Exploring individual and contextual determinants of cancer prevention behaviour change in the European Union: a qualitative study to inform implementation of the European Code Against Cancer

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Summary

Background Cancer prevention is central to Europe's Beating Cancer Plan (ECBP), with the European Code Against Cancer (ECAC) providing evidence-based recommendations to reduce cancer risk. The fourth edition (ECAC4) focuses on individual behaviour change, but effective implementation requires insight into individual and structural factors influencing adoption. We explored barriers and facilitators to adopting ECAC4 recommendations across nine EU Member States to inform the forthcoming edition.

Methods An exploratory multi-country qualitative study with 141 adults aged 18–65 years, with no prior cancer diagnosis, from Bulgaria, Croatia, France, Germany, Ireland, Poland, Portugal, Romania, and Spain was conducted. Semi-structured interviews examined perceived capability, opportunity, and motivation related to the 12 ECAC4 recommendations. Transcripts were translated, coded, and thematically analysed using ATLAS.ti, with high intercoder agreement ($\kappa = 0.88$). Themes were mapped onto the COM-B and Theoretical Domains Framework (TDF) to identify behavioural determinants.

Findings Barriers and facilitators were identified across all COM-B domains. Capability barriers included low health literacy, misinformation, and limited self-management skills; facilitators included early health education and reliable information. Opportunity barriers encompassed cultural norms, economic constraints, environmental limitations, and healthcare access issues; facilitators included supportive social networks, universal healthcare, and enabling policies. Motivation barriers involved entrenched habits and fear, while facilitators included personal health goals, family responsibilities, and determination.

Interpretation Adoption of ECAC4 recommendations is shaped by interlinked individual, social, and structural determinants. Multi-level implementation strategies, improving health literacy, ensuring equitable access, strengthening supportive environments, and tailoring motivational approaches, are essential. These findings directly inform ECAC5 and support the objectives of ECBP.

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Keywords: Cancer prevention; Behaviour change; European Code Against Cancer; COM-B model; Individual and contextual determinants; Implementation science

Research in context

Evidence before this study

The European Code Against Cancer (ECAC) provides evidence-based recommendations for reducing cancer risk and is a central tool within Europe's Beating Cancer Plan. We searched PubMed for articles published between the database inception and September 1, 2025. We used the English search terms ("European Code Against Cancer" OR "ECAC*" OR "cancer prevention recommendations" OR "cancer prevention") AND ("barrier*" OR "facilitator*" OR "challenge*" OR "enabler*") AND ("implementation" OR "adoption" OR "uptake") AND ("European Union" OR "Europe"). Prior studies, such as Ritchie et al. (2021), have found low awareness of the ECAC but high willingness to change behaviour once exposed to its messages. However, most existing evidence focuses on single risk factors or screening behaviours, with little qualitative research examining how citizens across Europe perceive the full set of ECAC recommendations and what facilitates or hinders their adoption.

Added value of this study

This study is the first multi-country qualitative exploration of all 12 ECAC4 recommendations, conducted with 141 adults across nine EU Member States. Guided by the COM-B model and Theoretical Domains Framework, it systematically mapped barriers and facilitators of behaviour change at individual, social, and structural levels. Findings reveal that while motivation to adopt preventive behaviours is often high, adoption is constrained by capability and opportunity factors, including low health literacy, misinformation, economic limitations, cultural norms, and gaps in healthcare access. Conversely, facilitators such as supportive social networks, universal healthcare coverage, and early health education emerged as enablers. These insights provide context-sensitive evidence directly feeding into the development of ECAC5, ensuring that recommendations are both actionable and equitable.

Implications of all the available evidence

Cancer prevention strategies in Europe should move beyond individual-level education and address broader contextual barriers. Multi-level interventions—combining public education, equitable access to preventive services, and supportive policy environments—are essential to achieve sustained behaviour change. By applying behavioural science to understand public perceptions of ECAC4, this study delivers actionable evidence to guide ECAC5 and to strengthen the implementation of Europe's Beating Cancer Plan.

Introduction

Cancer remains a leading cause of morbidity and mortality in the European Union (EU), with an estimated 2.9 million new cases and 1.3 million deaths in 2023 across Member States (MS).[1] This is projected to rise by 25.3%, reaching 3.8 million new cases by 2050.[2] Despite advances in early detection and treatment, the growing cancer burden continues to strain healthcare systems, economies, and societies.

A substantial proportion of this burden could be prevented, as it is estimated that around 40% of cases could be avoided, and mortality reduced, by eliminating or reducing exposure to known risk factors.[3] Cancer prevention is therefore a pivotal strategy for reducing the global cancer burden, offering cost-effective and long-term public health benefits.[4,5]

In 2021, the European Commission (EC) launched the Europe's Beating Cancer Plan (EBCP),[6] aiming to address the entire cancer control continuum. A key objective of the EBCP is to improve health literacy regarding cancer risks and determinants. Adults with low health literacy are more likely to avoid visiting doctors, hold fatalistic views, misidentify the purpose of cancer screening tests, and avoid information about diseases they do not currently have.[7] Higher fatalistic belief levels are also directly associated with lower engagement in cancer prevention behaviours.[8]

To support cancer prevention across the EU, the EC commissioned the International Agency for Research on Cancer (IARC) to update the European Code Against Cancer (ECAC) to its fifth edition. The ECAC is a set of evidence-based recommendations aimed at helping people reduce their cancer risk. The fifth edition aims to reinforce the importance of a dual approach to cancer prevention: in addition to individual-level recommendations, it introduces guidance for policymakers aimed at shaping environments that enable and sustain healthier behaviours.[9]

Effective implementation of the ECAC requires a nuanced understanding of the challenges and enablers that the EU population encounter when attempting to adopt cancer prevention recommendations.[10] Without such insight, policy interventions risk being ineffective or inequitable, particularly when individuals are expected to make behavioural changes that require supportive structural and environmental conditions.[11] Evidence on public perceptions, contextual constraints, and facilitators of behaviour change is essential to guide socially just, effective implementation strategies.

Ritchie et al.[12] conducted the first evaluation of the ECAC and found that, although awareness was low, over 60% of people were willing to change their behaviour to prevent cancer after reading its recommendations. However, such willingness may not translate into actual behaviour change without optimal implementation approaches that meet the needs of target populations. Further research is therefore needed to understand how individuals perceive and experience the recommendations. The aim of this study was to explore the barriers and facilitators encountered by the EU population when attempting to adopt the cancer prevention recommendations outlined in the 4th edition of the ECAC (ECAC4),[13] to inform the development of the upcoming 5th edition and to guide future evidence-based interventions in the region aimed at enhancing cancer prevention.

Methods

Study design

An exploratory multi-country qualitative study with a narrative approach[14] grounded in implementation science was conducted to examine how individuals perceive the ECAC4 recommendations (see Additional File 1 in Supplemental Data), and make sense of their past and future experiences, including perceived capabilities and opportunities, and motivation to adopt the cancer prevention actions recommended in the ECAC.

Theoretical frameworks

Understanding behaviours and their underlying influences is crucial for maximising the impact of cancer prevention recommendations. Behavioural frameworks within implementation science help identify structural, contextual, and psychological factors shaping behaviour, making them valuable for addressing implementation challenges and designing effective, evidence-based interventions.[15] To guide study design, data collection and analysis, two complementary theoretical frameworks were used: the COM-B model and the Theoretical Domains Framework (TDF).

The COM-B model identifies three core conditions for any behaviour: capability, opportunity, and motivation.[16] Individuals must feel psychologically and physically able to perform the behaviour, have the opportunity to do so, and be more motivated to engage in the behaviour than by competing actions.[17] This model informed three key steps of the study: (1) drafting the main research questions, (2) guiding the content and structure of the interviews, and (3) conducting a deductive qualitative analysis, in which the COM-B factors were used to organise themes and codes derived from the data.

Context assessment frameworks can also provide insight into challenges in implementing the ECAC. The TDF, which builds on the COM-B, comprises 14 domains and is widely used to identify implementation barriers and inform behaviour change interventions in healthcare and public health.[18] In this study, the TDF was applied to triangulate the findings from the COM-B analysis.

Participants

Participants were adults aged 18–65 years with no prior cancer diagnosis, residing in a participating EU MS: Bulgaria, Croatia, France, Germany, Ireland, Poland, Portugal, Romania, and Spain. These countries were selected to ensure representation across all EU regions and to include MS with varying population sizes. A maximum variation sampling strategy (i.e., quota sampling[19]) was used to achieve diversity in gender, age, and educational attainment. Details of the sampling and recruitment processes are described elsewhere.[20]

Data collection

In-depth, semi-structured interviews with open-ended questions were conducted using a topic guide (see Additional File 2), with questions designed and organised according to the COM-B model to ensure coverage of all relevant behavioural determinants.[21,22] Interviews were conducted face-to-face, when possible, at participating organisations' facilities or other accessible public locations where participants felt comfortable and safe. Alternatively, interviews were conducted via online communication platforms (i.e., Zoom or Microsoft Teams), in each country's native language.

Twenty mixed-gender interviewers conducted the study across nine countries (VB, SMS, SS, HV; see also *Acknowledgements*). They were early-career researchers from health, psychology and sociology backgrounds, with prior qualitative research experience at MSc, PhD or postdoctoral level. All interviewers were supervised by a local principal investigator (AF, AD, MG, PK, PP, IT, HZ) and received training on the study protocol, topic guide, and ethics.

Various strategies were used to enhance the study's credibility, dependability, transferability, and confirmability,[23] as outlined elsewhere.[20] To ensure transparency and methodological rigour, this research complies with the Consolidated Criteria for Reporting Qualitative Research (COREQ)[24] (see Additional File 3).

Data preparation

All interviews were audio-recorded using a digitally encrypted recording device. Each participant was assigned a unique ID to ensure anonymisation of transcripts. Audio files were manually transcribed by a professional external company and subsequently translated into English using DeepL Pro, an artificial intelligence (AI)-powered software.[25] All translations were backchecked by local researchers in each country except for Portugal and Poland, where limited capacity and resources made this unfeasible. English transcripts were then imported into ATLAS.ti (version 25),[26] to facilitate data organisation, coding, and analysis.

Data analysis

A deductive thematic content analysis was conducted, guided by the COM-B model, using its predefined factors (capability, opportunity and motivation) to identify and organise key themes in the data.[27] Given the large volume of interviews (N = 141), English transcripts were initially screened and coded using ATLAS.ti's AI-assisted coding tool to support data management and preliminary analysis. To ensure trustworthiness, two coders (AF, BB) independently reviewed the AI-generated codes for accuracy, reliability, and interpretive consistency.[28] The coders then independently organised the retained codes into the COM-B–based coding framework, and intercoder agreement was calculated using Cohen's Kappa ($\kappa = 0.88$), indicating high agreement between coders. Any discrepancies were resolved through discussion with a third senior researcher (CE). All codes were cross-checked against raw transcript data to mitigate potential biases, such as over-reliance on lexical matches or under-representation of nuanced, context-specific meanings.

Codes were organised within a COM-B-based coding framework to guide data abstraction and synthesis. The coders (AF, BB) held iterative meetings to select the most relevant codes and group them under the three COM-B domains. Content analysis followed a consensus-based approach, with the research team collaboratively reviewing interpretations and resolving remaining discrepancies. Themes and subthemes were developed and mapped onto the COM-B model.[16] Illustrative quotes were selected to exemplify key themes and ensure transparency (see Additional File 4).

Finally, to enhance theoretical robustness, the themes identified through the deductive COM-B analysis were triangulated and mapped onto the TDF,[18] providing additional granularity and confirmation of the findings. For further rigour, both coders (AF, BB) participated in the triangulation and mapping, which was subsequently validated by the co-principal investigator (CE) in the final stages of analysis to ensure validity and consistency with the theoretical frameworks.

Data analysis involved iterative coding and refinement of themes to ensure theoretical sufficiency at the EU level; that is, when the data were considered sufficiently rich and diverse to support the analytic claims regarding behavioural determinants within the COM-B model and the TDF.[29]

Ehics approval

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the International Agency for Research on Cancer (IARC/WHO) Ethics Committee (IEC project 22–24; May 22, 2023). Local ethical approval for the study methods was obtained from the Ethics Commission Medical Chamber Bremen (No. 855; March 1, 2023) in Germany, from the Dublin City University Research Ethics Committee (DCUREC/2023/006; February 11, 2023) in Ireland, and from the Ethics Committee of the Center for Innovation in Medicine (EC-INOMED) (No. EC-INOMED: 2; October 1, 2023) in Romania. All participants provided verbal informed consent prior to enrolment in the study and were informed of their right to withdraw at any point, retract data already provided, or to decline to answer specific questions. The consent was audio-recorded as part of the interview.

Role of the funding source

The funders did not influence the study design, data collection, data analysis, interpretation, or writing of the manuscript.

Results

The sample included 141 participants, with a slight majority of women (53.9%) and a balanced distribution across age groups (18–65 years old). Most had moderate or high education (76.6%) and lived in urban areas (71.6%). The majority reported no financial difficulties (71.6%), had a close family member or friend with cancer (79.4%), and believed cancer is preventable (93.6%). Only 24.1% had previously heard of the ECAC (Table 1).

Summary of the analysis and mapping onto the Theoretical Domains Framework (TDF)

A total of 2485 meaning units were coded, of which 524 were assigned the meta-code 'barriers' and 426 'facilitators' for adopting cancer prevention recommendations. Meaning units were further categorised under COM-B sub-domains: *psychological capability* (n = 221 for barriers; n = 150 for facilitators), *physical capability* (n = 66; n = 15), social opportunity (n = 120; n = 82), *physical opportunity* (n = 274; n = 156), *reflective motivation* (n = 28; n = 127), and *automatic motivation* (n = 28; n = 99) (Fig. 1). Details for each of the 12 ECAC4 recommendations, including the frequency of reported barriers and facilitators and their mapping to the COM-B components, are provided in Table 2.

	Total	N	%
		141	
EU Member States	Bulgaria	12	8.51%
	Croatia	18	12.77%
	France	18	12.77%
	Germany	18	12.77%
	Ireland	9	6.38%
	Poland	18	12.77%
	Portugal	18	12.77%
	Romania	12	8.51%
	Spain	18	12.77%
Gender	Men	65	46.10%
	Women	76	53.90%
Age group	18–30	44	31.21%
	31–45	49	34.75%
	46–65	48	34.04%
Educational level	Low	33	23.40%
	Moderate	51	36.17%
	High	57	40.43%
Living area	Rural	30	21.28%
	Town	35	24.82%
	City	66	46.81%
Difficulty to pay bills in the last 12 month	Most of the time	7	4.96%
	From time to time	24	17.02%
	Almost never	101	71.63%
Close case of cancer	No	20	14.18%
	Yes	112	79.43%
Belief that cancer is preventable	Disagree	3	2.13%
	Agree	132	93.62%
Heard of the ECAC, 4th edition	No	98	69.50%
	Yes	34	24.11%

ECAC: European Code Against Cancer.

Table 1: **Participants' characteristics.**

Themes were systematically mapped onto the TDF (Table 3) using a matrix linking the six COM-B components to specific behavioural determinants.[30] Table 3 also contains exemplary quotes for each subtheme. The main results are presented below by COM-B component and organised by themes.

Barriers and facilitators to adopt ECAC4 cancer prevention recommendations

Psychological capability

Personal health literacy. A lack of knowledge and information was a key barrier to adopting ECAC4 recommendations, particularly regarding exposure to carcinogenic substances in the workplace (recommendation 8) and high radon levels at home (recommendations 9) (see Additional File 1). Participants reported not knowing about these substances, how they might be exposed, whether they were at risk, or how to assess exposure. Misinformation, uncertainty, and a lack of understanding of how to implement the recommendations or where to seek appropriate professional guidance further hindered action.

Participants supported early, school-based health education to build reliable knowledge and enable informed health decisions in adulthood. Awareness of ECAC4 recommendations, and, more critically, of associated risks, was seen as a key facilitator for behaviour change, especially for reducing sun exposure (recommendation 7) and alcohol consumption (recommendation 6). Being informed about vaccination (recommendation 11) and screening programmes (recommendation 12) availability and benefits was also a strong enabler.

Practical health skills to manage one's health and apply available information effectively were viewed as crucial. Many participants recognised their personal responsibility in making informed choices and stressed the value of being able to assess health risks—for example, ensuring their children received recommended vaccinations. The credibility of information sources also played a major role: guidance from authoritative figures, particularly general practitioners (GPs), frequently encouraged trust and motivated action.

Psychological resources. Analyses identified mental health, psychological maturity, and personal experiences as factors influencing participants' ability to adopt ECAC4 recommendations. Poor mental health, often associated with stress or anxiety, was identified as a significant barrier, leading some to adopt unhealthy coping strategies such as binge eating (recommendation 5) or smoking (recommendation 1). Concerns about personal or family well-being, combined with frustration over unmet health goals, heightened self-doubt, further exacerbating anxiety.

Balancing preventive actions with everyday demands was also recognised as challenging. Challenges imposed by daily routines often led to reliance on fast, less healthy food choices and sedentary habits (recommendation 4). However, while some participants felt that certain behaviours were difficult to implement, others could be integrated with moderate effort and planning. Consistency was identified as a key facilitator in overcoming these challenges, linked to progress toward health goals.

Older age was frequently identified as a facilitator to adopting prevention behaviours. Many participants described maturity as a shift in priorities, with greater health awareness and a desire to maintain a fulfilling quality of life. With age came a stronger sense of responsibility toward personal and environmental health, viewing health as a resource to be safeguarded.

Perceived internal influences. A key barrier identified was the perceived lack of control over environmental

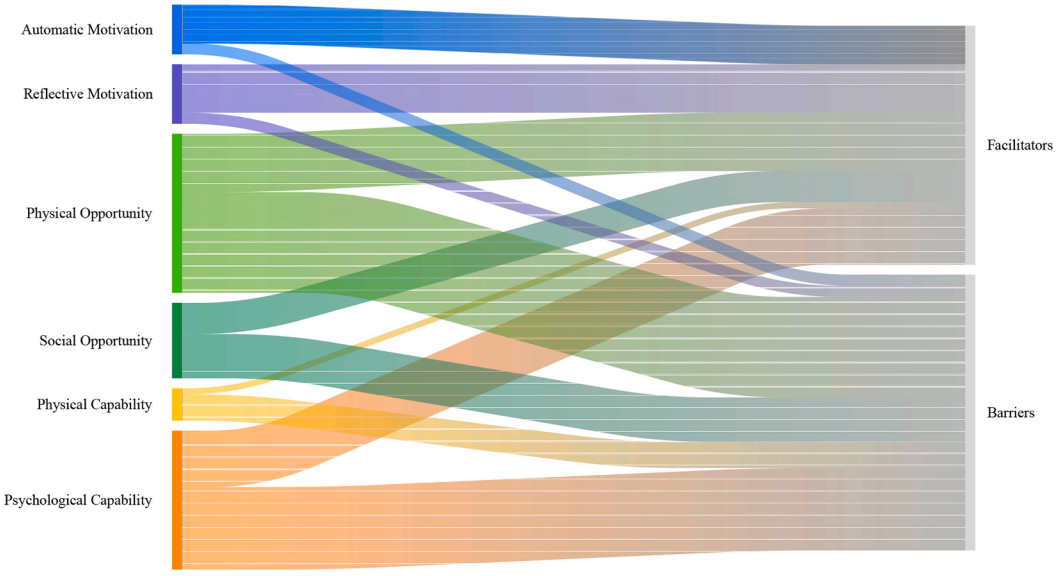

Fig. 1: Sankey diagram of barriers and facilitators to adopt ECAC4 cancer prevention recommendations mapped to COM-B Model sub-components.

exposures, such as second-hand smoke (SHS) (recommendation 2), workplace carcinogens, and high radon levels at home. Many felt powerless in managing these risks, emphasising that responsibility often lay with employers or authorities. Similarly, avoiding SHS in social or workplace settings was challenging when others lacked awareness or consideration, reinforcing a sense of limited personal agency.

	Total		COM-B model of behaviour											
			Psychological capability Gr = 884		Physical capability Gr = 133		Social opportunity Gr = 349		Physical opportunity Gr = 596		Reflective motivation Gr = 328		Automatic motivation Gr = 214	
	☒	☑	☒	☑	☒	☑	☒	☑	☒	☑	☒	☑	☒	☑
General–ECAC (4th ed.) [Gr = 181]	49	132	18	57	1	4	10	25	35	25	2	49	6	42
1. Do not smoke [Gr = 120]	72	48	25	14	44	1	20	12	8	14	2	13	2	10
2. Make your home smoke-free [Gr = 37]	26	11	16	3	1	0	4	3	5	5	2	2	0	1
3. Be a healthy body weight [Gr = 32]	17	15	9	4	5	2	3	1	7	1	3	9	0	7
4. Be physically active in everyday life [Gr = 198]	88	110	16	21	9	1	13	24	73	51	3	30	3	25
5. Have a healthy diet [Gr = 202]	131	71	41	20	6	8	38	15	84	27	1	16	0	13
6. Limit alcohol drinking [Gr = 61]	50	11	15	3	3	0	39	4	9	2	1	3	0	1
7. Avoid too much sun [Gr = 34]	19	15	9	9	2	1	8	1	10	2	0	5	2	3
8. In the workplace, protect yourself against cancer-causing substances [Gr = 33]	29	4	25	3	0	0	2	0	23	4	0	0	0	0
9. Find out if you are exposed to radiation from naturally high radon levels in your home [Gr = 42]	41	3	39	2	0	0	1	0	9	2	1	0	0	0
10a. If you can, breastfeed your baby [Gr = 23]	17	6	8	4	4	0	6	1	4	0	2	3	0	2
10b. Limit use of hormone replacement therapy [Gr = 13]	13	0	8	0	2	0	1	0	5	0	2	0	2	0
11. Ensure your children take part in vaccination programmes [Gr = 33]	15	18	9	6	0	0	3	6	6	14	8	3	1	1
12. Take part in organised cancer screening programmes [Gr = 66]	35	31	14	15	0	0	3	4	19	21	1	9	13	4

Groundedness (Gr) refers to the number of times a code appears in the data. A meaning unit could be mapped to more than one COM-B model component. ☒ accounts for 'barriers' and ☑ for facilitators.

Table 2: **Co-occurrence analysis of barriers and facilitators to each of the 12 ECAC4 recommendations mapped to COM-B model components.**

COM-B model	TDF domains [adapted from[18,30]]	Themes (no. meaning units)	Subthemes *(if applicable)*	Codes *(non-exhaustive list)*	Quotes (*see Additional File 4*)
Capability					
Psychological	Knowledge	Personal health literacy (185)	Health-related knowledge	*Awareness, lack of knowledge/understanding, lack of information, misinformation*	*"[…] not sure how I could adopt the part of the Code that talks about radiation derived from high levels of (unnoticeable), not least because I don't really understand what that would mean, how that kind of radiation could come. And I think in general I don't know how you could adopt that measure" (Portugal, Male, 18–30, HE)*
	Cognitive and interpersonal skills; and memory, attention and decision processes		Health-related skills	*Ability to find professional help*	*"I don't know, maybe such coaches would be useful? Who would somehow support with recommendations. Who could be approached online or by phone, or even somewhere on site? (Poland, Female, 31–45, HE)*
				Risk perception/risk assessment, balance benefits and risks	*"I'm going to do a little thing on point 11, with the vaccination. It is really to be convinced that there are more advantages than disadvantages. But after that, I'm still in favour." (France, Female, 46–65, ME)*
	Behavioural regulation	Psychological resources (57)		*Burden/required effort, mental health, psychological maturity, being consistent, personal experience*	*"I think just the older you're getting, you're just more aware of things that can happen in life. And more so than when you're trying, you don't have to worry about anything." (Ireland, Female, 31–45, HE)*
	Behavioural regulation, beliefs about capabilities, and reinforcement	Perceived internal influences (168)	Behavioural reaction	*Factors outside of one's control, resistance to change, temptation, finding balance*	*"The only disadvantages I see are those that do not directly involve the possible risk of being a patient. And that's what they are, the environmental ones, the ones that don't depend on you. Exposure to areas where there might be some kind of, well, as it says here, radiation, or even exposure to the sun's rays." (Spain, Male, 31–45, HE)*
			Cognitive abilities	*Being committed, being concerned, lack of interest, lack of trust*	*"I think the most difficult ones are related to screening. I don't know … I have a reluctance to go to the doctor; I couldn't exactly explain why, but I don't go with an open heart. I keep postponing it." (Romania, Female, 31–45, HE)*
			Emotional responses	*Pleasure, dislike, discomfort*	*"For colon cancer, I don't know what is done, is it a colonoscopy? Who would think of doing a colonoscopy … plus, it's under general anaesthesia and it's not very good to do it like that. Problems with the colon for years and sometimes when there is pain I worry that there might not be another problem, but now it does not work to say give me a colonoscopy to constantly undergo this." (Bulgaria, Female, 46–65, HE)*
			Personal traits	*Self-control, willpower, perseverance*	*"Yes, I can imagine that. It may be difficult in some cases, but with a strong will it is possible. So of course, the head plays a big role in pushing it through." (Germany, Male, 46–65, HE)*
Physical	Physical skills and beliefs about capabilities	Physical abilities (68)	Biological factors	*Age, preexisting health conditions, physical inability to take action*	*"[…] I started following some of them due to getting older. When I saw that … I don't know. Physical limitations have appeared, actually. I noticed that I get tired more quickly, that I start to feel various pains … In my back, kidneys. And well! That convinced me; otherwise, I don't think I would … I don't know." (Romania, Female, 31–45, HE)*
			Psychological factors	*Having an addiction, cravings*	*"Well, because some people have addictions. We were talking about smoking, well, they can't help themselves. So, they're bound to do it anyway. So, they're going to, they're going to [inaudible] health or whatever." (France, Female, 18–30, ME)*
		Physical skills (44)		*Difficulty or perceived inability to act*	*"Because it's already a habit and you'd have to do a lot of … you'd have to do a lot of thinking. I know it's bad for you, very bad indeed, one day later I really want to quit smoking, but because of the stress of everyday life and all that stuff, I don't want to stop now. It's not wanting to; it's not being able to." (Portugal, Female, 18–30, ME)*

(Table 3 continues on next page)

COM-B model	TDF domains [adapted from[18,30]]	Themes (no. meaning units)	Subthemes *(if applicable)*	Codes *(non-exhaustive list)*	Quotes (*see Additional File 4*)
(Continued from previous page)					
Opportunity					
Social	Social influences, social/professional role and identity, environmental context, and beliefs about consequences	Social, cultural, and interpersonal influences (243)	Cultural factors	*Celebrations/rituals, customs, taboos*	*"[…] it's never affected me. But again, I just knowing from talking to people or in hearing it in general, some people are sitting breastfeeding, and they feel conscious, or they get told can they go to another area or something and that's a natural way to feed a newborn. So, I just think that needs to be promoted and told a little bit clear about that this is really natural and it's not someone getting stripping in public." (Ireland, Female, 31–45, HE)*
			Societal factors	*Social acceptance of harmful behaviours, social pressures, public awareness, social support, having a supportive environment, media*	*"It's very deeply rooted in society right now. You meet someone for a beer, sometimes a coffee, but mostly something alcoholic. If you go out at night you often end up having a drink." (Spain, Male, 18–30, HE)*
	Social influences		Family-related factors	*Parent responsibilities, role model, family support, family dynamics*	*"Oh my. For my children, for my close family, I want to pass on to them good habits in relation to healthy eating for example or not smoking or not drinking too much, doing things on foot. So yes for my family, for the planet too. I don't really know what to say." (France, Female, 31–45, HE)*
			Peer-related factor	*Peer pressure, peer support, shared habits/ goals, health promotion peer encouragement*	*"[…] Mm, yes. I have a group of friends who are very much urging me to quit smoking. They shout at me a lot when I go to smoke a cigarette so … I think they would motivate me to do it." (Poland, Male, 46–65, ME)*
Physical	Environmental context	Environmental factors (105)		*Geographical limitations, modern convenient lifestyle, environmental factors, place of residence, rural vs. urban environment, seasonal aspects*	*"I also find it a bit difficult sometimes to adopt the measure of screening, because in the area where I live it's not exactly a common thing. Sometimes you have to travel a few kilometres to go for a screening, and this makes it more difficult for people like me, who live in those areas, to have a screening. Even if sometimes they want to, it is difficult to do it because of the distance." (Portugal, Male, 18–30, HE)*
		Personal circumstances (121)		*Time constraints, time management, work-life balance*	*"[…] the consequence of today's life, too much sitting, too much work, too many obligations. I think that maybe sometimes it's not, as you would say, within some limits of our capabilities. If I watch, say, starting with myself, who have a desire for 100 things, cycling, running with hiking. Sometimes people don't have time for that. So, you work all day, you come home with a bunch of obligations, so I think it's more of a problem of some kind of hectic lifestyle." (Croatia, Male, 31–45, HE)*
		Systemic and policy-level determinants (72)		*Conflict of interest, availability of programmes, prevention campaigns, regulations, taxation, governmental intervention, universal healthcare coverage, adequate provision of healthcare services/workforce, infrastructure*	*"A major insurmountable obstacle is the existence of strong financial interests in the sale of high-calorie drinks, alcohol, canned meats and other highly processed foods" (Bulgaria, Male, 46–65, HE)*
		Workplace-related factors (64)		*Type of job, employees' benefits, workplace culture, employers' responsibilities, workplace safety*	*"Well, when I'm in a workplace like that. I go into the sun both in the morning and in the afternoon. And to work from work, the sun is both in the face and in the lap, chest." (Croatia, Male, 46–65, ME)*
	Resources	Access to resources (120)		*Access to healthcare services, access to cancer screening tests/programmes, access to vaccination programmes, access to green spaces, access to sport facilities, access to healthy food/quality products, access to information*	*"What also facilitates physical activity is to have spaces, parks, etc. In Lyon, this is very limited. In Lyon, it's very difficult. But to have spaces too … Maybe smaller green spaces. It's true that they are now trying to include this in the projects, but these are things that could facilitate physical activity." (France, Male, 31–45, HE)*
		Economic factors (73)		*Affordability, cost of living, financial constraints, household budget*	*"Well, some of the major disadvantages we have, I believe, are the conditions. With not having a very good financial situation in Romania, it is difficult to go to the gym because memberships are quite expensive, and it's hard to have a more active lifestyle, although you can certainly do that outdoors." (Romania, Male, 18–30, ME)*
		Healthcare accessibility (53)		*Difficulty to set an appointment, lack of follow up, out-of-pocket payment services, disregard importance of cancer prevention, health insurance*	*"The only problem I was a bit kind of wary of at that it was at least a month before the next appointment. So, if you've got something you're worried about, I'd say that seems quite long." (Ireland, Female, 31–45, HE)*

(Table 3 continues on next page)

COM-B model	TDF domains [adapted from[18,30]]	Themes (no. meaning units)	Subthemes *(if applicable)*	Codes *(non-exhaustive list)*	Quotes (*see Additional File 4*)
(Continued from previous page)					
Motivation					
Automatic	Emotions and beliefs about consequences	Emotional responses (91)		*Concerns about medical procedure, fear of cancer, seeing other people suffer, closes cases of cancer diagnosis family/loved ones, feeling better, feeling healthier, parental protective instinct, happiness, well-being*	*"Well, the main reason is the fear that some malignant disease might eventually happen to me. Fear of, in the future, that something will happen to me." (Croatia, Female, 46–65, HE)* *"The main reason is my health and that of my loved ones. It is important to follow the recommendations if we want to be healthy for ourselves and our loved ones." (Bulgaria, Female, 31–45, HE)*
	Reinforcement	Habits and personal empowerment (41)		*Having a routine, habit formation, being motivated*	*"For me, it is important that a person is motivated, to implement the recommendations that are really achievable." (Bulgaria, Female, 46–65, HE)*
Reflective	Beliefs about consequences	Benefits (25)		*Not perceived benefit, health benefits*	*"Yes, if I chastise myself with it and I'm not convinced that I want to do it, I wouldn't do it either. Why should I subject myself to the torture, now it's a bit exaggerated torture, but really subject myself to an effort, then I'll just live longer with this effort. That doesn't do me any good. I don't know how to explain it." (Germany, Male, 46–65, LE)*
		Self-reflection (16)		*Being mindful of one's body image, taking care of one's health, being mindful of others' health*	*"It clearly helps not to consume alcohol, not to do … It also helps you from … you don't get wrinkles if you don't stay like that, I mean you don't get as many wrinkles if you don't spend so much time in the sun and if you put on SPF and all that." (Romania, Female, 18–30, ME)*
	Beliefs about capabilities (confidence)	Values (21)		*Determination*	*"It depends on the approach. Well, it will come easier for some, it will come harder for others a little bit, no? It's all in the mind. If you decide to do something, if you are determined to do it, then I think … you can achieve it." (Poland, Female, 31–45, LE)*
	Goals and intentions	Plans and goals (84)		*Cancer prevention, disease prevention, desire for better health, desire for a better quality of life, desire for longevity, early detection, well-being, weight management, having a healthy lifestyle*	*"I want to enjoy a healthy life. I want to live my life as best I can (inaudible) any steps I could take to reduce cancer; I'd gladly take on board." (Ireland, Male, 18–30, HE)*
	Social/professional role and identity, and optimism/pessimism	Beliefs (22)		*Religion, vaccine hesitancy, conviction*	*"I used to hesitate when I vaccinated children, had them vaccinated.? I thought then, normal stories, ouch, maybe it could be both harmful and this and that … Then I had such a doubt, but I'm glad they were vaccinated, I'm very glad. And secondly, nothing, it was such a doubt, i had doubts maybe I was wrong, maybe I wasn't … And everything else, I absolutely don't think there are any shortcomings." (Croatia, Female, 46–65, ME)*

TDF: Theoretical Domains Framework. Numbers in brackets indicate the total number of meaning units assigned to each theme, classified as either barriers or facilitators. Educational attainment: HE: High education, ME: Moderate education, LE: Low education.

Table 3: **Summary of themes, subthemes and main codes mapped to Theoretical Domains Framework (TDF) domains[18,30] and corresponding COM-B Model of behaviour factors.[16]**

This perceived lack of control was compounded by difficulties in behavioural regulation. Resistance to change, lack of interest, discomfort, and difficulty resisting temptation hindered the adoption of ECAC4 recommendations. Reluctance to modify long-standing habits often stemmed from convenience or comfort, with immediate gratification outweighing long-term health, particularly regarding diet, alcohol use, and sun protection.

Emotional discomfort, particularly from medical procedures like colonoscopies and, to a lesser extent, mammography, was another deterrent. These procedures were described as invasive and stigmatised, leading some to avoid them altogether. Distrust in health authorities, especially regarding vaccination, and scepticism about public health regulations further complicated engagement with preventive measures.

Pleasure and enjoyment had a dual influence. Participants struggled to limit behaviours they found pleasurable (e.g., smoking and alcohol), despite recognising their health risks, creating a conflict between immediate rewards and long-term goals. Conversely, enjoyment from healthy behaviours, such as exercising for fun, supported sustainability. A strong aversion to SHS also motivated avoidance of high-exposure environments.

Personal commitment, concern about health risk, and interest in health matters emerged as important drivers of change. Commitment significantly influenced participants' ability to make and sustain changes, with some behaviours integrating easily into daily routines and others requiring effort and perseverance. Many acknowledged that health-related changes were often reactive, triggered by perceived immediate health threats, rather than proactive prevention.

Traits such as self-discipline, self-control, adaptability, and persistence were central to sustaining preventive behaviours. Willpower and resilience helped participants manage setbacks, resist temptations, and stay aligned with their goals. Adaptability, including modifying strategies in response to challenges, further supported long-term adherence.

Physical capability

Physical abilities. Preexisting health conditions and age emerged as key barriers to engaging in daily physical activity. Participants frequently cited health conditions such as asthma, back pain, and the natural effects of aging as limitations. Although many recognised the benefits of regular exercise and were motivated to engage, physical restrictions constrained what was feasible.

Chronic illnesses also complicated other health-related behaviours, particularly diet. Conditions like diabetes or autoimmune disorders posed significant challenges to adopting and maintaining healthy eating habits. In some cases, a past health crisis triggered initial lifestyle changes, yet sustaining these behaviours over time remained difficult due to ongoing health constraints.

Additional biological and physical factors also impact adherence to specific recommendations. Female participants described challenges related to breastfeeding (recommendations 10), including pain and infant latching difficulties. While some coped well, others experienced significant physical discomfort, emotional distress, and feelings of guilt or shame when expectations were unmet; for example, stopping breastfeeding early, which created further barriers to continued breastfeeding.

Addiction to tobacco and alcohol was another major barrier. Smoking was described as a deeply entrenched behaviour, reinforced by psychological factors like stress relief and relaxation. Many participants reported long-standing struggles with cravings, dependency and repeated cycles of cessation and relapse.

Physical skills. Low confidence about physical skills further limited participants' perceived ability to adopt cancer prevention behaviours. Doubts about their capacity to change long-standing habits were common. Despite recognising the benefits of behaviour change, many expressed frustration and helplessness, torn between knowing what should be done and lacking confidence or capacity to follow through.

Social opportunity

Social, cultural, and interpersonal influences. Participants described challenges in maintaining healthy lifestyles within diverse cultural and social contexts. Cultural norms around celebrations, traditions, and taboos often conflicted with ECAC4 recommendations. Traditional diets, rich in red and processed meats and sugary foods, were perceived as culturally valued and difficult to change, especially in countries with low nutrition awareness.

Taboos and limited public discussion also hindered engagement with some health behaviours; for example, breastfeeding lacks visibility and societal support, making it harder for individuals to adopt or sustain without stigma or shame.

Family dynamics shaped health behaviours both positively and negatively. Balancing caregiving, work, and personal time, often led to the deprioritising self-care. Resistance to change or engagement in unhealthy behaviours among family members often undermined individual efforts, creating tension at home.

Peer and social pressures also emerged as major barriers. Alcohol use was seen as deeply entrenched in cultural practices, with celebrations creating episodic pressure to drink, while broader peer dynamics exerted

more persistent influences. Participants described difficulty resisting smoking, unhealthy eating, or alcohol when surrounded by peers who engaged in such habits, often feeling judged or labelled (e.g., as a 'health pope') when abstaining or promoting healthier behaviours, discouraging adherence to prevention recommendations.

Despite these barriers, several facilitators emerged. Supportive family environments helped promote and sustain healthy behaviours. Spouses and children were key sources of motivation and accountability. Many women expressed a desire to serve as positive role models for their children and viewed maintaining their own health as an integral to support family well-being.

Peer support also enabled positive change. Health-conscious social circles encouraged healthier choices, and group-based initiatives, such as collectively quitting smoking or improving diet, were seen as powerful motivators. Encouragement and reinforcement from peers fostered a shared purpose and made change feel more attainable.

Physical opportunity

Environmental factors. Participants reflected on how their living environments influenced their ability to adopt healthy behaviours, particularly regarding diet and physical activity. A key barrier was limited availability of healthy food. While some acknowledged an increase in healthier options over time, many emphasised the overwhelming presence of processed, unhealthy foods and the lack of suitable alternatives in certain settings, which hindered efforts to sustain a healthy diet.

Modern lifestyles were also seen as contributing to unhealthy habits. Busy schedules, time constraints, and the convenience of fast food frequently led to poor dietary choices and reduced physical activity.

Characteristics of the place of residence were further linked to opportunities for healthy behaviours. Rural settings were generally regarded as supportive of healthy lifestyles, offering cleaner air, direct access to fresh produce, and more opportunities for outdoor activities like walking and gardening. However, rural living also posed barriers, including limited public transport, restricted healthcare access, and limited availability of cancer screening due to geographic isolation.

Seasonal changes also influenced behaviour. Winter conditions, particularly in countries with limited daylight, were seen as particularly discouraging to physical activity.

Personal circumstances. Participants discussed how personal circumstances affected their ability to maintain a healthy lifestyle. Time was consistently seen as a major barrier for both diet and physical activity. Despite recognising the importance of health-promoting behaviours, many reported resorting to convenience foods or skipping meals due to time constraints. Competing demands of daily life often left little room for exercise or healthy eating, highlighting the gap between intention and practical feasibility. Some participants acknowledged that better planning and time management could support healthier choices. Establishing routines, such as meal prepping or scheduling time for physical activity, was seen as a potential strategy to overcome time-related barriers.

Systemic and policy-level determinants. Participants identified multiple systemic barriers to adopting healthier lifestyles, particularly regarding preventive care and access to services. The lack of financial incentives for GPs to promote prevention acted as a structural disincentive. Conflicting economic interests and weak regulation of harmful products (e.g., tobacco, alcohol, ultra-processed foods) were also viewed as undermining health promotion.

Universal healthcare coverage, where available, was seen as a mitigating factor, reducing financial barriers and supporting equitable access to preventive services, although logistical and infrastructural gaps persisted. Participants strongly endorsed greater investment in preventive care at the policy level, including integrating cancer screening and vaccination programmes into national health strategies. Suggested measures included tax incentives or subsidies to improve access to healthy foods, stricter regulations on marketing and sale of harmful products, and targeted public awareness campaigns. Community infrastructure was seen as an essential facilitator, with local organisations playing a key role in reinforcing healthy behaviours.

Workplace-related factors. Barriers included long working hours, shift work, and sedentary roles. Physically demanding jobs, such as construction, posed risks through exposure to hazardous materials, inconsistent use of protective equipment and inadequate safety training. Participants described that rigid organisational structures and workplace hierarchies limited their ability to advocate for health-related changes. In some male-dominated industries, a *'lad culture'* discourage safety compliance and health-promoting behaviours.

Workplaces were seen as potential enablers when supportive policies existed. Suggested interventions included on-site recreation facilities, healthy food options in canteens, paid time for health screenings, and financial incentives such as fitness vouchers. Policies promoting physical activity during the workday and strong leadership commitment to employee health were viewed as key drivers of change.

Access to resources. Participants emphasised the importance of access to essential resources for cancer

prevention. These included availability of healthy and affordable food, access to community sports facilities, parks, green spaces, and walkable neighbourhoods, free active transportation (e.g., public bicycles), and equitable access to healthcare services such as cancer screening, vaccination programmes, and smoking cessation support.

Economic factors. Financial constraints were a consistent barrier to adopting healthy behaviours. Participants reported that healthy food options, particularly fresh and organic products, were often unaffordable, particularly for low-income households. The perceived cost disparity between nutritious and processed foods led many to choose cheaper, less healthy options. Rising inflation and living costs were cited as exacerbating factors. Access to physical activity resources was also influenced by financial means; gym memberships and even public sports facilities were described as costly. Additionally, participants noted that those with greater financial resources had better access to preventive services, reinforcing health inequities. While budgeting and nutrition knowledge helped, economic limitations often overrode personal intentions, highlighting the need for structural interventions to make healthy living achievable.

Healthcare accessibility. Systemic barriers were reported in accessing preventive healthcare services, particularly cancer screenings and routine check-ups. Long wait times, limited availability of specialists, often with demand exceeding supply, limited appointment availability, GPs' restricted capacity or willingness to refer patients and broader healthcare system inefficiencies hindered timely care. Workforce shortages, exacerbated by COVID-19, further delayed early detection. Even with health insurance, out-of-pocket expenses for private consultations and tests were often prohibitive, leading many to seek care only once symptoms appeared.

Preventive services were often poorly prioritised or communicated, leaving patients unaware of when and how to access care. The lack of proactive engagement and follow-up was also discouraging. Participants highlighted the need for better communication from healthcare providers, clearer pathways, and effective feedback mechanisms to enhance patient experience and support earlier detection. Despite these challenges, prevention was seen as more cost-effective than treatment.

Automatic motivation

Emotional responses. Participants explained how emotional responses, especially fear and personal experiences with cancer, shaped engagement with prevention. Many mentioned the loss or suffering of close relatives to cancer as a powerful motivator to quit smoking or participate in cancer screening programmes. Witnessing loved ones suffer motivated individuals to adopt healthier behaviours in an effort to reduce the risk of experiencing similar pain themselves. This heightened awareness prompted proactive cancer prevention and a desire to live longer. For some, the shift in perception, from viewing cancer as a death sentence to recognising the potential for survival and recovery, strengthened their commitment to early detection and ongoing health monitoring. Yet fear also acted as a barrier. Anxiety about a possible diagnosis led some to avoid medical appointments or delay screenings. Concerns about invasive procedures were also mentioned as deterrents. Additionally, emotional discomfort associated with discussing cancer openly was seen as contributing to stigma and reduced help-seeking.

Personal and familial motivations were also central to maintaining healthy lifestyles, often rooted in their roles as parents or caregivers. Many expressed a desire to remain present and active in their children's lives. Some participants noted specific turning points, such as pregnancy or family illness, that prompted significant lifestyle changes, including smoking cessation.

Motivations extended beyond disease prevention to enhancing everyday well-being. Improved mood, energy levels, and sleep quality were frequently mentioned as reinforcing outcomes of healthful habits. Participants described how engaging in enjoyable exercise generated a sense of achievement and boosted mental well-being, contributing to a self-sustaining cycle of healthy behaviour. These practices were also linked to better emotional regulation, reduced stress, and a stronger sense of control. Overall, participants viewed healthy living as supporting not only disease prevention but also vitality, productivity, and the capacity to fulfil valued social roles.

Habits and personal empowerment. Participants discussed challenges in maintaining a healthy lifestyle during periods of disrupted routines, such as unemployment or major life transitions. For some, the lack of daily structure made it harder to engage in physical activity or sustain healthy eating. Many emphasised the importance of consistent habits, noting that while change is difficult at first, consistency helps normalise behaviours and reduces perceived effort. Motivation was also a key driver of sustained engagement; understanding the health benefits of their actions reinforced commitment, especially during tough times.

Reflective motivation

Benefits. Participants believed healthy behaviours improve well-being and quality of life. These day-to-day benefits often motivated adherence to ECAC4

recommendations more than potential cancer risk reduction. While most regarded healthy living as beneficial and fulfilling, some were sceptical about its impact on cancer, particularly in the context of genetic predisposition. A few noted that lifestyle changes might feel burdensome or reduce enjoyment for some individuals. Nonetheless, the prevailing view was that the benefits outweighed any drawbacks.

Self-reflection. Participants explained that perceived personal outcomes strongly shaped motivation to adopt healthier behaviours. Improvements in body image, self-esteem, and physical appearance (e.g., feeling younger) were noted as key drivers for weight management (recommendation 3), smoking cessation, and dietary changes. Additionally, protecting others, especially children, from SHS was identified as an important motivator, reflecting social responsibility in health-related decision-making.

Values. Participants discussed the role of self-determination in sustaining health-related behaviour change. A strong internal desire to change was viewed as essential, with many noting that genuine commitment enables individuals to achieve their goals even without external support. Persistence and mental focus were frequently cited as crucial for overcoming setbacks or low motivation. Long-term change was seen as being driven more by internal conviction and goal-oriented effort than by short-term incentives or external pressure. Maintaining consistency despite obstacles was considered critical to adopting and sustaining healthy habits.

Plans and goals. Participants articulated clear intentions and long-term goals, such as preventing cancer and other chronic conditions. Many emphasised that maintaining good health was important not only for extending lifespan but also for preserving quality of life and avoiding illness. This goal orientation was often linked to aspirations for longevity, self-sufficiency, and reducing future dependency on others.

Beliefs. Participants explained how personal beliefs and faith shape their behaviours. They emphasised their focus on maintaining health according to spiritual values, guiding their dietary choices and avoidance of alcohol and tobacco. Vaccine hesitancy was also stemmed from factors like social media misinformation and religious views. Comfort, value alignment, and informed choices were consistently viewed as key enablers of behaviour change.

Discussion

Our findings provide crucial insight into how European adults from a representative mix of countries and sociodemographic backgrounds perceive the 12 ECAC4 recommendations. The analysis highlights key barriers and facilitators affecting their implementation at the individual level. Although the ECAC4 was developed as an educational tool to guide individual behaviour, our results highlight that effective cancer prevention cannot rely solely on individual responsibility. Despite individual factors such as health literacy, physical skills, self-efficacy, and other psychological determinants being identified as key contributors to adoption, systemic and structural barriers, including, but not limited to, limited access to healthcare services or screening programmes, financial constraints, and insufficient institutional support, had a significant perceived impact on behaviours. Beyond these structural constraints, lifestyle behaviours also cluster socially within networks, shaping individual choices and reinforcing existing patterns.[31,32] These structural challenges, combined with persistent gaps in health literacy, shaped prevention behaviours as much as, if not more than, individual motivation or capability, which aligns with existing literature on the adoption of cancer prevention behaviours.[33–36] Notably, the balance of barriers and facilitators varied across COM-B domains as, for example, automatic and reflective motivation were associated with more facilitators than barriers, whereas physical capability revealed numerous barriers and relatively few facilitators. This suggests that motivation may be more easily leveraged in interventions, while capability requires stronger structural and contextual support.[16]

Identified barriers and facilitators often overlapped across COM-B themes, such as perceived internal circumstances and reflective motivation, social opportunity and personal circumstances, or physical skills and personal empowerment, reflecting the interconnected nature of individual, contextual and motivational factors. This underscores the need for multi-level implementation strategies that go beyond individual-level interventions to address broader social and environmental determinants of health.

Framing these behavioural determinants using the COM-B and the TDF allowed a structured synthesis of findings from an implementation science perspective. This approach will help to identify potential intervention functions and policy categories likely to influence cancer prevention behaviours, using the Behaviour Change Wheel,[16] which links COM-B and TDF domains to evidence-based strategies for behaviour change. To improve the uptake of ECAC recommendations, our findings suggest tailoring implementation strategies to each COM-B domain. For capability, this could involve integrating recommendations into school-based programmes and public health campaigns to improve health literacy. For opportunity, strategies may include enhancing equitable access to screening and vaccination, and promoting supportive environments through policy measures. For motivation, target messaging can

be used to reinforce the value and feasibility of preventive behaviours. These insights informed the expert deliberations in developing the forthcoming fifth edition of the ECAC (ECAC5). Specifically, they guided how to account for contextual barriers when translating evidence supporting the recommendations into practical advice for the public, as well as the formulation and prioritisation of complementary, population-level recommendations for policymakers, which will accompany the individual-level recommendations in ECAC5.[9]

The identified barriers and facilitators are also relevant to broader EU primary and secondary cancer prevention initiatives, at national or regional levels, supporting the achievement of the EBCP goals,[6] particularly increasing health literacy. They provide policymakers and decision-makers with actionable insights to optimise interventions by targeting key determinants of behaviour change related to cancer prevention. Moreover, these findings are valuable for intervention designers and researchers, offering both overarching and risk-specific insights across the ECAC4 recommendations, including behavioural and medical interventions.

This study has several notable strengths. To our knowledge, it is the first to explore perceptions of the ECAC4 recommendations by the public. The approach enabled in-depth, experience-based insights, enhancing the relevance and transferability of the findings. An extensive sample drawn from diverse sociodemographic backgrounds and nine EU MS, spanning various regions, populations, and sociopolitical contexts, provided a broad understanding of factors affecting adoption across the EU. The use of the COM-B and the TDF facilitated a structured analysis of barriers and enablers, strengthening the conceptual interpretation and reinforcing the results. Additionally, integrating AI, as described elsewhere,[37] accelerated data processing and enriched the content analysis, deepening our insights into the research question.

A key strength of the study lies in its unprecedented scope, being conducted across nine EU countries using common theoretical frameworks, although this breadth also posed challenges for ensuring transferability and consistency. First, theoretical sufficiency was achieved at the EU level but not necessarily within each participating country. This reflects the study's emphasis on capturing EU-wide diversity rather than exhaustive within-country variation, as well as contextual recruitment constraints in certain settings. Second, the sample was predominantly urban, highly educated, and without major financial difficulties, which may limit the transferability of findings to more socioeconomically vulnerable or rural populations, i.e., groups that often face additional barriers to cancer prevention. Third, backchecking of AI-based translations was not feasible for Portugal and Poland, which could have introduced some residual translation-related bias; however, inconsistencies were cross-checked against the original transcripts in these countries. Fourth, the overlap and interaction between themes across COM-B and TDF domains made it challenging to clearly delineate their independent effects as barriers or facilitators. Fifth, as the analysis followed a deductive approach based on predefined categories, some nuances or emergent links between themes may not have been fully captured. Finally, the study could not fully rule out the possibility of interviewer, selection, or social desirability biases, despite standardised procedures and experienced interviewers.

Despite these constraints, the study brings forth cross-national findings into behavioural determinants relevant to cancer prevention across the EU.

In conclusion, our findings highlight that adoption of cancer prevention behaviours is shaped as much by systemic and structural barriers as by individual motivation or perceived capability. Effective cancer prevention recommendations should strengthen health literacy, ensure equitable access to resources, foster supportive environments, and reinforce the value and feasibility of preventive behaviours. By linking individual- and system-level determinants, this study provides actionable insights for designing interventions that are both effective and context-sensitive. Our results offer timely evidence to inform the forthcoming fifth edition of the ECAC and contribute directly to the health literacy objectives of the EBCP, helping to enable environments and policies that empower citizens to engage in sustained cancer prevention behaviours.

Contributors

Ariadna Feliu: Conceptualisation, Methodology, Formal analysis, Resources, Data curation, Visualisation and Writing-Original Draft, Project administration, Funding acquisition. Bibiana Barrera: Formal analysis, Data curation, Writing-Review & Editing. Vanessa Boland, Amanda Drury, Marian-Gabriel Hâncean, Marius Geantă, Paweł Koczkodaj, Sophie Mulcahy-Symmons, Patricia Pinto, Sarah Sheehan, Ivan Tchalakov, Helena Vučković, Hajo Zeeb: Investigation, Data curation, Writing-Review & Editing. Vaughan W. Rees: Writing-Review & Editing. Carolina Espina: Conceptualization, Validation, Writing-Review & Editing, Project administration, Funding acquisition. Ariadna Feliu and Carolina Espina are the guarantors of the study, are responsible for the decision to submit the manuscript, and accept full responsibility for the integrity of the data and the accuracy of the data analysis and interpretation. Ariadna Feliu and Bibiana Barrera have accessed and verified the data.

DeepL Pro and ATLAS.TI (version 25), both AI-based software, were used to translate interview transcripts into English, and data management, coding, and content analysis, respectively.

Data sharing statement

The datasets generated and analysed during the current study available from the corresponding author on reasonable request.

Declaration of interests

Hajo Zeeb reports support from the German Cancer Aid for a scientific study on smoking cessation offers for pregnant women (payment to institution). He also held an unpaid position as Chair of the Association at the German Public Health Association. The authors declare no other competing interests.

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Where authors are identified as personnel of the International Agency for Research on Cancer/World Health Organization, the authors alone are responsible for the views expressed in this article, and they do not necessarily represent the decisions, policies, or views of the International Agency for Research on Cancer/World Health Organization.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lanepe.2026.101633.

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