Perceived Barriers and Coping Strategies to Smoking Cessation in Patients with Osteoarticular Pathology in Spain

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RESUMEN

Introducción: el aumento de la esperanza de vida y de las enfermedades crónicas sitúa al tabaquismo como un factor crítico. El tabaco exacerba el dolor y dificulta la recuperación de pacientes con patología osteoarticular, lo que convierte a la cesación en una prioridad clínica. **Objetivo:** evaluar la dificultad percibida, motivaciones, barreras, satisfacción con el apoyo sanitario, conocimiento de riesgos y la efectividad percibida de estrategias de afrontamiento en pacientes y profesionales de la salud. **Método:** el estudio se estructuró en dos fases: fase cualitativa mediante grupo nominal con pacientes expertos fumadores; y estudio observacional mediante encuestas online dirigidas a profesionales sanitarios y pacientes fumadores y exfumadores recientes (< 5 años) con patología osteoarticular. **Resultados:** con más de 100 participantes por grupo, coincidieron en la alta dificultad para dejar de fumar. Se observaron discrepancias: los profesionales reportaron mayor satisfacción con el apoyo del sistema sanitario y percibieron menor conciencia de riesgos en los pacientes que estos últimos. Ambos grupos expresaron baja satisfacción con el seguimiento recibido. La principal motivación fue la salud personal, mientras que la dependencia, el bienestar asociado al consumo, la fácil accesibilidad y la presión social fueron las principales barreras. Las estrategias de afrontamiento consideradas más eficaces fueron la proactividad, la autocrítica y la reestructuración cognitiva. **Discusión y conclusiones:** los resultados subrayan la necesidad de intervenciones individualizadas e integrales que combinen estrategias farmacológicas y conductuales con un seguimiento continuo. Incorporar la experiencia de los fumadores es imprescindible para diseñar programas de cesación más efectivos y centrados en el paciente.

Palabras clave: osteoarticular, cesación tabáquica, estrategias de afrontamiento, resultados informados por el paciente.

ABSTRACT

Introduction: the rising prevalence of chronic diseases and life expectancy highlights smoking as a critical factor. Tobacco exacerbates pain and impairs recovery in patients with osteoarticular diseases, making cessation a clinical priority. **Objective:** to evaluate perceived difficulty, motivations, barriers, healthcare satisfaction risk awareness, and the effectiveness of coping strategies among individuals with osteoarticular disease and healthcare professionals. **Method:** the study comprised two phases: a qualitative exploration using the nominal group technique with expert smoking patients, and a cross-sectional study via online surveys targeting current or former smokers (< 5 years) with osteoarticular disease and healthcare professionals. **Results:** with over 100 participants per group, both cohorts reported high difficulty in quitting. Discrepancies were observed: professionals reported higher satisfaction with system support and perceived lower patient awareness of tobacco harms than patients themselves. Both groups reported low satisfaction with follow-up care. The primary motivation was personal health, while major barriers were nicotine dependence, perceived well-being/pleasure from smoking, easy access to tobacco, and social pressure. Proactivity, self-criticism, and cognitive restructuring were rated as the most effective coping strategies. **Discussion and conclusions:** findings highlight the need for individualized, comprehensive cessation interventions integrating pharmacological and behavioral strategies with continuous follow-up. Incorporating smokers' lived experience is essential for designing effective, patient-centered cessation programs.

Keywords: osteoarticular, smoking cessation, coping strategies, patient-reported outcomes.

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INTRODUCTION

Life expectancy continues to rise globally, now exceeding an average of 80 years in Spain (Instituto Nacional de Estadística, 2023). This demographic shift has led to a significant increase in multi morbidity: currently, 24% of individuals over 65 and 31.4% of those over 85 live with four or more chronic conditions (Soler et al., 2010). Among these, osteoarticular disorders are particularly prevalent, and represent a leading cause of disability and diminished quality of life in older populations (Yokota et al., 2024).

Smoking and Health Burden

According to the World Health Organization (WHO, 2025), approximately 22.3% of the global population, equivalent to 1.3 billion people, consumes tobacco, and this habit experts a multidimensional impact affecting individual health, social environments, and the overall efficiency of healthcare systems. Smoking remains the leading preventable cause of morbidity and premature mortality worldwide.

Robust evidence links tobacco use to an array of systemic pathologies, including cancer, cardiovascular disease, and metabolic disorders, as well as dysfunctions within the respiratory, digestive, urinary, reproductive, and musculoskeletal systems, among others (GBD 2019 Tobacco Collaborators, 2021).

Smoking is responsible for the death of approximately half of its users (WHO, 2025), causing over 7 million annual deaths among active smokers and around 1.6 million among those exposed to secondhand smoke (WHO, 2023). In Spain, Ministry of Health data indicate that tobacco use accounts for 50,000 to 60,000 annual deaths, making it the nation's primary preventable health threat. These fatalities are associated with more than 35 diseases (Ministerio de Sanidad español, 2024).

Tobacco Use and the Musculoskeletal System

Smoking exerts deleterious effects on the musculoskeletal health through mechanisms such as oxidative stress, microvascular impairment, and alterations in bone metabolism and collagen synthesis. These processes delay tissue repair and accelerate degeneration (Al-Bashaireh et al., 2018a; Felson & Zhang, 2015). Consequently, tobacco use contributes to reduced bone mineral density, increased risk of fractures, and compromised cartilage and tendon integrity (Al-Bashaireh et al., 2018b; Castillo, 2024). Moreover, smoking is associated with chronic widespread pain, heightened levels of disability, and an increased risk of osteoarthritis (Bonilla et al., 2024; Encinosa et al., 2025; Xiao et al., 2025).

Smokers frequently report greater chronic pain severity and lower bone mineral density than non-smokers, suggesting an under-recognized burden of smoking-related osteoporosis (Vergatti et al., 2024). Moreover, smoking has been linked to worse outcomes in autoimmune joint diseases, conversely, cessation has been shown to reduce disease activity and enhance treatment response (Roelsgaard et al., 2019). Collectively, these findings underscore the profound impact of nicotine dependence on musculoskeletal outcomes.

Smoking Prevalence and Patterns in Spain

Approximately 11 million people in Spain live with osteoarticular pathology (Fundación Española de Reumatología, 2019), and nearly 2.5 million are smokers. The most recent *Survey on Alcohol and Other Drugs in Spain*, published by the Delegación del Gobierno para el Plan Nacional sobre Drogas (2024), estimates that 9.8 million Spaniards aged 15-64 use tobacco, of whom 8.2 million smoking daily, making it the second most commonly used psychoactive substance after alcohol. Overall, 66.6% of respondents reported smoking at least once in their lifetime, with higher prevalence among men (70.9%) than women (62.4%), and among adults (70%) compared to younger cohorts aged 15-34 years (59.6%). Manufactured cigarettes remain the primary mode of consumption (73.1%), followed by roll-your-own tobacco (16.1%) and mixed use (10.8%). Daily smoking remains highly prevalent (26%), with an average initiation age of 16.6 years, a figure that has remained relatively stable for nearly three decades. Furthermore, among those reporting polydrug use, the combination of alcohol (93.5%) and tobacco (77.5%) was the most prevalent, followed by cannabis.

Notably, smoking cessation has been shown to increase the likelihood of recovery from alcohol and other substance use disorders (Parks et al., 2025). Despite a high perception of smoking-related risks (92.7%), cessation rates remain modest (Delegación del Gobierno para el Plan Nacional sobre Drogas, 2024).

Tobacco use imposes a substantial economic burden, accounting for roughly 15% of Spain's national healthcare expenditure (Ministerio de Sanidad español, 2024). These figures highlight the urgent need for targeted interventions, particularly among populations with chronic diseases.

Chronic Disease and Barriers to Cessation

The relationship between chronic illness and smoking cessation is complex. The HABITA study (Study of

Smoking Habits among patients and address their dropout) (Baquero et al., 2021) found that smoking prevalence among Spanish patients with respiratory, cardiovascular and mental health conditions was comparable to the general population, which suggests that the presence of a chronic diagnosis alone is an insufficient catalyst for quitting. Participants reported low satisfaction with the support provided by the public health services and cited insufficient follow-up as a key systemic barrier. Furthermore, one-third of the smokers expressed no intention to quit, a figure that rose to two-thirds among those with mental health disorders. Nicotine dependence, along with stress and anxiety during the cessation process, were identified as the primary barriers for this population.

International data mirror these challenges. Research in Shanghai found that while chronic patients attempt to quit smoking more frequently, yet success rates remain low (Wang et al., 2019). Similarly, data from the *South Korean National Smoking Cessation Program* showed that while comorbidities increase motivation, they are associated with lower abstinence rates at six months (Seo et al., 2021). Within Europe, the EUREST-PLUS ITC Survey (European Regulatory Science on Tobacco: Policy implementation to reduce lung disease - International Tobacco Control Europe Survey) revealed that smokers with chronic diseases do not necessarily receive more clinical assistance than their healthy counterparts (Hedman et al., 2019). In Spain, hospital-based cessation counseling remains underutilized despite the broad support for smoke-free policies (Martínez et al., 2020). A systematic review of cessation interventions among individuals with chronic diseases (Gupta et al., 2021) confirmed these challenges, emphasizing the need for integrated, multidisciplinary approaches.

This evidence reveals a persistent gap between public health goals and the lived experiences of smokers with disabling conditions.

Policy Frameworks and Gaps in Practice

In alignment with the WHO Framework Convention on Tobacco Control and the European Commission's Tobacco-Free Generation Initiative, member states are urged to expand cessation programs that integrate behavioral and pharmacological support (European Citizen Initiative, 2024; WHO, 2013). Spanish public health policies, however, often prioritize prevention and the protection of non-smokers, while therapeutic efforts frequently focus narrowly on nicotine dependence.

These approaches often overlook the emotional, social, and occupational dimensions that influence the quitting process, contrasting with the WHO holistic definition of health, which advocates for comprehensive care encompassing physical, psychological, and social well-being (WHO, 1946).

To address these gaps, the Osteoarthritis Foundation International (OAFI) conducted a study exploring the perspectives of patients with osteoarticular pathologies who were current smokers or recent former smokers (quit within < 5 years), along with the healthcare professionals involved in their care (Baquero et al., 2024).

This study, promoted by OAFI, seeks to mitigate the underrepresentation of musculoskeletal patients in tobacco research, highlighting the significant physiological and behavioral impact of smoking on this population. The primary objective of the study was to analyze coping and self-care capacities during the quitting process by assessing the effectiveness of various management strategies. Secondary objectives included the difficulties of abstaining from tobacco use, assessing awareness of smoking-related harms to oneself and others, evaluating satisfaction with the assistance provided by the public healthcare system, identifying key motivators and barriers to cessation, and determining which approaches are deemed most and least effective across four domains (physical, emotional, social, and occupational).

METHOD

Design

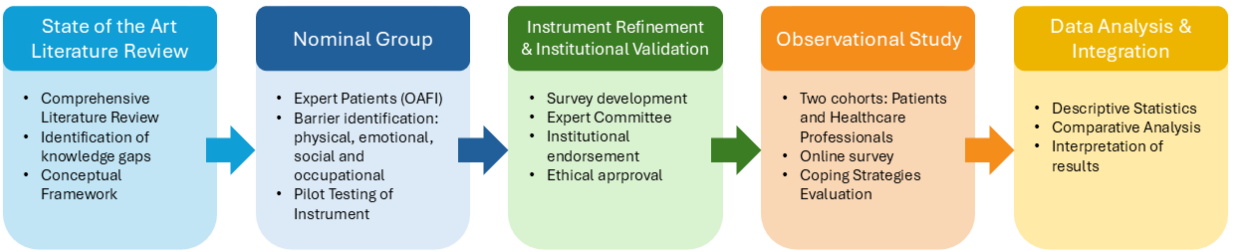
A mixed-methods sequential design was used, consisting of two complementary phases: an initial nominal group for qualitative exploration, followed by a cross-sectional observational survey-based study for quantitative analysis. The study followed an integrated sequential workflow as detailed in Figure 1.

This framework enabled the identification, refinement, and systematic evaluation of perceived barriers and coping strategies associated with smoking cessation among both individuals with osteoarticular pathologies and healthcare professionals.

Nominal Group – Qualitative Exploration

The process began with a comprehensive literature review and contextual analysis aimed at identifying the current state of the art regarding smoking cessation

Figure 1
Integrated sequential workflow.



in chronic osteoarticular pathologies. This review served as the foundation for developing the discussion prompts and the initial conceptual framework.

Subsequently, the nominal group phase was conducted during the last quarter of 2023 through synchronous online sessions (Baquero et al., 2024).

The methodology adhered to the protocol described by McMillan (McMillan et al., 2014), and the central research question was formulated according to the PICO framework (Patient -Population, Intervention, Comparison and Outcome) (Nishikawa-Pacher, 2022). The question posed was: "Based on your experience, what do you consider to be the main physical, emotional, social, and occupational barriers to smoking cessation?"

Participants were patients associated with OAFI, who were properly trained. They were adults diagnosed with chronic osteoarticular disorders who were either current or recent former smokers. Prior to enrollment, all participants received detailed information about the study's objectives and provided written informed consent. Participation was strictly voluntary, and privacy was ensured through the anonymization of all qualitative data.

During these structured online sessions, participants identified and prioritized their opinions, experiences and needs regarding the quitting process. Perceived barriers across four domains (physical, emotional, social, and occupational) were evaluated using a 10-point relevance scale (1 = minimum, 10 = maximum impact). Furthermore, these sessions served as a pilot test for the instrument used in the cross-sectional observational phase. This approach allowed for the refinement of semantic clarity, conceptual coherence and usability of the online platform based on direct participant feedback.

Instrument Development and Institutional Validation

Following the qualitative findings from the nominal group, a robust methodological protocol and was finalized for the cross-sectional, survey-based study.

During this period, a specialized expert committee was formed, composed of representatives from six prominent Spanish scientific and professional organizations: the General Council of Psychology of Spain (COP, Consejo General de Psicología de España); the Spanish Society for Healthcare Quality (SECA, *Sociedad Española de Calidad Asistencial*); the University Institute for the Study of Addictions of the Center for University Studies (IEA-CEU, Instituto Universitario para el Estudio de las Adicciones del Centro de Estudios Universitarios); the Spanish Society of Primary Care Physicians (SEMERGEN, Sociedad Española de Médicos de Atención Primaria); the Federation of Community and Primary Care Nursing (FAECAP, Federación de Asociaciones de Enfermería Familiar y Comunitaria), and the Comunitaria Ibero-American Scientific and Professional Society of Community Pharmacy (SOCF-IC, Sociedad Científico-Profesional de Farmacia Iberoamericana). This expert committee supervised the refinement of the study procedures and the design of the final survey instrument. Furthermore, formal institutional endorsements were obtained from these six organizations, and ethical approval was obtained from the Comité Regional de Ética en la Investigación de la Comunidad Autónoma de Madrid (Regional Research Ethics Committee of the Community of Madrid, Spain) (Approval No. 03/25, dated June 3, 2024), thereby providing the necessary regulatory framework.

Cross-Sectional Observational Study

The cross-sectional, survey-based study was conducted during the first quarter of 2025 via an online platform, targeting two distinct populations: patients (individuals diagnosed with osteoarticular diseases who were current or recent former smokers [< 5 years]), and healthcare professionals (physicians, nurses and pharmacists with clinical experience in smoking cessation).

The PICO research question (Nishikawa-Pacher,

2022) guiding this phase was: "Based on your experience, how effective do you consider each coping strategy in addressing the barriers to smoking cessation?".

Participants

The minimum representative sample size for the patient group was calculated using the Netquest Sampling Tool (Netquest, 2024), assuming a 95% confidence level, 50% heterogeneity, and a maximum sampling error of 10%. Based on these parameters, a minimum of 97 participants was required to ensure statistical representativeness. Patients were required to have a diagnosis of osteoarticular disease and to be either current or recent former smokers (< 5 years).

For the healthcare professionals' group, a comparable number of respondents was targeted to maintain balance between the study populations. Representation was ensured across three professional categories: physicians, nurses, and community pharmacists, with a minimum of ten participants per category to guarantee sufficient diversity of perspectives and experience. Healthcare professionals were required to have clinical experience in tobacco cessation within their respective fields.

Eligible participants were adults (≥ 18 years) and residing in Spain. Participation was strictly voluntary, and all individuals provided informed consent prior to enrollment.

Variables and Measurement

The survey evaluated participants' perspectives across five main areas related to the quitting process: perceived difficulty of achieving abstinence; satisfaction with the support provided by the Spanish National Health System (NHS); awareness of tobacco-related harms to oneself and others; primary barriers and motivations influencing smoking cessation; and perceived effectiveness of a set of coping strategies designed to address the physical, emotional, social, and occupational obstacles identified during the previous phases.

These coping strategies, based on Lazarus' and Folkman's framework (Lazarus & Folkman, 1984) and validated during the previous phases, were defined as follows:

a) Proactivity: individual initiative and self-motivation to overcome nicotine dependence.

b) Self-criticism: reflective evaluation of personal responsibility regarding smoking behavior.

c) Emotional expression: communication or release of feelings associated with the withdrawal process.

d) Wishful thinking: mental visualization of a smoke-free lifestyle and future health improvements.

e) Social outreach: seeking assistance from trusted individuals or specialized support groups.

f) Cognitive restructuring: reappraisal of the quitting process and adopting alternative mental frameworks.

g) Problem denial: minimizing, avoiding, or concealing smoking-related issues.

h) Social withdrawal: distancing oneself from environments or individuals that trigger the urge to smoke or reinforce the habit.

Each strategy was evaluated using a 10-point Likert scale (1 = not at all effective; 10 = extremely effective) specifically in relation to its capacity to mitigate the barriers previously identified within the physical, emotional, social, and occupational domains.

Data Analysis

Data were processed and analyzed by the OAFI Technical Research Team using Microsoft Excel (LTSC MSO version 2407). Quantitative variables were summarized using descriptive statistics, including measures of central tendency (mean [M], median [MD], and mode [MO]) and measures of dispersion (standard deviation [SD] and interquartile range [IQR]). While these parameters characterized the distribution and variability of responses, the median was prioritized as the primary measure of central tendency, as it provides a more robust estimate in the presence of potential skewness or extreme values.

Comparative analyses were performed between the two primary cohorts (patients and healthcare professionals) to identify convergences and discrepancies in their perceptions and evaluations of smoking cessation strategies. Variances between groups were first compared using Fisher's F-test. Subsequently, differences were assessed using Student's t-test for equal variances or Welch's t-test for unequal variances.

Although Likert-type scales are inherently ordinal, they were treated as continuous variables in this study under the assumption of equal intervals between categories. This approach allows for the application of parametric tests without introducing significant bias, particularly given that the distributions approximate normality in accordance with the Central Limit Theorem. Furthermore, parametric tests were deemed robust due to the substantial sample size, the absence of extreme skewness, and the lack of significant outliers (Jeunen, 2025).

Effectiveness thresholds for coping strategies were established when both samples showed alignment:

- Highly recommended: MD ≥ 8.
- Not recommended: MD ≤ 3.
- Inconclusive effectiveness: MD between 4 and 7.

To assess data consistency, the coefficient of variation based on the median (CVMD) was calculated. In cases where CVMD > .50, indicating high variability and reduced representativeness of the MD, the mode was used as a complementary indicator to provide a more reliable interpretation of the findings.

Quality Assurance

All methodological procedures, including study design, data management, and analysis, were reviewed and validated by the multidisciplinary expert committee. A comprehensive final report was produced and endorsed by the participating scientific societies to ensure reproducibility, scientific integrity, and compliance with international research standards.

Ethical Considerations

All procedures were conducted in accordance with the principles of the Declaration of Helsinki. Participants provided informed consent prior to participation. Privacy and confidentiality were ensured through anonymization of all responses, and personal data were processed in compliance with national and European data protection regulations. Ethical approval was obtained from the Comité Regional de Ética en la Investigación de la Comunidad Autónoma de Madrid, Spain, (Research Ethics Committee approval No. 2025/558, dated 17 December 2025).

RESULTS

The results of this study are structured to directly address the research objectives following the two-phase methodological framework described above. First, the findings from the Nominal Group phase identify and prioritize the primary barriers to smoking cessation across the four analytical domains: physical, emotional, social, and occupational. Second, the results of the cross-sectional, survey-based study provide a comparative analysis of perceptions between patients and healthcare professionals.

Nominal Group Phase

The nominal group phase included 11 participants (7 women and 4 men) with a mean age of 52.80 years (SD = 12.16). All participants were patients diagnosed with osteoarticular disorders. Of these, seven were current smokers and four were recent former smokers (abstinence period < 5 years). This phase identified the primary barriers to smoking cessation across four predefined domains (Table 1).

The highest-rated barrier was nicotine addiction (physical domain), followed by the perception of smoking as a source of pleasure, satisfaction, and well-being (emotional domain). Barriers related to the social and occupational domains, such as tobacco availability and social pressure, were also identified as significant, though they yielded lower mean scores.

Cross-sectional Phase: Participant Recruitment and Demographics

A cross-sectional, survey-based study was conducted, initially enrolling 209 individuals. Following the data cleaning and validation process, the final sample comprised 170 individuals residing across the 17 Spanish autonomous communities. Within this study population, 101 (59.4%) were active smokers and 69 (40.6%) were former smokers.

The analysis specifically targeted the subpopulation of participants reporting a diagnosed osteoarticular pathology (n = 113, 66.5% of the validated sample). This sample size met the statistical power requirements, exceeding the calculated minimum threshold of 97 participants. The patient cohort (n = 113) presented a mean age of 46.46 years (SD = 13.87), with a gender distribution of 60.2% women (n = 68) and 39.8% men (n = 45). Regarding smoking status, 62 (54.9%) were current smokers and 51 (45.1%) were former smokers.

The healthcare professional cohort comprised 107 participants, exceeding the pre-established recruitment target. This group was primarily composed of nurses (n = 73, 68.2%), followed by community pharmacists (n = 18, 16.8 %) and physicians (n = 16, 15%).

Comparative Perceptions of Smoking Cessation

Comparative analyses revealed areas of both consensus and divergence between patients and healthcare professionals regarding the cessation process (Table 2). Both groups perceived quitting as highly challenging, although patients reported a higher difficulty score (MD = 10) than professionals (MD = 8), although this difference did not reach statistical significance (p = .077).

Substantial divergences were observed regarding the perceived satisfaction with the support provided by the Spanish NHS. The data suggest that

patients maintain a critical view of the assistance received, reporting low median scores across all domains: general guidance (MD = 3), individualized interventions (MD = 3), and follow-up (MD = 2). In contrast, the evaluations from healthcare professionals tended towards more favorable appraisals of these same services (MD = 7, 7 and 6 respectively; $p < .001$ for all). Notably, patient responses showed considerable dispersion (CVMD > .50) whereas among professionals responses were more consistent.

Table 1

Principal Barriers to Smoking Cessation across Physical, Emotional, Social, and Occupational Domains in Patients with Osteoarticular Pathology (Nominal Group phase).

Physical Domain	*M*	*SD*
Nicotine addiction	8.7	1.41
Lack of self-control	7.4	1.74
Physical withdrawal symptoms	7.1	1.45
Difficulty quitting the first cigarette of the day	6.4	2.88
Smoking provides physical relaxation	6.2	3.15
Concern about weight gain	5.2	2.91
Need to occupy the hands	4.3	2.87
Need to occupy the mouth	3.9	2.32
Difficulty sleeping (insomnia)	3.7	3.04
Emotional Domain	*M*	*SD*
Smoking provides pleasure, satisfaction, relief, relaxation, and well-being	7.2	2.91
Smoking is used as a coping mechanism during sadness, boredom or other emotional states	6.9	2.67
Perception that there is never a right time to quit	6.9	3.04
Smoking provides mental relaxation	6.4	1.94
Difficulty overcoming psychological withdrawal; risk of relapse may persist for years)	6.2	2.44
Stressful situations increase the urge to smoke	6.1	2.15
Quitting leads to sadness and anxiety	5.9	2.15
Emotional avoidance or self-denial related to quitting	3.3	2.24
Smoking triggers pleasant memories	2.9	1.96
Social Environment	*M*	*SD*
Easy availability and access to tobacco	6.4	2.96
Limited access to effective cessation support	6.2	2.39
Certain social events (parties, leisure activities) make quitting difficult	6.2	2.77
Loneliness leads to smoking due to reduced motivation	5.9	3.26
Smoking is a long-standing habit, culturally normalized	5.8	3.53
Interpersonal conflicts or reactions may outweigh perceived harm from smoking	4.1	2.57
Receiving contradictory information regarding smoking or cessation	3.9	2.30
Exposure to secondhand smoking despite quitting	3.4	1.74
Smoking by partners or peers represents a temptation	3.1	3.09
Work / Occupational Environment	*M*	*SD*
Social pressure from colleagues, smoking is a group activity	6.1	2.85
Smoking is encouraged during breaks and commutes	5.4	3.31
Smoking facilitates social interactions during meetings with supervisors, clients, or colleagues	5.3	3.25
Remote work reduces exposure to smoking restrictions	4.3	2.63
Fear of losing allotted break time	4.1	2.42

Note: participants rated each barrier on a 10-point Likert scale (1 = minimal impact; 10 = maximal impact); M = mean; SD = standard deviation.

Table 2

Comparative Perceptions of Smoking Cessation Difficulty, National Health System Support, and Knowledge of Tobacco-Related Harms between Patients and Healthcare Professionals.

		Patients (n = 113)	*Health professionals (n =107)*	*p**
Difficulty to quit smoking	MD	10	8	.077 (ns)
	IQR	2	1	
	CVMD	.20	.13	
	MO	10	8	
Perceived general support from the Spanish NHS	MD	3	7	< .001
	IQR	4	3	
	CVMD	1.33	.43	
	MO	1	7	
Perceived specific/individualized support from the Spanish NHS	MD	3	7	< .001
	IQR	4	2	
	CVMD	1.33	.29	
	MO	1	7	
Perceived follow-up support from the Spanish NHS	MD	2	6	< .001
	IQR	3	3	
	CVMD	1.50	.50	
	MO	1	7	
Perceived knowledge of harm to oneself	MD	10	7	< .001
	IQR	1	3	
	CVMD	.10	.43	
	MO	10	7	
Perceived knowledge of harm to third parties	MD	9	4	< .001
	IQR	2	3	
	CVMD	.22	.75	
	MO	10	2	

Note: CVMD = coefficient of variation based on the median; *IQR* = interquartile range; *MD* = median; *MO* = mode; *NHS* = National Health System
**ns* = not significant ($p \geq .05$).

A pronounced discrepancy was also observed regarding the perceived level of awareness of concerning tobacco-related harms. While patients reported very high self-perceived knowledge of the risks to themselves (MD = 10) and others (MD = 9), the healthcare professional cohort estimated smokers' actual awareness to be substantially lower, particularly regarding to the impact of the smoke on their surroundings (MD = 4, $p < .001$). Although professional responses showed variability, their modal response was 2, contrasting with the MO of 10 observed in the patient group.

Motivators for Smoking Cessation

Analysis of the drive to quit smoking highlighted both alignment and divergence between groups

(Table 3). Concern for personal health was the most prominent motivator for both groups, although it was rated higher by patients (MD = 10) than by professionals (MD = 8, $p < .001$). Specific life circumstances, such as pregnancy or cohabitation with vulnerable individuals, were rated as highly important by both groups (MD = 9, $p = .876$).

Other motivators, including concern for harm to others, nicotine dependence, and economic cost, were perceived as significantly more impactful by patients than by healthcare professionals (harm to third parties: MD = 8 vs. 6, $p < .001$; dependence: MD = 8 vs. 6, $p < .001$; cost: MD = 7 vs. 6, $p = .026$).

Motivations related to social pressure and regulatory restrictions did not differ significantly between groups.

Perceived Effectiveness of Coping Strategies

The evaluation of the eight coping strategies against the identified barriers revealed consistent patterns (Table 4). Active and cognitive-behavioral approaches were rated as the most effective by both cohorts.

Proactivity emerged as the highest-rated strategy across all domains (MD = 9 for both groups). Similarly, self-criticism and cognitive restructuring were identified as highly effective, yielding MD scores of 8 and 9 across all categories. In contrast, the passive strategy of problem denial and avoidance was uniformly deemed the least effective (MD = 1-2).

Emotional expression and social support were rated higher by healthcare professionals than by patients ($p < .001$), suggesting divergent perceptions regarding their utility in the cessation process. Wishful thinking and social withdrawal received intermediate ratings, with minor variations between groups depending on the barrier domain.

Given that these findings reflect subjective perceptions, future studies incorporating objective health literacy assessment are warranted to validate these results.

Table 3

Comparative Assessment of Motivations for Smoking Cessation.

		Patients (n = 113)	*Health professionals (n =107)*	*p**
Perceived harm to self	MD	10	8	.077 (ns)
	IQR	2	2	
	CVMD	.20	.25	
	MO	10	8	
Perceived harm to others	MD	8	6	< .001
	IQR	2	3	
	CVMD	.25	.50	
	MO	8	8	
Dependence-related concerns	MD	8	6	< .001
	IQR	2	3	
	CVMD	.25	.50	
	MO	8	7	
Social pressure	MD	7	6	.237 (ns)
	IQR	3.75	3	
	CVMD	.54	.50	
	MO	7	6	
Specific life circumstances	MD	9	9	.876 (ns)
	IQR	2	2	
	CVMD	.22	.22	
	MO	10	9	
Ecomomic cost	MD	7	6	.026
	IQR	3	2	
	CVMD	.43	.33	
	MO	7	6	
Regulatory and environmental restrictions	MD	6	6	.718 (ns)
	IQR	2	2	
	CVMD	.33	.33	
	MO	6	5	

Note: CVMD = coefficient of variation based on the median; *IQR* = interquartile range; *MD* = median; *MO* = mode **ns* = not significant ($p \geq .05$).

DISCUSSION AND CONCLUSIONS

The results of this study provide a comprehensive view of barriers and coping strategies for smoking cessation in patients with osteoarticular conditions, comparing their views to those of healthcare professionals. While these findings offer valuable insights, it is important to note that the following considerations are exploratory and should not be interpreted as clinical recommendations or practice guidelines, particularly in musculoskeletal populations where specific safety data are limited.

The sample was representative of active and former smokers with musculoskeletal disorders in Spain, and no significant differences were found between subgroups of current and former smokers, or between individuals with and without osteoarticular pathology.

Across all dimensions, both patients and professionals rated the difficulty of quitting smoking as high, indicating strong agreement on the complexity of tobacco cessation. This perception aligns with existing evidence reporting low long-term cessation success and frequent relapse (Rigotti et al., 2022; Spanakis et al., 2022), emphasizing the need for structured, sustained follow-up and individualized guidance.

The discrepancy in the perception of the support provided by the Spanish NHS between patients and professionals aligns with evidence indicating a systematic disconnect between patient-reported

Table 4

Comparative Evaluation of Coping Strategies Applied to Key Barriers to Smoking Cessation.

		Physical dependence (nicotine addiction)			*Emotional reinforcement (satisfaction, well-being)*			*Environmental availability and accessibility of tobacco*			*Occupational and social peer pressure*		
		pts	*hp*	*p**	*pts*	*hp*	*p**	*pts*	*hp*	*p**	*pts*	*hp*	*p**
Proactivity / self-initiative	MD	9	9	.031	9	9	.075 (ns)	9	9	.733 (ns)	9	9	.005
	IQR	2	2		2	2		2	2		2	2	
	CVMD	.22	.22		.22	.22		.22	.22		.22	.22	
	MO	10	10		10	10		10	10		10	10	
Self-critical reflection	MD	8	8	.093 (ns)	9	8	.980 (ns)	9	8	.980 (ns)	8	8	.004
	IQR	3	2		3	2		3.75	2		3	2	
	CVMD	.38	.25		.33	.25		.42	.25		.38	.25	
	MO	8	7		10	8		10	9		10	8	
Emotional expression	MD	6	8	<.001	7	9	.000	4	8	<.001	7	9	<.001
	IQR	4	2		3	2		5	4		3	2	
	CVMD	.67	.25		.43	.22		1.25	.50		.43	.22	
	MO	6	8		7	9		3	8		7	9	
Positive future-oriented thinking (wishful thinking)	MD	8	8	.001	7	8	.001	7	8	.037	7	8	<.001
	IQR	3	2		2	2		2.75	3		3	3	
	CVMD	.38	.25		.29	.25		.39	.38		.43	.38	
	MO	8	9		7	9		7	10		7	10	
Social support-seeking	MD	7	9	<.001	7	9	.000	6	8	<.001	7	9	<.001
	IQR	3	2		2	2		2	2		3	2	
	CVMD	.43	.22		.29	.22		.33	.25		.43	.22	
		8	10		7	9		6	9		7	10	
Cognitive restructuring	MD	8	8	.020	8	8	.034	8	8	.613 (ns)	8	8	.004
	IQR	3	2		2.75	2		3	3		2	2	
	CVMD	.38	.25		.34	.25		.38	.38		.25	.25	
	MO	9	9		9	9		9	8		8	9	
Problem denial	MD	2	1	.252 (ns)	2	1	.017	2	1	.587 (ns)	2	2	.719 (ns)
	IQR	2	2		3	2		3	3		3	3	
	CVMD	1.00	2.00		1.50	2		1.50	3		1.50	1.50	
	MO	1	1		1	1		1	1		1	1	
Social withdrawal	MD	7	8	.001	7	8	.070 (ns)	7	8	<.001	8	9	.016
	IQR	2	2		3	3		3	3		3	3	
	CVMD	.29	.25		.43	.38		.43	.38		.38	.33	
		8	8		7	10		7	10		9	8	

Note: CVMD = coefficient of variation based on the median; *HP* = health professionals; *IQR* = interquartile range; *MD* = median; *MO* = mode; *Pts* = patients **ns* = not significant ($p \geq .05$).

experiences and the provider's perception of care quality in chronic disease management (Anhang et al., 2014).

Professionals may be more aware of available resources within the system, while patients often experience the practical shortcomings in continuity, personalization and accessibility of care. These results reinforce the importance of incorporating patient-reported experience measures (PREMs) in the design and evaluation of cessation services (Bull et al., 2019).

Another relevant gap was observed in the perception of tobacco-related risk awareness. While patients expressed a strong conviction in their understanding of the harms of smoking to themselves and others, healthcare professionals perceived this awareness as considerably lower. This finding could be interpreted as an overestimation of knowledge by patients or a degree of skepticism among professionals. Such a gap may stem from repeated exposure to patient relapse, burnout, or a tendency to underestimate patients' readiness to change (Miller et al., 2006; van Boekel et al., 2015). However, as no objective health literacy tools were used, this should be viewed as a perceptual inconsistency rather than a confirmed professional bias. The high variability in professional responses further suggests that these perceptions are influenced by individual clinical experience and communication style.

In terms of barriers, nicotine dependence emerged as the most prominent physical barrier, while peer pressure in occupational settings was particularly influential. Emotional attachment to smoking, including its role in pleasure and well-being, alongside

the social accessibility of tobacco, were also identified as significant obstacles. This multidimensional clustering highlights the limitations of approaches focused predominantly on the physical aspects of addiction and supports models that emphasize the role of affect regulation and social rituals in smoking cessation (Piasecki et al., 2002).

Regarding motivations, both groups consistently identified self-perceived health risks as the leading driver for cessation, alongside specific life circumstances such as pregnancy, breastfeeding, or cohabitation with children or the elderly. It is worth noting that patients placed significantly greater importance on harm to others and the burden of dependence than professionals did. These findings suggest that empathy and personal frustration with addiction are powerful, yet potentially under-recognized, motivators in clinical practice. Economic and regulatory factors were rated lower, suggesting that while they may cause discomfort, they are less potent drivers for behavioral change than health and empathy centered motives.

The analysis of coping strategies revealed a clear pattern across all domains, with active cognitive-behavioral strategies being rated as the most effective. In particular, proactivity, self-criticism, and cognitive restructuring (i.e., reframing thoughts to explore alternatives) emerged as pivotal, underscoring the importance of an empowered, self-reflective, and adaptive approach. Cognitive restructuring aligns with the principles of cognitive-behavioral therapy (CBT), which effectively targets the maladaptive thoughts that maintain smoking behavior (Perkins et al., 2013; Ravikoti et al., 2025).

Wishful thinking was also valued, particularly when dealing with physical dependence and emotional gratification. Social withdrawal appeared to be a useful strategy for resisting environmental triggers, whereas problem denial was consistently rated as ineffective, confirming that avoidance and minimization are counterproductive.

In Spain, NHS smoking cessation programs remain largely limited to motivational interviewing and pharmacological interventions, with an underutilization of structured psychological support such as CBT. A Cochrane review encompassing over 330 randomized controlled trials showed that combined behavioral and pharmaceutical interventions increase smoking cessation success rates (Lindson et al., 2023). Nevertheless, nicotine remains a highly addictive, and not risk-free substance (Ramon-Torrell, 2025).

Within this framework, the available evidence suggests that harm reduction strategies, including regulated nicotine delivery systems, such as e-cigarettes or non-combustible products, may contribute to reductions in reduce morbidity and mortality compared with traditional combustible cigarettes although findings remain heterogeneous across populations and study designs (Dewhirst, 2021; Fowles et al., 2000; O'Leary & Polosa, 2020). Nevertheless, nicotine-based interventions do not eliminate the risks associated with addiction, and their long-term impact remains under ongoing investigation.

Spain's regulatory and clinical approach continues to prioritaze complete abstinence, in contrast to countries such as Sweden, where the regulated use of oral snus, a tobacco product placed under the lip to deliver nicotine, has been associated with lower smoking prevalence and reduced smoking-related disease burden (European Commission, 2024; Polosa et al., 2013). However, causal interpretations should be made cautiously due to confounding policy, cultural, and behavioral factors. The WHO's Framework Convention on Tobacco Control (FCTC) has shown limited effectiveness in reducing smoking prevalence in some high-income setting, with evidence suggesting a slowdown in recent declines (Fagerström et al., 2025). Further research is needed to evaluate the long-term safety, efficacy and ethical implications of harm reduction strategies, especially in patients with chronic conditions.

Overall, the findings of this study underscore that smoking cessation is a multifactorial challenge requiring personalized, multidisciplinary approaches. Individual motivation and self-initiative are essential, but external support, consistent follow-up, and empathetic communication play equally critical roles. The observed discrepancies between patient and professional perceptions underline the importance of co-designing cessation interventions that integrate patients' lived experience with healthcare providers' clinical expertise.

In conclusion, smoking cessation is a complex and multifactorial challenge that requires an integrated, tailored approach that combines pharmacological, psychological, and behavioral interventions, and may also include consideration of less harmful alternative strategies in selected contexts. The identified perceptual gaps between patients and professionals highlight the need for co-designed interventions that are both relevant and supportive from the patient perspective. Clinically, cessation programs should integrate training in coping strategies, particularly proactive and cognitive-behavioral approaches, and could consider harm-reducing options for specific cases moving beyond an exclusive focus on

withdrawal. From a public health perspective, fostering open dialogue around harm reduction may offer pragmatic solutions, although further research is needed to evaluate its long-term safety, effectiveness, and acceptability within the Spanish healthcare context.

Empowering patients through self-efficacy, providing continuous and empathetic support, and addressing the full spectrum of physical, emotional, and social barriers, are essential steps toward improving cessation outcomes. From a preventive perspective, fostering responsibility and self-care from early life stages, through education on healthy habits, physical activity, and emotional well-being, may contribute to healthier long-term behavioral trajectories.

Limitations of the Study

This study has several limitations that should be acknowledged. First, its cross-sectional design precludes causal inferences and limits the ability to assess changes over time or the long-term impact of coping strategies. Second, the reliance on self-reported data may introduce response and social desirability biases, particularly regarding health behaviors and awareness. Furthermore, recall bias may have influenced participants' responses concerning past smoking patterns and the perceived effectiveness of previous cessation attempts. Third, although the sample size met predefined representativeness criteria, it may not fully capture the heterogeneity of smokers with osteoarticular pathologies in Spain. Fourth, the use of online surveys may have excluded participants with limited digital literacy, potentially introducing selection bias. Fifth, although the study identified the perceived effectiveness of coping strategies, it did not directly measure behavioral outcomes, such as quit or relapse rates, which should be addressed in future longitudinal or interventional studies.

Despite these limitations, this study provides a necessary foundation for understanding the specific cessation needs and perceptions of this clinical population.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest. They also declare no use of artificial intelligence tools. All content was verified and edited by the authors, who assume full responsibility for the final version of the manuscript.

AUTHORS CONTRIBUTION

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