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Randomized Controlled Trial of a 12-Week Digital Wellbeing Program in Improving Workers Healthy Habits

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Abstract

Background: To evaluate the impact of an educational strategy to raise awareness of 12 weeks aimed at promoting healthy lifestyle habits (HLH) in the work context in the body composition profile (BCP), the physical condition (PC) and self-perception. **Methods**: An experimental longitudinal study based on the measurement and comparison of response variables before and after the intervention, where the BCP was measured through electrical bioimpedance, the PC through manual grip with dynamometry and jump variables with countermovement with the APP My Jump; as well as self-perception through questionnaire. **Results**: The intervention significantly improved height and speed of the jump as well as the total lean mass, bone mass and the metabolic age of the general sample. In addition, disaggregating by sex, the male BCP and PC in both. **Conclusions**: An educational awareness-raising program aimed at the HLH promotion could improve BCP and PC values.

Keywords: Healthy Habits; Work Environment; Metabolism; New Technologies; Physical Activity; Health

Introduction

Healthy lifestyle habits (HLH) are defined as a series of attitudes and behaviors that are carried out repeatedly over time with the ultimate goal of self-care [1]. Food, physical activity (PA) and break are three of the fundamental pillars that the World Health Organization (WHO) associates with a healthy lifestyle.

The high stress levels [2-5] that have brought about the new ways of working, they are assuming the increase in risk factors derived from this marked sedentary lifestyle and physical inactivity and generally a low-quality diet [6,7] and that have been associated with greater prevalence of physiological diseases (obesity, high blood pressure, stress oxidative), cardiovascular and metabolic disease (Diabetes Mellitus Type II, hiperlipidemia, hypercholesterolemia, dyslipidemia, heart disease), musculoskeletal (sarcopenia, dinapenia), and even psycho-emotional (stress, Burnout síndrome, anxiety and depression). All of them can be prevented, to some extent, throught a healthy lifestyle [8-15].

In the work environment, the evaluation of body composition profile (BCP) has been shown to be efficient [16-18] and physical condition (PC), defined by the upper limb strength [19-22] and lowe limb strength [23-25]; as valid indicators for the study of the state of physical health of a concrete collective [16].

The 2030 agenda proposed by the United Nations (UN) to encourage companies to icorporate within its goals the sustainable development objectives, has accelerated the number and type of health promotion interventions and corporate wellness, especially in matters of PA, nutrition, break and family conciliation [26-31]. The search for improvement in activities of daily personal and

work life through proposals such as those of the National Institute for Occupational Safety and Health (NIOSH) [32] have shown to have a direct and indirect positive effect in the Public Health System [27, 33-37].

For all this and with the aim of adding value to the type of interventions in the work environment, our main objective was to study the effect of a HLH promotion program based on 12-week sensitization program through educational sessions at the BCP and PC in a sample of workers.

Our hypothesis was based on the fact that providing employees with educational sessions awareness in matters such as diet, PA and break for 12 weeks, it will have a positive effect on lowering the BCP and PC improvement.

Methods

A non-randomized experimental longitudinal study was carried out using a 12-week intervention in volunteer subjects, workers of a multinational company.

Sample

The intervention was carried out in a voluntary group of workers (N = 136; men = 74; women = 62) from the same multinational company, which were distributed in different locations and geographic areas. The data demographics are shown in (Table 1).

Sample size	136	Men	Women
Age (Years)	38.33 (±7.78)	38 (± 8.13)	38.73 (± 7.38)
Height (Meters)	1.70 (± 0.10)	1.77 (± 0.77)	1.62 (± 0.64)
Weight (Kilograms)	72.08 (± 15.2)	81.45 (± 2.04)	60.89 (± 10.20)
BMI (Kg/m^2)	24.61 (± 3.73)	25.80 (± 3.06)	23.19 (± 3.97)

Table 1: Demographic data of the simple (MED ± SD).

The inclusion criteria were set on having satisfactorily passed the medical examination that enabled the sample to carry out the evaluation tests carried out in the project; as well as the voluntary signature of the informed consent established by the Organic Law of Data Protection 3/2018.

Regarding the exclusion criteria, they were only discarded from the research those subjects who did not satisfactory pass the medical examination or they refused to sign the aforementioned informed consent.

Material

For the measurement of the BCP, the Tanita® BC-601 Bioimpedance Scale ISO 9001 Certified (Figure 1) was selected, which has eight reading electrodes.

Figure 1: Bioimpedance Tanita®BC-601 Scale.

Figure 2: CAMRY EH101 dynamometer.

To evaluate the manual pressure force (MPF) we used the CAMRY EH101 dynamometer from General Asde S.A. (Valencia, Spain) (Figure 2) [38] and to evaluate the height of the countermovement jump (CMJ), we used MyJump2® App for smartphone. In all cases we used an iPhone 8 from Apple®. A tape measure was used to measure the height of all subjects. The HLH self-report was filled out through a Samsung Galaxy Tab A- Tablet de 10.1" FullHD tablet model.

Intervention Design

The educational intervention strategy was contextualized in a 12-week corporate challenge, which we called "Active Challenge".

The challenge was divided into 3 large blocks of content that were distributed in 4 weeks of duration each (Table 2). Each day of the challenge, audiovisual educational sessions containing the explanation of a healthy habit and easy tasks to implement in the day to day to get it, was moved through the company intranet.

Nutrition habits	Movement habits	Rest habits
Learn to differentiate between food and ultra-processed. Learn to read the food labeling. Know the daily recommended quantity of different types of food.	Reach the recommendations of the WHO for the regular Physical Activity practice (>150min/week). Incorporate moderate/vigorous intensity activities in the day to day.	Incorporate habits to improved quality and amount rest night. Learn to disconnect after business hours for the break improvement.
	Incorporate regular physical exercise practices weekly.	

Table 2: Awareness blocks for the improvement of HLH.

Content selection was determined based on scientific evidence with the objective of being able to generate the greatest possible impact on the BCP and the PC in a 12-week time frame. In this sense, a low quality diet [6,7] is associated with a BCP outside the healthy ranges in the work context. So a priority object was to raise awareness among the study population about the type and amount recommended daily intake, as well as the food labelling reading. In this way, regular strength training along with the increase in daily PA improves the BCP [7] and the lean mass (LM) percentage, considering these key markers in functional capacity and quality of life [21]; so that we seek to raise awareness in the daily compliance of PA practice defined by WHO, as well as the appropriate intensity and amount of PA practice. Lastly, the increase in work stress has a negative effect on the people´s daily rest, so our goal was to provide educational sessions that will help workers to disconnect after working hour, both from work itself and from technology [39].

To measure the intervention strategy effect, it was made available to all company employees a PRE- POST measurement intervention box that evaluated the BCP and the PC. To improve worker experience and with the aim of reinforcing their education about their results, a face-to-face worktable was included that facilitated the individualized interpretation keys of the results and the project objectives. Participation in the measurement box was totally voluntary.

Measurement Protocol

The measurement box was implemented following the same measurement protocol used in other similar studies within the work context [16]. To enter in the measurement room, each subject has the necessary time to read and interpret the Informed Consent and LOPD 3/2018 documents, after which goes to the measurement box where height was measured with a tape measure and the box was started: 1st BCP after that jump height (JH) was measured through the Balsalobre´s protocol [23] for finally assess the dominant and non-dominant hand MPF using the protocol proposed by Kallman [19].

Variables

According to the protocols established in other studies, the study variables for the BCP [16] and the PC [23-25] shown in (Table 3).

Variables and metrics	Abbreviation	Variable description	Healthy ranges*
Fat Mass (%)	%FM	It is the fat amount that we store in the body in relation to our wight total body.	25.0 – 27.9 % Women 21.0 – 23.9 % Men
Visceral Fat (No. 1-60)	VF	Visceral fat is the fat that is found inside the abdominal cavity, surrounding the vital organs of the trunk (abdominal área).	Values less than 12
Lean Mass (%)	%LM	Lean Mass Weight Percentage (LM) with respect to the total weight.	45 - 68 % Women 44 - 69% Men
Bone Mineral Density (kg)	BMD	The bone mass index is a bone quality indicator; also bone mineral density (BMD).	2.40 Kg Women 3.29 Kg Men
Water percentage	%WATER	The water percentage is the amount of water that the body has with respect to body weight.	45 – 60 % Women 50 – 65 % Men
Body Mass Index	BMI	BMI has always considered as a global health indicator, it is calculated from starting height and total body weight.	18.5 – 24.9 Women and Men
Jump Height (cm)	JH	Height of a jump with countermovement (CMJ).	16.82 cm Women 23.34 cm Men
Jump Velocity (m/s)	JV	CMJ jump velocity.	0.90 m/s Women 1.06 m/s Men
Manual Press Force (kg)	MPF	Value obtained from the average between Manual Press Force (MPF) results of the dominant and the non-dominant hand.	24.4 -26.9 Women 37.5 – 42.5 Men

Table 3: BCP and PC variables.

In order to know the worker´s self-perception regarding variables such as stress, self-perceived health, rest, the ability to interpret food labelling, exercise, awareness level in the incorporation of daily HLH or satisfaction with the awareness program, we generate a self-administered form in the questions and variables from validated scales were incorporated scientifically as the National Health Survey (2017), [40-43], WHO (2018) and Net Promoter Score (NHS 2017; EUROSAT 2018; WHO 2018; Reichheld 2003). Variables analysed are described in (Table 4).

Variables	Abbreviation	Variable description	Rating scale*
Health self-perception	HealthSelf-Perceived	Health self-perceived assessment (Escala EQ-5D)	Values from 0 to 100, measured by Visual Analog Scale
Self-perceived Level from HLH	HabitsLevel	HLH level perception in their daily life	Values from 0 to 100, where 0 is very low: “I don´t know where start” and 100 is very high: “I am very involved with my habits daily
Stress self-perception	Stress	Self-perceived stress level in the day to day (National Health Survey)	Values from 1 to 7, where 1 is no stress and 7 is major possible stress perceived

HLH inclusion daily lifestyle	InclusionHabits	HLH inclusion in a conscious way in the day to day	Values from 1 to 4, where 1 is I don´t include healthy habits in my day to day and 4 is yes, I include
Nutritional labelled interpretation	LabelsReading	Knowledge and understanding of nutritional labels	Values from 1 to 4, where 1 is I don´t know how to interpret it and 4 is yes, I feel safe with me training in this regard
Job disconnection	Disconnection	Achievement level to disconnect later from work	Values 1 to 4, where 1 is I am always connected to work and 4 is yes, I always disconnect
Daily Sleep hours	Dream	Sleep night hours assessment depending on the number of sleep continuous hours in the last 6 months	Values from 1 to 4, where 1 is I have many sleep interruptions and 4 is more than 8 hours a day
Rest improvement activities	Rest	Conscious and planned inclusion of activities to improve rest and personal well-being	YES-NO
PA realization daily	PAdaily	PA inclusion as an HLH in the day by day consciously	YES-NO
PA intensity done	PAintensity	PA intensity level performed from habitually in the last 6 months	Values from 1 to 3, where 1 is low, 2 is moderate and 3 is high
Satisfaction degree with the program	NPS	Satisfaction degree of the sample with the program carried out through the Net Promoter Score	Values from 1 to 10, where 0 is not likely and 10 is extremely probable

Table 4: Variables associated with wself-perception by the worker;*Values extracted according to assessment scales.

Statistics

A data statistical analysis was carried out using the IBM Program SPSS Statistics 19 (Windows 8.1 version). The results are displayed as: Mean ± Standard Deviation. In the first place, in order to assess the simple effect intervention, a descriptive statistical analysis of the analysed variables from the sample in the PRE and POST measurements was performed. Then, Saphiro Wilk test was carried out to study the analysed variables distribution, concluding that only FM, JH and JV are parametric variables. To such variables, the T-Student test was performed for samples related to the purpose of obtaining the "p value" and determining if there were significant differences between PRE and POST measurements ($p < 0.05$). For the rest of variables, the Wilcoxon test was applied for non-parametric related samples determining the significant difference at $p < 0.05$.

On the other hand, following the work methodology of the Crespo-Ruiz research group [16,18], the %FM, VF, %LM, BMD, %WATER, BMI, MPF, JH and JV variables were categorized into two ranges depending on whether the subject was within healthy values based on sex and age group (standardized for each of the tests). Once the variables are categorized again, a PRE-POST comparison was performed using contingency tables through McNemar test.

Next, a variables correlation was carried out through Spearman R correlation test, just as we carry out a linear regression with the variables that correlated moderately and/or strongly with the previous test.

Finally, a means comparison of the HLH test responses was carried out through the Wilcoxon test for ordinal variables and the McNemar test for nominal and dichotomous.

Results

Below is a general comparative analysis of PRE-POST and segmented by sex in order to be able to analyse the differences in BCP and PC and self-perception regarding the HLH of the group after the intervention. Second, we present the correlations established for each of the analysed variables.

PRE-POST averages general comparison

The PRE-POST comparative analysis results obtained for the analysed variables related to the BCP are shown in (Table 5).

Variable	PRE	POST	*p*
Weight	72.08 (±15.2)	71.79 (± 14.66)	0.63
%FM	24.24 (±7.29)	24.51 (± 7.26)	0.30
VF	5.49 (± 3.35)	5.70 (± 3.27)	**0.02***
%LM	51.67 (± 11.82)	51.46 (± 11.78)	**0.01***
BMD	2.74 (± 0.59)	2.71 (± 0.58)	**0.01***
%WATER	54.83 (± 5.2)	54.29 (± 4.93)	**0.02***
BMI	24.61 (± 3.73)	24.43 (± 3.47)	0.18

Table 5: Comparative analysis of PRE-POST means for the BCP (MED ± SD).

In general terms, when we study the PRE-POST impact in the BCP we find significant decrease of %LM, BMD ($p < 0.01$) and %WATER ($p < 0.05$), also increasing by VF was significant ($p < 0.05$). In the analysis by gender, in the male sex we found significant improvement with respect to BMI ($p = 0.046$); as well as in the female gender we obtained a significant worsening in terms of %LM ($p = 0.014$), %WATER ($p = 0.01$) and an increase in VF ($p = 0.06$).

The PRE-POST comparative analysis results obtained for the analysed variables related to the PC are shown in (Table 6).

Variable	PRE	POST	*p*
MPF	35.29 (±10.26)	35.49 (±10.31)	0.67
JH	21.42 (±6.22)	22.58 (±6.39)	**<0.001****
JV	1.01 (±0.15)	1.04 (±0.15)	**<0.001****

Table 6: Comparative analysis of PRE-POST means for PC (MED ± SD); (** $p<0.01$ * $p<0.05$) MPF = Average Manual Press Force (Kg); JH = Jump Height (cm); JV = Jump Velocity (m/s).

Regarding the PRE-POST intervention impact on the PC variables we observed significant improvements in both the JH and JV ($p < 0.01$), maintaining the PRE-POST values regarding the MPF ($p > 0.05$). That shows a positive and significant impact on the CF of the studied sample.

Likewise, men present a significant improvement in JH ($p = 0.000$), but female gender shows the greatest significant differences in the three variables related to PC, such as MPF ($p = 0.036$), JH and JV ($p = 0.001$).

Next, we proceed to carry out the PRE-POST results comparative analysis obtained for the related variables to the HLH self-perception (Tables 7 and 8).

QUESTIONS	PRE	POST	*p*
Self-perceived Health	3.86 (± 0.86)	3.89 (± 0.73)	0.82
Stress	4.18 (± 1.49)	4.31 (± 1.33)	0.25
Habits Level	3.24 (± 0.86)	3.54 (± 0.72)	**<0.001***
Habits Inclussion	3.27 (± 0.59)	3.49 (± 0.50)	**<0.001***
Labels Interpretation	2.78 (± 0.81)	3.17 (± 0.61)	**<0.001***
Disconnection	3.43 (± 0.51)	3.53 (± 0.56)	**0.04***
Dream	2.78 (± 0.69)	2.87 (± 0.55)	0.14
PAintensity	2.10 (± 0.61)	2.21 (± 0.57)	0.11

** $p < 0.01$ * $p < 0.05$

Table 7: Comparison of PRE-POST means of ordinal variables of the HLH survey(MED ± SD).

We observe how the sample significantly improved the HLH level, HLH inclusion, labels interpretation and job disconnection variables ($p < 0.01$). A positive trend is also shown in the rest variables, although non-significant ($p > 0.05$).

QUESTIONS	PRE value (% of the total)		POST value (% of the total)		P
	NO	YES	NO	YES	
Rest	39.70%	60.30%	31.85%	68.15%	0.12
PAdaily	18.38%	81.62%	12.78%	87.22%	0.18

*Significant (p<0.05)

Table 8: Comparison of PRE-POST means of nominal and dichotomous variables of the HLH survey.

The results show a positive trend, although not significant for rest and PAdaily variables between pre-post (p>0.05).

In the analysis by sex, there has been a significant improvement in both women as well as men in the improvement of the perceived level of HLH, the HLH inclusion, label interpretation and job disconnection variables ($p < 0.05$); in addition, in the female sex we found a significant improvement in sleep variables ($p < 0.05$), PA intensity and PA daily ($p < 0.01$) that we didn´t find in males.

Lastly and because each sex has different associated values to the healthy ranges for each variable, we present the sample percentage into healthy ranges before starting the program and after it, in order to know the change that has been generated (Table 9).

VARIABLE	GENDER	PRE	POST	*p*
%FM	Men	68.91%	70.27%	1
	Women	53.22%	48.39%	0.25
VF	Men	93.24%	93,24%	1
	Women	98.39%	100%	1
%LM	Men	97.29%	98.65%	1
	Women	22.58%	14.52%	0.06
BMD	Men	20.27%	18.92%	1
	Women	16.13%	14.52%	1
%WATER	Men	91.89%	94,59%	0.50
	Women	95.16%	93.55%	1
BMI	Men	44.59%	47.30%	0.50
	Women	77.42%	83.87%	0.13
MPF level	Men	77.02%	86.49%	**0.01***
	Women	77.41%	79.03%	1
JH level	Men	58.10%	72.97%	**0.001****
	Women	41.93%	56.45%	**0.004****
JV level	Men	63.01%	75.34%	**0.004****
	Women	47.54%	57.38%	**0.03***

**p<0.01 *p<0.05

Table 9: Comparative analysis of the effect of the intervention on the sample percentage into the healthy ranges.

In general, variables in which we find as a starting point the largest number of the workforce within the healthy ranges are the VF and %WATER, where is at least 90% of the total sample, both variables related to the BCP. In relation to the PC profile, the MPF is the variable in which healthy values are obtained for a higher workforce percentage (77%).

In general terms, the variable for which the lowest healthy workforce percentage is recorded before the intervention is BMD (18-20%) for both sexes and specifically the %LM in women, since they present compliance values lower than 22% of the total sample.

Likewise, when we analyse other variables, we observe marked differences between the sexes in terms of the sample percentage that presents healthy values before the intervention in variables such a %LM in men (97%) versus women (22%), JV levels in men (63%) versus women (47%), the %FM in men (68%) versus women (53%) and BMD in men (20%) versus women (16%).

After the intervention, we observed a significant improvement in the percentage of men achieving healthy ranges related to PC variables such a MPF, JV and JH ($p<0.01$), also showing a positive trend, although not significant in the percentage increase of men who improve their healthy ranges in terms of %FM, %LM, %WATER and BMI variables (p>0.05) related to the BCP.

In women, the HLH awareness programs also occurs significant improvements in the women percentage who improve their healthy ranks in variables related to PC such as JV and JH ($p < 0.01$), also a non-significant but positive trend in the sample percentage improvement that meets the healthy ranges related to MPF ($p > 0.05$). However, regarding the variables related to the BCP, not only did we not find improvements in the women percentage who meet the recommended healthy ranges after the intervention, but we observed non significantly lower percentages of female workforce into healthy values for the rest of the related variables.

Finally, we analyse the sample satisfaction in relation to the program measured through the NPS (Table 10).

	Detractors	Passives	Promoters	Score
NPS	13.49%	51.59%	34.92%	21.93

Table 10: NPS results.

Based on the possible NPS results, we obtained a discreet and positive results on recommending the program to others employees or family members, with 50 points being a good results, 100 points being a excellent results and -100 point the worst possible results achieved in regarding the program recommendations to other colleagues or family members.

Correlation between variables

The main correlations are found between the %LM and MPF variables ($r = 0.819$; $p = 0.00$) and %LM and JH variables ($r = 0.646$; $p = 0.00$) being positive and significant in both cases; which means that as there is an improvement in the %LM in the sample also increases the MPF and the JH and with it the PC improvement of the subjects.

In addition, we found a negative and significant correlation between %FM and JH ($r = -0.430$; $p = 0.00$), which means that as %FM decreases, increases the JH which positively impacts the healthy ranges associated with the PC.

Discussion

First of all, we want to point out that the main objective of the present article that focused on studying the effect of an awareness program regarding the HLH promotion through a educational sessions based on self-perception of HLH, BCP and PC during 12-week in a employees sample.

As a starting point, when we analysed the sample size into the recommended healthy ranges for each of the variables regarding to the study of the BCP and PC, we observe a starting point in the variables related to the PC that present higher degree of compliance than those related to the BCP [44]. After the intervention, although in general the percentage of participants into the healthy ranges in PC increase, this improvement does not occur in the same way in BCP.

On the other hand, when we analyse self-perception regarding HLH we observe how the awareness program has generated a positive and significant effect in the sample perception regarding a higher incorporation of healthy habits in the day to day, the self-perceived healthy habits level in the lifestyle and disconnection after the workday. It has also generated significant improvements in the nutrition labels interpretation that serves as a basis to differentiate between ultra-processed from healthy food [6,7]. All this accounts for a better predisposition of the group to continue working in this line of awareness.

If we do a detailed analysis of those variables that have a significant improvement as a JH and JV and MPF positive trend, these variables may be related o an improvement in the practice of weekly PA and taking awareness regarding your daily rest an movement habits, as is observed in the questionnaire done [45].

When we relativize the healthy ranges by sex, we observe how the most of the male participants presents a better PC and BCP than the female sex, showing a significant improvement after the intervention that is not observed in women.

A better starting point for meeting healthy ranges could suppose not only a better predisposition to the change of behaviours in men, but also more sensitive effect on physical conditioning to the improvement of these in terms of PC and BCP. In this sense, it is likely that those people, men and women, who start the program from a less healthy starting point, could need awareness programs and behavioural change of greater duration to manifest tangible effects in PC and BCP variables as occurs in studies with similar interventions such as that of the Teeriniemi group [46].

On the other hand, and regarding the discussion of the results by sex, the bibliography refers to higher stress levels and poorer self-perception of health in the female sex, also coinciding with a marked lack of conciliation between job and personal life due to the performance of other tasks and loads family members outside of working hours that could make it difficult to acquire new behavioural patterns in less time [47], which reinforces the hypothesis that longer duration strategies or even customized to the different lifestyles of each person may be required.

Likewise, we would like to detail the limitations of the study in order to continue this research line in future works. Design methodological sought to reproduce as far as possible the awareness-raising interventions type based on content that is traditionally use from human resources in health programs to encourage a improvement in workers. Since we were unable to include a group control, because participation was voluntary and a group could not be excluded of its realization; we could not find out what specific changes he had made each person in their day to day, as if it has been evidenced in similar studies with a control group [43] and the inability to control food intake or daily amount of PA for each person; in future interventions, the objective is to add concrete improvement actions to the educational day to day sessions of each person, personalizing the intervention in each case.

For this reason and although there have been certain improvements in the group, we partially reject the initial hypothesis where we indicated that facilitating to employees HLH awareness education sessions for 12 weeks would have a positive effect on your BCP and PC, considering the intervention type based on insufficient educational content for significant improvement of

both component of health, at least objectively.

Once the results have been analysed, we consider that a longer duration implementation, incorporating in addition to the educational content sessions, more personalized evaluation and control actions could have more positive benefits than those found in our study because we only obtained improvements regarding the BCP with respect to BMI in the male gender. This is in relation to other studies [48,49]. Likewise, put the focus on a single objective such as improving eating habits, PA or rest, could generate major changes in specific BCP or PC parameters, however, our intention has always been to promote habit changes in a comprehensive way in the participants, so by attending to the premise, the recommendations would be distribute the themes by specific work blocks for at least 6 months [50].

Conclusion

The main conclusions drawn from the results obtained with the study intervention are:

• The 12-week awareness program to promote HLH in the work context generated a positive and significant effect on the decision-making awareness regarding the HLH acquisition; however, we consider that the 12 weeks of duration are insufficient to find significant differences in variables related to BCP and that a longer program (greater than 6 months), better monitoring and individualization, could yield more significant results.

• Improved awareness of eating habits, movement and rest can boost some improvements in the PC of the group, regardless of the starting point; since we obtained more significant differences in female gender starting from a lower PC level.

• We found differences in the intervention impact between genders, obtaining in the short term in the female gender a lesser impact on their BPC compared to the male gender, although a greater impact on female PC versus male. If we categorize the variables in healthy range function, yields slightly positive results in the masculine gender compared to the feminine in term of BCP, since the latter shows a slight deterioration; as well as the variables associated with PC do show a significant improvement in both cases.

• The difference between satisfaction (good) with the program on the part of participants and their effect on biometric variables suggest the need to incorporate on the same intervention strategy new monitoring tools and physical intervention, in person, gamified and individualized, which enhance the positive intervention effect; as well as a duration greater than 12 weeks used in our study.

Future research lines

The future specific research lines to be followed are:

• Standardization of a 24-week HLH promotion program based on gamification tools.

• Study of HLH promotion program based on gamification tools combined with a 24-weeks PA program.

• Study of 24-week PA practice program effect after an awareness-raising intervention in HLH with greater monitoring control inside and outside the work environment.

• Study of 24-week healthy eating program effect after a sensitization intervention in HLH with a higher monitoring control inside and outside the work environment.

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