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ORIGINAL

GRAPHIC SYSTEM EVALUATION IN PHYSICAL ACTIVITY AND HEALTH

SISTEMA GRÁFICO PARA EVALUAR LA ACTIVIDAD FÍSICA EN RELACIÓN A LA SALUD

Martínez-de-Haro, V.¹; Pareja-Galeano, H.²; Álvarez-Barrio, M.J.¹; del-Campo-Vecino, J.¹; Cid-Yagüe, L.¹ y Muñoa-Blas, J.¹

1 Grupo de investigación "Actividad Física, Salud y Educación-UAM". Departamento de Educación Física, Deporte y Motricidad Humana. Universidad Autónoma de Madrid. vicente.martinez@uam.es, mjose.alvarez@uam.es, juan.delcampo@uam.es, lourdes.cid@uam.es, jose.munnoa@uam.es

2 Universidad de Valencia superhpg@hotmail.com

Spanish-English translators: Víctor Gutiérrez Martínez Idiomas León victor@idiomasleon.es

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ABSTRACT

The research group "Physical Activity, Health and Education-UAM" of the Department of Physical Education, Sport and Human Movement at the "Universidad Autónoma" of Madrid, researchers looking for a possible way to resolve questions about how they could systematize the areas that should be professional account of the physical activity to establish a protocol for the treatment of persons who practice any type of physical activity and sports, taking as a reference point (base) state of health found.

In the present article we try to present what should be the parameters configured for the areas to consider when establishing such a protocol to do this, use the "health cube" as a useful tool for the assessment, design and control healthy physical activity plans for all types of people.

KEY WORDS: health, Physical Activity, Evaluation, "health cube".

RESUMEN

El Grupo de investigación “Actividad Física, Salud y Educación-UAM” del Departamento de Educación Física, Deporte y Motricidad Humana de la Universidad Autónoma de Madrid, investiga buscando una manera posible de solucionar dudas sobre cómo se podrían sistematizar los ámbitos que debería tener en cuenta el profesional de la actividad física para poder establecer un protocolo de actuación con las personas que practican cualquier tipo de actividad física y/o deporte, teniendo como punto de referencia (base) el estado de salud en el que se encuentran.

En el presente artículo tiene como objetivo exponer cuáles deben ser los parámetros configuradores de los diferentes ámbitos a tener en cuenta en el establecimiento de un protocolo de actuación con las personas que practican cualquier tipo de actividad física y/o deporte, tomando como punto de partida su estado de salud, utilizando para ello el “cubo de la salud” como un instrumento muy útil para la evaluación, diseño y control de planes de actividad física saludable para todo tipo de personas.

PALABRAS CLAVE: Salud, Actividad Física, Evaluación, “Cubo de la salud”.

INTRODUCTION

A sedentary lifestyle is considered, in public health, a 21st century pandemic, and is therefore one of the issues that the World Health Organization (WHO) is focusing on. In this very area, nobody can deny the important part that sports and physical activity plays as a preventative measure and means of improvement in the development of illnesses linked to sedentary lifestyle.

On the other hand, the appearance of the definition of “health” in the WHO’s 1946 Constitution: “health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”⁽¹⁾, has since been used as a paradigm of the goal that all actions promoting health should lead to. Although it is known that it is almost impossible for any person to reach this condition, remembering the progressive addition of the dynamic, and not the static, concept of health while including the individual in the natural environment.

The assertion that “health is the result of the interaction of individual biology and behaviour, physical and social environment, politics and governmental intervention and of access to quality medical care” is what was revealed in the document *Healthy People 2010*, carried out by the U.S. Department of Health and Human Services.⁽²⁾

According to the WHO, “environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics”.⁽³⁾

Nevertheless, despite professionals who base their references on health on the definition by the WHO, and use physical activity to improve health, as in the case of Pate⁽⁴⁾, usually forget about the psychological and social aspects. For this reason, our investigation group would like to consider whether there could be a system which would help professionals using physical activity remember all of its fields, and whether some graphic presentations of it are possible.

For this reason, we searched for graphic presentations of health and found, as the oldest reference, the one quoted by Bruhn et al. in 1977.

Some authors bring up the dynamic concept and the *continuum* of health, identifying health as a continuous flow between illness and ideal health. One of them is Bruhn et al.⁽⁵⁾, the first author to graphically present the mentioned *continuum*.

Terris⁽⁶⁾ (1980) develops a simple graph, in which he uses squares and crosses to differentiate between illness and health. It is a one-dimensional graph divided into two big columns: “Health” and “Illness”. Each column is then subdivided into another four, in each one of those, from the outside towards the middle, a larger amount of crosses leads to a smaller amount, indicating a person's better and worse health, until reaching the poorest of conditions, both in “health” and in “illness”, as indicated by one cross (fig.1.).

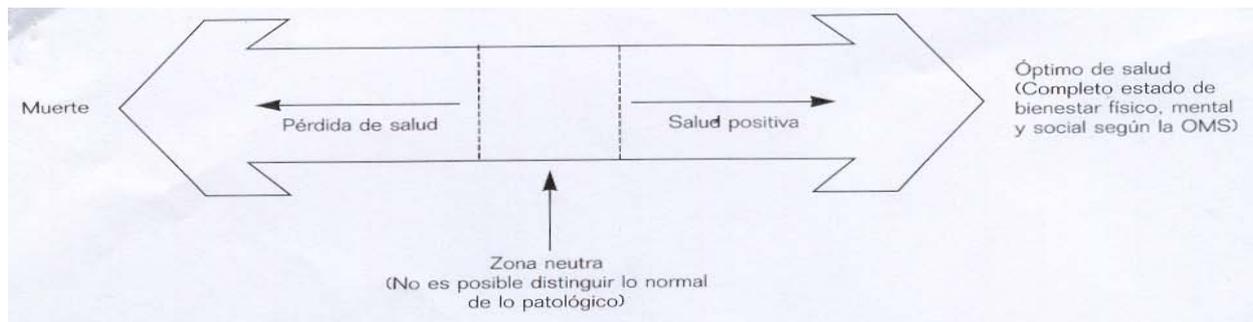


Fig.1 Terris, M. (1980) the epidemiological revolution and social medicine. Mexico: 21st century

Focusing on the linear model, Catford⁽⁷⁾ creates a figure in 1983 and names it “Health Status as a Continuum”, which he ranks by using Terris's model, with positive and negative health indicators, from “well-being”(++++) to “death”(- - -), with “minimization of risk” (+++), “risk factors only” (++) , “asymptomatic disorder” (+), “symptomatic disorder”(0), “impairment” (-), “disability” (- -) and “handicap” (- - -) in between the two extremum (fig.2).

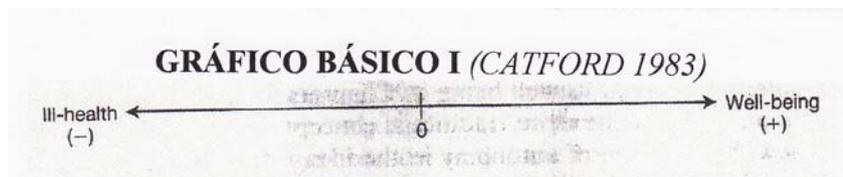


Fig.2 Catford's graph (1983)

Also considering health as a continuum, Salleras⁽⁸⁾ creates a variation of Terris's model in 1985. From out of the neutral area in the center, where he says that it is impossible to distinguish between a normal and a pathological state, come two arrows pointing in opposite directions. On the right hand side, “positive health” which leads to “optimum health”, or a “high level of well-being”, represents the WHO's definition of health. And on the left hand side, “health loss” leads to its extrema which is “death”. In the middle of these are the “signs”, “symptoms” and “disability” stages (fig.3).

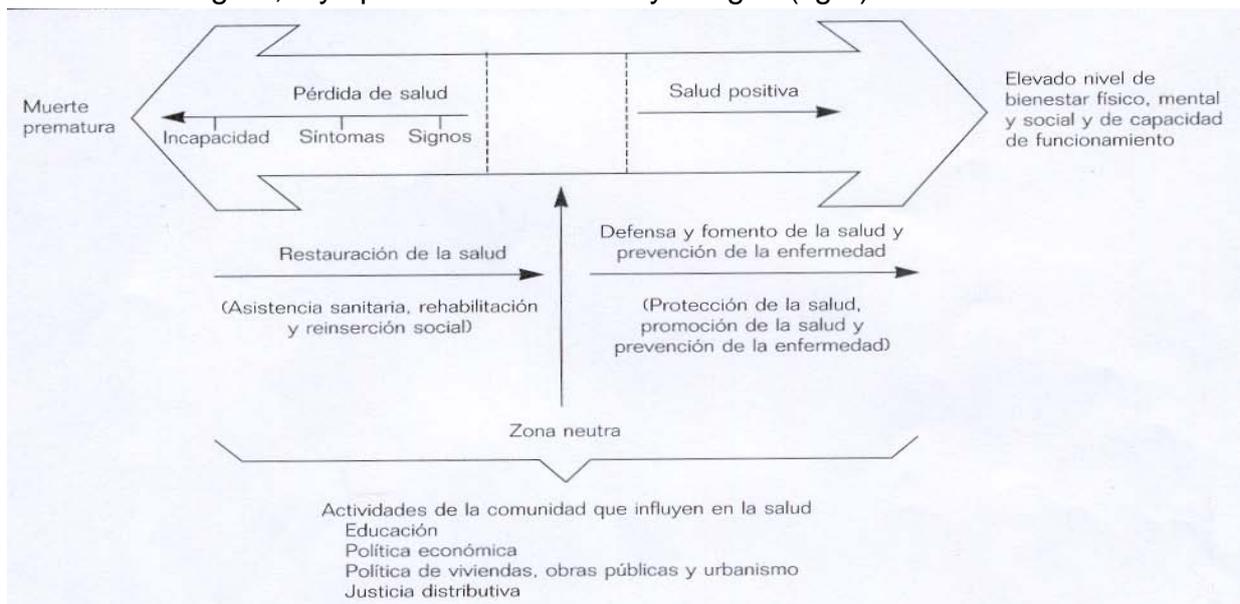


Fig.3 – Salleras's health-illness continuous (1985)

In 1981, Lorenz and Davis⁽⁹⁾, basing their studies on Bruhn, develop a three-dimensional graphic which they call “Health Care System”, with “Not ill” and “ill” on the X-axis; “Good” (“well-being”) and “Not good” (“ill-being”) on the Y-axis, and the “Time Vector” on the Z-axis. These represent modifications in the health-illness condition and in the state of well-being – ill-being throughout time, or the age of an individual. This graph describes four categories (Type I: Well, Type II: Well but vulnerable, Type III: Asymptomatic ill and Type IV: ill) (fig.4).

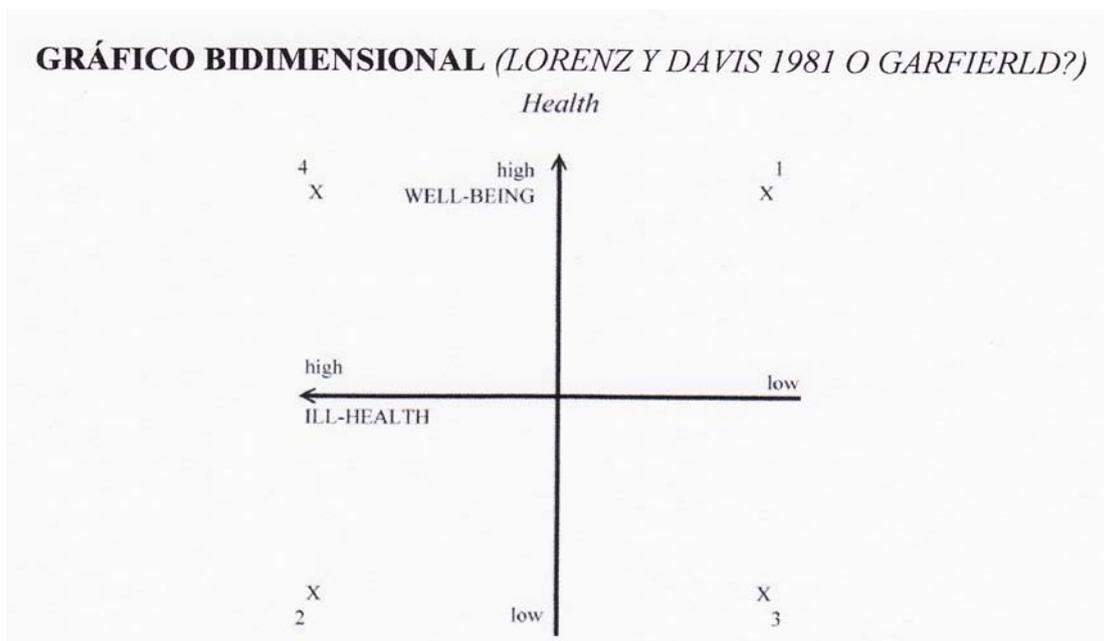


Fig.4 – Lorenz and Davis's two-dimensional graph

In 1990, Downie et al.⁽¹⁰⁾ suggest a cyclical model, based on Catford's linear model, situating in the center a diagram interrelating physical, mental and social aspects. On the far right hand side is negative health (disease, illness, unwanted states, injury, deformity, disability and handicap); and on the far left, positive health (true well-being and fitness) (fig.5).

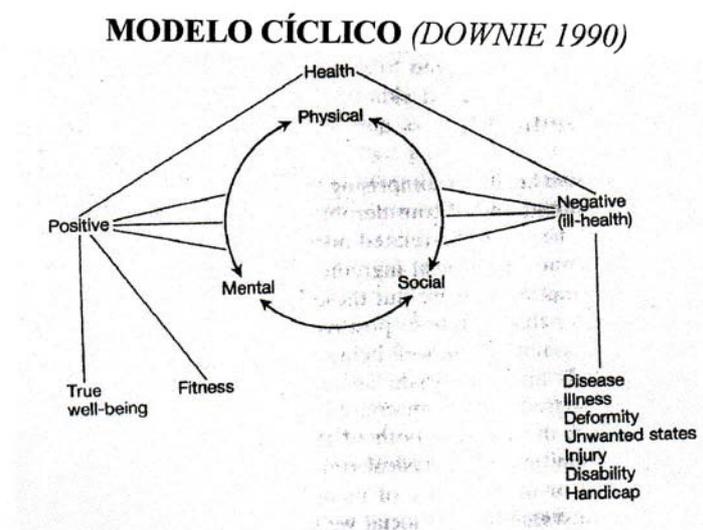


Fig. 5 – Downie's cyclical model of health (1990)

These models didn't satisfy our investigation group because of the fact that the evaluation of a person's health condition turned out to be impossible, as did the effect of physical activity on health. For this reason, a graph named "health cube" was designed, and we began by presenting a simple graphic design of a cube which represented the environment. In the inside of the cube there were three axes joined in the center, each axis represented an area in health (physical, mental and social) and each extrema represented optimum or worst health (physical, mental or social). Nevertheless, this simple graphic design wasn't satisfactory for a variety of reasons. First of all, the health condition wasn't assessed, which is why we decided to use a decimal scale for each axis, appointing the worst condition to the value of 0, and the best condition to the value of 10, knowing that this evaluation scale would be both subjective and objective. And secondly, it seemed an exaggeration that from the median value (5, in our case), where the axes joined, the border between illness and health would be marked, coinciding with Salleras; which is why we chose to represent it with a sphere what would correspond to "statistical normal". That is, on each axis, a normal curve was displayed, showing the distribution of the population, classifying 95% of the population between ± 2 SD (between 2.5 and 7.5), completing the definitive model. In this cube, the points indicate the individuals, the green vector represents physical activity; the risks are represented by a red vector pointing the opposite direction and the prevention, also pointing the opposite direction and overlapping the risk vector, is represented by a black vector (fig.6).

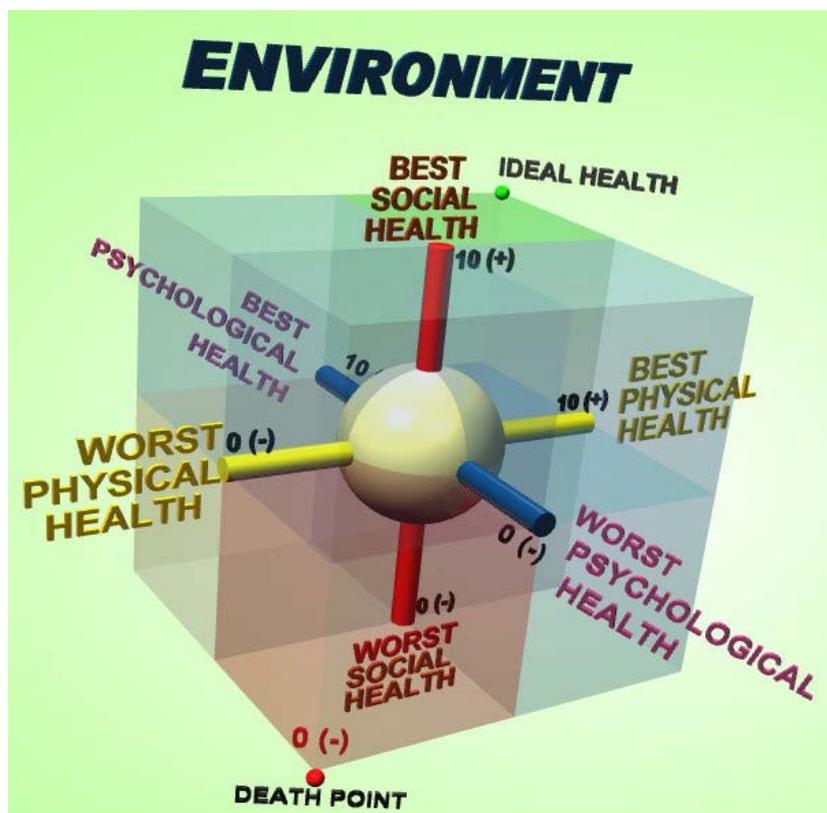


Fig.6 Health cube designed by our group (Martínez-de-Haro, V. et al. 2009)

For this reason, the suggested objectives are: to show on a graphic system the location

and development of people's health linked to physical activity; present the physical programs according to their health; show a graphic presentation of the risks of physical activity that turn out being detrimental to health and possible ways of preventing these risks, and the influence of the environment.

METHODOLOGY

The methodology that we have used is an analytical deductive method, and is carried out through the analysis of different cases, by using the "health cube".

Which professionals can evaluate and situate a person in the health cube?

Obviously, many can, but in this article we will indicate the evaluations and functions which a physical activity and sports coach can carry out, and the professionals that can give him the best possible support. We will begin with the latter.

The first place is occupied by the doctor; this professional can evaluate in depth the health of his patient, specifying the optimum way the patient can use certain organic systems, and which systems he should avoid using, and how to help the individual obtain the highest level of achievement. So as to be healthy, the assessment will be both subjective and objective. The assessment that he carries out should be the most precise possible, and not only at the organic level, but also psychosocial. Obviously, we think that the most qualified medical specialist to carry out this assessment, aimed at doing physical exercise, is a sports doctor. Through anamnesis, physical examination, kinanthropometry, spirometry, EEG analysis at rest, analysis and stress tests.

In the psychological field, the psychology and psychiatry professionals have the best tools to do a good assessment.

From a social point of view, professionals with the best tools and knowledge of the area are the ones who have a degree in social work, or are social assistants or sociologists, and could therefore facilitate an outstanding report about the person they work with.

Nevertheless, it is obvious that an exercise professional hardly ever has these tools available to him. And, on the other hand, the right to freedom of any individual (provided he has the means and opportunity to have a test done) allows him to choose not to be examined, and simply go and take part in a physical activity carried out with the exercise professional. And in this situation, what is it an exercise professional can do?

First of all, he can do a "non-medical" evaluation of the person's health condition in order to assess the possible risks and limitations, by using a number of questionnaires available for this purpose.

Through a personal interview, and using the knowledge of a sports coach, and avoiding scientific fields which are professionally out of his range, the professional can carry out a short summary of his psychosocial profile, in order to find out the objectives and goals of the person that wants to take part in physical activity.

The tools that are available to a sports coach are: the possibility to evaluate healthy

physical fitness (from our point of view, the basic physical abilities: strength, stamina, flexibility and speed), the abilities that are determined by health (coordination, lateralization and balance), and also ludograms which help get to know the role of the analyzed individual in our physical activity group.

Thanks to these reports, it is possible to situate the individuals in the health cube, and to establish the program and the goals, the risks and the preventative and safety measures. Below, in order to facilitate the understanding of what has been pointed out previously, we have provided various examples.

EXAMPLES OF USING THE HEALTH CUBE BY PHYSICAL ACTIVITY PROFESSIONALS

a. The case of the elitist sportsman

Have you ever seen an olympic decathlete on the podium or competing? Would you say that he's ill? If you received this olympic sportsman's health report, you'd tell us that his internal health is excellent, his self-esteem just after receiving the medal is optimal, and that his social success is obvious. What is the problem? The risk of suffering from an injury is very high due to the fact that the physical activity is very demanding. The objective is to obtain organ systems which can adapt in the best possible way to effort. Nevertheless, a good planning of the physical activity program and a thorough control of the risks, observing the cube, can help avoid many surprises. This sportsman would be represented in the first quadrant with a very positive outcome. The physical activity line is short because it would be difficult for him to gain better health results, but the risk vector is very high which is why special attention should be paid to prevention.

b. The case of a 65 year old woman, grandmother and housewife

It is very possible that this woman suffers from one or various chronic illnesses due to her age, but she will be diagnosed and treated, and if she feels good, she'll be able to take part in everyday activities. In the health cube, the woman would surely be situated on the normal curve. The physical activity program would concentrate on slightly improving her health condition, avoiding hypokinesia and using physical activity to improve her organ and psychosocial systems. The risk, a priori, is the possibility of falling over, which would have severe repercussions on the skeleton. For this reason the prevention should be focused on avoiding activities which could make the subject vulnerable to falling. This would be represented by a point situated, with regard to the physical area, towards the center and positive in the other two areas, with the physical activity vector moderate, and with a minimum risk vector compensated by preventative measures.

c. Situation 3. An 8 year old school child

All children above 6 years of age are required to be educated and their pediatrician is the one that carries out the monitoring of their health condition. Normally, the health condition of the child should be good, unless a medical report contradicting this fact has been issued. In which case the exercise professional should try to carry out healthy fitness programs with a small amount of risk, that would facilitate development and growth, easily evaluated in the health cube.

d. Situation 4. A 16 year old adolescent suffering from juvenile diabetes

This is the case of a chronically ill adolescent which has been diagnosed and treated. His doctor will have set the guidelines to his using insulin, and to having a suitable diet and exercise routine. The sports coach should make sure, before starting the session, that the adolescent is correctly following these medical guidelines and that they are preventing the possibility of hypoglycemic crisis happening during the exercise. This person would be, in the physical area, below the lower limit of normal. That is, he'd belong to the group of ill individuals, supervised by their doctor. The exercise would have to be moderate, the risk would be high, and the prevention should be high. Regular physical activity has a large number of beneficial effects on people who suffer from this pathology.

e. Situation 5. A 45 year old woman who suffers from arterial hypertension, with a history of cardiovascular problems.

In this case, this woman is situated even lower in the descending part of the health cube's physical field. It's a person who is at greater risk and requires more monitoring, but, unquestionably, moderate, regular exercise has a positive influence on her health condition (16). Both in this case and the previous one, the physical activity vector is the one that counteracts the risk vector. The obvious risk is the development of a cardiovascular problem. The prevention must be important.

f. Situation 6. A young 22 year old who practices extreme sports.

The situation which is presented here is the situation of a normal person, who has underwent a thorough medical and sports examination, practices sports which have high risk of accident (climbing, canyoning, paragliding...), because of the excitement which comes with it, although the objective isn't to win, but to overcome oneself. In this case, the physical activity isn't the factor that counteracts the risk vector, it's the preventative measures (for example the security measures undertaken during climbing, by using a rope).

CONCLUSIONS

- The "health cube" turns into an instrument of evaluating health condition, and allows us to situate any person, at any given time, according to the examinations that have been carried out (medical, psychological, social and physical activity) in order to get to know the initial condition. This way, the exercise professional uses a person's starting point as a point of reference in the programming and determination of the type of exercise or physical activity that can be practiced.

- By means of the "activity vector", it is possible to control the effect of physical activity which has been planned and carried out by taking into account all health fields, and being especially careful not to produce a negative effect in any of these fields. It is possible to situate a new point which we could call "objective points", and which would be the place in which we would like to have the individual situated, after having applied the physical activity program.

- By means of the “risk vector”, it is possible to prevent two types of risks which can alter a person's physical activity:

- Risks inherent in the person's condition (age, sicknesses, injuries).
- Risks which are linked to the type of activity (place, type, intensity, volume).

Therefore, we introduce a three-dimensional graphic design, which represents the health definition established by the WHO, and which turns into a powerful tool enabling the monitoring of the effects of physical activity in any person.

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