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Integrating Social-Ecological Contexts and Health Identity in Understanding Health Behavior Change

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Abstract

Health behaviors are pivotal in determining overall health outcomes, making them a key focus for health promotion initiatives. However, fostering behavioral change is intricate due to the interplay of numerous factors influencing health-related actions. While information, awareness, and knowledge are essential, they are often insufficient on their own. Effective health promotion necessitates looking beyond individual psychological and cognitive factors to grasp the broader, multifaceted processes driving behavior change. Social-ecological models offer a framework to navigate these complexities, though they can sometimes lack specificity. This qualitative grounded theory study explores how individual, interpersonal, and environmental factors converge to shape health behaviors and examines how social-ecological models can be tailored to address diverse ecological needs. Participants were drawn from a community-based cardiovascular disease prevention program in Northern Sweden. Through in-depth interviews, the study investigated health behaviors across the life course among middle-aged men and women. Results reveal that barriers and facilitators to health behavior vary systematically based on individuals' health identities. Customizing social-ecological interventions to reflect these identities could improve their impact. Beyond conventional risk-factor screening, evaluating health identities may guide the development of more precise, context-sensitive health promotion strategies.

Keywords: Health behavior, Health promotion, Health interventions, Social-Ecological framework, Health identity, Grounded theory

Introduction

Health Behaviors as Determinants of Health Individual behaviors, including diet, physical activity, smoking, substance use, and interaction with healthcare services, are fundamental in shaping health outcomes. These behaviors are critical not only for maintaining and enhancing health but also for explaining disparities in health status and inequities, positioning them as a cornerstone of public health and health promotion efforts [1]. Health behaviors extend beyond actions with direct physiological impacts to include broader social practices, such as community engagement and social network participation [2]. While the link between certain behaviors, like smoking and lung cancer, is well-documented, the pathways connecting other behaviors to health outcomes are complex and context-specific [3]. For instance, social media engagement may either promote or impede behaviors like exercise or healthy eating, depending on individual and social contexts.

Influencing health behaviors is inherently challenging due to the simultaneous influence of multiple determinants. While information, awareness, and knowledge are necessary, they rarely suffice to drive sustained change. Despite understanding the risks, individuals often persist in detrimental behaviors, such as consuming high-calorie foods or smoking [4]. Some behavioral determinants are common across various health behaviors, while others are specific to particular actions [3]. As a result, effective health interventions must extend beyond individual cognitive and

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psychological factors to address the broader, intricate dynamics of behavioral change.

Theoretical frameworks provide guidance for designing health interventions. Many models rooted in health psychology emphasize individual decision-making, such as the Health Belief Model [5, 6], the Theory of Reasoned Action [7], the Theory of Planned Behaviour [8], and the Transtheoretical Model [9]. Others focus on social and interpersonal influences, including Social Cognitive Theory [10, 11] and Social Support and Social Network Models [12]. Broader frameworks, such as Community Organisation Models [13], Diffusion of Innovations [14], and Communication Theories [15], consider communities, schools, and workplaces as critical settings for shaping health behaviors.

Social-Ecological Perspectives on Health Behavior Change Social-ecological models acknowledge that health behaviors are embedded within interconnected social systems and shaped by the dynamic interplay between individuals and their environments [16, 17]. These models account for influences across multiple ecological levels—individual, interpersonal, organizational, community, and policy—and their interactions [18]. For example, interventions may aim to improve personal health literacy while simultaneously reshaping community norms [19]. Social-ecological approaches highlight that behavior both shapes and is shaped by the surrounding social environment, suggesting that interventions targeting environmental or policy changes can support individual behavior change, and vice versa.

These frameworks align with the social determinants of health (SDH) perspective, which considers the broader social, economic, and environmental conditions influencing health outcomes. The World Health Organization defines SDH as "the conditions in which people are born, grow, live, work, and age, including the health system" [20]. The Dahlgren and Whitehead model illustrates how individual lifestyle factors are influenced by social networks, living and working conditions, and broader societal structures, such as socioeconomic, cultural, and environmental contexts [21]. Limited access to resources and social power influences both exposure to health risks and the capacity to adopt healthy behaviors. For instance, lower socioeconomic status can restrict access to healthy food, exercise opportunities, or healthcare, while also shaping health literacy and social norms. In this context, unhealthy behaviors, such as smoking or overeating, may serve as coping mechanisms for adverse life circumstances [22]. Chronic stressors linked to disadvantage, such as financial strain and social exclusion, further limit the ability to sustain health-promoting behaviors [22]. By addressing these underlying determinants, social-ecological models target the "causes of the causes" to inform more effective interventions.

Despite their theoretical robustness, the practical application of social-ecological approaches remains limited. Few interventions address multiple ecological levels concurrently, and the translation from theory to practice is often incomplete [16, 19]. A review by Golden and Earp [16] of 157 health promotion programs found that while nearly all included individual-level activities, only 65% incorporated interpersonal strategies, and just 20% targeted community or policy levels. Moreover, fewer than 10% explicitly referenced an ecological framework, highlighting the need for guidance in designing and implementing multi-level interventions.

Additionally, evidence that multilevel interventions consistently outperform single-level approaches is limited [19]. Another challenge is that social-ecological interventions risk becoming overly broad and unfocused by attempting to address all health-related factors simultaneously, given their interconnected nature [23]. As Stokols [17] notes, "Overly inclusive models are not likely to assist researchers in targeting selected variables for study, or clinicians and policymakers in determining where, when, and how to intervene." Furthermore, environmental factors targeted by interventions, such as community norms, may impact individuals differently based on personal attributes, including personality, attitudes, and available resources [17]. Consequently, health promotion strategies grounded in social-ecological frameworks may need to be customized for specific behaviors and population subgroups [24]. Understanding the complex interactions across ecological levels for diverse populations is critical to determining which interventions are effective for whom. Tailoring social-ecological interventions in this way can enhance alignment between individuals and their environments, increasing the likelihood of meaningful behavioral change.

Aim This study examines how individual, interpersonal, and environmental factors interact to influence health-related behavior changes among middle-aged adults in Northern Sweden. It also investigates how social-ecological health promotion interventions can be adapted

to accommodate the ecological patterns and needs of specific populations.

Materials and Methods

Study Setting—The Västerbotten Intervention Programme Participants were recruited from the Västerbotten Intervention Programme (VIP), a community-based cardiovascular disease (CVD) prevention initiative in Västerbotten County, Northern Sweden. Launched in a single municipality in 1985, the VIP expanded countywide and was fully integrated into routine primary care by 1995. Individuals aged 40, 50, or 60 are invited to participate in systematic CVD risk screenings, comprehensive health surveys covering lifestyle, socioeconomic, and psychosocial factors, and personalized health dialogues with trained nurses [25]. During these dialogues, participants receive feedback on their measurements and risk profiles, visualized through the "VIP star," where blunt tips indicate higher risk and sharp tips indicate lower risk. The program aims to encourage the maintenance of healthy habits and support those with multiple risk factors in making lifestyle modifications [26].

Study design

This study adopted a qualitative, social constructionist grounded theory approach [27]. Data were collected through in-depth interviews exploring participants' health and behaviors over their life course. Following the principles of social constructionist grounded theory, an abductive approach was employed, allowing data collection and analysis to occur concurrently. Insights from early interviews informed refinements to the interview guide, shaping subsequent data collection.

Sampling and Study Participants All participants had engaged in the VIP during 2018–2019, ensuring they could recall their CVD risk profiles. Sampling aimed to maximize variation in sociodemographic and socioeconomic characteristics, including urban versus rural residence, educational attainment, sex, and age (40, 50, or 60 years). Following ethical approval, a random sample of eligible VIP participants was obtained from the Norr Register Centre [28], which manages the VIP register. Contact information enabled researchers to invite participants directly, bypassing intermediary gatekeepers from the program. Initial contact was made via mailed information letters, followed by phone calls approximately one week later to provide further details and extend a personal invitation. Of 86 individuals contacted, 69 declined participation or could not be reached after three attempts, citing time constraints or lack of interest.

Seventeen participants (13 women and 4 men) ultimately agreed to participate. The sample varied in age, educational background, and rural versus urban residence, as summarized in **Table 1**.

Table 1. Sociodemographic description of the participants

Sex	Age			Geographical residence		Educational background	
	40	50	60	Urban	Rural	Short	Long
Women (*N*=13)	7	5	1	4	9	3	10
Men (*N*=4)		1	3	1	3	2	2

Data collection

Semi-structured interviews were conducted in Swedish between spring and early autumn 2021. Prior to the main study, a pilot interview was carried out in spring 2020 to evaluate the functionality of the interview guide. Only minor adjustments were required following the pilot, and, given the valuable insights obtained, the pilot interview was included in the final dataset, contributing as one of the 17 participants.

An open-ended, thematic interview guide was developed to capture participants' subjective experiences of health and health-related behavioural changes across the life course. Interviews began with a broad question inviting participants to define health and describe what they considered part of their own health. Participants were then asked to illustrate their health trajectory on a timeline, marking periods of better and poorer health. Each participant determined the starting point of their timeline, ranging from childhood to more recent years. Participants reflected on factors that contributed to periods of good or poor health along their health line. Guided by the study's objectives and our theoretical understanding of social determinants of health, probes addressed participants' behaviours and lifestyle, social circumstances, social networks, work situation, significant life events, and experiences during the

COVID-19 pandemic. Questions regarding COVID-19 and the role of VIP were collected but are not analyzed in this study.

Due to the ongoing COVID-19 pandemic, all but one participant opted for telephone interviews; the remaining participant preferred a video call to see the researcher. Interviews ranged from 40 to 90 minutes. After each session, memos were written and later used in co-author discussions and preliminary analyses. All interviews were audio-recorded and transcribed verbatim to prepare for coding.

Data analysis

Analysis followed a social constructivist grounded theory (GT) approach, consistent with Charmaz [27] and Clarke (2005). The process included initial, focused, and theoretical coding. Consistent with the principle of constant comparison, coding was iterative, with continuous comparison of data, initial codes, and focused codes to develop analytical insights [27]. Social constructionist GT emphasizes abduction and grounded theorizing rather than purely inductive theory-building [29]. The social-ecological model was employed as a sensitizing framework, offering a directional lens for identifying patterns in the data without constraining interpretation [29].

Initial coding was conducted line by line across all interviews, without presupposed theoretical frameworks. The three primary authors (ME, LS, KL) independently coded the interviews they had conducted and performed a first sorting of initial codes to facilitate discussion. The authors then convened to compare and negotiate code sorting, resulting in two analytical pathways for subsequent analysis.

This article draws from a subset of initial codes capturing participants' perceived factors influencing health behaviour changes. Codes were clustered thematically according to content, with key clusters aligning with the study's aims: self-image, motivations and driving forces, daily life organization, social networks, living and working environments, and nature. An additional cluster pertained to participants' overarching health identity, defined as "observations and expectations concerning their health, their knowledge about health and in what ways their health is related and comparable to the health of others" [4].

During focused coding, we organized and compared codes within and across the initial clusters, which revealed a strong intersection between health identity and all other thematic areas. This intersection guided the development of categories and sub-categories representing "ideal types" of health identities based on our data. Ideal types are conceptual tools designed to bring structure to diverse observations by emphasizing shared characteristics [30] and highlight core aspects of how health identity relates to health behaviour change [31]. Following Weber's framework (1903/1949, cited in Ritzer [31]), these ideal types are analytical constructs rather than exact representations; participants rarely corresponded to a single type, but the types were nonetheless grounded in the empirical material.

In the theoretical coding phase, we connected these ideal type categories and their sub-categories to the social-ecological model, allowing the assignment of codes to different ecological levels. To present the findings visually, we created a positional map illustrating the primary perspectives in the data regarding factors across ecological systems that participants viewed as enabling or constraining health behaviour change for the different health identity types [29]. **Figure 1** depicts the iterative process of moving between data, codes, and categories during analysis.

Text	Examples of Initial codes	Cluster of codes	Sub-Categories	Category Ideal type of health identity
	INTERPERSONAL SYSTEM LEVEL			
Sometimes I tag along to the go-cart track, then I run back home. That's a good way to get it into your everyday activities	Finding time for exercise, Running home from children's activities	The social organisation of daily life	Balancing work and family life	**Health is the main priority in my life**
I need to exercise…I need to get away, I need to think about other things, or just listen to music… I think I just need that kind of thing. Not hearing 'mom'…	Training enables getting out, training is resting from motherhood		Exercising gives time for myself	

Figure 1. Illustration of the coding process

Ethical considerations

The study received approval from the Swedish Ethical Review Authority (dnr: 2019–02924 and dnr: 2020–02985). Prior to participation, all individuals were provided with both written and verbal information about the study. Verbal informed consent was obtained at the start of each interview. Participants were reminded throughout that participation was voluntary, that they could withdraw at any time, and that they were free to refrain from answering questions they found uncomfortable. Interviews were conducted in an informal, conversational manner, allowing participants to determine the scope of what they wished to share regarding their health and health behaviour changes.

Conducting most interviews via telephone posed a limitation, as visual observation of participants was not possible. For example, some participants self-described as "being fat," which could not be visually verified, potentially affecting the trustworthiness of the data. Conversely, the lack of visual presence may have facilitated greater openness, enabling participants to share sensitive experiences and personal reflections more freely.

Ethical vigilance also considered potential researcher influence on participants' willingness to engage. One author [KL] is involved in strategic planning for the VIP intervention, but none of the researchers were involved in its delivery or had prior interactions with participants in any professional capacity. To mitigate any perceived coercion or bias, participants were selected from the register in such a way that researchers avoided contacting individuals whose identities were known to them personally.

Results and Discussion

Three ideal types of health identity and associated perceptions of health behaviours The grounded theory analysis identified three primary categories, representing distinct ideal types of health identity. These types encapsulate shared expectations, knowledge about health, and comparative perceptions of personal health relative to others. Across these ideal types, participants expressed common perceptions of factors facilitating or constraining health behaviour change, spanning multiple ecological levels. **Table 2** presents an overview of the codes, code clusters, and sub-categories that informed the construction of these three ideal types of health identity.

Table 2. Categories of three ideal types of health identity with their assigned codes, constructed from the social constructivist grounded theory (GT) analysis

Ecological System Level	Clusters of Codes	Categories		
		Ideal Type 1 **Health is the main priority in my life**	**Ideal Type 2** **Life stands in the way of my health**	**Ideal Type 3** **Health is not a major concern in my life**
		Sub-Categories		

Individual System Level	*Self-image*	- I look at the bright side of life - I conquer setbacks - I am determined to live a healthy life	- I put others before myself - I do not have many options	- I prefer to be on my own - I'm fine, after all
	Motivation and driving forces	- I set health goals for myself - Exercising is an enjoyable must - Living healthy to reduce future illness	- I want to change, but I'm trapped in life - Life stands in the way of health - A healthy life is but a dream	- I would rather invest in health tomorrow … - Previous attempts have failed - Sustainable lifestyle change is almost impossible
Inter-Personal System Level	*The social organisation of daily life*	- Balancing work and family life - Adjusting exercise after life circumstances - Exercising gives time for myself	- Domestic life obstructs a healthy life - My daily life is full of stress	- Eating healthy is out of my control - Irregular working hours obstruct healthy food
	Social networks	- Family support is crucial - My training buddy supports change - Close friends are important for health	- Online support compensates for a lack of offline support - No time for socializing - Ordinary people cannot understand my life	- Close family is enough - My way of living obstructs socializing - I refuse to exercise with people around
Environ-Mental System Level	*Living environment*	- Neighbourhood relations mean safety - Proximity facilities socializing - Proximity to work enables walking or biking	- The home environment is demanding - Neighbourhood support is important - Proximity to school and work eases everyday life	- My home is my castle - Living in peace and calm is important - Moving between environments obstructs physical exercise
	Working environment	- Colleagues mean a lot - Enjoying work gives energy for life and health - Problems at work are negative for health	- Worn out from work - Too tired after work for an active life - No other work opportunities for me	- I prefer not to interfere with colleagues - Outdoor job is good for health - Dissatisfaction at work is bad for health
	Nature	- Nature is health-promoting - Nature gives recovery - Nature gives a sense of freedom	- Nature gives strength and recovery - The forest is healing	- Nature gives peace and calm - Nature facilitates physical activity

Ideal type 1: health is the main priority in my life

Individuals in this ideal type are dedicated to a healthy lifestyle, viewing themselves as curious and goal-driven. They perceive setbacks as part of the process but focus on possibilities, integrating exercise into daily routines as an enjoyable necessity: "Sometimes I tag along to the go-cart track, then I run back home. That's a good way to get it into your everyday activities" (woman, 40 years old, participant 2). Their choices are informed by health knowledge and personal or family health histories: "I think I've learned how to handle it better today … when I look back, I can see that I was a bit tougher on myself … today, I do understand more regarding balancing …" (woman, 50 years old, participant 7).

They value family and friends as supportive networks, withdrawing from draining relationships: "Yes, but it's important to have friends and a social network that give you strength, too, and not just eat energy …" (man, 60 years old, participant 17). Socializing often involves physical activity, such as exercising with a "training buddy."

Living and working environments are crucial, with proximity to nature, friends, and work facilitating activity and socialization. A positive work environment boosts energy, while workplace issues negatively affect health.

This ideal type has high health expectations and perceives their health as superior to others'. *Explanation*: This section retains all quotes, examples, and ecological-level details, rephrased for clarity (e.g., "devoted" to "dedicated," "essential" to "crucial").

Ideal type 2: life stands in the way of my health

This ideal type desires health behavior change but feels constrained by life circumstances, prioritizing others: "… my health has always come second" (woman, 40 years old, participant 11). Demanding jobs or family responsibilities, especially caring for children with health issues, limit energy: "Unfortunately you're so worn out at the end of a workday that you don't have energy for anything else …" (man, 60 years old, participant 12).

Social networks are reduced due to these demands, with participants feeling "ordinary people" cannot relate. Online support compensates, offering accessible forums: "There isn't really a real human being … there are various forums and the like online, you do that – otherwise, you wouldn't survive …" (woman, 40 years old, participant 3).

Proximity to work and school eases logistics, and neighborhood support is valued. Physically demanding jobs hinder health behaviors, but nature provides stress relief: "I know that, during periods when I've been thinking a lot, it's been a help many times to go for a walk …" (woman, 50 years old, participant 15). This ideal type has low health expectations and perceives their health as poorer than others'. *Explanation*: All details, quotes, and ecological factors are preserved, with rephrased language (e.g., "no possibility" to "feels constrained").

Ideal type 3: health is not a major concern in my life

This ideal type sees little need for health behavior change, valuing independence and feeling unconcerned about others' opinions: "My health has been rather steady … I have neither had any large issues with my health … I do have a BMI of 43–44 … I do know that …" (woman, 50 years old, participant 13). Motivation is low, with changes postponed: "But it is, I don't feel bad … so I simply have the wrong motivation" (woman, 40 years old, participant 4). Past failed attempts reduce motivation further.

Their social needs are minimal, preferring solitude: "I guess I am a big … lone wolf, so to speak …" (man, 60 years old, participant 12). Negative social experiences lead to withdrawal, and they avoid group exercise. Irregular work hours and solitary preferences result in unhealthy eating.

A calm home environment is a haven, and moving between environments disrupts routines. They prefer solitary work and value nature's calming effect. This ideal type has no specific health expectations and avoids health comparisons. *Explanation*: All quotes and ecological details are maintained, with rephrased terms (e.g., "not a priority" to "not a major concern").

The Ecological System of Obstructing and Enabling Factors for Health-Enabling Behavior Among Different Ideal Types of Health Identity **Figure 2** illustrates enabling and obstructing factors for health behaviors across ecological systems for each ideal type.

At the individual level, ideal types 2 and 3 face barriers—prioritizing others (type 2) or lacking motivation due to satisfactory health (type 3). Ideal type 1 is motivated and opportunity-seeking.

At the interpersonal level, ideal type 2's family and work demands limit time, while ideal type 3's social withdrawal hinders support. Ideal type 1 balances responsibilities and integrates social activity with exercise.

Environmentally, ideal type 2's demanding work depletes energy, and ideal type 3 finds public spaces stressful. All types benefit from nature and proximity to daily destinations. *Explanation*: This section preserves the positional map reference and ecological analysis, rephrased for clarity (e.g., "obstacles" to "barriers").

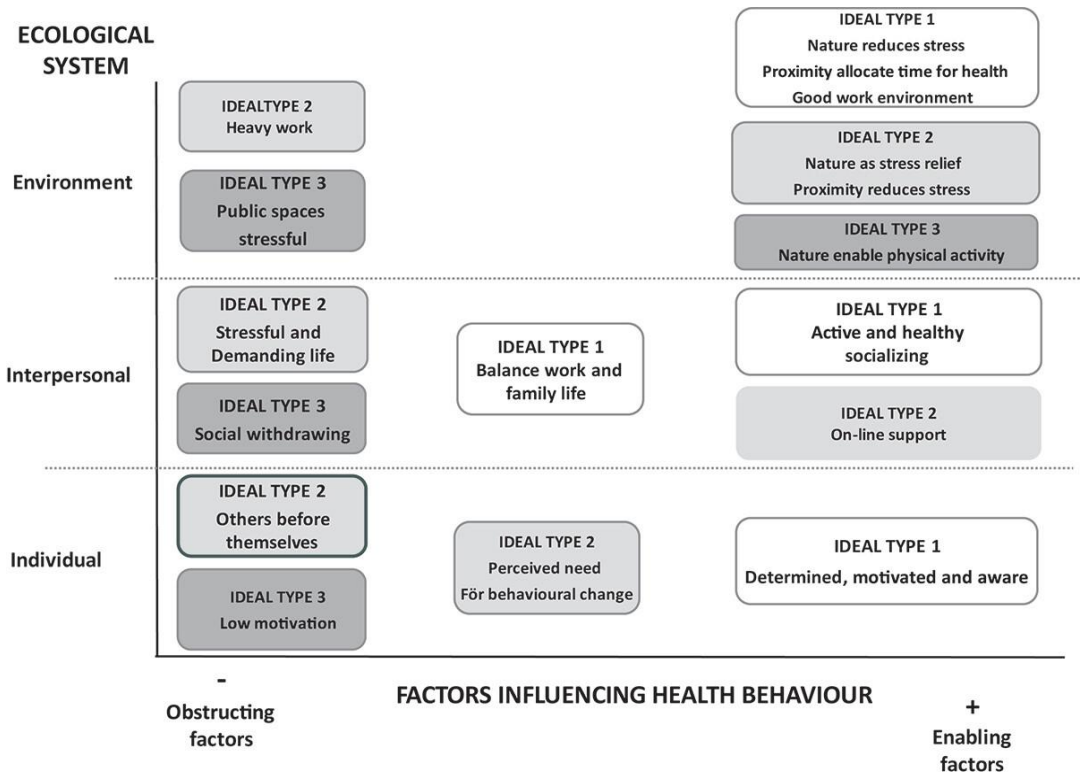

Figure 2. Obstructing and enabling factors in different ecological systems for different ideal types of health identity

At the individual level, ideal types 2 and 3 encounter multiple barriers to engaging in health-promoting behaviours. For ideal type 2, prioritizing others over themselves presents a significant obstacle; even when they perceive a strong need for behavioural change, this is insufficient at the individual level, as their personal health goals are subordinated to the needs of others. In the case of ideal type 3, low intrinsic motivation hinders engagement in health behaviours. This lack of motivation is partly because they perceive their overall health as satisfactory, despite the presence of conventional risk factors such as overweight or sedentary lifestyle. Conversely, ideal type 1 exhibits several enabling factors at the individual level, actively seeking opportunities to adopt a healthy lifestyle. Individuals within this type are motivated, goal-oriented, and conscious of what is required to maintain wellbeing and prevent future illness. At the interpersonal level, ideal type 2 faces a demanding life context, including significant family obligations, which limits time and energy for exercise or preparing nutritious meals. For ideal type 3, social withdrawal acts as a barrier, as they avoid exercising in the presence of others, rendering social forms of support, such as having a "training buddy," ineffective. Ideal type 1 experiences challenges in balancing work and family responsibilities, which could constrain health behaviours. However, they consciously implement strategies to create balance, such as reducing work hours or lowering household expectations, enabling them to prioritize health. Furthermore, ideal type 1 integrates social life with physical activity, transforming social interactions into opportunities for exercise, while ideal type 3 may leverage online social networks to compensate for limited real-life social support, facilitating potential health behaviour change.

Within the environmental system, ideal type 2 faces obstacles due to physically demanding work, which depletes energy needed for additional health-promoting activities. Ideal type 3 finds public spaces stressful, limiting access to gyms or other shared venues for physical activity. All three ideal types identified enabling environmental factors: ideal type 1 benefits from spending time in nature, proximity to workplaces and schools, and supportive work environments, all of which facilitate daily activity. Similarly, ideal type 2 experiences stress relief from nature and logistical ease from close proximity to daily destinations, while ideal

type 3 also perceives engagement with natural environments as motivating for physical activity.

The findings demonstrate that barriers and facilitators of health behaviours manifest in patterned ways according to distinct health identities. Following Grabowski [4], health identity—defined as "observations and expectations concerning one's own health and knowledge about health and in what ways one's own health is related and comparable to the health of others" (p. 141, adapted)—is communicatively constructed and thus flexible, subject to change through interactions with the surrounding environment.

Possessing a health identity in which health is prioritized (ideal type 1) correlates with high motivation and personal agency to maintain and modify health behaviours. For these individuals, personal motivation and health literacy interact with environmental factors, supporting healthy lifestyle maintenance. From a social-ecological perspective, this interaction reflects a reciprocal influence: an individual's active behaviour can encourage activity in their social environment, and conversely, an environment conducive to physical activity facilitates sustained health behaviours [4, 18, 32].

In contrast, ideal type 2, characterized by a health identity where life's demands take precedence over personal health, may experience a sense of powerlessness regarding behaviour change. The interplay between self-perceptions of prioritizing others and a demanding daily life constitutes significant barriers. Social-ecological dynamics further reinforce these behaviours: individuals attentive to the needs of others may encourage their social environment to expect support, strengthening the perception that others' needs outweigh their own health priorities. This aligns with findings from Nieboer and Cramm [32], which showed that older adults in the Netherlands who sought approval from others regarding their healthy lifestyle were less physically active than those who did not, highlighting how social approval can impede health behaviour change.

Individuals with a health identity that does not prioritize health (ideal type 3) typically exhibit low motivation for adopting a healthy lifestyle. At the individual level, low intrinsic motivation interacts with social withdrawal tendencies and an environment that enforces normative health expectations, creating obstacles to behaviour change. Introverted individuals with prior negative experiences in social networks often avoid social interactions, and the more they deviate from societal health norms (e.g., physical fitness), the less likely they are to adopt these behaviours. Research suggests that individuals aligned with social groups are more inclined to follow group norms [33]. In the current study, ideal type 3 participants lack a clear social identification, perceiving themselves as different from others, which further impedes health behaviour change.

These findings indicate that social-ecological interventions could be more effective if tailored to individuals' health identities. Beyond assessing traditional risk factors, evaluating health identities—how people perceive health and their capacity to influence it—may inform the design of targeted health-promotion strategies.

Tailor-made social-ecological interventions could vary depending on the health identity. Individuals with ideal type 1, who prioritize health, may require minimal support from health services to maintain healthy behaviours. Previous studies show that individuals already engaging in health-promoting behaviours are more likely to participate in preventive interventions such as cardiovascular screening [34], while those with less severe mental health issues seek help more readily than those with severe conditions [35]. In contrast, individuals with ideal types 2 and 3 may require more structured support to facilitate necessary behaviour changes.

From a social-ecological perspective, barriers for ideal types 2 and 3 span individual, interpersonal, and environmental systems, although the specific challenges differ. Ideal type 2 struggles with prioritizing personal needs and establishing boundaries, whereas ideal type 3 faces low motivation and limited trust in social support. While these challenges extend beyond a strictly biomedical approach [36], they can be addressed within primary healthcare through psychological and social counselling. However, interpersonal-level obstacles—such as heavy family and work responsibilities for ideal type 2—are not typically addressed by health services, despite almost 50% of sick leave in Sweden being linked to stress or mental health [37, 38]. Addressing these needs could reduce negative outcomes for both individuals and society.

Practical examples of interpersonal-level interventions include private gyms offering childcare or allowing parents to bring children to workouts [39]. Research shows that family responsibilities and work constraints hinder physical activity, while social support and opportunities to exercise with children facilitate participation [40]. Strengthening collaboration between

health services and public, private, or civil society actors could enhance interpersonal-level interventions and support health behaviour change.

For ideal type 1, active and supportive social networks act as facilitators of health behaviours. In contrast, the lack of social support hinders behaviour change for ideal types 2 and 3. Interventions to enhance social support, though still relatively rare in Sweden, include self-help groups, mentorship or buddy systems, and initiatives to increase social interactions or practical support [12, 41]. Online social support may be particularly beneficial for individuals with heavy family or work obligations, as seen in ideal type 2. Online peer-to-peer connections can help individuals with serious mental illness reduce stigma and access digital wellbeing interventions [42]. Similarly, the Star C programme [43] develops personalized digital coaching to promote health behaviour change, which could support individuals with health identities resembling ideal type 2.

Environmental factors and nature as a health-promoting resource

Across all health identity types, participants emphasized the positive effects of spending time in nature. Research supports these findings, showing that access to green spaces reduces stress and encourages physical activity [44-47]. Jimenez *et al*. [46] reported benefits of nature exposure on cognitive function, brain activity, blood pressure, mental health, physical activity, and sleep. Interventions incorporating "physical activity prescriptions" already exist [48, 49], and our results suggest that promoting "time in nature" as a structured intervention could be similarly beneficial. Implementing such initiatives would likely benefit from collaboration between health services and outdoor organizations.

Conclusion

This study highlights that enabling and obstructing factors for health behaviours operate across individual, interpersonal, and environmental levels, interacting differently depending on health identity—how individuals perceive their health and their ability to influence it. Screening for health identities within healthcare settings could support the development of tailored interventions. While screening for health identities has been suggested for children and adolescents [4], it may be particularly valuable in population-based interventions for middle-aged adults, such as the VIP programme.

Our findings also indicate that many factors influencing health behaviour are not typically addressed by the health system, even though neglecting them can undermine health outcomes. Addressing these broader determinants aligns with the WHO's social determinants of health (SDH) framework, which emphasizes that health inequities are shaped by the conditions in which people are born, grow, live, work, and age [20]. Effective interventions, therefore, require multi-sectoral collaboration across public, private, and civil society sectors. Screening for health identities combined with examples of multi-sectoral action could provide a foundation for designing tailored, social-ecological interventions.

Methodological considerations

The credibility of qualitative research depends on transparency and reflection on the research design, including sampling, data collection, and analysis [50]. Individual interviews were appropriate to capture in-depth experiences of health and health behaviours [27], whereas focus groups would have limited exploration to collective attitudes rather than individual experiences [51].

Prolonged engagement by three lead researchers enhanced the study's trustworthiness through investigator triangulation. ME, LS, and KL were involved in all stages, from design to analysis, and engaged in regular peer-debriefing. Their multidisciplinary perspectives strengthened interpretation: ME is a social worker focusing on social determinants of health, LS is a psychologist with expertise in health behaviour and mental health, and KL is a nutritionist researching complex health interventions. Additional peer validation from AS, HL, and NN during later stages further supported the trustworthiness of findings.

Grounded theory enabled the construction of analytical categories beyond mere description, allowing the development of ideal types of health identity and identification of factors influencing health behaviour change. While these constructs may be transferable to other settings, further research is needed to explore applicability.

Sampling aimed for diversity in residence, education, sex, and age. Although no clear patterns emerged based on these factors, the small sample size and low proportion

of men (4/17) limited subgroup analyses. Sex and age may influence health identity and behavioural change, warranting further study. Future research could also focus on developing instruments to measure health identities for broader quantitative application.

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