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Quality of Life and Physical Activity: Their Relationship with Physical and Psychological Well-Being

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Abstract

Many studies have been focused on the analysis of different factors that relate to the *quality of life*. And those studies have found a clear relationship between the quality of life, psychological well-being, and health. It is important to know those relationships and to know factors that can improve these three aspects simultaneously. And one of the most important factors is the realization of physical activity on a regular basis. This study analyzes the effect of physical activity on improving the quality of life (physical health and well-being) and its relationship with psychological well-being through two studies. One was a randomized clinical trial involving 98 low-risk incident cases of acute coronary syndrome, who were randomly assigned to an unsupervised walking program or a cycle ergometer exercise program. The other study is an ex-post-facto investigation with a total of 841 healthy subjects. We apply them questionnaires to measure subjective well-being, satisfaction with life, positive and negative affect, Short Form-36 Health Survey (SF-36), and the specific Velasco-del Barrio questionnaire for post-myocardial infarction. This study concludes physical activity and exercise are key factors in an individual's perception for their quality of life, both in the area of physical and psychological health.

Keywords: psychological well-being, quality of life, health-related quality of life, physical activity, psychological health

1. Introduction

The conceptual definition of well-being, both in terms of general well-being and quality of life, is a question about which there is no widespread consensus. There are a number of reasons

for this, including the complexity of the concept itself, the fact that it changes and varies over time, the multiple variables involved in its origin and its subjective nature, among others [1].

In the early 1940s, the World Health Organization [2] noted generically that “quality of life is associated with the subjective perception that the individual has about a complete state of physical, psychological and social well-being, and not merely the absence of disease, shaping it as a multidimensional concept.” As a result of this definition, the key dimensions in any assessment of quality of life have since contemplated three main aspects: (a) the physical dimension, understood as one’s perception of one’s own health and physical status (which in turn is often understood as the absence of disease or the symptoms derived from disease); the idea is that physical well-being is improved through the use of one’s physical capabilities; (b) psychological well-being, which could be described as an individual’s state of cognitive (satisfaction with life) and affective (a high level of positive affect and low level of negative affect) well-being; this encompasses a wide range of ever-changing daily experiences, such as intellectual changes, the meaning of life, personal and spiritual beliefs and emotional ups and downs; and (c) social well-being, which is achieved when a person’s roles in life enable them to maintain and develop or satisfy personal relationships; this dimension could therefore be understood as an individual’s behavior in the field of relations with others, the roles they play in their life, their perception of having an adequate support network (made up of family members and friends), and even their professional undertakings [3, 4].

Quality of life has been approached from two different models [1]. First, there is the physical or medical approach, in which quality of life is considered synonymous with good health. The term health-related quality of life (HRQL) is often used in this context. The other approach is the psychological model, in which quality of life is understood as being synonymous with psychological well-being and is determined by an individual’s assessment of their own life and the quantity and quality of their emotions (positive and negative affect). When quality of life is understood as psychological well-being, a person with a high level of psychological well-being is one who has a high level of satisfaction with his/her own life while experiencing a high number of positive and few negative emotions [5–7], regardless of their age [8].

The aim of this chapter is to analyze quality of life from the perspective of both models (the medical or physical one and the psychological one), as well as from a combination of the two, focusing on the importance of physical activity. Section 2 therefore provides a brief review of the theoretical framework.

2. Theoretical framework

Many studies have focused on analyzing the two models (physical and psychological) of quality of life [4, 9–11]. It has been found, for example, that both subjective well-being and satisfaction with life correlate positively with physical well-being (health) [11–14,] as well as with behaviors aimed at improving health or physical well-being, such as physical-sporting activity [8].

A review of the scientific literature focusing on well-being reveals the many types of different variables that are associated with this concept: age, sex, income level, family, culture, personality traits, work, etc. [10, 15–19]. However, studies on the possible connections, which may exist between physical exercise and psychological well-being are lacking. Considerable effort has been made over recent years to fill this empirical gap, due to the importance attached to physical-sporting activity as a means of preventing various negative emotions and physical diseases.

Although sports science and physical activity studies insist that physical exercise results in higher levels of well-being [20, 21], the vast majority of studies have overlooked the importance of fostering quality of life understood as psychological well-being, focusing instead on exploring its links with anxiety, depression, and diverse psychopathologies [20, 21].

The few studies that have focused on analyzing the relationship between physical activity and the different components of psychological well-being have found that those who engage in physical activity score higher for both well-being in general and its three dimensions: satisfaction with life, positive affect and negative affect [8, 13, 22]. However, when frequency of physical activity is taken into account, the differences observed in negative affect disappear and the same also occurs sometimes with satisfaction with life [22]. In other words, in measures of global well-being and positive affect, the results differ in accordance with the frequency of the physical activity engaged in, with more frequent exercise resulting in higher scores than more sporadic activity. However, this is not true for measures of satisfaction with life or the degree of negative affect experienced, for which the most important thing seems to be the act of engaging in physical activity itself, regardless of the frequency of practice.

Certain characteristics of this physical activity have also been analyzed, specifically the intensity and type of organization [23]. In regard to intensity, it has been found that psychological well-being is higher among those who engage in physical activity with a medium level of intensity. On the other hand, results reveal that the type of organization within which the physical activity is carried out (extracurricular club, federation, unmonitored or monitored) has no impact on psychological well-being; what is really important here is the fact of engaging in some kind of physical activity, no matter its format.

In the field of quality of life understood as physical health, research focuses on the analysis of health-related quality of life (HRQL) and is based on the subjective assessment of the impact of disease and treatment on the domains of functioning and physical well-being. These studies have found that quality of life is a predictive variable of the course of several diseases, regardless of other prognostic factors, suggesting that a poorer quality of life could in itself aggravate the disease [24]. According to Soto et al. [25], the most important dimensions of HRQL are social, physical and cognitive functioning, mobility and personal care, and emotional well-being, although it should not be forgotten that HRQL is also impacted by certain economic, social and cultural factors.

To date, reviews quantifying the results of exercise interventions indicate that relatively few studies report any quality of life data, and in most clinical trials the quality of life is evaluated

as a secondary variable [26]. It has, however, been recommended that HRQL should play an important role as a main outcome variable [27], and of course, this variable should always be assessed and defined by the individual patient, the focus being on the person rather than on the disease, placing importance on how the patient feels, regardless of clinical results.

Coronary heart disease is one of the most widespread health problems, and is among those which could benefit most from physical activity in relation to HRQL. In this sense, regular physical exercise has been shown to be inversely associated with the risk of coronary heart disease, cardiac events and death [28]. Moreover, functional capacity may also be inversely related to all-cause and cardiovascular morbidity and mortality in coronary heart disease patients. Moreover, according to some studies, physical exercise also has a positive impact on the HRQL of these patients, although the effect of size is generally small [29].

The combination of the magnitude of the problem of coronary heart disease, the impact that it has on the social, family and working lives of those who suffer from it, and the psychiatric factors associated with its evolution makes HRQL a key aspect to bear in mind.

Other studies have tried to clarify the relationship between subjective well-being and health-related quality of life. A covariation of both was found with those with high rates of psychological well-being reporting better health-related quality of life compared to those who reported a moderate sense of psychological well-being [30]. It has been recently found that a person's subjective perception of their own well-being greatly influences HRQL, suggesting that by increasing people's perceptions we can help them attain higher levels of health-related quality of life [31], as well as better quality of life during childhood and adolescence [32].

Finally, some studies have analyzed this relationship from a multidimensional perspective of quality of life, finding that subjective well-being correlates closely with mental health and, to a lesser extent, with one's perception of one's own physical condition [33–36]. Other studies have found empirical evidence regarding the negative effect of chronic or long-term health problems on subjective well-being [37], suggesting that the experience of being ill alters the relationship between quality of life and subjective well-being.

However, while it is important to understand the relationship between quality of life, psychological well-being and physical health, it is even more important to understand what factor or factors can improve these three aspects simultaneously. And it seems that the answer may well be physical activity, since, as shown above, it has been found that engaging in physical activity on a regular basis may be one of the most important factors for improving quality of life, both in the case of psychological well-being and in relation to health-related well-being. Nevertheless, further studies are required to test this relationship and to verify that physical activity can indeed be considered a means of improving health-related quality of life.

Finally, this chapter presents two different studies carried out in accordance with the two approaches to quality of life (psychological and physical). The first study was conducted with the aim of analyzing the possible relationship between physical exercise and the three components of psychological well-being, whereas the second study focused on comparing two types of exercise and their effect on health-related quality of life.

3. Methodology

3.1. Participants

3.1.1. Study on physical activity and psychological well-being

A total of 1178 randomly selected students aged between 12 and 23 participated in the study. The questionnaires were administered in public and semi-private schools, high schools and universities with a medium sociocultural level in the north of Spain (specifically in the Autonomous Regions of the Basque Country, La Rioja and Burgos). Among the total sample, 398 (33.79%) were male and 780 (66.21%) were female. With regard to physical activity, 211 participants claimed they never to do any exercise, whereas the remaining 967 said they did (325 claimed to do so regularly, 344 said they exercised between one and three times a week and 298 claimed to engage in physical activity more than three times a week).

3.1.2. Study on physical activity and health-related quality of life

The sample was drawn from among the patient population of eight Spanish hospitals. All patients under the age of 80 were eligible for the study, providing they had suffered an acute ischemic cardiopathology within the last 3 months (not including the last 15 days), had been classified as having a low-risk prognosis and presented none of the exclusion criteria. The following criteria were used to classify patients as having a low-risk prognosis: hospital stay with no complications, current absence of myocardial ischemia symptoms, functional capacity ≥ 7 Metabolic Equivalent of Task, ejection fraction $>50\%$ and absence of severe ventricular arrhythmia.

The final sample group comprised 98 ischemic cardiopathy patients with a low-risk prognosis, of which 84.7% were men and 15.3% women, with a mean age of 56. The body mass index (BMI) data indicated that around 81% of patients had a higher-than-normal body mass, although the mean level among the sample groups was beneath the limits established for both arterial hypertension and hypercholesterolemia. All these data were important when determining patients' eligibility and their participation in exercise and physical activity programs.

3.2. Variables and measurement instruments

Satisfaction with life was measured using the Spanish version of the *Satisfaction with Life Scale* (SWLS) [38] translated by the original authors themselves. The SWLS comprises five items presented in the form of statements about the subject's global cognitive judgments of satisfaction with their life, which are rated on a 7-point Likert-type scale (1 = *strongly disagree*, 7 = *strongly agree*). The Spanish language version of the scale was validated in a study with students aged between 11 and 15 from the Autonomous Region of Valencia [39], with the authors finding an acceptable percentage of the total variance explained (53.7%) and a Cronbach's alpha reliability index for internal consistency of .84.

Positive and negative affect was assessed using the *Positive and Negative Affect (PNA) scale* [40], revised by Warr et al. [41]. The scale comprises 18 items (9 to assess positive affect and 9 to assess negative affect) to which responses are given on a 4-point Likert-type scale (1 = *never*, 4 = *all the time*). The Cronbach's alpha reliability coefficients were .66 and .64 for positive and negative affect, respectively, with correlations between the two of between $r = -.01$ and $-.07$. A slightly higher reliability coefficient was found with a sample of 104 Spanish participants [42]: alpha = .71 for negative affect and alpha = .76 for positive affect.

To measure physical-sporting activity, participants were asked how often they engaged in exercise and how many hours a week they spent on this pursuit. Four possible responses were provided in relation to frequency: (a) never, (b) every now and then, (c) one to three times a week and (d) more than three times a week.

HRQL was assessed using the Spanish version [43] of the generic Short Form-36 Health Survey (SF-36) [44] and the specific Velasco-del Barrio questionnaire for post-myocardial infarction at baseline and 7 months follow-up [45]. The Short Form-36 Health Survey is a general health questionnaire that represents the eight most important components of health (*physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role and mental health*). The dimensions of the SF-36 questionnaire are scored using the Likert method of summative scores. The instrument has been shown to have good internal consistency and a high test-retest reliability coefficient [46].

The specific Velasco-Del Barrio questionnaire is a specific test for post-infarction patients. It was validated in Spanish on the basis of Oldridge's Quality of Life Questionnaire for Myocardial Infarction (QLMI-Q) [47], in a sample of 190 myocardial infarction patients. A high correlation between both instruments was found ($r = .81$), along with a test-retest reproducibility index of .75 [45]. The Velasco-Del Barrio questionnaire comprises 44 items, with each item being rated on a 5-point Likert-type scale. The 44 items of the questionnaire are grouped into 9 dimensions (health, sleep and rest, emotional behavior, future projects, mobility, social relations, alert behavior, communication and leisure time and work).

3.3. Design and procedure

3.3.1. Study on physical activity and psychological well-being

The analysis of the relationship between physical-sporting activity and psychological well-being was designed as an *ex post-fact* quantitative-correlational study, which was carried out from 2008 to 2010. After contacting diverse schools, high schools and universities, permission was requested from both principals and (in the case of minors) parents. In order to control different factors, which might have skewed the results, students were assured of the anonymous and voluntary nature of their participation in the tests. The questionnaires were completed in a session lasting no longer than 20 min, and were administered in accordance with the single blind method.

3.3.2. Study on physical activity and health-related quality of life

The study was a randomized clinical trial carried out at the Primary Care Research Unit in Bizkaia, as part of a study on *Supervised Exercise for Coronary Heart Disease Patients in Primary*

Care Centers, funded by the Basque Government Health Department. The study was carried out in Spain from February 2005 to June 2010, at eight primary care centers.

All patients with an eligible CI underwent a stress test in the cardiology unit, and subsequently, after their risk had been individually assessed by a cardiologist, they were contacted in order to set up a meeting with the health center's head research physician, who informed them of the study and requested their informed consent. Once they had been included in the study, nursing staff carried out the initial measures (blood tests, electrocardiogram (ECG), and quality of life and risk of coronary event questionnaires). Patients were then assigned randomly to one of two study groups: an unsupervised walking program (UW group) or a cycle ergometer exercise program supervised by primary care nurses (SE group). The unsupervised walking group was provided with written guidelines on a walking program, while the supervised program consisted of 96 sessions of 38 min spent pedaling on a cycle ergometer while wearing a heart rate (HR) monitor. The schedule followed ranged from three sessions a week to five sessions a week, and each session was divided into three phases: warm-up phase, conditioning phase and cool-down phase. The two groups received the same components of secondary prevention care.

In the treatment phase, each group followed a different exercise regime lasting 6 months, during which time patients were called for five follow-up appointments with their GP. Subsequently, a final stress test was conducted with all participants in the cardiology unit and nursing staff carried out the final measures and administered the final questionnaires.

4. Results

4.1. Study on physical activity and psychological well-being

To determine whether psychological well-being is higher among those who engage in physical-sporting activity than among those who do not, participants in the first study were classified into two groups in accordance with their level of physical activity: those who never engaged in any physical or sporting activity and those who did, even if only sporadically (see **Table 1**).

The data obtained indicate that those who engage in physical-sporting activity always have higher psychological well-being levels ($t_{(1176)} = 7.83, p < .001$), experience more positive emotions ($t_{(1176)} = -5.438, p < .001$) and fewer negative ones ($t_{(1176)} = 2.84, p < .01$), and feel more satisfied with their lives ($t_{(1176)} = -4.373, p < .001$) than those who do not.

Another question the study aimed to answer was whether frequency matters or, alternatively, if just the mere fact of engaging in physical-sporting activity, albeit sporadically, is enough to improve well-being. To answer this question, those participants who claimed to engage in physical-sporting activity were subdivided into three different groups in accordance with frequency of practice (sporadic, one to three times a week and more than three times a week) (see **Table 2**).

The results revealed differences in subjective psychological well-being ($F_{(2, 964)} = 16.15, p < .001$), positive affect ($F_{(2, 964)} = 12.01, p < .001$) and satisfaction with life ($F_{(2, 964)} = 4.53, p < .001$), with

| | Physical activity | <i>n</i> | <i>M</i> | <i>SD</i> | <i>t</i> | <i>p</i> |
|-----|-------------------|----------|----------|-----------|----------|----------|
| PWB | No | 211 | 102.99 | 18.41 | 7.83 | .000*** |
| | Yes | 967 | 112.53 | 18.26 | | |
| PA | No | 211 | 24.27 | 4.39 | −5.43 | .000*** |
| | Yes | 967 | 26.12 | 4.48 | | |
| NA | No | 211 | 18.04 | 4.41 | 2.84 | .004** |
| | Yes | 967 | 17.05 | 4.58 | | |
| SL | No | 211 | 23.33 | 5.87 | −4.37 | .000*** |
| | Yes | 967 | 25.92 | 5.59 | | |

Note: PWB, psychological well-being; PA, positive affect; NA, negative affect; SL, satisfaction with life.

** $p < .01$.

*** $p < .001$.

Table 1. Psychological well-being as a function of physical activity.

| | Frequency of physical activity | <i>n</i> | <i>M</i> | <i>SD</i> | <i>F</i> | <i>p</i> | Post-hoc |
|-----|--------------------------------|----------|----------|-----------|----------|----------|----------|
| PWS | Occasionally (1) | 325 | 109.29 | 18.37 | 16.15 | .000*** | (3)-(2) |
| | 1–3 times/week (2) | 344 | 112.07 | 18.52 | | | (3)-(1) |
| | More than 3 times/week (3) | 298 | 116.5 | 17.12 | | | |
| PA | Occasionally (1) | 325 | 25.32 | 4.36 | 12.01 | .000*** | (3)-(2) |
| | 1–3 times/week (2) | 344 | 26.07 | 4.45 | | | (3)-(1) |
| | More than three times/week (3) | 298 | 27.06 | 4.49 | | | |
| NA | Occasionally (1) | 325 | 17.28 | 4.27 | 0.64 | 0.523 | – |
| | 1–3 times/week (2) | 344 | 16.97 | 4.8 | | | |
| | More than 3 times/week (3) | 298 | 16.89 | 4.67 | | | |
| SL | Occasionally (1) | 325 | 25.14 | 5.66 | 3.26 | .039** | (3)-(1) |
| | 1–3 times/week (2) | 344 | 26.1 | 5.47 | | | |
| | More than 3 times/week (3) | 298 | 26.54 | 5.57 | | | |

Note: PWB = psychological well-being; PA = positive affect; NA = negative affect; SL = satisfaction with life.

** $p < .01$.

*** $p < .001$.

Table 2. Psychological well-being as a function of the frequency of physical activity.

negative affect being the only area in which no such differences were observed ($F_{(2, 964)} = 0.64$, $p > .05$). The multiple post-hoc comparisons confirmed that frequency of physical activity was indeed relevant to psychological well-being levels, as well as to the dimensions positive affect and satisfaction with life, providing such activity is engaged in more than three times a week. We can therefore conclude that physical activity is associated with higher levels of psychological well-being, especially when it is engaged in on a daily basis, or at least four times a week.

4.2. Study on physical activity and health-related quality of life

All participants included in the study were analyzed with baseline observations carried forward for those who failed to attend the follow-up appointments. Changes in HRQL were analyzed, adjusting for the initial values, and the two study groups were compared. To this end, the effect attributable to the intervention was estimated by analyzing the difference in the change experienced between the two groups. Confidence intervals (CIs) were calculated at 95% and the comparisons were adjusted in accordance with baseline level, using covariance analysis models. Furthermore, and bearing in mind the different variables analyzed and the multi-center structure of the study, a multivariate adjustment was carried out of the change experienced in HRQL, and the two groups were compared. In addition to being adjusted for baseline quality of life levels, the models were also adjusted for confounding or modifying covariables. These models were tested to see whether risk factors and comorbidities modified the effect of the intervention. All the analyses were performed using the SASTM statistical software package (version 9.2).

Overall, 76.5% of participants completed the study, 44 and 31 in the SE and UW groups, respectively. **Figures 1** and **2** show the effect attributable to the supervised intervention obtained from the mixed multivariate models which took into account the multi-center structure of the data and were adjusted for baseline HRQL levels and confounding variables, such as age, sex, risk factors and comorbidities.

Figure 1 shows the effect attributable to the supervised intervention (cycle ergometer) in each of the dimensions of the SF-36 questionnaire analyzed. Values above 0 indicate evidence in favor of the effectiveness of the supervised exercise intervention. The improvement observed in the supervised exercise group was no greater in any of the dimensions than the improvement observed in the unsupervised walking program. In all dimensions, the 95% confidence interval of the effect attributable to the supervised exercise intervention was 0, a finding which fails to provide evidence rejecting the hypothesis that there are no differences between the two groups.

The adjustment of the multivariate models revealed that baseline HRQL levels were associated with changes in the final measurement in each dimension of the SF-36 questionnaire. Participants who began the intervention with a poorer quality of life were the ones who improved most. Only the variable *sex* was associated with changes in the physical functioning dimension of HRQL, with men improving more than women. None of the other variables were associated with changes in HRQL nor were any changes observed for any of them in relation to the effect of the intervention.

Figure 2 shows the effect attributable to the supervised intervention in each of the dimensions of the Velasco-Del Barrio questionnaire analyzed. In this case, since we are dealing with dimensions in which any improvement is expressed through negative values, values lower than 0 indicate evidence in favor of the effectiveness of the supervised intervention. The improvement observed in the supervised exercise group was no greater in any of the dimensions than the improvement observed in the unsupervised walking program. Moreover, in the communication dimension, the unsupervised walking program group improved significantly more than the supervised cycle ergometer exercise group. In all other dimensions, the

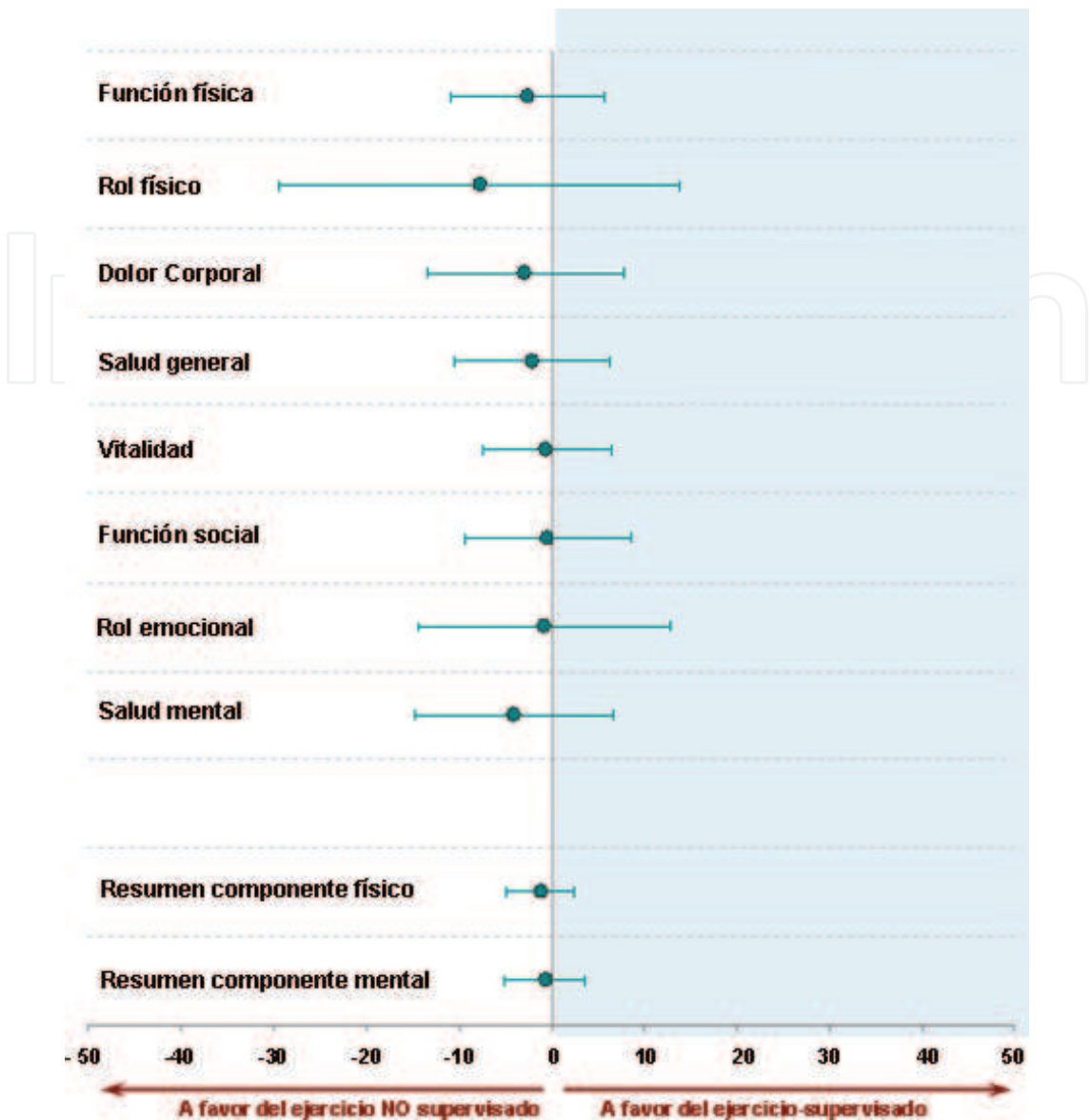


Figure 1. Effect of physical exercise on health-related quality of life (SF-36). Note: On the left effect attributed to supervised exercise (cycle ergometer) and to the right to unsupervised walking activity.

95% confidence interval of the effect attributable to the supervised exercise intervention was cut-off at 0, thus failing to provide evidence for rejecting the hypothesis that there are no differences between the two groups.

The adjustment of the multivariate models revealed that baseline HRQL levels were associated with changes in the final measurement in each dimension of the Velasco-Del Barrio questionnaire. Participants who began the intervention with a poorer HRQL were the ones who improved most. Diabetes, low-density lipoproteins (LDL) cholesterol, age, BMI and employment situation were found to be predictor factors of changes in HRQL. Finally, no changes were observed for any of these variables in relation to the effect of the intervention.

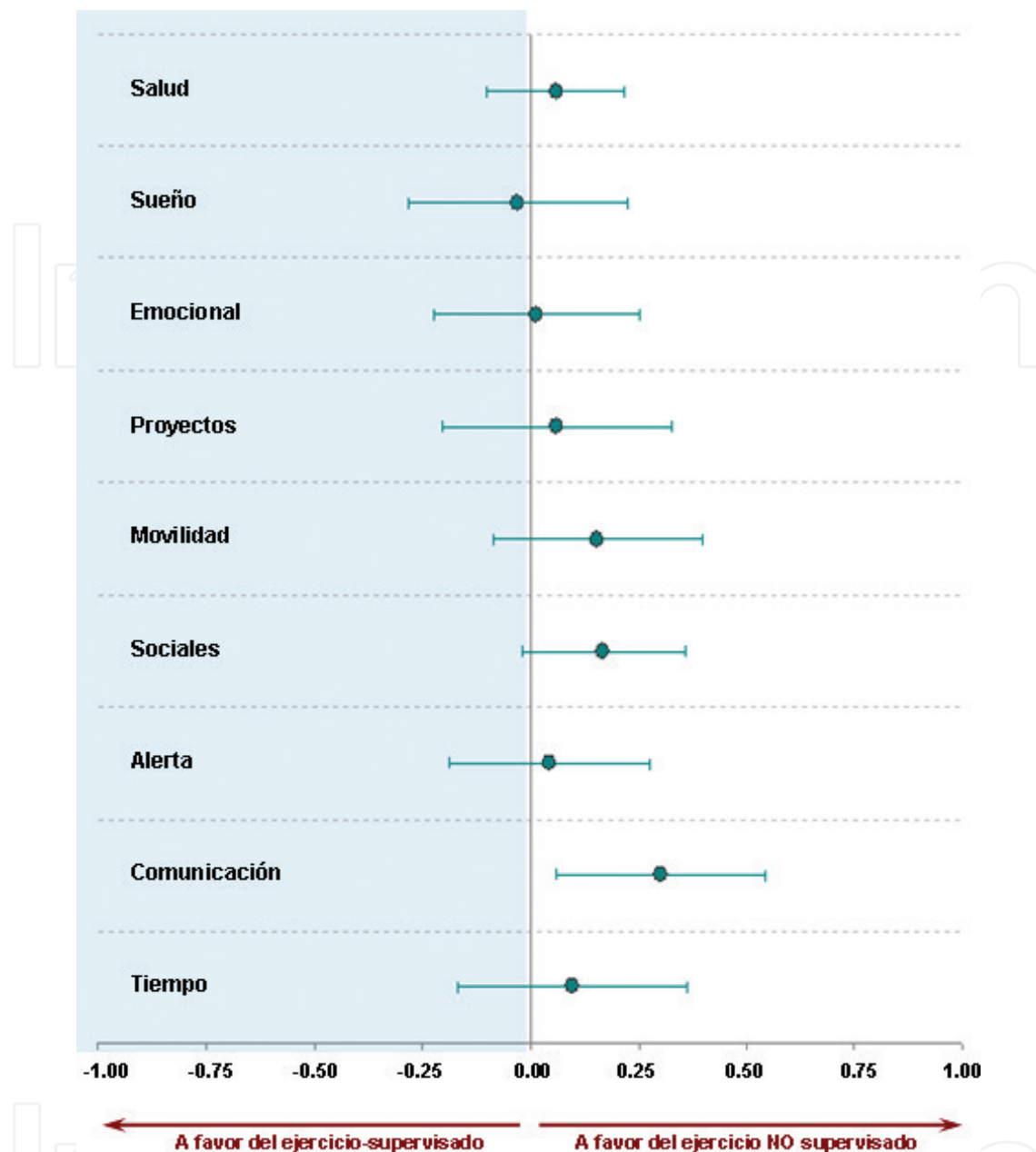


Figure 2. Effect of supervised and unsupervised exercise on the quality of life (Velasco del Barrio questionnaire). Note: On the left effect attributed to supervised exercise (cycle ergometer) and to the right effect of unsupervised walking activity.

Additional analyses assessed changes in HRQL in both groups and compared those values. On the SF-36, patients in both groups showed considerable improvements in the *physical role* dimension. Additionally, scores of the UW group improved significantly in the *bodily pain* and *mental health* dimensions. There were not, however, any significant differences in the improvement shown by each group in any of the dimensions or components ($p > .05$). As for the Velasco-del Barrio questionnaire, all patients' scores improved notably in the *health dimension*. Furthermore, scores of the UW group significantly improved in *social relationships*

and *mobility dimensions*. Again, however, there were no significant differences between the changes in the groups in any of the dimensions ($p > 05$).

5. Discussion of the results

Right from the earliest studies on well-being and quality of life, numerous authors have tried to determine which factors facilitate or foster higher indexes for both its psychological component (psychological well-being) and its physical one (health-related quality of life). Some of the most widely studied factors include (within the psychological model): age, sex, income level and social support in one's environment, culture, personality traits and work [10, 15–19]. Within the physical health models, these include economic, social and cultural factors [25].

Over recent years, probably as the result of an increase in diseases caused by a sedentary lifestyle, as well as a rise in negative sentiments (anxiety, depression, etc.) linked to greater stress levels in our society, the focus of attention has shifted to physical exercise as a means of improving quality of life [24].

During 1919s, several reviews were conducted on the effects of physical exercise on depressive disorders, with the authors finding that those suffering from these disorders spend less time engaged in physical activity than the normal population, due to a major reduction in their physical capacity. It was also found that when trying to reduce the symptoms of these disorders through sport in any type of population, what was most important was to adopt physical activity as a habit of daily living [21, 48]. Much the same is true of anxiety: many studies have confirmed the benefits of any type of physical exercise or sport for reducing this negative emotion [49–51].

Nevertheless, these studies cannot be considered empirical antecedents of the study presented here, since they understand well-being as the absence of psychological disorders, rather than in a more precise sense of the term. Consequently, it was important to verify whether physical-sporting activity may be a viable means of increasing psychological well-being, understood as a three-dimensional construct (satisfaction with life and positive and negative affect). The results presented here indicate that psychological well-being is indeed associated with physical-sporting activity, since those people who perceive themselves as having a more positive degree of psychological well-being are also the ones who claim to engage in physical exercise, even if it is only sporadically. Moreover, this greater psychological well-being was found to be higher the more regular the physical-sporting activity engaged in, with the exception of negative affect, which was found to remain stable regardless of the assiduousness with which the individual in question engaged in physical exercise.

In short, the data presented here identify physical activity as a variable associated with higher well-being scores, although this association was not found in the case of negative affect when frequency of the physical activity engaged in was taken into account. The results indicate that in order to achieve high levels of psychological well-being, individuals should engage in physical activity on a regular basis, at least four times a week. These findings are consistent with those reported in the field of sports science, which affirm that physical exercise results in greater well-being [52–54].

The question we must ask ourselves now is whether this improvement in psychological well-being occurs as the direct result of physical exercise, or whether it is mediated by another variable (in other words, whether exercise in fact improves the levels of a mediating variable, which in turn increases well-being). A previous study suggests that this may in fact be true, identifying physical self-concept as the variable which may mediate the relationship between physical exercise and well-being [8]. The linear relationship between physical activity and well-being is altered when physical self-concept is considered as a mediating variable, which leads us to conclude that a greater degree of physical activity results in a better general physical self-concept, which in turn is directly associated with higher levels of well-being. Hence, we can conclude that physical-sporting activity generates a better physical self-concept, which in turn is directly associated with well-being, as postulated by Thørgersen-Ntoumani et al. [55].

In regard to the study of the effects of different types of physical activity on health-related quality of life, the results describe the impact of a program of supervised exercise on health-related quality of life among a group of participants receiving conventional medical treatment for ischemic cardiopathy, in comparison with the impact of an unsupervised walking program. No significant differences were observed between the supervised and unsupervised groups in relation to the improvements attained. The only significant improvements found between baseline and final values were observed in the unsupervised exercise group in the dimensions bodily pain, mental health, physical component, mobility and social relations.

6. Conclusions

It is important to highlight the fact that the scientific evidence obtained to date has been limited. This is due to a number of reasons. Firstly, because of the high degree of variability in the dose (intensity and duration) and type (aerobic, muscular endurance, unsupervised walking, etc.) of exercise studied. Secondly, because comparison groups are not always the same across all studies (control group, intervention group, etc.). And thirdly, because the instruments used to measure HRQL vary from one study to another (generic and specific questionnaires), making it difficult to compare the different health dimensions.

Existing literature shows that standard generic health measures have their limitations, since many people with serious functioning or health problems do not necessarily have quality of life scores that are proportional to their poor state of health [56]. It is possible that the generic variables included in the SF-36 questionnaire may be irrelevant for describing the health status of some of the participants in this study.

In this same line, the first study has some limitations. The first one is due to the fact that only the frequency of physical activity has been evaluated. But the level of intensity should also have been evaluated to verify if the low, medium or high intensity physical activity affects the level of psychological well-being. The second limitation is that the study was carried out on people between 12 and 23 years old; therefore, the sample should also be extended to adult population. The third and final limitation is the correlational research design; if we really

want to check the effect of physical exercise on psychological well-being, we need to develop an experimental study with a control group and an experimental group that confirms the results found with correlational methods.

In any case, it is clear that for both physically healthy people and people with some type of ischemic cardiopathy engaging in some kind of physical exercise frequently on a regular basis helps to improve the three components of psychological well-being (satisfaction with life, positive affect and negative affect) and health-related quality of life, respectively. It is equally true that certain important questions have yet to be answered regarding this relationship, including the possible differential effect of intensity and duration, or even the type of exercise engaged in. Future research should try to clarify these issues and should strive to determine the specific direction of the effects identified: does physical exercise improve health, which consequently improves physical self-perceptions that, in turn, give rise to higher levels of psychological well-being?

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