the following pages:

- Exercise is medicine to be prescribed exactly as a therapy, with indications, contraindications, dosage and administration, warning and precautions, risk of over dosage, and monitoring of compliance[i] is more recent and difficult to be implemented.
- Gender medicine i.e. the biological and gender-based socioeconomic and cultural differences influencing people's health.

It's important to provide women with all relevant information about the risk due to physical inactivity for their CV health, for their bones and muscles; moreover the epidemiological data, the ageing of the population, the role of risk factors, will clarify the importance not only to earn “years to life” but also “life to years”.

On the other hand, women should be aware that with a reasonable, but constant commitment in physical activity they will experience short and long-term physical and psychological benefits.

This manual has been developed for physical exercise professionals and sport managers who want to organise a training course for their peers using WOMEN'S HURDLES knowledge helping them organising physical activities with women of all ages.

EU demography and epidemiology

On 1 January 2021, there were approximately 229 million women and 219 million men in the EU. This corresponds to a ratio of 104.6 women per 100 men, which means that there were 4.6 % more women than men (ec.europa.eu/Eurostat).

There were more women than men in all Member States, except Malta, Luxembourg, Sweden and Slovenia. The highest rates were found in Latvia (16 % more women than men) and Lithuania (13 % more).

Focusing on the countries participating to the project:

Population on 1 January by sex					
2021	Total	Males	Females	Contribution to the total population	Femminility rate
European Union	447.207.489	218.534.272	228.673.217		51,1
Bulgaria	6.916.548	3.349.715	3.566.833	2%	51,6
Greece	10.678.632	5.196.048	5.482.584	2%	51,3
Italy	59.236.213	28.866.226	30.369.987	13%	51,3
Lithuania	2.795.680	1.313.598	1.482.082	1%	53,0
Romania	19.201.662	9.387.590	9.814.072	4%	51,1

The sex ratio varies by age group: women generally live longer than men in all parts of Europe, but women also experience more years of disability than men.

Cardio Vascular Disease (CVD) are a main cause of mortality as well as disability, morbidity and hospitalizations among women in Europe.

Cardio Vascular Diseases that include coronary heart disease (CHD) and cerebrovascular disease (stroke), causes just over 1.8 million deaths each year – around 800,000 deaths in men and 1 million deaths in women, 37% of all EU deaths – 34% among men and 40% among women. CHD and stroke are, respectively, the first and second most common single causes of death in the EU.

CHD is responsible for over 335,000 deaths (14%) among men and for over 297,000 deaths (12%) among women in the EU, while stroke accounts for over 176,000 (7%) male deaths and just under 250,000 (10%) female deaths.

In addition, cancer, the next most common cause of death in the EU, accounts for 748,000 deaths (30%) in men and more than 590,000 deaths (24%) in women.

Comparing the CVD mortality burden across individual European countries reveals substantial variation, with a higher burden typically found in Central and Eastern European countries compared to that in Northern, Southern and Western countries ranging from 23% in France to 60% in Bulgaria among men, while in women, the burden ranges from 25% in Denmark to 70% in Bulgaria. Indeed, the age-standardised CVD prevalence rate in the EU ranged from 3,975/100,000 in Italy to 7,135/100,000 in the Czech Republic among females. The number of cases increased by 26%, among females, between 1990 and 2015.

Among the countries involved in WOMEN'S HURDLES project the epidemiological situation is the following:

Country	Age-standardised death rates from IHD, all ages (x 100.000) - 2012	Age-standardised prevalence rates of CVD (x 100.000) - 2015	Age-standardised DALYs lost rate (x 100.000) IHD-2015
	Females	Females	Females
Bulgaria	166	6.759	2.441
Italy	83	3.975	613
Lithuania	450	6.346	2.183
Romania	284	6.120	2.118
Greece	68	4.052	1.135

Possible explanations for these differences include different risk factor profiles, socio-economic and environmental factors, but also standards of healthcare.

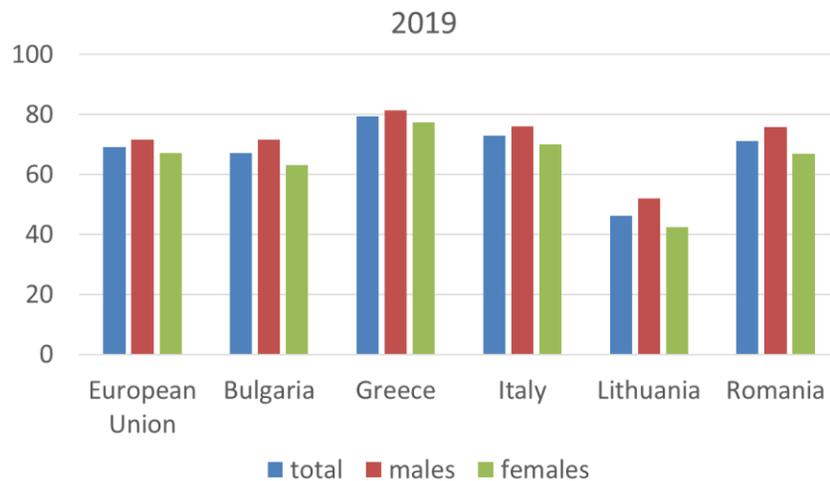
Premature deaths are of interest since many are preventable through reduced exposure to behavioural risk factors plus timely and effective treatment.

In the EU, CVD is the second largest cause of mortality in those under 75 years, resulting in more than 436,000 deaths (26%), compared to 681,000 deaths (40%) from cancer. Among women CVD accounts for around 139,000 deaths (23%), cancer accounts to 279,000 (46%).

Within the EU, CVD is the second largest cause of mortality also in those under 65 years, responsible for around 192,000 (22% of deaths under 65 years) per year, compared to around 339,000 (38%) from cancer. Among women under 65 years in the EU, CVD causes just over 50,000 deaths (17%) each year, compared to just over 144,000 deaths (48%) from cancer.

In Europe the perception of the state of health had a clear decline in 2020 but in 2021 it seems to have exceeded previous levels; gender differences show a lower perception for women in each country involved in the project. Although the perception of health status is worse for women than for men, the average life expectancy of women at birth is historically higher than that of men.

	TOTAL			MALES			FEMALES		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
European Union	69,2	-	-	71,5	-	-	67,1	-	-
Bulgaria	67,2	66,7	67,6	71,5	70,8	71,7	63,2	62,9	63,8
Greece	79,3	78,6	78,3	81,4	80,1	80,1	77,4	77,1	76,5
Italy	72,9	-	73,6	76,0	-	76,2	69,9	-	71,0
Lithuania	46,2	44,3	47,9	51,9	49,5	52,3	42,5	48,9	45,8
Romania	71,2	73,0	72,8	75,9	77,4	77,1	66,8	69,8	68,7



The Eurobarometer survey on physical activity collects data for EU countries on the frequency of participation in exercise or sport and in non-sport physical activities such as active transport, dancing or gardening.

Looking at the last Eurobarometer, overall, participation in exercise or sport was relatively low across the EU, with 45% of respondents on average reporting that they never participated in these activities and only 6% practise an activity on a regular basis.

Respondents in Finland (71%), Luxembourg (63%), the Netherlands (60%), and Denmark and Sweden (59% in both countries) are the most likely to exercise or play sport at least once a week. Conversely, over half of respondents in eight countries say they never exercise or play sport, with the highest levels in Portugal (73%), Greece (68%) and Poland (65%).

If we compare women and men, we can clearly see how women are less active than men: only 5% of women exercise regularly and 30% moderately.

Overall, in the EU, men exercise, play sport or engage in other physical activity more than women. This disparity is particularly marked in the 15-24 age group, with young men tending to exercise or play sport on a regular basis considerably more than young women. The amount of regular activity that people do tends to decrease with age. Women (35%) tend to be more likely than men (28%) to never engage in other physical activity such as cycling from one place to another, dancing, gardening, etc

In the table below the percentages of insufficiently active adults in the European partners of the project:

Country	Never or seldom exercise or play sport	Never or seldom exercise or play sport
	Males	Females
EU27	57%	65%
Bulgaria	76%	82%
Italy	62%	70%
Lithuania	65%	71%
Romania	78%	82%
Greece	73%	81%

The gender gap is present also in the new generations: the Analysis of Health Behaviour in School-aged Children (HBSC) survey show that globally 80% of the 13-15 years olds students do not accumulate the recommended 60 minutes of moderate to vigorous PA per day, and again girls are less active than boys.

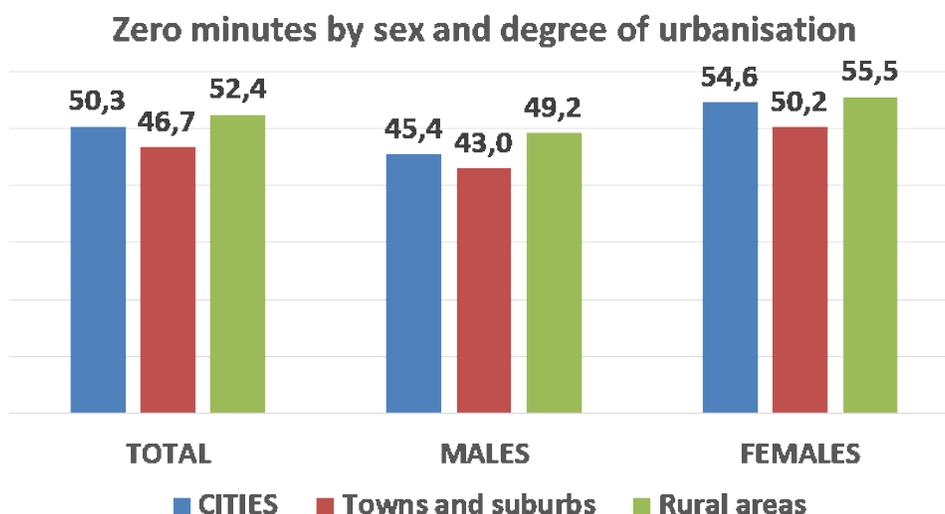
Performing health-enhancing physical activity is a male characteristic both at the EU and at the single country level. The best performance in this case is from Lithuania but all the countries considered are far below the European average, therefore with wide space for improvement.

The percentages are higher for the youngest and for those with a high level of education.

	Total			Males			Females		
	Aerobic and muscle-strengthening	Aerobic	Muscle-strengthening	Aerobic and muscle-strengthening	Aerobic	Muscle-strengthening	Aerobic and muscle-strengthening	Aerobic	Muscle-strengthening
EU	13,6	31,0	19,7	16,1	35,3	22,4	11,3	27,0	17,3
Bulgaria	5,3	10,2	7,7	8,4	15,2	11,3	2,5	5,7	4,5
Greece	7,1	18,3	10,3	9,7	22,7	13,1	4,8	14,3	7,8
Italy	7,9	18,6	11,5	10,3	23,1	14,1	5,7	14,6	9,2
Lithuania	10,3	19,5	19,2	13,5	23,5	22,8	7,7	16,1	16,3
Romania	1,5	7,0	1,8	2,5	11,1	2,9	0,6	3,2	0,7

Zero time spent on health-enhancing (non-work-related) aerobic physical activity are influenced by sex and degree of urbanization: the levels of sedentary lifestyle are higher for women than for men but living in a peripheral area is a protective factor because it corresponds to lower percentages of sedentary lifestyle.

Zero minutes	TOTAL	MALES	FEMALES
European Union	49,8	45,9	53,5
Bulgaria	82,7	75,1	89,4
Greece	74,1	70,0	77,7
Italy	65,0	59,4	70,0
Lithuania	63,7	57,3	68,9
Romania	84,4	76,5	91,7



The top reason preventing people to practise sport is the lack of time (41%) and the second is the lack of motivation (25), only 10% for financial reasons.

The wide disparities between countries and the inequalities within countries should be of concern to all European policy makers as well as to national Governments, regional, community policymakers and health planners.

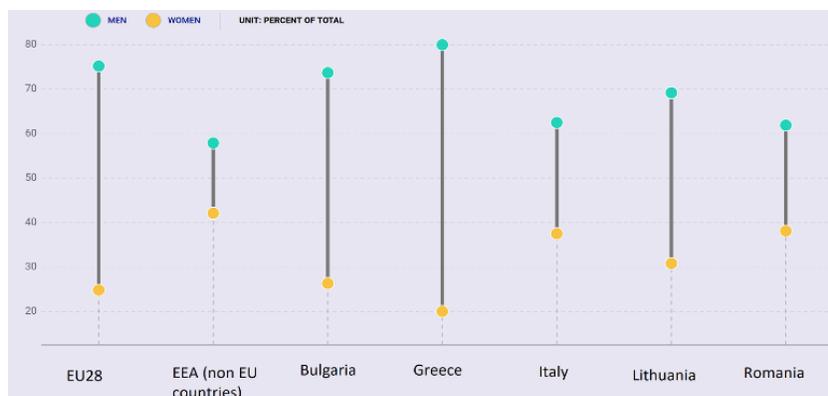
Gender gap

Considering that we are studying the hurdles women encounter it is important to analyze the issue of gender (in)equality at European level.

The issue of gender equality is measured through a complex index that includes various information about work, economic condition, level of education, power position, health, free time. This index allows an overall view and a quick comparison between countries



With regard to positions of high responsibility in the field of sport (National Olympic Committees: presidents, deputy/vice-presidents, members and executive heads) women always have a much smaller presence than men (as a percentage of the total number of employees, that is this figure does not depend on the total number of employees).



Women heart & vascular

Major risk factors for cardiocerebrovascular diseases can be divided in non-modifiable risk factors (age, premature menopause, genetic predisposition as family history of premature CCVDs) and modifiable risk factors (elevated LDL-cholesterol, low HDL-cholesterol, arterial hypertension, diabetes, obesity, smoking, sedentary life, stress, low socio-economic class). A protective factor as HDL-COLT is higher in women even in subjects with heterozygous familial hypercholesterolemia.

Cardiovascular risk factor changes during menopause:

- ↑ insuline-resistance
- ↑ glycemia
- ↑ body weight (abdominal)
- ↑ blood pressure
- ↑ triglycerides
- ↑ total cholesterol
- ↑ pro-thrombotic factors (as homocysteine, fibrinogen, factor VII)
- ↓ HDL-cholesterol

The INTERHEART study data identified 9 potentially modifiable risk factors that account for 96% of the population-attributable risk of heart attack in women: smoking, hypertension, type 2 diabetes, waist-to-hip ratio, dietary patterns, alcohol consumption, plasma apolipoproteins, psychosocial factors and physical activity. For young women with favourable levels of all 5 major traditional risk factors (smoking, hypertension, diabetes, serum cholesterol, and body mass index), CHD is a rare event, but unfortunately, only about 20% of women <40 years of age meet these low-risk criteria. With regards to the waist-to-hip ratio the “Apple obesity” waist measurement > hip measurement (intra-abdominal fat) is a cardiovascular risk factor, while the “pear obesity” (sub-cutaneous fat) waist measurement < hip measurement is not.

The psychosocial factors are important because women are subjected to double stress: work and family load. Men managers after coming home from work can relax, while women speed up blood pressure, pulse, noradrenaline. The double family and work stress accelerate progression of coronary disease in women.

Coronary heart disease has traditionally been considered a disease of men and, indeed, women are often older when they present with their first acute myocardial infarction (MI).

Regardless of age, within a year of a first MI, more women than men will die (26% of women and 19% of men); within 5 years of a first MI, more women than men will die (47% of women and 36% of men), have heart failure (HF), or suffer from a stroke; compared with men, women with MI and those after coronary revascularization have longer hospitalizations and higher in-hospital mortality. These data underline that CHD remains understudied, underdiagnosed, and undertreated in women (the so called “Yentl Syndrome” as defined in an Editorial on NEJM in 1991).

Eventually, women are faced with several barriers to participate to Cardiac Rehabilitation that may account for their lower enrolment, poorer adherence, and higher dropout rates.

Women bones

The human skeleton has different functions: support, movement, protection, production of blood cells, storage of minerals, endocrine regulation

There are 206 bones in our body: flat, short and long bones. The long bones (e.g. femur and humerus) ends are organized in two different structures:

- COMPACT BONE -> hard cortex on the outside
- SPONGY BONE -> trabecular structure on the inside

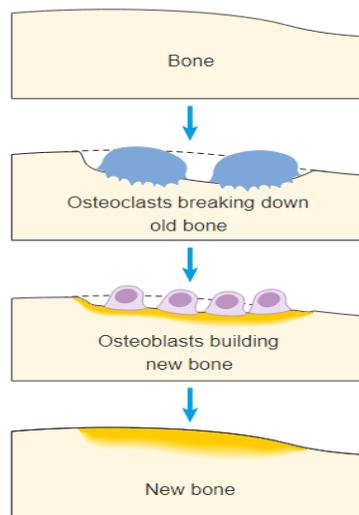
This differentiation allows the bones to be resistant, elastic and lighter at the same time.

During all life, the bones are constantly under the effect of 2 different type of cells:

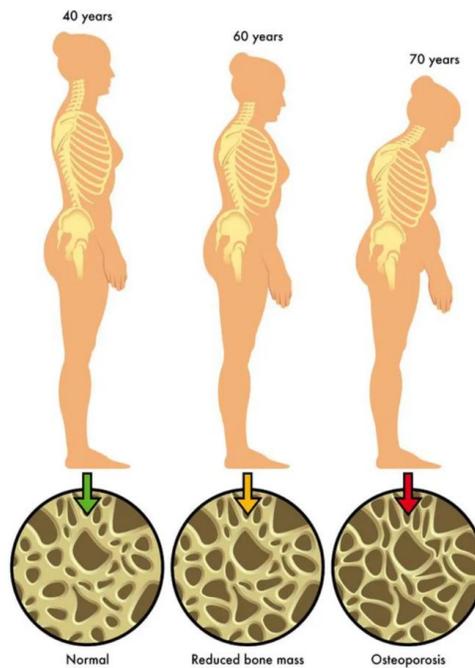
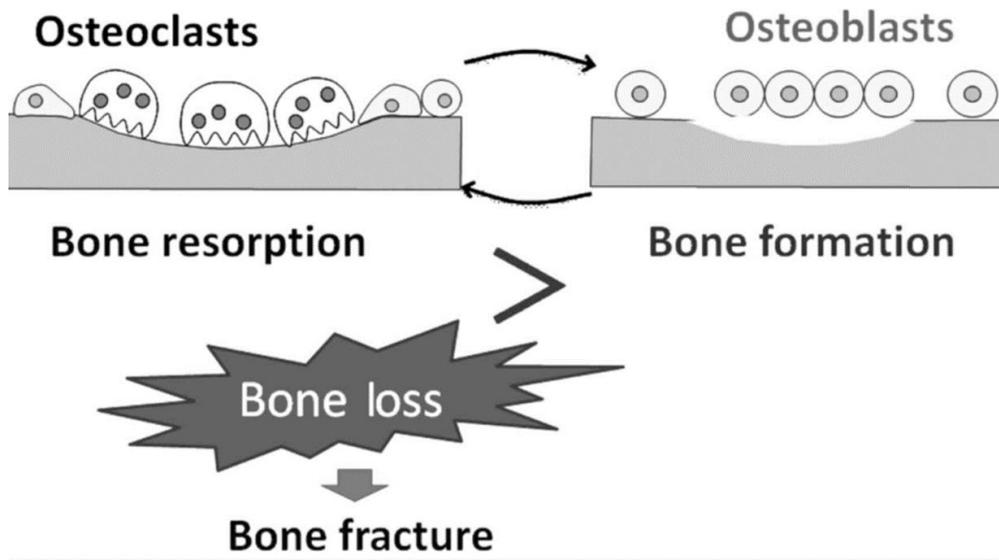
- OSTEBLASTS -> create new bone
- OSTEOCLASTS -> destroy old bone

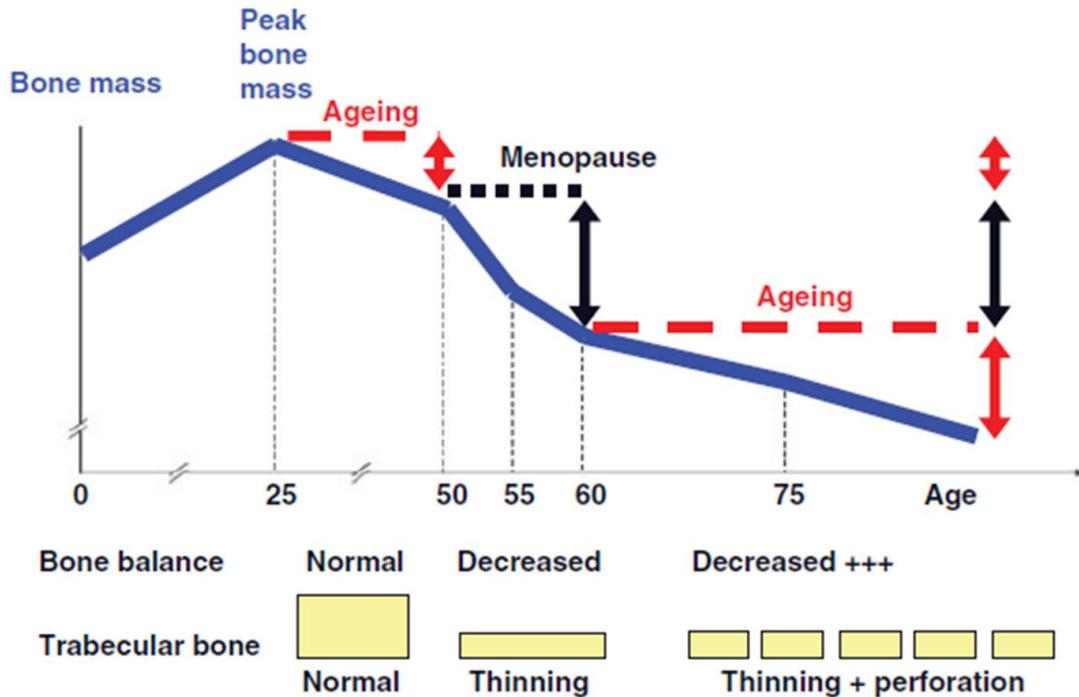
Normal bone remodelling is necessary for growing, fracture healing and skeleton adaptation to mechanical use, as well as for calcium homeostasis.

Osteoclasts and osteoblasts must maintain an equilibrium to keep the bone healthy and functional.



An imbalance between bone resorption and formation can result in several bone diseases, like osteoporosis, a pathological condition characterized by low bone mass and micro-architectural alterations that can lead to bone fragility and eventually to fractures. Women are particularly hit by osteoporosis, because of the role of the hormone estrogen, which is more produced in females than in males. The decrease in estrogen level at menopause is the main cause of bone loss and osteoporosis: the estrogen suppresses the osteoclast formation and activity as well as induces osteoclast death.





During pre- and early puberty, the skeleton is most amenable to the influences of mechanical stimuli.

As bone structure influences bone strength, exercise during growth could have long-term anti-fracture benefits via the structural changes it induces, independent of any long-term effects on bone mass. Half of the benefit in bone size and one-third of the benefit in bone strength obtained from physical activity during youth are maintained throughout life, even though the bone mass benefits are lost. When physical activity was continued during aging, some mass and more strength benefits were preserved.

These data suggest that physical activity during youth should be encouraged for lifelong bone health, with the focus being optimization of bone size rather than increasing mass. If loading on a particular bone increases, the bone will remodel itself over time to become stronger to resist that sort of loading.

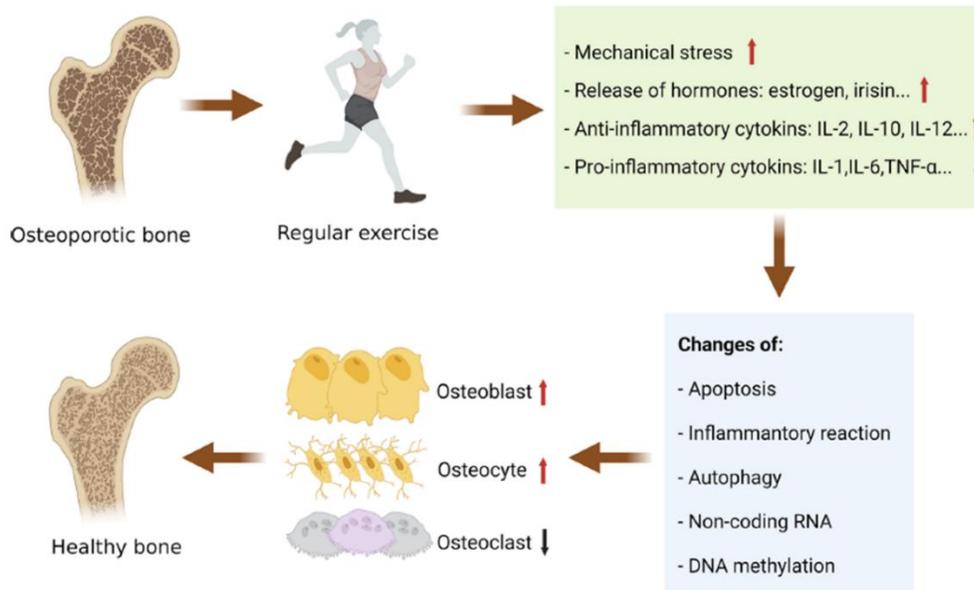
The internal architecture of the trabeculae undergoes adaptive changes, followed by secondary changes to the external cortical portion of the bone, perhaps becoming thicker as a result.

The inverse is true as well: if the loading on a bone decreases, the bone will become less dense and weaker due to the lack of the stimulus required for continued remodelling (Wolff's law).

Keep stresses on your bones and keep moving allow the bones don't become more frail.

How does exercise increase bone density? Physical activity helps build bone tissue as well as muscle.

The mechanism of exercise improving osteoporosis



Weight-bearing and resistance exercises are the best for bones.

- Resistance exercises force you to work against gravity: They include walking, hiking, jogging, climbing stairs, playing tennis, and dancing.
- Weight-bearing exercises, such as lifting weights, can also strengthen bones.

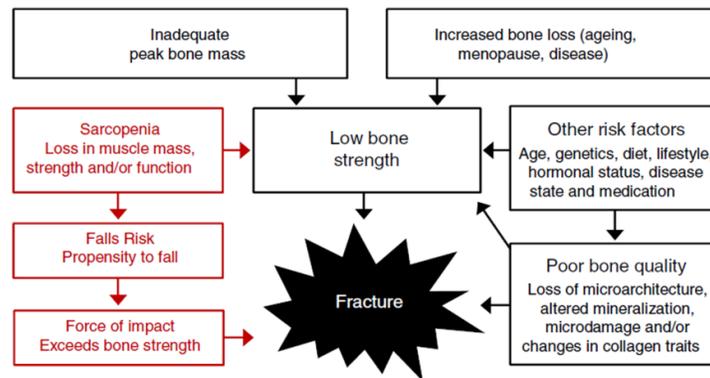


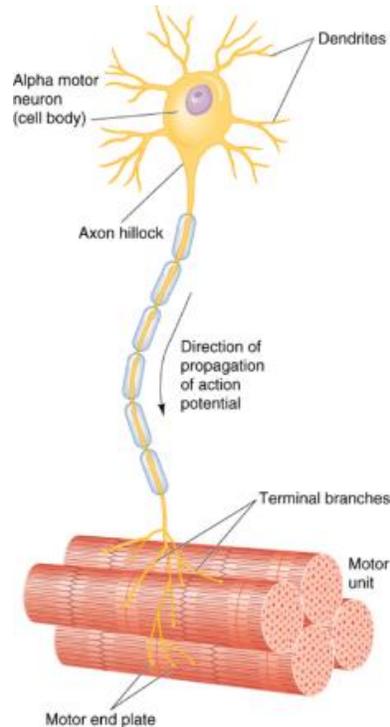
Figure 1 Pathogenesis of osteoporotic-related fractures. The risk for fracture is dependent on both skeletal and non-skeletal risk factors, but fractures result from a structural failure of bone, wherein the loads applied to bone (most often from a fall) exceed its strength.

Adults aged 65 years and above should do same as for adults and as part of their weekly physical activity, varied multicomponent physical activity that emphasizes functional balance at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.

Women muscles

In the body there are smooth muscles (involuntary muscles; controlled unconsciously in the walls of blood vessels and internal organs), the cardiac muscle (controls itself with assistance from the nervous and endocrine systems, present only in the heart) skeletal muscles (over 600 voluntary muscles, controlled consciously).

The motor unit is the functional unit



The muscle fibers can be categorized as follows:

Slow-Twitch (ST)	Fast-Twitch (FTa) Muscle Fibers	Fast-Twitch (FTb) Muscle Fibers
High aerobic (oxidative) capacity and fatigue resistance	Moderate aerobic (oxidative) capacity and fatigue resistance	Low aerobic (oxidative) capacity and fatigue resistance
Low anaerobic (glycolytic) capacity and motor unit strength	High anaerobic (glycolytic) capacity and motor unit strength	High anaerobic (glycolytic) capacity and motor unit strength
Slow contractile speed (110 ms to reach peak tension)	Fast contractile speed (50 ms to reach peak tension)	Fast contractile speed (50 ms to reach peak tension)

and myosin ATPase	and myosin ATPase	and myosin ATPase
10–180 fibers per motor neuron	300–800 fibers per motor neuron	300–800 fibers per motor neuron
Low sarcoplasmic reticulum development	High sarcoplasmic reticulum development	High sarcoplasmic reticulum development

Genetics determine which type of motor neurons innervate our individual muscle fibers. Muscle fibers become specialized according to the type of neuron that stimulates them.

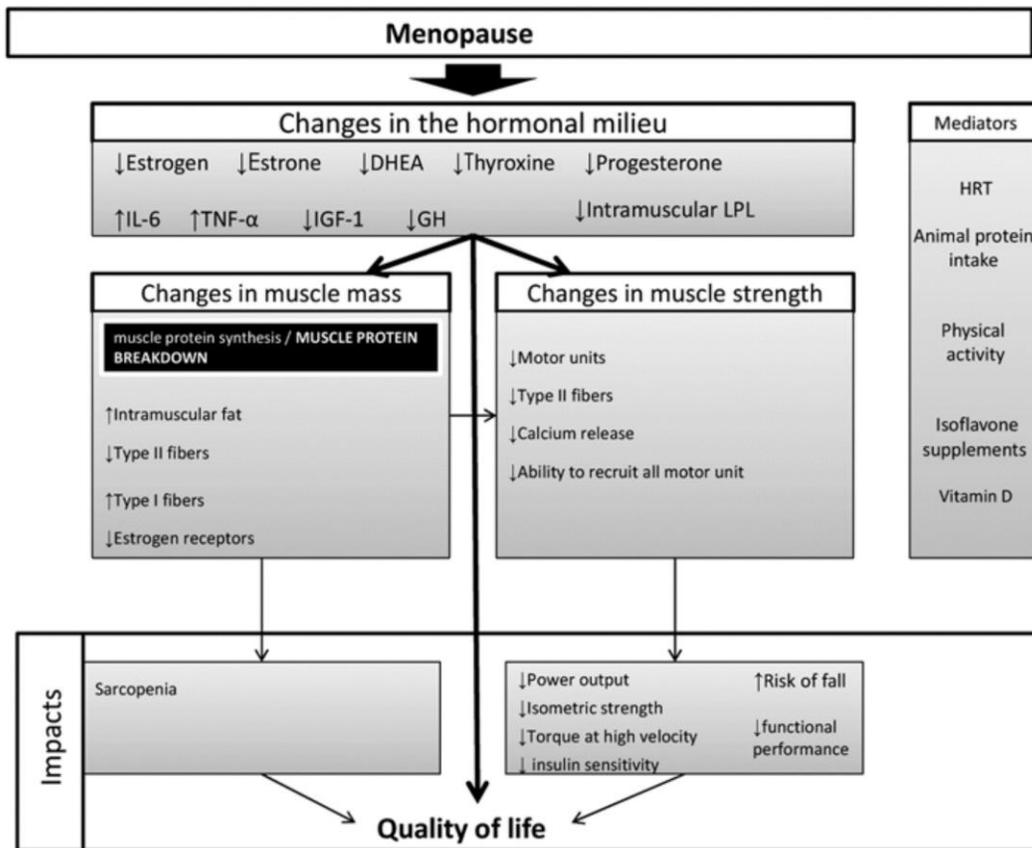
Endurance training, strength training, and muscular inactivity may result in small changes (less than 10%) in the percentage of FT and ST fibers. Endurance training has been shown to reduce the percentage of FTb fibers, while increasing the fraction of FTa fibers.

Aging may result in changes in the percentage of FT and ST fibers.

In both sexes muscle performance determinants are fiber type composition, muscle mechanical properties, cross sectional area (CSA) and training status.

For female muscle female physiology and age-related changes (menopause) should be considered.

Menopause is associated with a natural decline in estrogen, that increases visceral fat mass, decreases bone mass density, muscle mass, and strength. Studying changes in muscle mass associated with menopause is important, because of the high number of postmenopausal women in developed countries and the related risk of physical incapacity. Among modifiable factors, low physical activity and protein intakes are the best contributors to sarcopenia and the loss of strength in postmenopausal women. On the other hand, some biological factors, namely oxidative stress, inflammation, estrogen and other hormone deficiency are predictors of these phenomena. Interestingly, some methods have the potential to attenuate the loss of muscle mass and strength such as exercise, and supplement intake.



Age-related deterioration in muscle performance is one of the major reasons for decreased functional capacity and disability in older people. In women, impaired muscle performance has already been observed during peri-menopause in concert with rapid and dramatic decrease in ovarian hormone production. This observation suggests that female sex steroids may have an important role among other agents in regulating muscle performance in middle-aged and older women. Previous experimental studies have shown that hormone replacement therapy (HRT) and intensive physical training have positive effects on muscle force and explosive power in healthy post-menopausal women. Hormone replacement therapy in combination with physical training may exert even greater gains in muscle performance than HRT and training alone. Despite the significant mean increase in muscle force and power by HRT and/or training, a considerable variability in the individual responses is observed.

Physical activity

Physical activity is one of the milestones of prevention as Hippocrates stated 4 centuries before Christ.

For PA we could consider any bodily movement produced by skeletal muscles that results in energy expenditure: domestic, occupational, transport and leisure time activity.

If sedentary life is strongly associated with obesity, diabetes, cardiovascular diseases and some cancer, on the contrary, physical activity (PA) plays a critical role in the prevention and treatment of cardiometabolic risk factors (obesity, diabetes, hypertension), CVD (above all heart disease and stroke), brain health (improved cognitive function, reduced risk of dementia, reduced incidence of anxiety and depression), some cancer (lower incidence of bladder, colon, endometrium, oesophagus, kidney, lungs, stomach cancers).

The main effects of PA are the following:

- ↓ body weight
- ↓ blood pressure values
- ↓ blood sugar levels
- ↓ insulin resistance
- ↓ triglycerides
- ↓ LDL-cholesterol
- ↑ HDL-cholesterol
- ↑ bone density
- ↑ memory test

The psychological benefits of exercise are repeatedly and consistently reported in the literature. Various forms of exercise, varying in duration and intensity, yield comparably positive changes in affect, which sheds doubt on the significance of exercise characteristics in the acute mental health benefits resulting from physical activity: mental wellbeing, coping with stress, specific benefits in difficult life phases (e.g, postpartum, menopause).

The recommended physical activity by the World Health Organization WHO for adults is the following:

- at least 150–300 minutes of moderate-intensity aerobic physical activity;
- or at least 75–150 minutes of vigorous-intensity aerobic physical activity;
- or an equivalent combination of moderate- and vigorous-intensity activity throughout the week

plus muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits. Another aspect is limiting the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits.

OVERCOMING THE HURDLES

Introduction

The objective of WOMEN'S HURDLES is to develop, implement and transfer practices related to physical activity in a hard to reach and teach population: women in their active period.

In early adulthood women experience drastic changes in lifestyle: transition from school to adult life, search for identity, openness to experience and therefore physical activity is no longer mandatory. In fact, women are more and more represented in the workplace, but continue to perform the majority of household tasks, leaving little time for extracurricular activities such as physical activity.

Women as they grow up, experience less enjoyment in exercise, have less confidence in their physical abilities and therefore believe exercise is not for them, take the biggest share of housekeeping and child rearing duties and don't get as much support from their social circle. Adherence to lifestyle changes is complicated by the lack of time of women involved in household chores, childcare, care of elderly /sick family members, and voluntary work. Women with children under the age of 15 are particularly at risk for low levels of physical activity, often reporting lack of child-care as a reason for inactivity. But many homemakers also report feeling selfish and guilty as barriers to the promotion of physical activity when choosing to take time away from household responsibilities and family especially those with young children.

Older women reported lower levels of most "physical" activity barriers than women in all other age groups because of reduced care giving duties and/or retirement from full-time employment, but they are sensitive to their health-related needs and abilities.

Globally, women who don't exercise don't gain its benefits, are more in risk for future issues and experience more barriers.

There is no magic formula, but a set of practical and emotional changes behind a woman's decision to undertake physical activity. Attitudes and behaviours may vary for different target audiences. It is the responsibility of the sports and exercise deliverers to ensure that they build on this by understanding the specifics of their target groups.

WOMEN'S HURDLES produced a "Manifesto for physical activity in European women" with the definition of Golden rules to increase women's participation to physical activity programs to pull out key learnings which apply at a high level to most women.

However, WOMEN'S HURDLES team expects that this Manifesto can be used as a starting point and a reference for community-based actions to be implemented at European, national, regional and local levels.

Identification of the barriers

Barriers are complex and numerous, but not insurmountable.

The knowledge of barriers is the indispensable premise for finding solutions to the problem of low level of physical activity in European women: health and social care services need to understand and address barriers to women participation in regular physical activity (women's hurdles, hence the title of the project) and ultimately try to break them down.

The factors that prevent individuals from engaging in an activity or hinder their ability to do so can be classified as follows:

Contextual barriers

- Lack of time is often given as the main reason preventing women from taking part in sport and exercise.
- Lack of information is another significant barrier, particularly compounded by lack of time to find the information.
- Costs
- Lack of programs or facilities

Personal Barriers

- Absence of "self-permission": while women may see that they should be doing more for themselves and their health, the training/cultural background, cause them to believe that they do not have permission to do so, taking time for themselves appears selfish or indulgent to them. A midlife woman typically put herself at the bottom of the priority list, a woman's responsibility is to put her family's welfare above her own. In the case of mums in particular, spending time on exercise might be perceived as neglecting her domestic and maternal duties.
- Fear of being judged: from immediate friends and family (afraid of not living up to their expectations), from other women (not matching up to their standards) and from men (dismissive of their ability).
- Worries about appearance: can be a general unhappiness with having to reveal their body, as well as being put off by what looking like once you do exercise (no make-up, hot, sweaty etc.).
- Lack of social confidence/support: women often are put off by the idea of having to 'confront' these activities on their own.
- Concerns about ability/performance: for women who have worries that they won't fit in 'it's not for me'. Even women who have been previously very sporty can worry about ability and failure to live up to expectations.
- Concerns about danger: for women with injuries or health conditions.
- Lack of motivation, predicted lack of enjoyment

In our research (WP3) we have found that barriers are quite independent from financial aspects or from the lack of sport centers. Above all, they are linked to the lack of time, as well as the lack of motivation.

Golden rules Manifesto

1. INVOLVEMENT of the WHOLE DECISION-MAKING PYRAMID

For a true change in sports and organized physical activity, women should have more opportunities to participate in decision-making in sports organisations and institutions, as well as in administrations and agencies dealing with sport.

Women have to cover all positions of the organizational pyramid and all roles (decision makers, directors, coaches, referees, trainers...).

A fundamental change of mentality is requested: sport and exercise are generally not perceived as directly relevant to what goes on in everyday life for women. It rarely appeals to women's core values or reflects what is important to them.

2. WOMEN of ALL AGES NEED TO PRACTICE SPORT or PHYSICAL EXERCISE

Women of all ages benefit from physical activity.

Moreover, some "sensible phases" in women's life and particular women's categories have to be carefully monitored.

- a. *Late adolescence*: The habit of encompassing sport in our daily routine can be an acquired habit that can be taught in our school years, when the curb of learning and memorizing new skills is of easier and powerful form. In other words, if a person decides to start a physical activity in her school period, she may be more prone to continue that aspect in her adulthood. However, searches show that too many girls are dropping out of sport and physical activity during teenage years and developing deep-rooted negative attitudes towards it, which act as barriers throughout life. The adolescents need to feel to be part of a group, to obtain commitment and an extracurricular leisure, healthy and balanced growth both at the body and mental level. Young girls are at high risk of social isolation, eating disorders and vigorexia.
- b. *Pregnancy*: Physical activity is important to allow women to continue to take care of their bodies and perform still useful physical activity during pregnancy when they are afraid of hurting their babies; after pregnancy to discharge the typical stress in the post-partum, with vulnerability to mood disorders; in the motherhood when there is a huge increase in responsibilities and a little free time when they can feel guilty about leaving the baby to others to take care of their bodies (*A Woman Even Before Being A Mother Must Be A Woman!*).
- c. *Menopause*: Many women are unprepared for how debilitating the symptoms may be; moreover, physical exercise counteracts some of the metabolic changes due to menopause and the effects on women's health. There are changes in body image and loss of confidence in it, negative mood and anxiety symptoms. Physical activity can help women cope with these changes, helping them sustain self-confidence.
- d. *Breast cancer and other cancers/chronic diseases*: Physical activity has a role to accept and reconnect with their bodies, build new self-confidence, enhance self-expression, address feelings of isolation, depression, anger, sense of inadequacy and fear and to

strengthen personal resources and above all, to do a physical activity necessary for their well-being.

- e. *Disabilities*: Women with disabilities have 'double discrimination' in sport and organized physical activity: being person with disability and being a woman. For women with disabilities, activities need to be accessible making it easier to integrate within mainstream offerings.
- f. *Hard to Reach Population*: As low-income women, migrants/refugees, other underprivileged women.
- g. *Overweight/Obesity*: It is important to break the vicious circle leading a sedentary life accumulating extra weight that will result in less physical involvement as it is gets harder and harder to be active; the increase in the BMI can be the cause of several health problems that potentially reduce the possibilities to perform physical/sport activity as demonstrated by literature data active normal weight women -> 62%, active overweight women -> 46%, active obese women 35%.
- h. *Depression*: Physical activity has important psychological benefits thanks to the secretion of serotonin, the hormone of wellbeing or happiness, that leads to a state of satisfaction and joy.

A huge campaign in alliance with traditional and modern media is mandatory in order to overcome barriers and stimulate participation in physical activity, in order to increase awareness about healthy life-style habits, the importance of long-term adherence to physical activity and the risks of dropping-out during the course of life, mainly at "critical milestones"

3. PERSONAL MOTIVATION IS THE DRIVER

Human beings are born to be active, but we live in a lazy world, that's why everybody needs to find the right motivation to be consistent.

Extrinsic motivation with external pressures, rewards like the desire to earn an external reward or avoid externally imposed punishments is unsuccessful, lasts in the short term, fades with immediate pressure. Focus on appearance motivation encourages wrong attitudes.

Intrinsic motivation is based on the sense of accomplishment, enjoyment, and other innate rewards that are gained from physical activity, while health benefits with the aim to motivate have to be used with caution.

Intrinsic motivation makes deciding to exercise easier. The more one enjoys exercise the easier it is for them to decide to be physically active. Being in a good mood can boost physical/sport activity while a simple physical activity can drastically improve the psychological condition of a human being. Moreover, help women develop intrinsic motivations is a key to long term consistency. Physical exercise practice can become an activity that gives willpower.

Women should be assisted to break down practical and personal barriers and build up a consistent personal motivation.

The main question is "What Do You Like To Do?". This is the only guarantee of long-term persistence.

The goal of trainers must be to find the best strategies to avoid the drop out:

- inputs in the decision-making,
- feedback, for the first 3/5 months, until the exercise becomes an established habit,
- monitoring continuous but not harassing.

Re-think sport and exercise to incorporate a social element.

Arrange “bring a friend (or carer)” discounts to encourage women to overcome the fear of exercising alone.

The formation of training groups with fixed participants based on personal needs and motivation will encourage the socialization and motivation and favour sisterhood and therefore persistence.

Develop feelings of “sisterhood” to overcome personal barriers such as lack of time and children care.

Exercising alone is for the real determined, those who have firm personal motivation and enjoy exercising.

The risk if this doesn't happen is that “Women Talk About Sport But Don't Practice It”

If women are never able to overcome that sense of inadequacy due to a wrong approach, they will never be able to experience the countless physical and psychological benefits that physical activity brings.

4. COMMUNICATION PRINCIPLES

The word “sport”, “gym” and its traditional accompanying images can trigger negative associations for many women as competition, fatigue. Proper communication about the experience women will have in practicing physical activity is fundamental.

- Positive messages about fun and well-being, and less about health, are necessary.
- Use words that resonate physical exercise not as another duty, but as fun, freedom, exploration.
- Reframe activities as quality time to spend with friends / family.
- Assume a positive, motivational tone of communication rather than patronizing or authoritative.
- Myth-busting messages: make it clear that one does not have to be super fit to participate and that others will be beginners as well.

5. THE ROLE of TESTIMONIALS

A woman's body is visible, on display. Physical exercise and sport are associated to images of fitness and beauty that can be a wonderful motivational trigger but may feed feelings of inadequacy and trigger body image issues. These develop social physique anxiety, body image dissatisfaction, anxiety and insecurity to show the body in social settings that comes from the fear of being judged for one's appearance.

Similarly, athletes and coaches often promote specific body standards for best performance.

There is the need for role models to inspire, characterized by similarity/relatability, with shared values and goals. Thus, it is important to use real role models showing women confident being themselves: show women in sports clothing exercising and sweating but still looking comfortable

and happy, engage testimonials and use real life case studies/models demonstrating everyday women participating in sports to whom others will easily relate.

The role of education is confirmed by the results of WP3 showing that a higher level of education is more important than a higher economic level (report being physically active: 44% of participants with primary education, 61% of those with lower secondary education, 57% and 61% respectively of those with university or college education).

Communicate to women that by exercising they will be a good role model for their daughters as well as for others around them.

6. The ROLE of PARTNERS

Single women are more easily able to set and stick to a routine that includes physical activity due to a greater individuality and flexibility in organizing how they spend time in their day-to-day life, while women in committed relationships have to compromise and fragment their schedule according to that of their partner's (in the WP3 reported themselves as physically active: 63% of widows, 62% of divorced women, 58% of single women that have never been married, 54% of women married or just living together with a partner).

It is of paramount importance to offer husbands the opportunity of living together with a happy healthy wife, that is one doing sports and plenty of physical activity.

Partners should be encouraged to support women in practical ways (domestic chores e.g. childcare and cooking) to free up women's time as well as offering emotional support and positive encouragement.

7. The ROLE of CHILDREN

The fact that one individual has to take care and be responsible over another individual's life is very challenging. There are many factors to take into consideration, starting with satisfying basic needs (accommodation, nutrition, safety) and continuing with education as well as psychological and emotional support, actions that need time and commitment.

When we are talking about engaging in physical activity that is structured, regular and comprehensive, the majority of women with children have difficulties participating in it.

For a working woman, the time spent with their children is always too short, the programs due to the needs of children are inflexible therefore the support from the rest of the family is crucial. Organizing sports or physical activity together with their children may allow to optimize time slots and avoid guilty feelings and negative self-perception of selfishness.

From a practical point of view the solution may be:

- Offer family fun sessions or ways to exercise with children.
- Offer parallel courses (at the same time) mother/children.
- Set up a kindergarten or a room for homework in the sport facility.

8. The ROLE of the WORKPLACE

For a working woman, the need to optimize time availability is crucial. The opportunity to be engaged in physical activity at workplace during worktime could be very useful. Employers should offer flexibility in work schedule, offer corporate wellness and opportunities for exercise in the workplace: trainers and properly equipped places. In return they will get happy and healthy employees and an impressive increase in productivity.

It's important to offer a wide choice of time slots to allow women to find the right activity at the right time: before/after work, during lunch break, weekend mornings, later evening after children's bedtimes.

Moreover, women-will benefit from improvement of time management skills.

9. The ROLE of TECHNOLOGY

Technology may offer varied and updated advantages such as training (individual/group) at distance but with an online trainer for women who can't or don't want to go to the gym. Personal touches in communications are fundamental (e.g. text message reminders about forthcoming sessions, messages to offer encouragement after missed sessions).

Without an adequate structure and a specific approach, social media is not the right channel to create continuity in training.

10. The IMPORTANCE of PERSISTANCE

A wide and tailored proposal may balance many initial concerns of women approaching physical activity programs, then on many occasions in a woman's life the adherence to sports participation or physical activity programs may decrease or even completely stop. Every possible effort should be undertaken to maintain women's adherence to physical activity throughout all their lives.

- Arrange taster and drop-in sessions which allow women to participate without concerns of spending too much time.
- Offer sessions tailored to different ability levels, especially for beginners, those lacking confidence, as well as for the more advanced.
- Women-only sessions are particularly important to some communities and need to be organized and delivered appropriately. For example, male staff cannot walk into sessions to repair equipment.
- Age-targeted activities (at both ends of spectrum) can appeal to younger and older generations
- Offer 'bankers', activities whose popularity is well established (e.g. fitness and dance-based classes such as Zumba) can maintain a high motivation

Importance of communication

Considering that many barriers are personal barriers such as lack of motivation, low self-esteem, absence of self-permission, communication plays a crucial role.

It is important to use words that resonate physical exercise not as another duty, but as fun, freedom, exploration, reframe activities as quality time to spend with friends / family and explain women they are a good role for their daughters and others around them.

A positive, motivational tone of communication is more efficient than a patronizing or authoritative one. Accordingly, well prepared, friendly female instructors, who have been trained in softer skills and understand the importance of boosting women's confidence may be very important: for women that relish a challenge, they may set goals and encourage progress towards them, they may provide a personal touch in communications and finally they may ask for feedback and input in decision-making.

With regards to informative materials, it is important to make it clear that women don't have to be super fit and that there are programs for beginners, to show sweating women in sports clothing comfortable and happy in themselves, to engage energizing, but reliable testimonials, to use real life case studies that show normal women to whom others will easily relate. The materials should provide detailed information, not just the basics on timings and venues, but also what sort of clothing is required, changing facilities available, childcare etc.

Sports facilities

The business model and the evaluation of the consumers' needs are both very important for success.

Once a sports club has decided to target women, it needs to start making:

- Analysis of the social condition within the neighbourhood.
- Analysis of the competitors.
- Analysis of the missing services for women in the district.

It might seem strange, but too often club owners are mainly focused on technical details than on the whole «ecosystem».

The role and the responsibilities of sport facilities are wide: practising sport is not just «moving your muscles», it's a real medicine for your body and your soul, it's socialization, it's taking care of yourself, it's a natural antidepressant, it's being active with your brain, it's commitment, it's overcoming your personal limits...clubs have to find the perfect mix to offer all that!

The best practices adopted all over the world are countless, here are the most relevant:

- Fixing a timetable that includes activities in the right timing: early morning, lunch break and late afternoon
- Creating activities for kids at the same time, from supervised childcare to classes for teenagers

- Selecting specific skilled staff: trainers specialized in pre/post-partum, menopause, breast implants, ...
- Including in the staff also operators different than just trainers (i.g. nutritionist, psychologist, beauty consultant, ...)
- Organising seminars focusing on «female topics»
- Making an agenda of events for family, especially during the weekends
- Using the location also for social activities (i.g. happy hours, social dinners, projection of a movie, etc...)

It's important making strategic partnerships with activities within the neighbourhood to attract women from different perspectives. Partners may be selected with care and make sure they are in target. A good network can be done with local doctors, beauty centres, schools, theatres. The key is to find a win-win solution and involving women in a comfortable way... remember that when it comes to word-of-mouth marketing, women depend on offline friend and family suggestions 22% more than men!

Another possible way to attract women is to set up a «ladies only» club! It's a radical decision that allows to be focused only on one precise target: women. There are several club chains all over the world that adopted this solution with great results. Every detail is conceived for women: the choice of equipment, the setup of the restrooms, the additional services, the anamnesis, ... everything turns around women's wants!

All good ideas are nonsense if the operators (trainers, owners...) are not able to give the right motivation and keep the customers in the right mood.

Establishing a personal interaction, beside the workout, is crucial to achieve this goal.

Conclusions

Epidemiological data are clear. Despite the numerous benefits of regular physical activity participation, only few adult women meet physical activity recommendations, with resulting increased morbidity and, subsequently, increased health care costs.

There is the risk that what the woman earns in years of life are years of sick and disabled life. The goal is not only "years to life" but also "life to years", combining life expectancy and physical and mental quality of life.

Therefore, explaining data, raising awareness, spreading and supporting the culture of the physical activity has so many good reasons (wellbeing, medical, social, economic).

It's clear the need to make: more women, more active, more often with the support of professional and skilled operators in suitable sports facilities using the right equipment.

The business and the politics should be involved to establish new socio-economical-political rules, to organize an alliance between trainers and managers/owners of gyms, medical doctors, psychologists, sport science teachers, employers, journalists with women.

Considering the hurdles that women face, interventions to target women are needed, with innovative models that are age appropriate, culturally sensitive, and personalized to women's psychosocial and physiological characteristics.

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