Atencion Primaria 56 (2024) 102946

Atención Primaria

www.elsevier.es/ap

ORIGINAL ARTICLE

Analysis of Madrid Primary Health-Care staff for the implementation of exercise prescription

Sergio Calonge-Pascual[a,b,*,◊], Miguel-Ángel Gómez[c], Susana Belmonte-Cortés[d], José Antonio Casajús Mallén[e,f], Marcela González-Gross[a,f], on behalf of EXERNET Study Group

[a] *ImFINE Research Group, Faculty of Physical Activity and Sport Sciences-INEF, Universidad Politécnica de Madrid, C/ Martín Fierro 7, 28040 Madrid, Spain*
[b] *REDAFLED Research Group, Departamento de Didáctica de la Expresión Musical, Plástica y Corporal, Facultad de Educación, Universidad de Valladolid, Calle Universidad, 42004 Soria, Spain*
[c] *Faculty of Physical Activity and Sport Sciences-INEF, Universidad Politécnica de Madrid, C/ Martín Fierro 7, 28040 Madrid, Spain*
[d] *Dirección General de Salud Pública, Consejería de Sanidad, Comunidad de Madrid, Spain*
[e] *GENUD Research Group, Faculty of Medicine, Universidad de Zaragoza, C/ Domingo Miral s/n. 50009 Zaragoza, Spain*
[f] *CIBER Physiopathology of Obesity and Nutrition (CIBEROBN) – Instituto de Salud Carlos III, 28029 Madrid, Spain*

Received 20 January 2024; accepted 22 March 2024

KEYWORDS
Family medicine;
Physicians;
Health promotion;
Population health;
Health plan implementation;
Social determinants of health

Abstract
Objective: To assess the self-perception of nurses and general practitioners (GPs) toward Physical Activity on Prescription (PAP) in Madrid Primary Health-Care (PHC).
Design: A survey-cohort study.
Site: Nurses and GPs of Madrid PHC System.
Participants: A total of 319 GPs and 285 nurses' responders.
Measurements: Data were analyzed under a classification tree analysis by four predictor variables: (i) Health professional (Nurses/GPs); (ii) Exercise prescription collaboration with all health professionals: physicians, nurses, psychologists, physical therapists, sports medicine physicians, sports scientists, nutritionists, and teachers (Yes/No); (iii) PA promotion collaboration with Sports Scientists (Yes/No); and (iv) The stage of change of PHC staff to PA promotion (0–4 Likert scale).
Results: Regarding the predictor variable (i), responders without PA guidelines knowledge and positive attitude to collaborate with nurses in PA promotion are more GPs of female sex (nurses $n = 33$ and GPs $n = 175$) than male sex (nurses $n = 3$ and GPs $n = 59$) ($p < .001$). For the predictor variable (ii) only 9.30% of PHC staff with a positive attitude to collaborate with all health

* Corresponding author.
E-mail address: sergio.calonge@uva.es (S. Calonge-Pascual).
◊ Beneficiario del programa de recualificación del sistema universitario español según R.D. 289/2021, financiado por la Unión Europea-NextGenerationEU y el Ministerio de Universidades.

https://doi.org/10.1016/j.aprim.2024.102946
0212-6567/© 2024 The Authors. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

professionals in PA promotion and exercise prescription. For the predictor variable (iii) was shown low collaboration with sports physicians and sports scientists under a multidisciplinary PAP approach (26.50% responders). Finally, in the predictor variable (iv) Staff maintaining PAP for at least 6 months, self-considered active, and with PAP knowledge want to collaborate with Sports scientists (Yes = 233; No = 133).
Conclusions: Nurses and GPs are conscious of health-related PA benefits despite the lack of PAP knowledge and lack of willingness to collaborate with other health personnel, exercise professionals, and community resources available.
© 2024 The Authors. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

PALABRAS CLAVE
Medicina de familia;
Médicos/as;
Promoción de la Salud;
Salud de la población;
Implementación del plan de salud;
Determinantes sociales para la salud

Análisis del personal de Atención Primaria de Madrid para implementar la prescripción de ejercicio físico

Resumen
Objetivo: Evaluar la autopercepción de enfermeros/as y médicos/as de Atención Primaria hacia la promoción de actividad física y prescripción de ejercicio físico (PAP) en los Centros de Atención Primaria (CAP) de Madrid.
Diseño: Estudio de cohortes mediante encuesta.
Emplazamiento: Enfermeros/as y médicos/as de los CAP de Madrid.
Participantes: Respondieron 319 médicos/as y 285 enfermeros/as de CAP de Madrid.
Mediciones: Árbol de decisiones con 4 variables predictoras: i) profesionales de la salud (enfermeros/as/médicos/as); ii) colaboración con profesionales sanitarios en prescripción de ejercicio físico (respuesta: sí/no); iii) colaboración con los educadores físicos en promoción de actividad física (respuesta: sí/no), y iv) estado del cambio del comportamiento en PAP (0-4 escala de Likert).
Resultados: Para la variable predictora i), los encuestados sin conocimiento de las recomendaciones de actividad física y actitud positiva para colaborar con enfermeros/as en promoción de actividad física son más frecuentemente médicos/as del género femenino (enfermeras n = 33; médicas n = 175) que del masculino (enfermeros n = 3; médicos n = 59) (p < 0,001). Para la variable predictora ii), solo un 9,30% de los profesionales desean colaborar con todos los profesionales de la salud. Para la variable predictora iii), se reflejó una baja colaboración con médicos/as deportivos y educadores físicos (26,50% de los encuestados). Finalmente, para la variable predictora iv), los profesionales que mantienen su PAP durante 6 meses, autopercibidos físicamente activos y con conocimiento en PAP, desean colaborar con los educadores físico-deportivos (sí = 233; no = 133).
Conclusiones: Los enfermeros/as y médicos/as de los CAP son conscientes de los beneficios de la actividad física, pero poseen falta de conocimiento y concienciación para colaborar con otros profesionales y utilizar los recursos comunitarios disponibles para prescribir ejercicio físico.
© 2024 Los Autores. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Introduction

Physical inactivity and sedentary levels are well known predictors of non-communicable diseases (NCDs).[1] However, at least one-third of the global age-standardized worldwide population possesses insufficient physical activity levels (PAL).[1] The most recent global estimates show that one in four adults and more than three-quarters of adolescents do not meet the physical activity (PA) guidelines.[1] These data are currently considered as a serious health threat.[1] During last decades, different Global Action Plans on Physical Activity have been implemented, such as the new Global Action Plan on Physical Activity 2018–2030, approved in 2018 with a target to reduce global levels of physical inactivity in people by 15% by 2030.[2] Therefore, after COVID-19 pandemic all the negative consequences of physical inactivity and sedentary behaviors for human health have got a new insight.[3] And nowadays, Health-Care Systems are increasingly considered a good resource to take an active role in PA promotion.[4] In this sense, it is well-known that PAP could prevent unhealthy conditions and exercise prescriptions to treat from 26 to 40 different NCDs.[5,6] PAP is considered as the best medicine-drug polypill over pharmacological interventions for some NCDs.[7] Besides, a higher number of patients visit Health-Care Setting each year and the evidence says that PAP is a cost-effective resource.[8] A review done by Blair et al. concluded that a brief exercise training prescription counseling is efficient, effective, and cost-effective.[9]

However, some authors indicate that lack of resources in the Health-Care System is an issue in implementing an efficient PAP.[8,10] Several barriers have been mentioned in the scientific literature such as lack of knowledge and training about exercise prescription, inefficient network team, having not enough time, individualized interventions in research and clinical settings, among others, that could lead to the reduced PAP in the Primary Health-Care (PHC) Settings.[11,12] For all these factors, evidence of specific strategies with greater effectiveness is still needed to enhance the implementation.[8] In this way, these multifactorial issues could be analyzed by a classification tree analysis (CHAID) to know which variable or combination of variables, better predicts PHC barriers and facilitators for PAP in a specific context.[13] In the last years, there have been many different initiatives support introducing PAP at PHC,[14] many of them, without a previous analysis for their design and implementation. For that reason, the implementation of PAP in Health-Care Settings is not without difficulties and worldwide problems and worthwhile to enhance.[8,15] Besides, previously, Desveaux et al. in 2016, observed discrepancies between the barriers perceived by patients and by PHC providers to a community-based exercise program measured by a questionnaire.[16] In 2016, Short et al. showed that only one-fifth of participants from their survey sample reported receiving PAP recommendation from their physicians.[17] The patients that received PAP recommendation were those who scored higher in physical health-related quality of life.[17] PA counseling, as part of routine healthcare delivery, is one of the best ways to promote healthy lifestyle habits and to provoke behavior changes improving health and quality of life in patients.[18] In this way, this study aims to assess the self-perception of nurses and GPs toward PAP in Madrid PHC.

Material and methods

This study was created as part of a broader mixed-method (complex mixed design) research project.[14] In the first stage, a qualitative semi-structured interview was performed with a representative sample of GPs and Nurses.[19] These data were used to create two validated questionnaires.[20] Finally, by this study we tested the questionnaire's items with a total of 319 GPs (76.50% females) and 285 nurses (88.40% females) with 23.68 (8.55) y and 25.51(10.84) y of PHC career experience, respectively, who were working at PHC in the Autonomous Region of Madrid.

The link to the online choice-modeling Google-form questionnaires were sent out centrally by the *Conserjería de Sanidad* to the directors of the seven health areas in which the Autonomous Region of Madrid is split into. These directors sent it to all GPs and nurses of their area. The results were downloaded directly in the Excel files from the Google form questionnaires. Link to the questionnaires for nurses: https://forms.gle/CmJDQAjR5Pt1zLp36; and GPs: https://forms.gle/coQttEgtBPYgH7Qj7 were sent via email, previous consent to participate.

Data collection took place between October 2018 and December 2018.

The dependent variables in the fourth processes were: (i) Health professional (Nurses/GPs); (ii) Exercise prescription collaboration with all health professionals: physicians, nurses, psychologists, physical therapists, sports medicine physicians, sports scientists, nutritionists, and teachers (Yes/No); (iii) PA promotion collaboration with Sports Scientists (Yes/No); and (iv) The stage of change of PHC staff to PA promotion (0−4 Likert scale). The dependent variable of this last process, according to the transtheoretical model, assumes that behavior change is a dynamic process, which occurs through a temporal dimension in a sequence of stages: (a). No PAP; (b). Purpose to PAP in the next months; (c). Current training and willingness about PAP; (d). Maintaining the PAP routine with their patients for less than 6 months; (e). Maintaining the PAP routine with their patients for more than 6 months. By these stages, the health professionals move until reaching regular PAP behavior with their patients.

The independent variables were related to the questionnaire's items. For the process i, ii and iii: there were selected items 1, 2 (both of them), 3 (binary category), 5 (0−4 level), 6, 8, 9, 10, 11, 13 (all of them), 14, 16 (all of them), 17, 18 (all of them), 19, 20, 23, 24, 25, 26, 27, 29 (all of them), 30 (all of them), sex, and working years at PHC System (binary category by $\leq$20 yr. or >20 yr.); and for the process IV, besides of the previous ones, age range variable was added (20-30 yr., 31-40 yr., 41-50 yr., 51-60 yr., 61-70 yr.). Predictor variables were changed in each model for independent variables of other processes.

Regarding the statistical analysis process, firstly, a descriptive and inferential analysis was performed using the crosstabs command. The Pearson's Chi-squared test, was used to analyze the effects between PHC staff (nurses and GPS) and all independent variables related to PAP collaboration. The odds ratio (OR) by the risk of the previouslymentioned test (95% confidence interval, CI). Some results were categorized by PHC areas, sex, age range and professional status, and corrected by the Fisher test for the lower frequency rates of answer of questionnaires' items 13, 16 and 18.

Effect sizes (ES) were calculated using the Cramer's *V* test and their interpretation was based on this criteria: 0.10 = small effect, 0.30 = medium effect, and 0.50 = large effect.[13]

Secondly, a classification tree analysis was used to determine the classification of which variable or combination of independent variables previously mentioned was used to better predict self-perceived context by nurses and GPs for future implementation of a PAP at PHC Settings in the region of Madrid. This technique allows splitting the sample into different subgroups (nodes) based on the impact of predictions (independent variables).

The exhaustive CHAID (Chi-squared automatic Interaction detection) was the algorithm used, appropriate to nominal dependent and nominal and metric independent 3 variables.

The Chi-square test identifies the relationships between independent variables by completing three steps on each node of the root to find the predictors that exert the highest influence on the predictor variable. The exhaustive CHAID checks all possible splits for each predictor and the merging step increases the search procedure to merge any similar pair until only a single pair remains. Furthermore, all these statistical specifications were considered: (i) the tree has a maximum of 3 levels; (ii) the Pearson's Chi-square was used

to detect the relationships between independent variables; (iii) 100 were the maximum number of iterations; (iv) the minimum change in expected cell frequencies is 0.001; (v) significant level was set at $p < .05$; and (vi) the Bonferroni method was used to significant values adjustments.[13]

The statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 21.0 for Windows (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0, Chicago, IL, USA, NY: IBM Corp.).

The study was performed according to the principles established with the Declaration of Helsinki 1964 and further amendments and other national regulations for research projects involving human participants: Protection of Personal Data, Law 15/1999 of 13 December on the Protection of Personal Data provided in the current legislation (Royal Decree 1720/2007 of 21 December). The protocol study was approved by the Ethical Committee of the ''Hospital Universitario Fundación Alcorcón'' and the Central Commission for research of the Region of Madrid with the protocol code: 42/17; ID:RP1811600040 (date: 13/12/2017) and the informed consent of all participants.

Results

The sample was obtained from a total of 3850 GPs and 3547 nurses, getting a total of 319 GPs' responses (response rate: 8.28%) and 285 nurses' responses (response rate: 8.03%) (Table 1).

The odds ratio in the collaboration on PA promotion, exercise prescription and community resources adjusted by PHC staff (nurses and GPs) is shown in Table 2.

According to the tree analysis process I, for the (Nurses/GPs) health professional predictor variable the results showed 13 nodes defined by the classification tree analysis (Fig. 1).

Level 1 (root node) is (Yes/No) knowledge about PA guidelines by the PHC responders. Low PA guidelines knowledge was achieved by the responders (node 1: 60.4%; nurses $n = 93$ and GPs $n = 272$) with higher level of PHC staff without PA guidelines knowledge (node 2: 39.6%; nurses $n = 192$ and GPs $n = 47$), with significant differences with the predictor variable ($p < .001$).

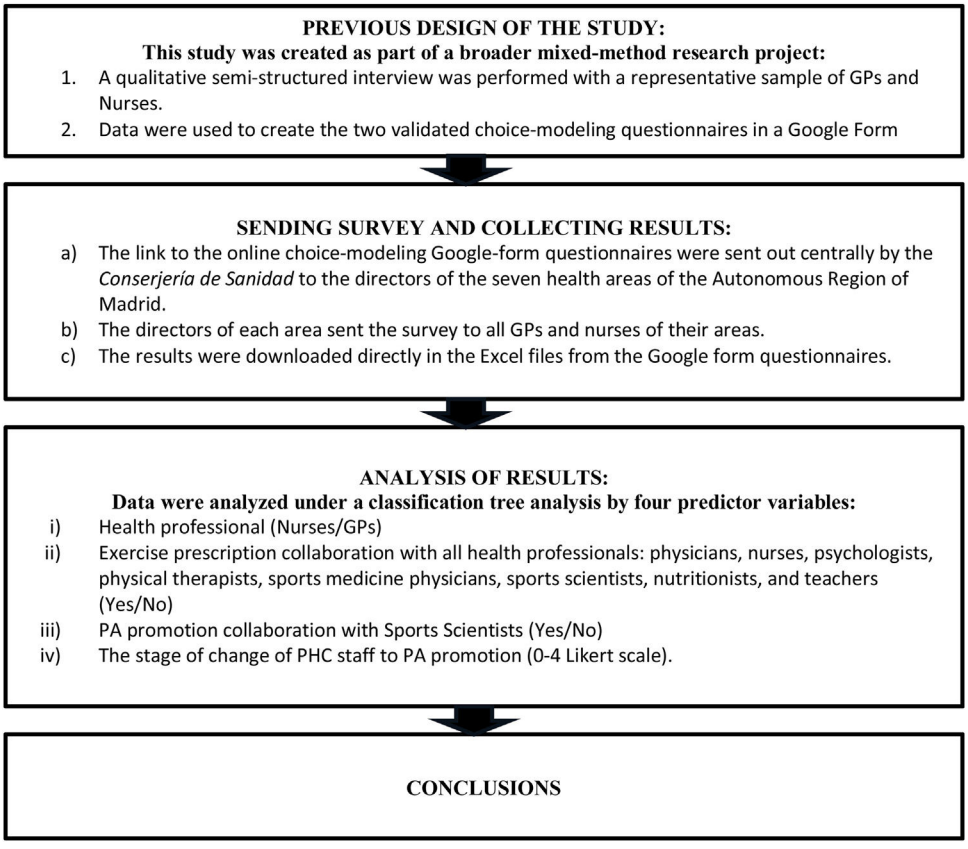
At level 2, there was higher PA promotion collaboration with nurses for responders without PA guidelines knowledge at the previous level. With high level in favor of collaboration between responders (node 3, 44.70%; nurses $n = 36$ and GPs $n = 234$) against non-collaborators of this level ($p < .001$).

At level 3, there were significant differences by sex ($p < .001$) according to the mentioned interaction and way of this tree analysis. In this sense, female responders without PA guidelines knowledge and positive attitude to collaborate with nurses in PA promotion are more female sex (node 7; 34.40%; female nurses $n = 33$ and female GPs $n = 175$) than male sex (node 8; 10.30%; male nurses $n = 3$ and male GPs $n = 59$).

This classification tree model enabled explaining 80.30% of the total variance.

In this analysis, it is important to highlight that from the total PHC staff analyzed only 80.3% of nurses and 19.7% of GPs knew current WHO PA guidelines.

In the tree analysis process II, for the (Yes/No) collaboration with all health professionals in the exercise prescription



General outline of the study: Scheme of the study.

Table 1 Frequency distribution (%) of the nurses and GPs responders of Madrid PHC according to questionnaire indicators (Crosstab Command: Pearson's Chi-square, degrees of freedom, significance, expected frequency distribution, and effect size).

	Health profession				X^2	df	*p*-Value	EFD	ES
	GPs		Nurses						
Indicators	%	*n*	%	*n*					
Item 1. Preventive PAP benefits									
No	0.94	3	0.35	1					
Yes	99.06	316	99.65	284	0.795	1	0.626	1.89	0.036
Item 2. Range age PA benefits (for men)									
No	35.11	112	23.51	67					
Yes	63.95	204	75.79	216	9.868	1	0.002**	84.57	0.128
Item 2. Range age PA benefits (for women)									
No	35.42	113	22.46	64					
Yes	63.01	201	75.79	216	12.198	1	0.001**	83.43	0.143
Item 3. PA guidelines knowledge (binary category)									
No	85.27	272	32.63	93					
Yes	14.73	47	67.37	192	174.39	1	0.000***	112.8	0.537
Item 5. Stage change PA promotion									
0 level	0.31	1	0.35	1					
1 level	2.46	7	2.19	7					
2 level	15.44	44	14.73	47					
3 level	2.46	7	2.82	9					
4 level	91.23	260	69.28	221	1.602	4	0.808	0.94[b]	0.052
Item 6. Physically active self perception									
No	21.94	70	17.19	49					
Yes	78.06	249	82.81	236	2.147	1	0.152	56.15	0.06
Item 8. PAP awareness use									
No	1.57	5	1.05	3					
Yes	97.18	310	96.84	276					
NS/NC	1.25	4	2.11	6	0.962	2	0.618	3.77[b]	0.04
Item 9. Promotion knowledge									
No	28.53	91	29.82	85					
Yes	71.47	228	70.18	200	0.123	1	0.788	83.05	0.014
Item 10. Prescription knowledge									
No	55.8	178	64.56	184					
Yes	44.2	141	35.44	101	4.812	1	0.031*	114.2	0.089
Item 11. Leader promotion									
No	16.61	53	5.96	17					
Yes	83.39	266	94.04	268	16.661	1	0.000***	33.03	0.166
Item 13. Collaboration health professional PA promotion									
Other physicians									
No	28.84	92	24.21	69					
Yes	71.16	227	75.79	216	1.65	1	0.231	75.97	0.052
Nurses									
No	13.48	43	60.35	172					
Yes	86.52	276	39.65	113	144.24	1	0.000***	101.5	0.489
Psychologists									
No	57.68	184	66.32	189					
Yes	42.32	135	33.68	96	4.753	1	0.036*	109	0.089
Physical therapists									
No	17.87	57	12.98	37					
Yes	82.13	262	87.02	248	2.734	1	0.115	44.35	0.067

Table 1 (*Continued*)

	Health profession				X^2	df	*p*-Value	EFD	ES
	GPs		Nurses						
Indicators	%	*n*	%	*n*					
Sports medicine physicians									
No	42.01	134	48.42	138					
Yes	57.99	185	51.58	147	2.502	1	0.12	128.3	0.064
Sports scientists									
No	42.95	137	36.49	104					
Yes	57.05	182	63.51	181	2.616	1	0.114	113.7	0.066
Nutritionists									
No	35.74	114	41.40	118					
Yes	64.26	205	58.6	167	2.043	1	0.156	109.5	0.058
Teachers[a]									
No	99.37	317	98.6	281					
Yes	0.63	2	1.40	4	0.923	1	0.428	2.83[b]	0.039
Total collaboration health professionals PA promotion									
0	0	0	0.35	1					
1	5.96	19	5.26	15					
2	13.17	42	18.95	54					
3	16.3	52	19.3	55					
4	13.48	43	19.65	56					
5	10.34	33	9.47	27					
6	10.03	32	5.61	16					
7	30.72	98	20.7	59					
8	0	0	0.7	2	20.534	8	0.008**	0.47[b]	0.184
Collaboration with all health professionals PA promotion									
No	63.95	204	77.89	222					
Yes	36.05	115	22.11	63	14.082	1	0.000***	83.99	0.153
Item 14. Leader prescription									
No	21.32	68	24.91	71					
Yes	78.68	251	75.09	214	1.098	1	0.333	65.59	0.043
Item 16. Collaboration health professional exercise prescription									
Other physicians									
No	27.9	89	58.95	168					
Yes	72.1	230	40.7	116	60.015	1	0.000***	121	0.315
Nurses									
No	17.55	56	24.56	70					
Yes	82.45	263	75.44	215	4.476	1	0.036*	59.45	0.086
Psychologists									
No	57.37	183	67.72	193					
Yes	42.63	136	32.28	92	6.865	1	0.009**	107.6	0.107
Physical therapists									
No	16.93	54	15.09	43					
Yes	83.07	265	84.91	242	0.378	1	0.539	45.77	0.025
Sports medicine physicians									
No	36.68	117	43.16	123					
Yes	63.32	202	56.84	162	2.64	1	0.114	113.3	0.066
Sports scientists									
No	39.81	127	34.39	98					
Yes	60.19	192	65.61	187	1.896	1	0.178	106.2	0.056
Nutritionists									
No	38.87	124	47.72	136					
Yes	61.13	195	52.28	149	4.806	1	0.032*	122.7	0.089
Teachers[a]									
No	99.06	316	99.3	283					
Yes	0.94	3	0.7	2	0.104	1	1	2.36[b]	0.013

Table 1 (*Continued*)

	Health profession				X^2	df	*p*-Value	EFD	ES
	GPs		Nurses						
Indicators	%	*n*	%	*n*					
Total collaboration health professionals exercise prescription									
0	0	0	0.35	1					
1	3.76	12	7.02	20					
2	13.79	44	17.19	49					
3	17.24	55	21.40	61					
4	15.67	50	14.04	40					
5	8.78	28	12.63	36					
6	11.29	36	5.61	16					
7	28.84	92	21.05	60					
8	0.94	3	0.35	1	19.269	8	0.013*	0.47[b]	0.179
Collaboration with all health professionals exercise prescription									
No	64.89	207	78.6	224					
Yes	35.11	112	21.40	61	13.835	1	0.000***	81.63	0.151
Item 17. PAP collaboration community resources									
No	2.19	7	1.05	3					
Yes	97.81	312	98.95	282	1.205	1	0.348	4.72[b]	0.045
Item 18. PAP collaboration community resources									
Town Hall									
No	15.36	49	49.47	141					
Yes	83.07	265	50.53	144	79.126	1	0.000***	90.40	0.363
Public sports centers									
No	8.78	28	362.4	107					
Yes	89.66	286	67.54	178	70.128	1	0.000***	64.23	0.342
Physical therapist centers									
No	43.57	139	74.39	212					
Yes	54.86	175	25.61	73	55.861	1	0.000***	118	0.305
Wellness centers									
No	81.19	259	57.19	163					
Yes	18.5	55	42.81	122	45.904	1	0.000***	84.22	0.277
Sports & younger government									
No	27.9	89	30.88	88					
Yes	70.53	225	69.12	197	0.461	1	0.531	84.22	0.028
Private gym									
No	72.73	232	76.49	218					
Yes	25.71	82	23.51	67	0.543	1	0.508	70.89	0.3
Schools									
No	23.2	74	33.33	95					
Yes	75.24	240	66.67	190	7.036	1	0.008**	80.41	0.108
Other centers									
No	96.87	309	97.19	277					
Yes	1.57	5	2.81	8	1.038	1	0.403	6.19	0.042
Total PAP collaboration community resources:									
0	0.63	2	1.40	4					
1	2.51	8	4.91	14					
2	9.40	30	23.86	68					
3	20.69	66	29.47	84					
4	26.96	86	23.86	68					
5	16.61	53	3.86	11					
6	8.46	27	1.75	5					
7	12.54	40	9.82	28					
8	0.63	2	1.05	3	65.055	8	0.000***	2.38[b]	0.33

Table 1 (*Continued*)

	Health profession				X^2	df	*p*-Value	EFD	ES
	GPs		Nurses						
Indicators	%	*n*	%	*n*					
PAP collaboration with all community resources									
No	82.76	264	87.72	250					
Yes	15.67	50	12.28	35	1.628	1	0.241	40.44	0.052
Item 19. PAP training courses predisposition									
No	6.58	21	7.37	10					
Yes	93.42	298	96.49	275	2.922	1	0.098	14.63	0.07
Item 20. Other training courses predisposition									
No	3.13	34	8.42	24					
Yes	86.21	285	91.58	261	0.868	1	0.407	27.37	0.038
Item 23. Previous promotion training courses									
No	62.7	200	52.28	149					
Yes	36.36	116	47.72	136	7.461	1	0.008**	119.5	0.111
Item 24. Previous number promotion training courses									
0	6.32	202	52.28	150					
1	10.97	35	19.3	55					
2	10.34	33	16.49	47					
3	6.58	21	5.26	15					
4	2.19	7	2.46	7					
5	0.63	2	1.40	4					
6	0.63	2	0.7	2					
7	0.94	3	0.35	1					
10	2.82	9	1.40	4	17.804	8	0.023*	1.90[b]	0.172
Item 25. Previous prescription training courses									
No	71.79	229	68.42	195					
Yes	27.27	87	31.58	90	1.181	1	0.284	83.94	0.044
Item 26. Previous number prescription training courses									
0	71.79	229	68.07	194					
1	10.97	35	20.35	58					
2	8.46	27	6.67	19					
3	2.19	7	1.75	5					
4	1.25	4	1.40	4					
5	0.94	3	0	0					
6	0.31	1	0	0					
7	0.31	1	0	0					
10	2.51	8	1.05	3	15.915	8	0.044*	0.47[b]	0.163
Item 27. PAL tool modification									
No	16.93	54	7.72	22					
Yes	83.07	265	92.28	263	11.604	1	0.001**	35.86	0.139
Item 29. Self-perceived barriers									
Space barriers									
1	12.54	40	5.96	17					
2	10.34	33	10.88	31					
3	21.63	69	19.65	56					
4	18.5	59	16.49	47					
5	17.87	57	18.25	52					
6	19.12	61	28.77	82	13.496	5	0.019*	26.9	0.149
Professional motivation									
1	0.63	2	1.05	3					
2	3.13	10	4.21	12					
3	7.84	25	10.88	31					
4	11.29	36	12.98	37					

Table 1 (*Continued*)

	Health profession				X^2	df	*p*-Value	EFD	ES
	GPs		Nurses						
Indicators	%	*n*	%	*n*					
5	27.9	89	22.46	64					
6	49.22	157	48.42	138	4.447	5	0.487	2.36[b]	0.086
Time management									
1	0.63	2	0.35	1					
2	1.25	4	3.16	9					
3	4.7	15	7.37	21					
4	8.15	26	10.88	31					
5	19.44	62	25.96	74					
6	65.83	210	52.28	149	13.247	5	0.021*	1.42[b]	0.048
Material or economic									
1	5.33	17	1.40	4					
2	6.9	22	8.07	23					
3	14.42	46	11.93	34					
4	18.18	58	19.65	56					
5	24.45	78	25.26	72					
6	30.72	98	33.68	96	8.278	5	0.142	9.91	0.117
External relationship									
1	1.88	6	1.05	3					
2	4.08	13	6.67	19					
3	11.29	36	8.07	23					
4	18.18	58	14.04	40					
5	29.47	94	28.77	82					
6	35.11	112	41.40	118	7.38	5	0.194	4.25[b]	0.111
Patient awareness									
1	0	0	0.35	1					
2	1.57	5	1.75	5					
3	6.58	21	7.72	22					
4	7.21	23	9.12	26					
5	16.3	52	20	57					
6	68.34	218	61.05	174	4.475	5	0.483	0.47[b]	0.086
Item 30. Self-perceived solutions									
PAL tool modification									
No	21	67	9.12	26					
Yes	72.41	231	88.07	251					
NS/NC	6.58	21	2.81	8	22.891	2	0.000***	13.68	0.195
PHC fitness spaces									
No	25.08	80	10.18	29					
Yes	65.2	208	82.11	234					
NS/NC	9.72	31	7.72	22	25.086	2	0.000***	25.01	0.204
PAP networking									
No	1.25	4	1.05	3					
Yes	98.12	313	97.54	278					
NS/NC	0.63	2	1.40	4	0.971	2	0.615	2.83[b]	0.04
PAP training courses									
No	0.94	3	0.35	1					
Yes	97.49	311	98.95	282					
NS/NC	1.57	5	0.7	2	1.796	2	0.407	1.89[b]	0.055
Publicity diffusion									
No	0.94	3	1.40	4					
Yes	96.55	308	96.14	274					
NS/NC	2.51	8	2.46	7	0.283	2	0.868	3.30[b]	0.022

Table 1 (*Continued*)

	Health profession				X^2	df	*p*-Value	EFD	ES
	GPs		Nurses						
Indicators	%	*n*	%	*n*					
Progressive PAP implantation									
No	0.94	3	1.40	4					
Yes	97.18	310	95.79	273					
NS/NC	1.88	6	2.81	8	0.866	2	0.649	3.30[b]	0.038
PAP material resources									
No	19.75	63	9.47	27					
Yes	70.53	225	81.75	233					
NS/NC	9.72	31	8.77	25	13.311	2	0.001**	26.42	0.148
PAP leader role at PHC									
No	10.03	32	6.32	18					
Yes	78.37	250	88.07	251					
NS/NC	11.6	37	5.61	16	10.362	2	0.006**	23.59	0.131
First patient visit									
No	10.66	34	5.61	16					
Yes	82.76	264	89.47	255					
NS/NC	6.58	21	4.91	14	6.142	2	0.046*	16.51	0.101
Outside PA referral									
No	17.87	57	9.47	27					
Yes	71.79	229	83.86	239					
NS/NC	10.34	33	6.67	19	12.824	2	0.002**	24.54	0.146
Increasing consult time									
No	5.96	19	2.81	8					
Yes	89.97	287	94.04	268					
NS/NC	4.08	13	3.16	9	3.958	2	0.138	10.38	0.081

GPs: general practitioners; df: degrees of freedom; EFD: expected frequency distribution; ES: effect size; PA: physical activity; PAP: physical activity on prescription; PAL: physical activity levels; NS/NC: do not know, no answer.

[a] Proposed by PHC staff.

[b] When EFD was below 5 or the variable includes values below 1% the Fisher's exact test was applied.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

predictor variable, the results showed 9 nodes defined by the classification tree analysis (Fig. 2).

Level 1 (root node) is PA promotion collaboration with all health professionals (node 1: 29.50%; Yes $n = 156$ and No $n = 22$) and non-collaboration with all health professionals (node 2: 70.50%; Yes $n = 17$ and No $n = 409$), having significant differences ($p < .001$).

At level 2 was significant differences between both groups and the predictor variable ($p < .001$), with low collaboration with all PAP community resources (node 3: 9.30%; Yes $n = 54$ and No $n = 2$). According to the previous variables analyzed in the tree analysis, only 9.30% of PHC staff with a positive attitude to collaborate with all PAP community resources and all health professionals in PA promotion and exercise prescription.

This classification tree model enabled explaining 93.50% of the total variance.

In this analysis, it is important to highlight that from the total PHC staff analyzed only 28.6% want to collaborate in exercise prescription with all health and exercise professionals offered in the multiple-choice questionnaire (physicians, nurses, psychologists, physiotherapists, nutritionists, sports medicine physicians, sports scientists, and schoolteachers).

In the tree analysis process III, for the (Yes/No) PA promotion collaboration with sports scientist's predictor variable the results showed 7 nodes defined by the classification tree analysis (Fig. 3).

Level 1 (root node) is PA promotion collaboration with sports physicians by the PHC staff analyzed (node 1: 55.00%), and the non-collaborators (node 2: 45.00%), showing significant differences with predictor variable ($p < .001$).

At level 2, there were significant differences by health profession (Nurses and GPs) and predictor variable ($p < .001$). In a first way, 22.2% of GPs (node 5) and 22.8% of nurses (node 6) do not want to collaborate with Sports Physicians and Sports Scientists under a multidisciplinary PAP approach. Furthermore, in the other way of this second level of the tree analysis, there were significant differences in PA promotion collaboration with all health professionals with the predictor variable ($p < .001$), considering low the collaboration with sports physicians and sports scientists under a multidisciplinary PAP approach (node 3; 26.50%).

Table 2 The odds ratio (OR) between PHC staff (nurses and GPS) in collaboration on PA promotion, exercise prescription and community resources (95% confidence interval, CI).

	Health profession						
	GPs		Nurses		OR	(95% CI)	
Indicators	%	*n*	%	*n*	(GPs/nurse)	Lower	Upper
Item 13. Collaboration health professional PA promotion							
Other physicians							
No	28.84	92	24.21	69			
Yes	71.16	227	75.79	216	1.269	0.882	1.825
Nurses							
No	13.48	43	60.35	172			
Yes	86.52	276	39.65	113	0.102	0.069	0.153
Psychologists							
No	57.68	184	66.32	189			
Yes	42.32	135	33.68	96	0.692	0.497	0.964
Physical therapists							
No	17.87	57	12.98	37			
Yes	82.13	262	87.02	248	1.458	0.931	2.284
Sports medicine physicians							
No	42.01	134	48.42	138			
Yes	57.99	185	51.58	147	0.772	0.559	1.064
Sports scientists							
No	42.95	137	36.49	104			
Yes	57.05	182	63.51	181	1.310	0.944	1.818
Nutritionists							
No	35.74	114	41.40	118			
Yes	64.26	205	58.60	167	0.787	0.567	1.093
Teachers							
No	99.37	317	98.60	281			
Yes	0.63	2	1.40	4	2.256	0.410	12.412
Collaboration with all health professionals PA promotion							
No	63.95	204	77.89	222			
Yes	36.05	115	22.11	63	0.503	0.351	0.722
Item 16. Collaboration health professional exercise prescription							
Other physicians							
No	27.90	89	58.95	168			
Yes	72.10	230	40.70	116	0.267	0.190	0.376
Nurses							
No	17.55	56	24.56	70			
Yes	82.45	263	75.44	215	0.654	0.441	0.971
Psychologists							
No	57.37	183	67.72	193			
Yes	42.63	136	32.28	92	0.641	0.460	0.895
Physical therapists							
No	16.93	54	15.09	43			
Yes	83.07	265	84.91	242	1.147	0.741	1.775
Sports medicine physicians							
No	36.68	117	43.16	123			
Yes	63.32	202	56.84	162	0.763	0.550	1.058
Sports scientists							
No	39.81	127	34.39	98			
Yes	60.19	192	65.61	187	1.262	0.906	1.759
Nutritionists							
No	38.87	124	47.72	136			
Yes	61.13	195	52.28	149	0.697	0.504	0.963

Table 2 (*Continued*)

	Health profession						
	GPs		Nurses		OR	(95% CI)	
Indicators	%	*n*	%	*n*	(GPs/nurse)	Lower	Upper
Teachers							
No	99.06	316	99.30	283			
Yes	0.94	3	0.70	2	0.744	0.123	4.487
Collaboration with all health professionals exercise prescription							
No	64.89	207	78.60	224			
Yes	35.11	112	21.40	61	0.503	0.350	0.725
Item 18. PAP collaboration community resources							
Town hall							
No	15.36	49	49.47	141			
Yes	83.07	265	50.53	144	0.189	0.129	0.277
Public sports centers							
No	8.78	28	362.4	107			
Yes	89.66	286	67.54	178	0.163	0.103	0.257
Physical therapist centers							
No	43.57	139	74.39	212			
Yes	54.86	175	25.61	73	0.274	0.193	0.387
Wellness centers							
No	81.19	259	57.19	163			
Yes	18.50	55	42.81	122	3.525	2.425	5.122
Sports & younger government							
No	27.90	89	30.88	88			
Yes	70.53	225	69.12	197	0.886	0.623	1.258
Private gym							
No	72.73	232	76.49	218			
Yes	25.71	82	23.51	67	0.870	0.599	1.261
Schools							
No	23.20	74	33.33	95			
Yes	75.24	240	66.67	190	0.617	0.431	0.883
Other centers							
No	96.87	309	97.19	277			
Yes	1.57	5	2.81	8	1.785	0.577	5.520
PAP collaboration with all community resources							
No	82.76	264	87.72	250			
Yes	15.67	50	12.28	35	0.739	0.464	1.177

GPs: general practitioners; OR: odds ratio; CI: confidence interval; PA: physical activity; PAP: physical activity on prescription.

This classification tree model enabled explaining 78.00% of the total variance.

In this analysis, it is important to highlight that from the total PHC staff analyzed 39.9% do not want to collaborate with Sports Scientists in PA promotion.

In the tree analysis process IV, for the stage of change of PHC staff for PA promotion predictor variable, according to a 0–4 Likert scale. The results showed 7 nodes defined by the classification tree analysis (Fig. 4).

Level 1 (root node) is PA promotion knowledge by The PCH responders, with a high level of PA promotion knowledge shown for them in the tree analysis (node 2: 70.90%; $n = 428$), and significant differences with the predictor variable ($p < .001$).

At level 2, there were significant differences in the physically active self-perception and predictor variable ($p < .01$). With a high level of positive physically active self-perception by the PCH staff (node 3: 60.60%).

At level 3, there were significant differences by PA promotion collaboration with sports scientists and the predictor variable ($p < .01$). In this way, to the predictor variable and the high levels of PCH staff promoting PAP at this moment and all the previously mentioned independent variables interacting in the tree analysis model, is low the percentage of PHC staff wanting a PAP implementation under a multidisciplinary approach, considering sports scientists (node 5; 38.60%; yes $n = 233$).

This classification tree model enabled explaining 29.10% (node 1), 10.30% (node 4), 38.60% (node 5) and 22.00% (node 6) of the total variance.

In this analysis, it is important to highlight that from the 604 PCH staff analyzed, there are a total of 233 that have maintained PAP for at least 6 months, they were self-

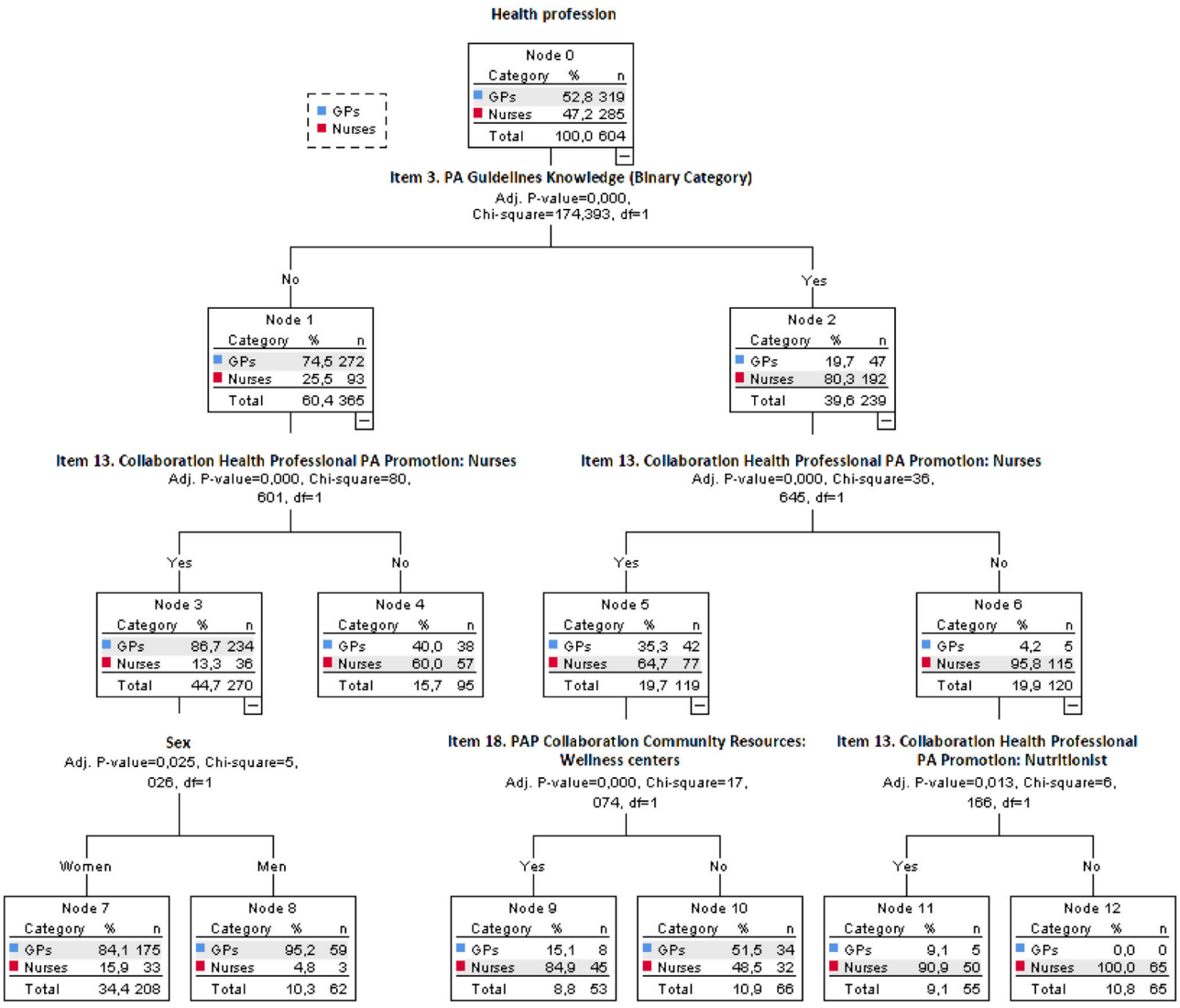


Figure 1 The process I of this classification tree analysis: predictor variable PHC profession.

considered active and with enough PAP knowledge, however, they want to collaborate with Sports Scientists in exercise prescription.

Discussion

The analysis of PAP self-perception of two of the most important PHC providers, nurses, and GPs, done in the Autonomous Region of Madrid has shown more than 99% agreement with the exercise and PA health-related preventive benefits. This survey-cohort study showed similar results that Christina Bock et al., offered in a German physician survey in 2012, where almost all physicians considered that PA promotion was part of their duties.[21] However, is worrying the fact that 25 and 37% of nurses and GPs, respectively, do not always consider PA health-related benefits good for adult patients of both sexes. A lack of knowledge and training to provide PAP counseling,[22,23] and also the lack of skills around behavior change techniques to motivate their patients had been one of the most common barriers to HC staff in the scientific literature.[21,24] These aforementioned results of our responders could affect a clear disconnect between the exercise health-related scientific fact and the ''theory-practice-gap'' of exercise prescription in Health-Care Settings such as has been previously shown by Kennedy et al. for PAP implementation.[25] Furthermore, data published in the literature indicates that only around one-third of physicians are using PAP counseling.[12] However, these results are lower when patients are asked.[17] In contrast, the 81.5% PHC physicians analyzed in our study showed that they maintain the PAP counseling with their patients for more than 6 months. This result contrast with lower exercise prescription levels shown by other authors.[26,27] However, our data demonstrate a better frequency of PAP counseling than previous reports of PHC GPs not related to the field of sports medicine,[28] and it is well-known that adherence to PAP is a complex and multidimensional phenomenon.[29] In this sense, according to the tree analysis process I, the results showed that PHC staff without PA guidelines knowledge and positive attitude to collaborate with nurses in PA promotion are more for the female

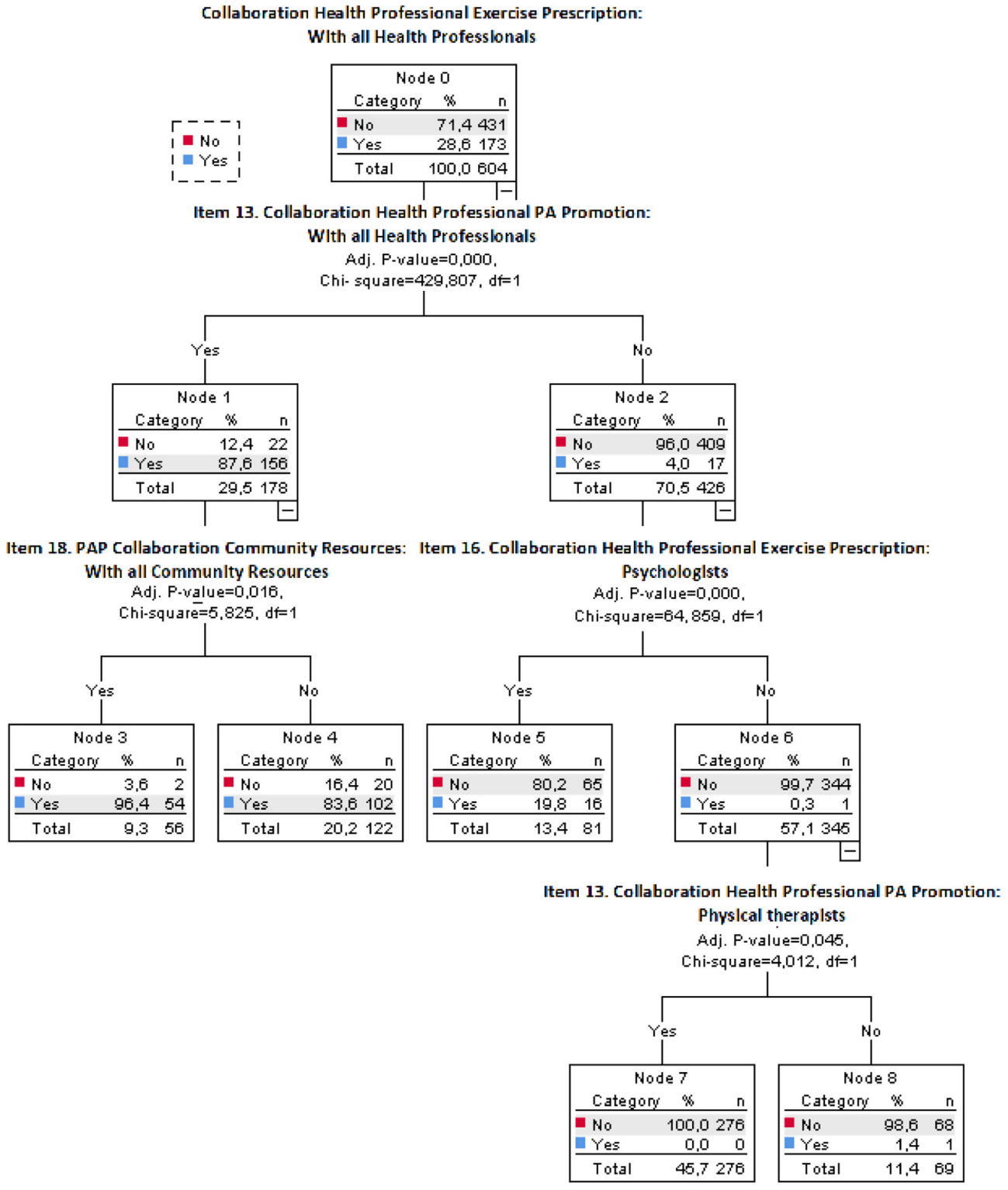


Figure 2 Process II of this classification tree analysis. Predictor variable: collaboration with all health professionals in the exercise prescription.

sex. Besides, in our tree analysis process IV, for the stage of change of PHC staff for PA promotion predictor variable, the results showed that there are significant differences between PCH responders with high level of PA promotion knowledge, positive physically active self-perception and willing to collaborate with sports scientists about PA promotion.

In this sense, physically active behavior shown by PHC staff could affect a future PAP implementation and influence PA promotion for their patients such as has been indicated in

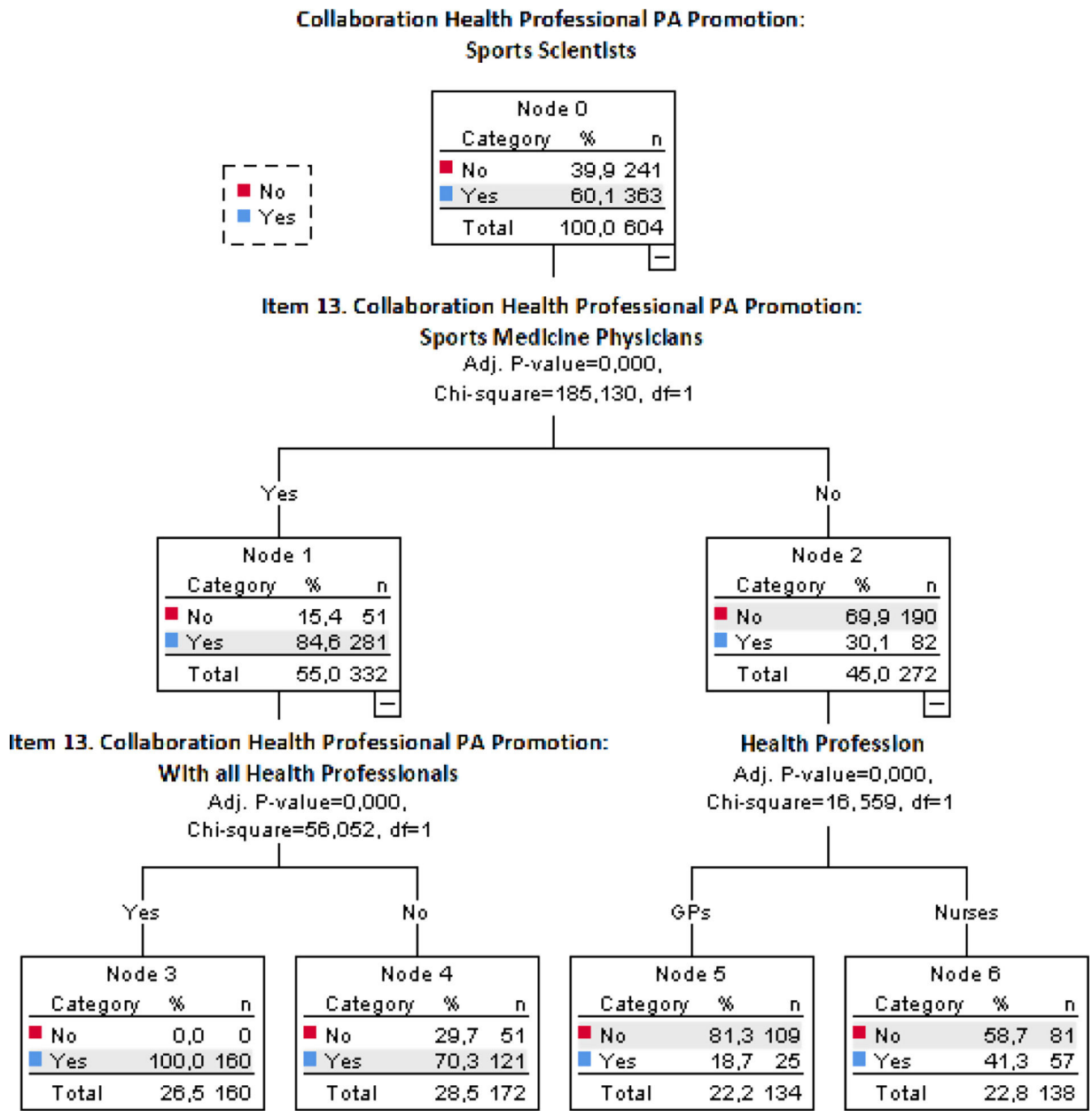


Figure 3 The process III of this classification tree analysis: predictor variable collaboration with sports scientists for PA promotion.

the scientific literature.[30] But the data shown by the respondents could be not reliable because most of them did not know PA guidelines to be considered physically active or not. In this sense, similar results were offered by PHC staff in Australia in the cohort survey study done by Freene et al.[31] Although, the current WHO PA guidelines should be known and properly used by nurses and GPs working in health services providing advice and guidance in PHC Settings.[2] The WHO has called for action to integrate physical activity promotion in different context such as schools or healthcare Settings. Furthermore, currently has been established eleven competencies for health professionals, which could serve as a reference to create a culture of advocacy for movement behavior change across all health disciplines,[32] with possible transference to exercise professionals, among others.

In addition, PHC professionals were more confident in the self-perception knowledge to promote PA than to prescribe exercise. According to a recent study published by Kennedy et al., the attitude of Health-Care staff to prescribe exercise is considered a barrier to change at a professional stage for PAP implementation.[33] However, both assume PAP leadership roles as a potential facilitator for the future PAP implementation in PHC Settings. Otherwise, both are interested in enhancing the PAP training skills by training courses in concordance with the necessities shown in other

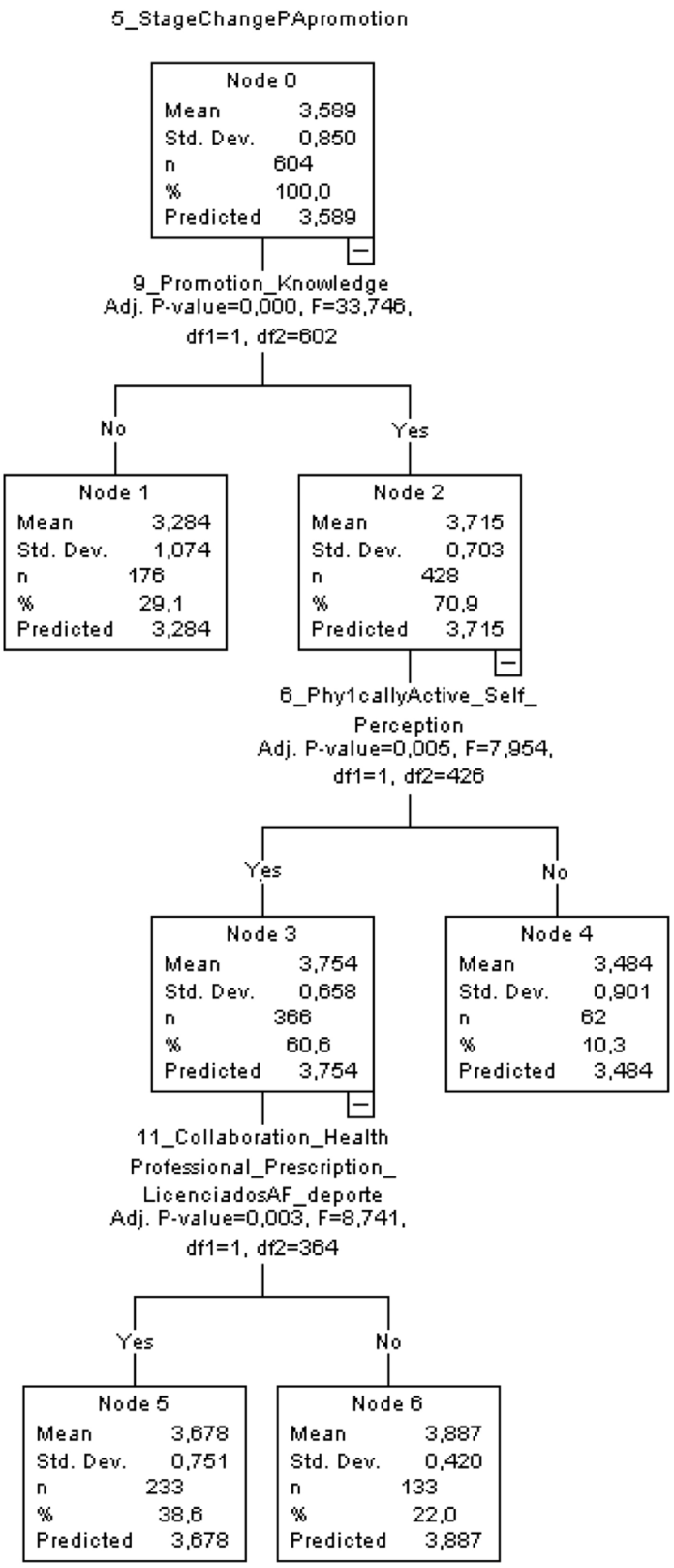


Figure 4 The process IV of this classification tree analysis: predictor variable stage of change for PA promotion.

studies.[22,23,30] In this sense, the lack of self-confident behavior in exercise prescriptions could be associated with the lack of exercise training knowledge. A mean of 70.4% indicated no exercise training background with a mean of less than one exercise prescription course for all PHC professionals during most of the 23 years of mean PHC career experience for the sample analyzed.

Furthermore, the results of this study with more than half GPs and nurses willing to collaborate with sports scientists and public sports centers contrast with the results obtained in the study of Pojednic et al., with less than half of physicians surveyed, concerned with certified trainers or specific outstanding teachers for PAP implementation. In this way, in our study, less than half of the responders were willing to collaborate with wellness and private gym centers in a similar way that is shown in the scientific literature.[34] However, the good predisposition in the collaboration with some sport facilities in our study is not only for the physicians of Spain. It has been shown previously in a German survey cohort study developed by Bock et al.[21]

Additionally, all the PHC respondents showed willing to collaborate with all health professional staff proposed, having the physician's 98.7% (OR: 1.987) more than probability to collaborate with all of them than nurses. Besides, almost all PHC professionals agreed to the collaboration with other community resources to enhance PAP in the PHC System, even although, both groups were interested in creating a PAP networking with other professionals and institutions with the aim to increase efficiency to prevent NCDs, according to the Exercise is Medicine initiative.[14] Despite of many studies have identified the lack of exercise resources such as lack of supervised exercise programs and qualified staff or exercise experts as a part of the multidisciplinary core care team as PAP implementation barriers.[24,34]

As limitation of this study, we would like to say that results obtained from this survey study could be biased by the sampling procedure performed, because it was not possible to guarantee a representative sample of the Madrid PHC System, despite the online questionnaires being sent by e-mail to all GPs and nurses of the Autonomous Region of Madrid. However, the low response rate of responders could be related to the PHC staff being more able or in favor of PAP.

Conclusions

GPs and nurses are conscious of the exercise and PA health-related benefits despite the lack of resources and self-perception barriers observed to implement PAP in PHC Settings. Collaboration with other health personnel, exercise professionals, and community resources are the main barriers observed in both PHC professionals.

According to these results, it is necessary to improve the exercise knowledge and training of GPs and nurses, design a procedure, and identify the stage of change of PHC staff to PA promotion who should assume a leadership role working with other professionals and community resources under a multidisciplinary or interdisciplinary approach.

What is already known on this topic

- Physical inactivity and sedentary levels are well-known predictors of non-communicable diseases and key risk factors for premature death.
- Exercise prescriptions could be a coadjutant treatment at least on 26 non-communicable diseases.
- There is a clear disconnect between the exercise health-related benefits and the ''theory-practice gap'' of exercise prescription in Health-Care Settings.

What this study adds

- This is the first study analysing the Physical Activity on Prescription self-perception of Primary Health-Care staff under a classification tree analysis.
- These data and this design model could be considered to effectively implement Physical Activity on Prescription in any Primary Health-Care System.
- Under a socioecological model approach, the analysis of interpersonal, organizational and community resources as we analyze in this study are key for an efficient Physical Activity on Prescription implementation and to resolve the ''theory-practice gap'' of exercise prescription in Primary Health-Care Settings.

Funding

This work was supported by the funds of the Instituto de Salud Carlos III through CIBEROBN CB12/03/30038 [2015-2019], which is co-funded by the European Regional Development Fund, and the Programa Unión Europea-NextGenerationEU y el Ministerio de Universidades [2022].

Ethical considerations

The study was performed according to the principles established with the Declaration of Helsinki 1964 and further amendments and other national regulations for research projects involving human participants: Protection of Personal Data, Law 15/1999 of 13 December on the Protection of Personal Data provided in the current legislation (Royal Decree 1720/2007 of 21 December). The protocol study was approved by the Ethical Committee of the ''Hospital Universitario Fundación Alcorcón'' and the Central Commission for research of the Region of Madrid with the protocol code: 42/17; ID:RP1811600040 (date: 13/12/2017).

Conflict of interest

The authors have no conflict of interest to declare.

Acknowledgments

We would like to thank to all PHC GPs and nurses of Madrid who gave their time and shared their self-perception bar-

riers and facilitators to implement PAP at PHC settings on behalf of Madrid Health-Care System.

References

1. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants. J Lancet Glob Health. 2018;6:e1077–86.
2. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54:1451–62.
3. Pérez-Gisbert L, Torres-Sánchez I, Ortiz-Rubio A, Calvache-Mateo A, López-López L, Cabrera-Martos I, et al. Effects of the COVID-19 pandemic on physical activity in chronic diseases: a systematic review and meta-analysis. Int J Environ Res Public Health. 2021;18:12278.
4. Sallis R, Franklin B, Joy L, Ross R, Sabgir D, Stone J. Strategies for promoting physical activity in clinical practice. Prog Cardiovasc Dis. 2015;57:375–86.
5. Pedersen BK, Saltin B. Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases. Scand J Med Sci Sports. 2015;25 Suppl. 3:1–72.
6. Ramirez-Velez R, Lobelo F, Izquierdo M. Exercise for disease prevention and management: a precision medicine approach. J Am Med Dir Assoc. 2017;18:633–4.
7. Ruiz JR, Lavie CJ, Ortega FB. Exercise versus pharmacological interventions for reducing visceral adiposity and improving health outcomes. Mayo Clin Proc. 2019;94:182–5.
8. Sanchez A, Bully P, Martinez C, Grandes G. Effectiveness of physical activity promotion interventions in primary care: a review of reviews. J Prevent Med. 2015;76 Suppl.:56–67.
9. Vuori IM, Lavie CJ, Blair SN. Physical activity promotion in the health care system. Mayo Clin Proc. 2013;88:1446–61.
10. Morgan F, Battersby A, Weightman AL, Searchfield L, Turley R, Morgan H, et al. Adherence to exercise referral schemes by participants – what do providers and commissioners need to know? A systematic review of barriers and facilitators. BMC Public Health. 2016;16:227.
11. Lamarche K, Vallance J. Prescription for physical activity a survey of Canadian nurse practitioners. J Can Nurse. 2013;109:22–6.
12. Jones M, Bright P, Hansen L, Ihnatsenka O, Carek PJ. Promoting physical activity in a primary care practice: overcoming the barriers. J Am J Lifestyle Med. 2019;15:158–64.
13. Gómez M-Á, Battaglia O, Lorenzo A, Lorenzo J, Jiménez S, Sampaio J. Effectiveness during ball screens in elite basketball games. J Sport Sci. 2015;33:1844–52.
14. Calonge-Pascual S. Context analysis in the development for future implementation of Exercise is Medicine® initiative as prevention and treatment resource for chronic diseases at Primary Healthcare settings [International thesis]. Spain: Universidad Politécnica de Madrid; 2019.
15. Lion A, Vuillemin A, Thornton JS, Theisen D, Stranges S, Ward M. Physical activity promotion in primary care: a Utopian quest? Health Promot Int. 2018;34:877–86.
16. Desveaux L, Goldstein R, Mathur S, Brooks D. Barriers to physical activity following rehabilitation: perspectives of older adults with chronic disease. J Aging Phys Activ. 2016;24:223–33.
17. Short CE, Hayman M, Rebar AL, Gunn KM, De Cocker K, Duncan MJ, et al. Physical activity recommendations from general practitioners in Australia. Results from a national survey. Aust N Z J Public Health. 2016;40:83–90.
18. Wattanapisit AA-O, Tuangratananon T, Thanamee S. Physical activity counseling in primary care and family medicine residency training: a systematic review. BMC Med Educ. 2018;18:159.
19. Calonge-Pascual S, Fuentes Jiménez F, Arnal-Selfa R, Belmonte-Cortés S, González-Gross M. Self-perception of primary health-care staff about physical activity on prescription: A qualitative semi-structured interview. Semergen. 2023;49:101856.
20. Calonge-Pascual S, Fuentes-Jiménez F, Mallén JA, González-Gross M. Design and Validity of a Choice-Modeling Questionnaire to Analyze the Feasibility of Implementing Physical Activity on Prescription at Primary Health-Care Settings. Int J Environ Res Public Health. 2020;7:6627.
21. Bock C, Diehm C, Schneider S. Physical activity promotion in primary health care: results from a German physician survey. Eur J Gen Pract. 2012;18:86–91.
22. Calonge-Pascual S, Casajús Mallén JA, González-Gross M. La actividad física en el currículo universitario español de los grados de Medicina, Ciencias de la Actividad Física, del Deporte como recurso en la prevención, tratamiento de las enfermedades crónicas. Nutr Hosp. 2017;34:961–8.
23. Calonge-Pascual S, Casajús Mallén JA, González-Gross M. Physical exercise training in the syllabus of Bachelor of Science in nursing degrees: an environmental scan. Contemp Nurse. 2022;58:192–211.
24. Kennedy MA-OX, Bayes SA-O, Newton RA-O, Zissiadis Y, Spry NA-O, Taaffe DA-O, et al. Implementation barriers to integrating exercise as medicine in oncology: an ecological scoping review. J Cancer Surviv. 2022;16:865–81.
25. Kennedy MA, Bayes S, Galvão DA, Singh F, Spry NA, Davis M, et al. If you build it, will they come? Evaluation of a co-located exercise clinic and cancer treatment centre using the RE-AIM framework. Eur J Cancer Care. 2020;29:e13251.
26. Iglesias Martinez B, Olaya Velazquez I, Gomez Castro MJ. Prevalence of performing and prescribing physical exercise in patients diagnosed with anxiety and depression. Aten Prim. 2015;47:428–37.
27. Persson G, Brorsson A, Ekvall Hansson E, Troein M, Strandberg EL. Physical activity on prescription (PAP) from the general practitioner's perspective – a qualitative study. BMC Fam Pract. 2013;14:128.
28. Pojednic RM, Polak R, Arnstein F, Kennedy MA, Bantham A, Phillips EM. Practice patterns, counseling and promotion of physical activity by sports medicine physicians. J Sci Med Sport. 2017;20:123–7.
29. Calonge-Pascual S, Casajús-Mallén JA, González-Gross M. Adherence factors related to exercise prescriptions in health-care settings: a review of the scientific literature. Res Q Exerc Sport. 2022;93:16–25.
30. Puig Ribera A, McKenna J, Riddoch C. Attitudes and practices of physicians and nurses regarding physical activity promotion in the Catalan primary health-care system. Eur J Public Health. 2005;15:569–75.
31. Freene N, Cools S, Hills D, Bissett B, Pumpa K, Cooper G. A wake-up call for physical activity promotion in Australia: results from a survey of Australian nursing and allied health professionals. Aust Health Rev. 2019;43:165–70.
32. Alsop T, Lehman E, Brauer S, Forbes R, Hanson C, Healy G, et al. What should all health professionals know about movement behaviour change? An international Delphi-based consensus statement. Br J Sports Med. 2023;57:1419–2142.
33. Kennedy MA-OX, Bayes SA-O, Newton RA-O, Zissiadis Y, Spry NA-O, Taaffe DA-O, et al. Implementation barriers to integrating exercise as medicine in oncology: an ecological scoping review. 2021 (1932–2267 (Electronic)). doi:10.1007/s11764-021-01080-0.
34. Pojednic R, Bantham A, Arnstein F, Kennedy MA, Phillips E. Bridging the gap between clinicians and fitness professionals: a challenge to implementing exercise as medicine. BMJ Open Sport Exerc Med. 2018;4:e000369.