TITLE: Physical Fitness, Exercise Self-Efficacy, and Quality of Life in Adulthood: A Systematic Review.

AUTHOR LIST AND AFFILIATIONS: Medrano-Ureña María del. R.(1), Ortega-Ruiz Rosario.(2), Benítez-Sillero Juan de. D. (3)

(1) Calle San Alberto Magno , s/n, 14071 Córdoba, Spain. Electronic address: z62meurm@uco.es PhD Student. Faculty of Education Sciences, University of Córdoba.
https://orcid.org/0000-0002-3691-3501
(2) Calle San Alberto Magno , s/n, 14071 Córdoba, Spain. Electronic address: ortegaruiz@uco.es Full Professor. Psychology Department. Faculty of Education Sciences, University of Córdoba.
https://orcid.org/0000-0003-2110-6931
(3) Calle San Alberto Magno , s/n, 14071 Córdoba, Spain. Electronic address: eo1besij@uco.es Lecturer. Department of Specifics Didactics. Faculty of Education Sciences, University of Córdoba.
https://orcid.org/0000-0003-1861-2913

Corresponding author:

Benítez-Sillero J.D.
Faculty of Education Sciences, University of Córdoba. Department of Specifics Didactics. Calle San Alberto Magno , s/n, 14071 Córdoba, Spain.

Email: eo1besij@uco.es
Phone number: 0034652249669

ABSTRACT: **Background**: The aim of the present work is the elaboration of a systematic review of existing research on physical fitness, self-efficacy for physical exercise, and quality of life in adulthood. **Method**: Using the PRISMA statement guidelines, and based on the findings in 396 articles, the final sample was composed of 31 articles, which were reviewed to show whether self-efficacy has previously been studied as a mediator in the relationship between physical fitness and quality of life in adulthood. **Results**: The results indicate that little research exists in relation to healthy, populations with the majority being people with pathology. Physical fitness should be considered as a fundamental aspect in determining the functional capacity of the person. **Conclusions**: We discuss the need to investigate the mediation of self-efficacy in relation to the value of physical activity on quality of life and well-being in the healthy adult population in adult life.

KEYWORDS: Physical fitness, Exercise self-efficacy, Quality of life, Adulthood.

Introduction

Today's developed society is subject to great changes, not always of a positive nature, some of which seem to impact health, well-being, and especially the prolongation of life [1]. This can only be said of societies where the complexity of economic systems and the benefits of wealth distribution allow for the extension of education and health systems to broad layers of the population. In this type of cultural environment, socio-political attention to the well-being of citizens allows individuals to assume, on their own, control over their own care. Beyond the fact that health services attend to health problems, attention to one's own well-being is, to a large extent, in the hands of each individual. This requires that one adopt habits and routines that prevent illness, and which improve the quality of both physical and psychological well-being. A good quality of life is, in turn, a prerequisite for the person to feel satisfied and ready to assume the challenges of a personal and social life.

Quality of Life in Adulthood

Adulthood is a period of the life cycle that differs widely due to socio-economic, labor, and cultural conditions. Although it can cover a wide range of ages, current scientific convention specifies an age span that begins between the ages of 40-45 and ends between the ages of 60-65, at which point we can speak of the beginning of old age [2,3]. During the process of adult maturity, important body changes take place or have already taken place, such as menopause and andropause, which involve diverse psychological impacts and, frequently, physiological changes. A loss of bone mass, for example, reduces the strength of the body, making it more vulnerable an injury or disease in daily life [4,5]. People are not always aware of these changes [6-10]. Recently, although there seems to be some interest among the population in understanding the keys to maintaining health and quality of life and to face the decline or deterioration that occurs in old age with better physical and mental health [11], the sedentary life continues to affect a wide range of the adult population [12].

Active Life as a Quality of Life Enhancer

In this period of life, adulthood presents opportunities for acceptable and positive social and occupational integration. In any of the family types now considered stable, the family nucleus is formed and there are sufficient means available to develop a reasonably balanced life. Many individuals, both men and women, must take care of themselves, and one option offered by our society and culture is the practice of physical activity. A review study [13] indicates that moderate and systematic physical activity is one of the factors that most affects quality of life. During childhood and adolescence, physical activity is academically programmed, and the habit of physical activity is regulated by schooling, with varying degrees of effectiveness and quality. In old age, health systems and community medicine usually incorporate guidelines that recommend moderate physical activity, with advice on the value of walking, swimming, or going to gyms and social health centers. These efforts, sometimes, are not always successful. However, during the mature adult years [14] that precede old age, the adult population seems to be under pressure from work and family responsibilities, leaving little time for personal attention to preventive health and well-being needs. Some research [15] has

revealed the challenge of practicing physical activity or sport in this period of the life cycle. The responsibilities of early adulthood are self-regulated by the experience and years of mature adulthood, and it is at this stage that the practice of physical activity and/or sport becomes a challenge, because it is known to benefit the individual's overall health [16,17].

Physical Fitness as an indicator of Quality of Life

Related to active living and physical exercise is the concept of physical fitness, a well-known and powerful health marker [18-20] among middle-aged populations, it is even more powerful than physical activity [7] but we must understand physical fitness as a concept broader than one related exclusively to biological health; it can be defined as the ability to carry out daily tasks with vigor and liveliness, without excessive fatigue, and with enough energy remaining to enjoy leisure time or to cope with unexpected emergencies [21]. Therefore, in addition to being related to biological health, physical fitness is also closely related to psychosocial factors on the human spectrum and has been found to influence fitness parameters [22]. However, few studies present data associating physical fitness in adults with it is psychosocial benefits. It is known that, as a method of achieving general well-being, physical fitness has a large regulated role in the negative relationship between the sedentary life and quality of life [23]. Thus, knowing the levels of physical fitness can be an important tool in providing specific advice to the population in relation to their well-being [24].

However, although it is known that physical activity and improved physical fitness generate benefits and play a fundamental role in both biological and psychological well-being [8,10], it cannot be taken for granted that adults currently incorporate it into their daily routines. Thus, it makes sense to understand the reasons why people engage in physical activity to improve their physical fitness.

The Role of Self-Efficacy in Maintaining an Active Life

Many different factors intervene in the dynamics of daily life in adulthood—socio-economic, family, and social affective—but they all end up taking shape in the set of routines and habits that frame personal activity. Habits regulate activity, work, and rest times, as well as the very perception of how each person organizes his or her life. This produces a more or less conscious record of the autonomy and control of one's personal agenda and the evaluation that each person makes of it. In fact, it is not only important to control the management of daily activities, but also the self-evaluation that is carried out, a concept that has come to be known as self-efficacy [25]. Expectations of self-efficacy refer to beliefs about personal abilities and the ability to satisfactorily carry out the necessary demands in different situations [26]. Losses inherent to the aging process, such as those related to physical functioning, can affect how one believes in one´s control, or loss of control of self-efficacy [2]. Fortunately, the practice of physical exercise can alleviate these consequences [19]. However, even though people understand the beneficial effects of healthy habits on their own bodies and on their overall well-being and health, we are not sure if there is reciprocity between this knowledge and the integration of physical exercise into their life routines [27].This may seem a paradox in relation to classical theories of motivation towards physical exercise,

which emphasize the role of rationality in the decision-making process [28]. It is here that the concept of self-efficacy for physical exercise becomes important, since it determines in part one's motivation to practice physical activity and is one of its most powerful predictors [29]. While the relationship between self-efficacy and the practice of physical activity and exercise performance is well established, the relationship and influence between overall self-efficacy and exercise self-efficacy regarding fitness appears to be understudied. This relationship seems to be very important: if we consider physical fitness to be a factor highly related to well-being and quality of life, as well as a quantitative aspect of each person's physical functioning—functioning that declines as one ages—then analyzing the relationship between these constructs seems to be an interesting hypothesis for a systematic review.

Material and Methods

We selected articles in the PubMed database presenting research results on the relationship between quality of life, physical fitness, and exercise self-efficacy in the adult population. They were chosen because they are the largest and most recognized base of abstracts and bibliographic references in the scientific literature worldwide. This search and analysis was conducted from March to October, 2018.

We used a pattern of argument follow-up based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol [30], which is recommended for the development of bibliographies, systematic reviews, and meta-analyses, where all works included in the journals in the Journal Citation Report (quartiles 1, 2, 3) and the SCImago Journal Rank (quartiles 1 and 2) were examined.

The exhaustive review of each of the articles was managed according to author, title of article, year of publication, language, , URL and/or DOI of publication, indexation of the journal, publication location, city or region of the study, number and type of sample, average age of participants, objective(s), methodology, analyses performed, measuring instruments, and techniques used.

The search terms used were: "Exercise" and "Physical Fitness" and "Self Concept" and "Self Efficacy" and "Quality of Life", and a combination of these with the Boolean operator "AND" under the guidelines of PubMed and with the filter belonging to the PubMed database itself, limiting the age stage to "middle-aged". The following search combinations were used: "Exercise and Physical Fitness and Self Concept and Quality of Life", "Exercise and Physical Fitness and Self Efficacy and Quality of Life", "Exercise and Exercise Test and Self Concept and Quality of Life", "Exercise and Exercise Test and Self Efficacy and Quality of Life". Criteria for the inclusion of articles were: a) the average age of participants was within the range of 40-70 years (in the case of articles that included this data, the criterion < 70 years was accepted); b) that they were empirical articles, or c) they were articles from bibliographical reviews or meta-analyses. The screening of articles was done manually, and the selected papers were included in a general table (see Table 1).

<<INSERT FIGURE 1 HERE>>

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Results

Figure 1. presents all the articles that were selected for this systematic review. Of the 31 articles reviewed focused on clarifying the relationship between fitness parameters and exercise self-efficacy, 27 articles were focused on populations with

some type of pathology [6, 31-56]. Four articles focused on the pathology-free middle-aged population [57-60]. The results obtained from the articles included in this review are shown in the table 2* section below.

Results of studies assessing physical fitness

Assessing physical fitness was the main objective for 11 articles, while it was secondary in 7 articles.

In relation to the measurement of the instruments used, different tests have been found for the evaluation of physical fitness, of which some are general and others, specific. On 21 occasions, the test used was "The 6-Minute Walk Test" (6MWT) that assesses aerobic endurance Self-perceived physical fitness was assessed on 10 occasions [6, 34, 37, 39, 40, 43, 47, 53, 56, 60].The "Foot Up and Go" test was used on six occasions [34, 42, 48, 54, 55, 57, 61].The "Sit to Stand Test" was used on 4 occasions [34, 39, 46, 57,]. Finally, the Arm Curl Test was used on 2 occasions [39, 57]. On four occasions, the "Handgrip forced" test was used to evaluate the strength of the upper and lower body, agility in the face of possible falls, flexibility of the upper and lower body, and dynamic balance [39, 42, 46, 58].The 10-Minute Walk Test (10MWT) assessing endurance was used on 3 occasions [40, 48, 50]. On 2 occasions the VO2 peak was evaluated with "The Borg Rating of Perceived Exertion Scale" [45, 54]. The VO^2 peak was assessed with the “Naughton Protocol” [6, 47] on two occasions. On 1 occasion, the VO^2 peak was assessed with the “Balke Protocol” [60]; with the “Bicycle Ramp Protocol” [54]; with the “Discontinuous Arm Crank” [38]; with the “Submaximal Bicycle Ergometer” [46] with “1-Repetition Maximum Free Weight Bench Press” [38]; and with the “Timed Stair Climbing” [43].

In 2 occasions, the test “Sit and Reach” was used [57, 58]. In 2 occasions, the “The Activities-Specific Balance Confidence Scale” (ABC Scale) was used [42, 50]. In 1 occasion, the following instruments were used: “Hip Flexibility” [58]; “Functional Aerobic Impairment” (FAI) [6];“50 Foot Flat Surface Walking Test” [43]; “Berg Balance Scale” (BBS) [48]; “The 14-item Mini Balance Evaluation Systems Test” (Mini-BESTest) [42].

Results of studies assessing self-efficacy.

For 13 articles, self-efficacy was assessed as a secondary objective.

In 3 occasions, the following instruments were used: “The Arthritis Self- Efficacy Scale” [34, 43, 53]; “The 16- items Cardiac Exercise Self- Efficacy” [6, 54, 55]; “The Exercise Self-Efficacy Scale” [45, 46, 62]. Furthermore, the following instruments were used in 2 occasions: “ABC Scale” [42, 50]; “The Self-Efficacy Questionnaire-Walking” (SEQ-W) [49]; and “The chronic obstructive pulmonary disease (COPD) Self-Efficacy Scale” [52]. In 1 occasion, we used the following instruments: “The New General Self-Efficacy Scale” [58]; “8-ítems measure of beliefs capabilities” [60]; “The Physical Activity Self-Efficacy” [59]; “Self-efficacy in Leisure-Time Physical Activity” (LIVAS) [39]; “Self-Rated Abilities for Health Practices Scale” (SRAHP) [38]; “Fear of Falling Efficacy Scale” (FFES) [48]; “Self-Monitor Exercise Behavior” (SMEB) [31]; Likert Scales [57]; “General Self Efficacy Scale” (GSES) [56].

Results of studies assessing quality of life.

Quality of life has been evaluated with different instruments, 11 articles used “The SF-36 Health Questionnaire” [6, 31, 32, 35, 36, 38, 41, 43, 44, 45, 53]. The “Chronic Respiratory Questionnaire” [36, 49, 62] (CRQ) was evaluated on 4 occasions [36, 49, 62]; “The SF-12 Health Questionnaire” was evaluated on 3 occasions [42, 51, 55]. On 3 occasions, the following were used: “The Medical Outcomes Study 36-Item

Short Form" (The MOS SF36) [44, 47, 52]; "Minnesota Living with Heart Failure Questionnaire" (The MLHFQ) [54, 55]; "The EuroQol Five-Dimensions Questionnaire" (EQ-5D) [46, 56]; "The St. George Respiratory Questionnaire" (SGRQ-TS) [39, 44].

On 1 occasion the following instruments were evaluated: "The European Organization for Research and Training, Quality of Life Questionnaire - Core 30" (The EORTC QLQ-C30) [59]; "Self-Administered Quality of-Well-Being Scale" (The QWB-SA) [44]; "Cancer Rehabilitation Evaluation System-Short Form" (CARES-SF) [57]; "The Fibromyalgia Impact Questionnaire" (FIQ) [32]; "Stroke Impact Scale–16" (SIS-16) [50]; "The Parkinson's Disease Questionnaire-8" (PDQ-8) [48]; "The Kidney Disease Quality of Life" (KDQOL-36) [51]; "The World Health Organization Quality of Life questionnaire" (WHOQOL-BREF) [40]; "The Quality of Well-Being Scale" (QWB) [49].

<<INSERT TABLE 2 HERE>>

Discussion

To find the relationship between physical fitness, the role of self-efficacy in physical exercise and physical exercise, and quality of life in the middle-aged population, the systematic review analyzed in detail works published on physical fitness, self-efficacy, and quality of life from 1997 to 2018. The minimum age of the subjects was 30 years and the maximum age was 80. A systematic search of the literature was carried out and 31 articles focusing on explaining these relationships were identified. Our results allow us to confirm that there is a relationship between the three explored constructs (physical fitness, quality of life, and self-efficacy in terms of improved health and healthy habits, although the relationship between the three is not entirely clear.

The results have shown that, although there is scientific production that attends to the relationship between the three variables, in most cases the population evaluated is a population with some pathology. Only in some cases was the evaluated population free of pathologies [58, 60] that a variation of the levels of physical fitness affects to the behavior in relation to the barriers towards the physical exercise and of the style of life of the population in consonance as they indicate authors as [50, 57]. This is especially relevant since identifying the pathology-free population that regularly exercises and tries to achieve and/or maintain good levels of physical fitness that is one of the main objectives of the current study [63]. All this, together with the novelty of the subject of analysis, means that this subject of study has yet to be clarified and delimited, hence its importance.

On a methodological level, the samples used for the studies was somewhat small: only one study [44] used a sample of 1,631 participants, while the others had samples of fewer than 250 subjects. This is due mainly to the fact that these studies were interventions or programs development studies of populations with very specific characteristics; fewer descriptive studies analyze the relationships between the variables under study. This requires us to be cautious when considering the results of the reviewed studies.

The assessment, through evidence, of the capacities that support the physical fitness should be considered as a fundamental aspect in determining the functional capacity of the person. The physical fitness represents a significant influence on the

quality of life associated with health, this being a key component in the quality of life [18, 19, 20]. In relation to the physical fitness variables studied, 28 articles assessed aerobic endurance, and 21 of these used the resistance test called The 6 Minute Walk Test. Cardiorespiratory capacity is the main indicator of the subject's state of physical fitness, with maximum oxygen consumption (VO2peak) being the physiological variable that best defines it in terms of cardiovascular capacity. It has been shown that a low level of physical fitness constitutes a major cardiovascular risk factor [63, 64] and is a strong and independent factor in all causes of death [45]. In relation to strength, the following were evaluated: general muscle strength; lower body strength; maximum muscle strength of the muscles that mobilize the hand, knee, and elbow; grip strength; maximum strength; maximum grip strength; knee strength; muscle power. It should be noted that various transversal and longitudinal studies have verified that strength decreases with age [66,67], and this decrease is significant starting in the 50s for women and in the 30s or 40s for men [68,69]. It would therefore be advisable to introduce strength exercises into physical activity programs to slow down the process of loss of muscle mass.

On the other hand, given that many of the gestures of daily life require extensive articular paths, this capacity facilitates the functional independence of the person. For this reason, flexibility should be included in recommendations for physical exercise in this phase of life. Flexibility has been evaluated in a small number of studies, although flexibility of the lower and upper body was also assessed [41, 57, 58]. General mobility, walking and leg mobility, and agility have also been evaluated [34, 40, 42, 43, 48, 50, 54, 57]. Static and dynamic equilibrium, which are affected by the progressive loss of sensory-motor function caused by increasing age, were assessed in several studies [42, 43, 48, 53, 55, 61].

In summary, several studies in this review focused their efforts on understanding what makes a person more consistent in their active exercise behaviors. Many of these, through different types of intervention programs, have shown how increased health perception is linked to increased awareness of personal health status and associated with improved levels of physical fitness [46, 50], improved behavior and enhanced adherence [31, 39, 46, 53], and tolerance of sports behavior [6]. Therefore, knowledge of fitness levels can be an important tool in providing specific advice to the population [45].

Self-Efficacy, Fitness, and Quality of Life

Empirical evidence supports the link between exercise self-efficacy and predictions of a variety of health-related behaviors [70, 71]. The importance of physical inactivity for public health in the adult population underscores the importance of identifying those physical activity mediators and moderators that can be targeted for interventions to increase physical activity levels [72]. In this review, four articles focused on showing the relationship between physical fitness and exercise self-efficacy, three of which showed a positive relationship between both variables [33, 47, 55], while on one occasion no relationship was shown between the two [35]. These results are consistent with the findings of other studies in which exercise self-efficacy is postulated as a powerful indicator of measures of functional and reflex change in an individual's physical fitness. It is also a determinant in the relationship between physical activity and various aspects of quality of life, including physical and mental health status and life satisfaction [23, 73, 74].

Review of Instruments and Measures

In relation to the instruments used in this review, 18 articles evaluated self-efficacy for physical exercise; these focus primarily on evaluating pre-behavioral processes such as change of behavior towards exercise [33, 39, 49], confidence in designated change towards exercise behavior [6, 45, 47, 54, 55], self-perceived capacity to develop sports behavior [45, 51], confidence in designated change towards exercise behavior [6, 54, 55], social support for exercise behavior [46], and self-perceived barriers to exercise behavior [57, 60]. Specifically, all of these results are related to Pender contributions, which link healthy behavior to the likelihood of engaging in it and one's sense of self-efficacy. He proposed that self-efficacy for physical exercise has a decisive influence on health behavior, perceived barriers, and commitment to a plan of action [75]. During adulthood there is a slight decline in levels of self-efficacy and mastery, and these influence the perception that there are obstacles to achieving new goals [76]. Therefore, it is essential to improve beliefs about the effectiveness of physical exercise and to promote healthy behavior in the long term.

One's general sense of well-being—being aware of and feeling healthy and adjusted to one's environmental conditions—seems to be an important requirement for developing self-awareness and a satisfying quality of life. Three studies in this review corroborated the relationships between the physical fitness variable and the quality of life variable [33, 35, 50]. Only Cameron-Tucker's study showed an absence of association between physical fitness and quality of life. Quality of life was evaluated with different instruments. Eleven articles used t*he SF-36 Health Survey*, a questionnaire that provides a clear understanding of what is being measured, how it is used, and the implications for future use. It includes most of the essential concepts for the evaluation of the general health status. It has also proved to be suitable for cross-cultural applications but may be too long for clinical use. In addition, its scoring method is more complicated. The *Chronic Respiratory Questionnaire* (CRQ), which is one of the available instruments to measure the general health-related quality of life in patients with chronic respiratory condition, and which has been translated into different languages [77]. On 3 occasions the *SF-12 Health Questionnaire* was evaluated. The SF-12 represents a plausible alternative to the SF-36 for measuring health status, showing only a minimal loss in measurement accuracy in comparation with SF-36 [78]. Other questionnaires analyzed in the results have been used on fewer occasions [46, 54-56]. On the other hand, if we take into account the importance of the dimensions evaluated for quality of life in middle age and in relation to the other variables analyzed, it should be noted that middle-aged women present more work-family complications and less social support as their perceived benefits of physical fitness increase [79]. It was also found that, among men, low mobility was associated with a lower quality of life in the psychological health domain. This is very important because increased dependence on others and reduced work capacity can be a major challenge for many men [80].

A relevant and conclusive aspect of our review is that a large variety of articles included intervention processes, the results of which focused on checking the possible effects of such interventions on the variables of physical fitness, self-efficacy, and quality of life . These results allow us to assume that, in most cases, the interventions that encourage on physical exercise programs offer benefits for physical fitness, self-efficacy, and quality of life when compared with the control groups, even throughout the follow-up time.

Conclusions

One of the main conclusions of this work is that the important role played by physical fitness and self-efficacy for physical exercise in achieving levels of well-being and quality of life in middle-aged and senior adults. Although one article [33] showed a positive relationship between the three reviewed constructs, the relationships between them are not completely clear. While there is no unanimity on the effects of these variables, it has been found that they are clear predictors of health, they benefit behavioral change, and they have a close relationship that can be mutually influenced. Since current research should try to identify variables that measure and moderate the practice of physical activity in the adult population, these data provide us with vital information that will allow us to deal with the serious problem of physical inactivity in favor of public health [72].

With the objective of promoting integral health, we should raise awareness that prevention should begin before disease appears [81]. However, one of the difficulties among the middle-aged population is lack of time, which undermines this link between personal cultivation and healthy habits.

As for the limitations of the study, we should highlight the large age range of the samples examined—a result of the scarcity of studies dealing with this vital period. Likewise, most of the studies we examined referred to subjects with some kind of pathology. Finally, we would add that physical fitness and self-efficacy show a positive relationship, which is important in well-being at this age.

Supplementary Materials:

Figure S1: Title, flow chart of the studies selected for the review.
Table S1: Title, description of the item selection process.
Table S2: Title, characteristics of the selected studies.

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Conflicts of Interest:

There is no conflict of interests.

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