

Article

Sport and Its Relationship with Oncology in Future Primary Education Teachers

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Abstract: This essay is aimed at analyzing the existing relationships between oncological problems and sport in future primary education teachers. This relationship was validated and confirmed by realizing a factorial analysis using an ad hoc-created Likert scale. To come up to certain conclusions, a non-experimental, descriptive, explanatory and correlational investigation process was carried out. The instrument used to collect the data have been made through Likert scale, which was validated in contents and with an excellent Cronbach's alpha (0.952). The validity of construct was made with factorial analysis exploratory (KMO (0.722), Bartlett (0.000), determinant ($3.266E^{-23}$)). Three different samples have been taken from 900 students (years 2017–2018–2019), being 896 subjects for research. Those persons were students from the fourth year of primary education degree at University of Jaen. The Kruskal–Wallis test allows us to keep the null hypothesis and make the P of Pearson. As a conclusion, we emphasize that there is a relationship between oncological problems and sport and future primary teachers should be informed about this relationship, as well as the importance of cancer and bones tumors and their relationship with sport, the media used to train in oncological problems may be less important.

Keywords: sport; oncology; tumor; cancer; mass media

1. Introduction

At the present time, the practice of physical education has become of secondary importance, because teenagers are interacting more with technology and less strenuous free-time activities [1]. Consequently, failure to undertake physical education is not good for health, and teenagers should have an active life [2–4]. On the other hand, in recent years health is understood in an alternative way, in a view becoming increasingly popular [5,6] The importance of psychological welfare has developed, and has invited further investigations in this regard [7]; Steel, Schmidt and Shultz, 2008 [8]. In recent years, psychological welfare has been studied in addition to the physical one, including depression, anxiety, stress, neurosis, etc. [9,10]. The concept of wellness psychological is better understood, to know if an individual will have good health throughout his or her life, in ways now seen as vital. The problem may be convincing teenagers to undertake physical exercise and understanding the importance of wellness in generally, to improve their health throughout their lives.

In persuading teenagers of the benefits of exercise, future primary teachers have a crucial role. If these teacher are correctly trained, we will be able to enjoy the best professionals in this field. This research is focusing on the following stage of the educational stage: primary education.

García [11] points out that in primary education, teachers must focus on activities which will entail anybody benefit to the students. physical education is aimed at improving students' health. Teachers should be involved in this process. Delgado et al. [12] assert that public awareness about

physical activity and health-related issues may contribute a huge boost to teachers that guide physical education in the low curriculum from a health promotion perspective.

García [11] confirms the paramount importance of physical education and its improvement in students' quality life. This justifies physical education teachers' duty at schools. It also promotes the necessity of swotting up on syllabus on health issues within the curriculum. As Ferrer [13] states, teachers must be aware of children's illness, how we may face that illness and the consequences that treatments may have in relation with physical education. Cintra and Balboa [14] expose the significance of doing exercise to prevent illness and reducing the possibility of suffering from cancer.

Then, a relationship on different aspects of oncology and its relationship with the physical health of people will be conducted.

Following the investigation of Leiva, Márquez, Rodríguez, Navas and Bozal [15] it was shown that women suffering from breast cancer, who undertook physical exercise, experienced less anxiety and depression, together with greater satisfaction with life, optimism and resilience. The practice of sports in all types of cancer has been evaluated and appeared to have benefits, reducing fatigue and increasing physical functioning and improvements generally in the quality of life [16].

A number of people feel unable to undertake physical exercise for various reasons, such as chronic fatigue, a reduction of physical ability or changes to the body due to weight gain or loss of muscle and bone. Particular authors show that these and other symptoms can be reduced or mitigated, if the individual undertakes even minimal levels of activity, with subsequent improvement to quality of life [17], welfare subjective [18] the relations social and emotional state [19,20].

Towards the end of the nineteenth century, previously established theories in relation to illness and physical exercise began to be challenged, according to Duclow [21] and the conception "comprehensive welfare" was substantiated by William James, of the United States, and led to the establishment of the concept of a "Mind Cure Movement" (1894–1898). It addressed the importance of positive emotions and faith. From here on, James' work combined established medicine with that of the mind and body, the alternative and complimentary therapies based on the importance of emotional and mental well-being, in illness and recovery, in "Mind-Over Matter", as it came to be known [22] After the study of Habert Benson [22] revealed the positive effect that the mind can have over illness, this author developed an interest in the study of meditative techniques such as deep breathing repetitive sentences, qui-yong, progressive muscular relaxation, tai-chi, etc. The study, entitled "The answer of relaxation" explores the vital link between mind and body [23,24].

From all these studies, the treatment of the mind and body can be divided into three separate stages:

- Employment of specific mind and body techniques and vice versa;
- Integration of systematic exercises for the development of the healing process of mind and body;
- Aiding the healing process of a patient to encourage individual recuperation [25].

The treatment of the mind and body is not only beneficial during periods of illness, but also in cases of common social, physical and mental well-being [26].

This paradigm gained ground, particularly in the United States around 1997/98, following one study about the use of this type of treatment. Some researchers found that 90% of people interviewed, who were over the age of forty, had followed some form of mind and body therapy in the last year, at the same time as they utilized care from a conventional doctor Wolsko, Einsenberg [27].

Physical education is essential in the treatment of people undergoing various treatments, such as oncology. Bodily expression allows the reflection of a creative emotional state; utilizing the body, the movements and function of senses confirm such benefits. Brehm and Kampfe [28]. "The dance or the discipline of creative movement, involves the rhythm of the body to awaken the awareness of the senses, which satisfies two basic human necessities: movement and thought." Encouraging and adding exposure, Stokoe [29] confirms the general purpose of this expressive work of movement to "recover and develop one intrinsic human condition: the capacity to absorb or accept sensory-receptive

system impressions of the internal and external world and to reveal and inform personal answers typical of these impressions, by means of the body". This author also explained that the objective is to "find the typical body-language, to plan through the internal world of oneself over the external and integrate with the rest of society." As reported by Brehm and Kampfe [28] Mays [30], movement and expression will assist the patient to connect with him or herself, to aid re-connection with society in general, and, through individuality of expression, to hopefully boost social interaction. It is then possible to observe the curative potential of bodily expression by different means, namely physical, social, mental, imaginative, creative and emotional and to diminish the inequality in applications and results in relation to patients who have participated.

The bodily expression presents a therapeutic aspect and if this is worked on by the individual, their health will improve too. Stokoe and Harf [31] explain that bodily expression is one conduct that has always existed in human beings, it is well defined as "the language by which a person can express him or herself, to gather in his or her own body, the message and the channel, the content and the form." Through means of imaginative movements or bodily expression, that expression is improved with mutual work, using the body in a creative way. In this regard, Stokoe [29] presents some specific examples, such as:

- Working sensitivity;
- Shortening division between mind and body;
- Increasing creativity;
- Improving creativity;
- Increasing working efficiency;
- Developing bodily assertion to increase self-confidence;
- Encouraging the improvement of learning (assimilation and flexibility for changing behaviors);
- Improving and developing a broad, thoughtful, positive attitude and considering modifying it for the benefit of oneself and others;
- Modify and be modified, analyze and be analyzed, criticize and be criticized;
- Work on different technical aspects, which form this task.

When imaginative movement or bodily expression is undertaken, the individual who practices it pays attention of the perception of movement within his/her body. This shows the importance of how the body moves and how do in reality, through emotions and feelings, guided by creating movement. In addition, those who practice it learn what Sheet Johnstone [32] describes as "thinking in movement", a procedure by which emotions are transformed into movements and sensations. According to Brehm and Kampfe [28] Mays [30], they explain that through the expression of movement, people have support and encouragement to access to their inner feelings. This leads to communication with others, demonstrating the importance of individuality of expression, which in turn encourages socialization.

The concept of space can be explained similarly, following Arteaga, Viciano and Conde [33] as the space in which the person moves and this allowed to distribute in:

- Spatial orientation: the ability to continuously support the movement of the body, in relation to location;
- Spatial structuring: the ability to learn how the distribution of space through the hierarchy of interaction between spaces, leading to the appreciation of independence, following elements, etc.;
- Spatial organization: the ability to distribute the space based on the location and structure of the space;
- Temporality: the concept derived from Arteaga, Viciano & Conde [33] as the way of reflecting on current affairs, as a result of the transformations or actions carried out, allowing division into:
 - Temporary spatial: concept of time and control of remarkable concepts in order to orient themselves in time.

- Structuring and spatial organization: awareness of places of origin: order and time.

When people study the use of the body, it is investigated a better practice of the body and perfection of made matrix, this goes the easiest to difficult and vice versa. This investigation also integrates the progress of consciousness of body, the corporal concept, the body image, the position and time, to know:

- Corporal consciousness: Castañer [34] explains it as a mixture or addition, of body image and image of itself, it collects some concepts, as well;
- Corporal image: Castañer [34] marks this concept of corporal image as limited for the physical character of a person, this need has one "Subjective Conception of typical body, parallel to the conception other people have of our body".

Arteaga, Viciano and Conde [33] together with Castañer [34], claimed that recognized instincts or concepts attached to our bodies, known as 'The Body Scheme', for rest or recuperation depending upon interaction of differing parts the body and their relationship with known and commonly understood objectives, can also lead to wisdom and knowledge of the body, the possibilities that it has together with the obstacles.

Space: a vital concept in the work of expression, self-esteem and the evaluation of the configuration and activity of the body for the well-being of each individual and group. Enjoying invention or total expression should be where esthetic practice and dramatic interpretation evolve. Work on expressive capacity must start with the main purposes and basic fundamentals of bodily expression. They are:

- Personal knowledge: this attempts to encourage the subject to understand him or herself, in relation to their opportunities, which are manifested through the whole body, creating a feeling of self-knowledge and a sense of self-realization of what he/she desires to achieve;
- Interpersonal communication: obtaining relevant correspondence from a minimum of two people; This is divided into oral and non-oral communication;
- Introspective communication: concerns the data provided by the individual on their internal self, of the various environments to which the data belongs. This could be established by either the internal world of the subject, the objectivity of each person (real) or the internal world of the subject, which they wish to determine; (invented).

The language of the body or creative movement, answers in another way to improve health, in which the person can choose or start in the progress and precautionary establishment of health.

Fernandez Río, Hortigüela and Pérez Pueyo [35] affirms that people should practice physical education in groups, the intention being to strengthen a climate that gives importance to process and collective achievement, sharing success together. Every person should progress to achieve their objectives.

López [36] explains that physical education should also be performed through dance, around sixty seconds of dance should enable people to be more concentrated and effective.

Friedenreich, Stone, Cheung and Hayes [37] explains that physical education is fundamental, whether a person has cancer or not, in reducing the risk of mortality. These authors also explain that playing sports after having had cancer enhances improvement in health.

Patel, Friedenreich, Moore, Hayes, Silver, Campbell and Denlinger [38] show how physical activity appears to have a greater effect on cancer outcomes, in comparison with physical activity prior to diagnosis.

Carriedo, Méndez Giménez, Fernández-Río and Cecchini [39] explain that bodily expression is a subject that should be worked on at all stages. Should know as work this corporal expression, the proposal and resources most innovative, can work with Internet. When people use the Internet, they have more motivation and interest the classes are more dynamic.

This investigation is considering the following research problem: Could oncological problems and sport be associated and related in future primary education teachers?

The main aim of this research is to establish the relation between oncology (blood cancer, bone and brain tumors) and sport, in general terms. We assume the definition by Castejón [40] (p. 17), who provides us with a newly extended definition of sport in which every single discipline can be included: “physical activity/exercise in which people make and reveal a set of movements or a voluntary control of movements, taking advantage of his/her personal characteristics and/or in cooperation with other(s), in a way he/she can compete with him/herself, with the environment or against other(s) trying to overcome his own limits, assuming that some rules to be abided by exist, and that even under certain circumstances, he/she could make use of any type of source to practice”.

Not only does our objective remain in setting a relationship between cancer and sport, but also, in the realization of an approach with future teachers of primary education, as it is of paramount importance to find out the educative consequences that the aforementioned relationship may suppose.

With all of the above-mentioned, the following general objective of research: Analyze if oncology problems and physical activity can be related in future primary education teachers and the specific objectives are to: 1. Verify if blood cancer affects practicing sports; 2. Show if bone cancer affects practicing sport. 3. Identify if brain tumors affect practicing sports; 4. Discover how people learn about the relationship cancer has with sport; 5. Investigate which are the means by which people have information about oncology and sport; 6. Characterize how people gain information about sport.

In this line, the hypothesis of departure of the study presented is: “Practicing sport could be related with oncology problems”. To this end, the following null hypothesis is defined; H0- It is not possible to project and approve a scale to measure the relationship between oncology problems and sport in future primary education teachers.

2. Materials and Methods

The current investigation has a non-experimental, exploratory, descriptive, explanatory and correlational nature, using a quantitative methodology. To carry out the research, the use of the Likert scale will be chosen, this is a data collection method. Furthermore, the software employed to process the data were SPSS v.25 y Lisrel 8.80.

Procedures.

- The questionnaire was prepared with an operationalization table, taking into account dependent, independent and general objective variables and specific objectives. Six measures were established with a total of thirty-eight items;
- First, we carried out a validation of content, with expert judgement and a pilot test. Second, an exploratory factor analysis was carried out to validate the construction of the questionnaire.

Participants.

The participants in the investigation come from of University of Jaen (Spain) All Students of the fourth course of primary education of University of Jaen were selected, in the years 2017, 2018 and 2019. In total, there were 900 students, although when scales were applied, there were in total 896 people of investigation.

Dimensions and variables.

The dimensions considered, extracted with reference to the theoretical framework, problems and specific purposes, were: A (cancer of blood and sport), B (tumor of bones and sport), C (cerebral tumor and sport), D (information of cancer and sport), E (mass media and sport) and F (information of sport).

In consequence, we establish the following variables:

- The dependent variables are perception, knowledge;
- The independent variables are tumors, information, mass media.

Instruments.

The Likert scale was constructed with an operationalization table, based on independent, dependent and specific object variables. Six measurements are established, with a total of thirty-eight items, with a graduation from 1—strongly disagree, 2—disagree, 3—indifferent, 4—agree, 5—strongly agree. The model of the Likert scale was designed with an operationalization table, however, the validation was carried out initially on contents, with an expert judgement and pilot test. Second, a factorial analysis was carried out to validate the scale of its construction.

Data analysis.

Validity of contents.

According to Malla and Zabala [41] should carry out the validity of contents with participation of fifteen specialist doctors. The competition coefficient (K) with a K average of 0.79, which shows a high level of competition of the topic. Once the validation questionnaires were analyzed, certain questions were revised. In addition, a pilot test was carried out on a part of the sample to review comprehension difficulties and discover invalid questions.

Data analysis.

All procedures which have data analysis use IBM SPSS Statistics v25 software and Lisrel 8.80.

3. Results

3.1. Construction Validity. (Exploratory Factor Analysis.)

The factor analysis technique applied in our research follows the standards set by Garcia Ferrando [42]; Díaz de Rada, [43]:

1. Study of the correlation matrix

The study of the correlation matrix is vital to confirm if the data obtained is correct for performing a factorial analysis. To do this matrix, it must have a specific structure. To verify this, the Kaiser Meyer Olkin measurement of sampling (KMO coefficient) was used. In our case the value is 0.722 and following Kaiser [44] the value is acceptable. The Bartlett sphericity test is meaningful (.000), determining a value of 3.266×10^{-23} .

2. Extraction of factors.

The resulting table of commonalities showed that the factors have a value greater than 0.582. This demonstrates that it is not essential to eliminate any item from the factorial analysis. The best represented items are: D24 (0.882)—I investigated about how people who have cancer can improve with sport. The item worst represented is: E30 (0.582)—I did not draw any inference from this.

3. Rotation of factors.

We have opted for the Varimax rotation, which optimizes the factor loads, so that the most extreme loads possible in the factors (highs and lows), are obtained. In our case, they are the first nine factors, which explains 78.858 of the accumulated variance.

4. Study of factorial scores.

Once the factorial scores and the analysis of variance explained and accumulated are calculated, as well as the determination of factors and distribution of items according to the highest level of saturation by factors, we can build table of items integrated in each factor (Table 1).

Table 1. Factors and items.

Factor	Name	Items Integrated in Every Factor of Questionnaire
I	A (blood cancer and sport)	A1. A2. A3. A4. A5. A6
	B (tumor of bones and sport)	B7. B8. B9. B10. B11. B12
	C (cerebral tumor and sport)	C13. C14. C15. C16. C17. C18
	D (information of cancer and sport)	D19. D21. D22. D23. D24
	E (mass information oncology and sport)	E25. E27. E28. E29. E30
	F (information of sport)	F31. F32. F35. F36. F37. F38
II		D20, E26
IV		F33, F34

Source: own making.

The original scale of 38 items produced an alpha of 0.952. We achieved a reduction of 4 items, with a similar reliability (0.950), from which we can conclude that our scale is reliable. According to the data obtained the original scale can be reduced (34 items) as follows in Table 2:

Table 2. Reduced scale.

Items
A1 The person that presents cancer in the blood has difficulties practicing sport.
A2 The person that presents cancer in the blood when practicing sport suffers from exhaustion.
A3 The person that presents cancer in the blood improves his or her health condition when practicing sport.
A4 The person that presents with cancer in the blood when practicing sport has bruises in various parts of his/her body.
A5 The person that presents with cancer in the blood when practicing sport has changes in behavior.
A6 The person that presents cancer in the blood when practicing sport have breathing difficulty.
B7 The person that presents tumor of the bones has an inability to practicing sport.
B8 The person that presents tumor of the bones can do sport.
B9 The person that has tumor of the bones have exhaustion when doing sport.
B10 The person that has tumor of the bones when doing sport will have bruises in various parts of his/her body.
B11 The person that presents tumor of the bones have fatigue when walking.
B12 The person that presents tumor of the bones, if he/she practices sport will show a change of behavior.
C13 The person that presents cerebral tumor cannot do sport.
C14 The person that has a cerebral tumor can do sport.
C15 The person that presents cerebral tumor has exhaustion.
C16 The person when have cerebral tumor will display a loss of equilibrium when doing sport.
C17 The person that presents cerebral tumor will have breathing difficulties when doing sport.
C18 The person that presents cerebral tumor will have bruises doing sport.
D19 I am interested in topics of oncology associated with sport.
D21 I try to keep up to date about what is happening nowadays in sport in relation with oncology.
D22 I try to keep up to date about of types of oncology and their relationship with sport.
D23 I would like to learn more about of oncology.
D24 To investigate about how we can improve the lives of people that have cancer through sport.
E25 I inform myself through newspapers and books of sport in relation to health.
E27 I inform myself through newspapers and magazines of a general purposes.
E28 I inform myself through television and radio.
E29 I inform myself through the Internet.
E30 I do not inform myself through any particular medium.
F31 It is always good to know how sport affect to people with cancer.
F32 Everyone should know about sport.
F35 Sport is good for your life.
F36 Sport can heal.
F37 One should always investigate different sports.
F38 People should do sport from an early age

Source: own making.

3.2. Correlation Analysis

We have performed the Kruskal–Wallis test to study the distribution of the population. In this case the distribution is normal, so we have chosen to perform the correlation by the method of P-Pearson

Analyzing the items of the investigation, the significant correlation (<0.05) is established between the following variables (Figure 1):

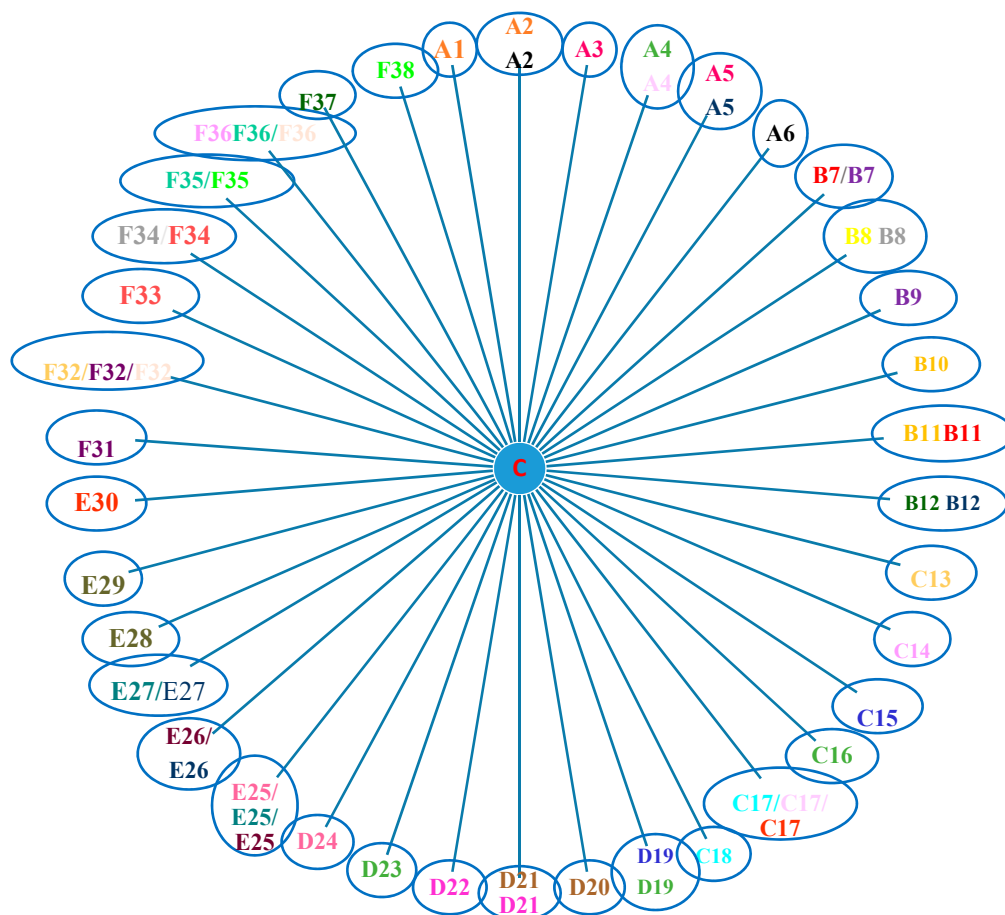


Figure 1. Relation of variable. Source: own making.

The most significant correlations are:

A3—The person who presents with cancer of the blood should improve his/her health condition when doing sport and A5—The person who presents with cancer of the blood when doing sport has a change in his/her behavior. With a level of significance of $0.000(p < 0.05)$, it is known that both variables are associated and are dependent one on the other. We conclude that the person that has blood cancer improves his or her health condition when doing sport and they change in their behavior, too.

B12—The person who presents with a bone tumor, if they do sport, shows a change in behavior and A5—The person who presents with cancer of blood when doing sport has a change in his/her behavior. With a level of significance of $0.000 (p < 0.05)$, it is known that both variables are dependent one on the other. We conclude that the person with bone tumors, by doing sport will change his or her behavior, and the person who has cancer of blood when doing sport have a change of his/her behavior, too.

B7—The person who has a bone tumor has an inability to playing sport and B9—The person who has a bone tumor becomes fatigued when doing sport. With a significance level of $0.000 (p < 0.05)$, it is known that both variables are dependent one on the other. We conclude that the person with a bone tumor has an inability to playing sport, and at the same time, they will become exhausted if they did.

C16—In a brain tumor, the person has a loss of balance when playing sport and A4—The person who presents with blood cancer when they play sport present bruises in various parts of his/her body. With a significance level of 0.000 ($p < 0.05$), it is known that both variables are dependent one on the other. We conclude that the person with a brain tumor has a loss of balance when doing sport and will present bruises too.

D21—I attempt to keep up to date about what is happening nowadays in sport, in relation to oncology and D20.-I attempt to keep up to date about the effect of sport on people with cancer. With a significance level of 0.000 ($p < 0.05$), it is known that both variables are dependent, one on the other. We conclude that the person who regularly enquires about sport in relation with oncology, also regularly enquires about the effect of sport on people with cancer.

E25—I attempt to keep up to date through magazines and sporting books related to health and E27—I keep up to date through books and magazines of a general purpose. With a level of significance of 0.000 ($p < 0.05$), it is known that both variables are dependent on each other. We conclude that people who learn through magazines and sports books related to health are also informed through magazines and newspapers of a general nature.

F33—Sport can be dangerous and F34—Sport can encourage false hopes. With a level of significance of 0.000 ($p < 0.05$), it is known that both variables are dependent on each other. We conclude that people who consider that sport is dangerous also think that sport can encourage false hopes.

3.3. Hypothesis Contrast (ANOVA)

The analysis of variance (ANOVA) tests the hypothesis that the means of the four samples are equal. The invalid hypothesis establishes that all means are equal, while that alternative establishes that at least one is different, Fisher [45] To perform the ANOVA contrast we need a grouping variable, (Group Factor) and the three independent samples. First, we calculated the Levene statistic to test the population variance hypothesis. The result is shown in Figure 2, having to reject the invalid hypothesis.

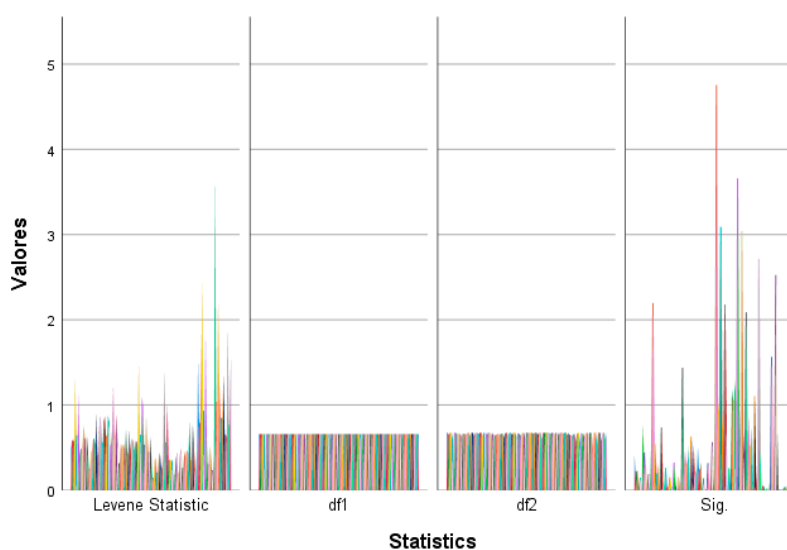


Figure 2. Test of homogeneity of variances. Source: own making.

This figure shows of different color of methods. The blue symbolizes A1. The person who has cancer in the blood has difficulties when doing sports based on mean. The red symbolizes A1. The person who has cancer in the blood has difficulties when doing sports based on median. The green color A1. The person who has cancer in the blood has difficulties when doing sports based on median and with adjusted off. The orange symbolizes A.1 the person who has cancer in the blood has difficulties when doing sports based on trimmed mean. The yellow symbolizes the person who has cancer in the blood when playing sports shows tiredness based on mean. The light blue color

symbolizes the person who has cancer in the blood when playing sports shows tiredness based on median. The pink color symbolizes A.2 The person who has cancer in the blood when playing sports shows tiredness based on median and with adjusted. The purple color symbolizes A.2 The person who has cancer in the blood when playing sports shows tiredness based on trimmed mean. The light green symbolizes A.3 The person who has cancer in the blood improves their health status by doing sports based on mean. The dark blue symbolizes A.3 The person who has cancer in the blood improves their health condition by doing sports based on median.

The significant differences of the data (ANOVA) according to the grade of significance (<0.05) occurs in all items. As information, we provide that in all cases the lowest scores are in the group of subjects of 2017 and the highest in the 2019 group, always ascending (Figure 3).

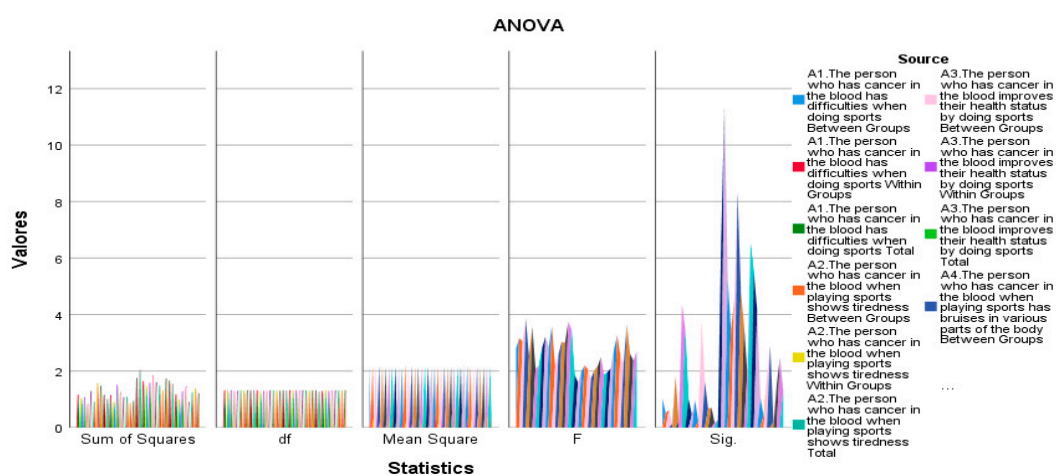


Figure 3. ANOVA of a factor. Source: Own making.

This figure shows of different color of source. The light blue symbolizes A.1 The person who has cancer in the blood has difficulties when doing sports between groups. The red symbolizes A.1 The person who has cancer in the blood has difficulties when doing sports within Groups. The green symbolizes A.1 The person who has cancer in the blood has difficulties when doing sports total. The orange symbolizes A.2 The person who has cancer in the blood when playing sports shows tiredness between groups. The yellow color symbolizes A.2 The person who has cancer in the blood when playing sports shows tiredness within groups. The light green symbolizes A.2 The person who has cancer in the blood when playing sports shows tiredness total. The pink color symbolizes A.3 The person who has cancer in the blood improves their health status by doing sports between groups. The purple color symbolizes A.3 The person who has cancer in the blood improves their health status by doing sports within groups. The green color symbolizes A.3 The person who has cancer in the blood improves their health status by doing sports total. Finally, the dark blue symbolizes A.4 The person who has cancer in the blood when playing sports has bruises in various parts of the body between groups.

3.4. Descriptive Analysis.

Dimensions A (blood cancer and sport): the subjects answered indifferently that people who present with blood cancer have difficulties in playing sport ($\bar{x} = 3.23$), as well as people with blood cancer have tiredness when playing sport, ($\bar{x} = 3.65$) and people with blood cancer show improvements in their health condition when playing sport ($\bar{x} = 3.34$).

Dimensions B (bone tumor and sports): people disagree that subjects who present with bone tumors can do sport, ($\bar{x} = 2.98$). that people with bone tumors who play sport present bruises in various parts of the body, ($\bar{x} = 2.72$) and subjects with bone tumors present changes in behavior if they play sport ($\bar{x} = 2.51$).

Dimensions C (brain tumors and sport): people are indifferent that subjects who have brain tumors can play sport ($\bar{x} = 3.42$) that people who present with brain tumors are exhausted when playing sport, ($\bar{x} = 3.17$) and subjects with a brain tumor have a loss of balance when playing sport. ($\bar{x} = 3.24$).

Dimensions D (information of cancer and sport): people are constantly in disagreement when informing me about the effects of sport in people that present with cancer, ($\bar{x} = 2.58$) that I regularly try to discover what is happening nowadays in sport, in relation to oncology, ($\bar{x} = 2.40$), to learn about different types of oncology and the relationship with sport, ($\bar{x} = 2.26$) and that I investigate how people that have cancer can improve with sport ($\bar{x} = 2.55$).

Dimensions E (media of oncology information and sport): subjects agree to inform themselves through magazines and sports books related to health, ($\bar{x} = 2.43$), I inform myself through oncology magazines and books, (for example, very interesting magazine) ($\bar{x} = 2.29$) and I inform myself through general newspapers and magazines ($\bar{x} = 2.30$).

Dimensions F (information of sport): subjects agree that it is always good to know how sport affects people with cancer, ($\bar{x} = 4.35$), the whole population should know about sport, ($\bar{x} = 4.54$) and sport is good for your life ($\bar{x} = 4.72$).

3.5. Confirmatory Factorial Analysis

The SEM methodology consists of a series of phases according to Kaplan [46] and Kline [47] that we will specify in four stages.

Phase I. Specification of the measuring model.

In this stage the latent features and dimensions that identify them as attractive variables of a grounded theory are established. This stage is conceptual in character, expressing the relationship between the latent variables reflected by the dimensions of the instruments and answers to the query questions. The Likert scale conceptual model obtained from the exploratory factorial analysis, is formed of 34 variables grouped into six dimensions

Phase II. Identification. computational implementation of the structural equation system.

To determine if the model is identified, we should calculate the degrees of freedom; (gL), In our case the value is 264, so we can say that the model is over-identified.

Phase III. Estimation of parameters.

The estimation stage of the model incorporates a graphic exposition of the theoretical–conceptual aspects of the instrument of analysis. This is the basis for realizing the reproduced matrix, which will be compared with the derived matrix. The table representation of the Likert scale is shown in Figure 4, where ovals represent the latent variables, (construct) and the boxes the observed variables, as a group representing the dimensionality of the instrument.

As we can observe in the model (Figure 4), for convergence to occur some adjustments are automatically made, dimension F disappears and dimension E is readjusted.

Regarding the regression coefficients that exist between of latent and observed variables, the deduction is as follows.

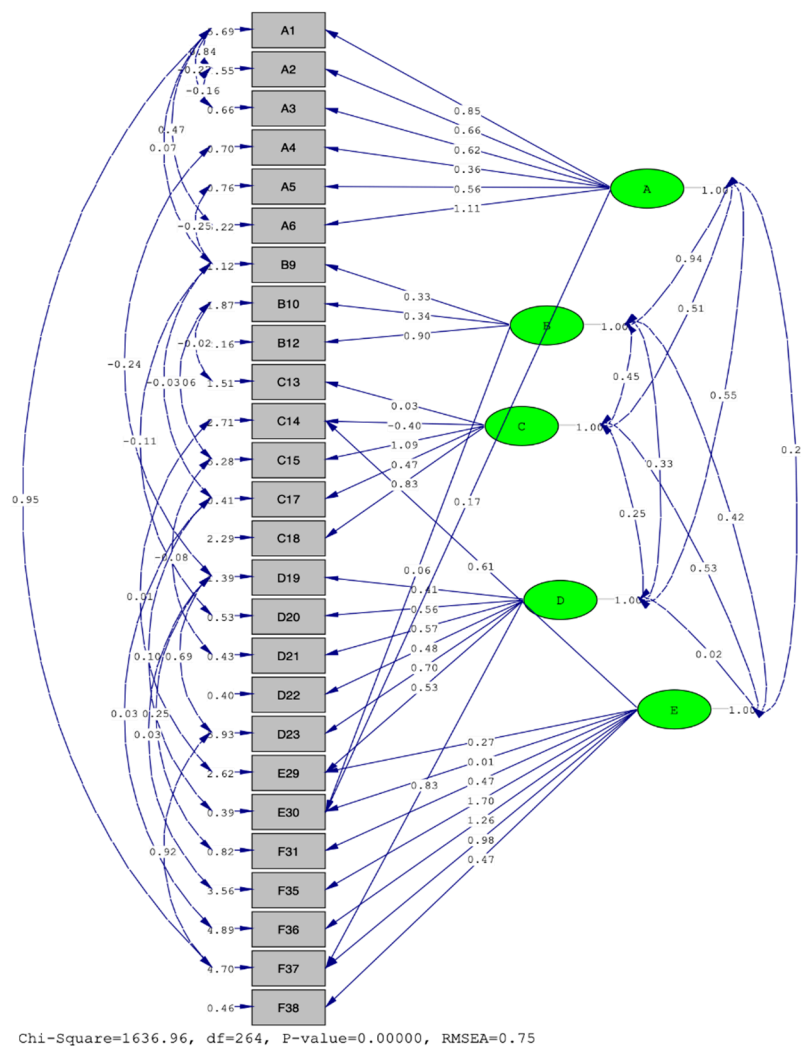


Figure 4. Graphical representation of the natural measurement model of the Likert scale. Source: own making.

Dimension A. blood cancer and sport:

- Major influence of the latent variable on A6—The person with blood cancer has breathing difficulty.
- Less influence of the latent variable on A4—The person with blood cancer has bruises in various parts of the body when playing sport.

Dimension B. Bone cancer and sport:

- Major influence of the latent variable on B12—The person with a bone tumor shows changes in behavior when playing sport.
- Less influence of the latent variable on B9—The person with a bone tumor shows exhaustion when playing sport.

Dimensions C. Brain tumor and sport:

- Major influence of the latent variable on C15—The person with a brain tumor is tired when playing sport.
- Less influence of the latent variable on C14—The person with a brain tumor can play sport.

Dimensions D. information on cancer and sport:

- Major influence of the latent variable on D23—I would like to know more about oncology

- Less influence of the latent variable on D19—I am interested in sports-related oncology topics.

Dimension E. oncology and sport information media

- Major influence of the latent variable on F35—Sport is good for your life.
- Less influence of the latent variable on E30—I do not gather information from any particular medium.

The relationship that exists between the latent variables is given by the following values:

A–B (0.94), B–C (0.45), C–D (0.25), D–E (0.02)

Scores to highlight:

A–C (0.51), A–D (0.55), A–E (0.21), B–D (0.33), B–E (0.42), C–E (0.53)

In summary, the strongest relation between latent variables is given by:

A (blood cancer and sport)–B (Bone tumor and sport)

A (blood cancer and sport)–D (information of cancer and sport)

The lowest ratio is given by:

D (cancer and sports information)–E (oncology and sports information media.)

A (blood cancer and sport)–E (oncology and sports information media.)

Stage IV—Evaluation of the adjustments. Best-practice indexes and adaptation criteria.

In this period, we used best-practice indexes and criteria to link the validating evidence with the dimensional structure of the instrument being assessed:

- Difference χ^2/gL (1636.96/264), this is considered a good indicator if the result oscillate between one or three or, the more laxa way if the result of different is ≤ 5 [48]; [49], the value get is 6.20, for the result is relatively good.
- CFI compares the improvement in the fit of the model in comparison with an invalid model to evaluate the degree of loss, which occurs in the adjustment when changing from the proposed model to the invalid model [50]. To accept the proposed model, its value should be ≥ 0.95 and the resulting value is 0.058
- RMSEA, among the indices based on the co-variances, the mean square error of approximation (RMSEA) was chosen. In this case the model would present an acceptable fit if the value was < 0.07 [51]. The value we calculated in our model was 0.75.
- NNFI reflects the proportion of total information explained by a model; because this index is not normalized, its values may adopt values outside the range of 0 and 1, a value of 0.97 seems to be more reasonable as an indication of good f model fit. The value we obtained is -0.16 [52].

As can be observed, the criteria of all best-practice indices are not strictly confirmed, but we do have such a model.

4. Discussion

The current research was carried out with students from the fourth year of primary education Degree at the University of Jaen for three years. In the next investigation, it would be significant to conduct the research with Post-Degree students in order to co-relate data at the different University stages.

This investigation is intended to both establish the relationship between oncological problems and sport and analyze—as well as propose—a scale which allows us to exhibit the relationship between cancer and sport. Results explain that taking 896 students as samples from the last year of primary

education degrees during 3 consecutive years, it is possible to design a Likert scale with excellent reliability, validated in content and throughout the explanatory-factorial analysis. These results present that participants give too much importance to make research on how people with cancer may get better thanks to sport. However, they do not look for that information in reliable sources. The correlated analysis, accomplished with Pearson's *P*, shows that there is a meaningful relationship between items of dimension A with B and A with C, that is, between "bone cancer and sport" with "bone tumor and sport" and "brain tumor and sport", that is, compared to cancer problems and sport.

ANOVA manifests that there are relevant differences among the samples, from year-to-year, existing a more positive assessment as time passes by. Eventually and pointing out some authors' ideas, Friedenreich, Stone, Cheung and Hayes [37] point out that physical education is fundamental, whether a person has cancer or not, in reducing the risk of mortality. These authors also explain that playing sports after having had cancer enhances improvement in health and Patel, Friedenreich, Moore, Hayes, Silver, Campbell and Denlinger [38] show how physical activity appears to have a greater effect on cancer outcomes, in comparison with physical activity prior to diagnosis. However, García [11] points out that in primary education, teachers must focus on activities which will entail anybody benefit to the students. Physical education is aimed at improving students' health. Teachers should be involved in this process. Ferrer [13] confirms that states, teachers must be aware of children's illness, how we may face that illness and the consequences that treatments may have in relation with physical education. Cintra and Balboa [14] expose the significance of doing exercise to prevent illness and reducing the possibility of suffering from cancer.

The confirmatory factorial analysis, sets out the relationships among different dimensions, being the highest "leukemia and sport" with "bone tumor and sport" and "cancer information and sport". The lowest relation is shown among "cancer information and sport" and "leukemia and sport" with "oncology resources and sport".

5. Conclusions

The following investigation has as its main objective to establish an association between oncological problems and sport in future primary education teachers. This objective was achieved throughout the investigation, in the same way the hypothesis is null, we accept the alternative hypothesis. Factor analysis allows us to affirm that we have a validity scale both in construct and in content.

Conclusions expose there exists a narrow relation between leukemia and sport as people suffering from blood cancer experiment breathing difficulties when practicing sport. Yet, blood cancer and sport are not related with the presence of hematoma or bruise in any body part. Concerning bone tumors cancer and sport, it affects people's behavior when doing sport. Still, people suffering from bone tumors do not feel breathing difficulties when practicing sport. Regarding brain tumors, sport has influence on fatigue. On the contrary, people with brain tumor are able to practice sport. mass media has a great influence on the message that sport is good for life, but very little influence on not learning through the media. To answer the question, we posed at the beginning of the investigation, there exist, indeed, an association between cancer problems and sport.

Future teachers of primary education must be informed about cancer, bone tumors and its relationship with sport. They need to be informed as oncology is a specialized topic, which requires information coming from reliable media.

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