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Penforntis, K.M.; Van Vliet, M.H.M.; Haeseler, E.F. von; Gebhardt, W.A.; Meijer, E.

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BMJ Open Conceptualisation, operationalisation and role of identity in physical activity and smoking in individuals aged 45 and over: a systematic scoping review

Kristell M Penforis ¹, Milon H M van Vliet ^{2,3}, Emma F Von Haeseler,¹ Winifred A Gebhardt,¹ Eline Meijer ^{2,3}

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¹Institute of Psychology, Unit Health, Medical and Neuropsychology, Leiden University, Leiden, The Netherlands

²Department of Public Health & Primary Care, Leiden University Medical Center, Leiden, The Netherlands

³National eHealth Living Lab, Leiden University Medical Center, Leiden, The Netherlands

Correspondence to
Dr Eline Meijer;
e.meijer@lumc.nl

ABSTRACT

Purpose Identity is a determinant of health-promoting behaviours such as physical activity and health-compromising behaviours such as smoking. This scoping review provides a comprehensive synthesis and comparison of the relationship between physical activity- and smoking-related identity and behaviour, and how these identities are defined and measured. Study participants' personal, physical activity-related and smoking-related characteristics were considered if data were available. The review focuses on people aged 45 and above.

Methods A search across 9 databases yielded 5801 unique publications. Ensuing careful screening, 268 peer-reviewed empirical studies met eligibility criteria, of which 45 concerned participants of 45+ age. Experts in the field contributed to validating and structuring the narrative.

Results Findings revealed the existence of an intricate, enduring direct and indirect relationship between identity and behaviour for physical activity and smoking. Numerous similarities and differences in this relationship, as well as in identity-related terminology and measurement tools used, were identified. In essence, endorsing an identity related to physical activity and smoking abstinence was found to be important for becoming physically active and quitting smoking successfully, respectively. Identity processes, encompassing identity formation, maintenance, change and loss, were detected as applicable to both physical activity and smoking, although differences were observed between the two behaviours. Characteristics such as gender, age and behavioural history emerged as relevant in shaping smoking-related and physical activity-related identities.

Conclusions Despite variances, findings suggest that the relationship between identity and behaviour, including associated processes, may not fundamentally differ between health-promoting and health-compromising behaviours. Avenues for future research, including exploring causality between identity and behaviour, are proposed.

INTRODUCTION

Scholars have advocated for integrating identity into behavioural theories for 35 years.¹ Identity, which answers the question 'Who

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Pioneers in its synthesis and comparison of identity terminology, labels, measurement tools in relation to both physical (in)activity and smoking (cessation).
- ⇒ Adopted a rigorous, multifaceted methodology including adhering to established scoping review frameworks and integrating both AI technologies and human input for efficient study selection.
- ⇒ Draws on 30 years of research across multiple disciplines, enriching the evidence base and offering a wide-ranging perspective on identity in relation to physical activity and smoking.
- ⇒ Findings focused on middle-aged to older adults and may not fully extend to younger populations.
- ⇒ Quality assessment of included studies may have strengthened the reliability and validity of findings, although expert contributions provided a valuable alternative.

am I?', is constructed from self-perceptions of oneself. It can encompass sociodemographic characteristics (eg, woman), societal roles (eg, devoted friend, parent) or social classifications (eg, smoker, fitness enthusiast).² Multiple theories have since then incorporated identity as a behavioural determinant. For instance, identity theory³ suggests that important salient identities (eg, healthy person) guide behaviour (eg, going for a walk at lunch). Social identity theory⁴ proposes that significant parts of one's identity stem from affiliations with social groups (eg, yoga class attendee), and that this social identity can influence behaviour (eg, purchase yoga pants) through a desire to belong to the 'ingroup'. Possible Selves Theory⁵ underscores that present behaviour (eg, regular physical activity (PA)) is guided by the desire to achieve or avoid certain future identities (eg, grandparent (un)able to play with grandchildren). In line with theory, empirical studies consistently demonstrate



that identity significantly influences (health) behaviours like PA and smoking, even beyond other predictors.^{6–8} To illustrate, PA-related identity gets consistently linked to PA behaviour,^{6 9–11} and smoking-related identity to smoking and quitting behaviours.^{12–16} Importantly, identity processes may potentially differ between health behaviours one should increase (eg, PA, healthy diet) versus those one needs to abandon (eg, smoking, drinking alcohol). That is, the first mostly consists of the development of something new (eg, a physically active identity), whereas the latter may be experienced as the loss of existing behaviour and particularly the meanings associated with it (eg, smoker identity). Investigating whether identity influences behaviour similarly for behaviours to increase vs those to abandon is interesting, and the focus of this review. The review focused on PA and smoking cessation, as smoking and physical inactivity, individually and especially when co-occurring, are major risk factors for disease^{17–19} and early mortality,²⁰ with smoking being the primary preventable risk factor. PA is a health-promoting behaviour which should be increased, while smoking is a health-compromising behaviour which should preferably be quit.^{21 22} In addition to furthering understanding of identity processes, the combined focus on PA and smoking cessation also has potential practical benefit. Quitting smoking has been found to facilitate PA through increased lung function,²² and increasing PA can facilitate smoking cessation by increasing quit intention²³ and reducing urges to smoke.²⁴ In other words, literature indicates a synergy between quitting smoking and increasing PA, and a better understanding of the role of identity in these processes may help to take advantage of this in supporting health behaviour change.

Despite substantial research, there is no comprehensive and up-to-date aggregation of knowledge regarding the identity-behaviour relation in the context of PA and smoking. Earlier syntheses are outdated,^{25–28} focus on youth only,²⁵ exclude physically inactive populations²⁶ or report limited results regarding the role of identity in smoking behaviour.¹³ This review is the first to aggregate knowledge for both PA and smoking. The lack of aggregation and overview of the existing knowledge may stem from variations in definitions and operationalisations of identity.⁸ Addressing this, the present review maps the conceptualisation and operationalisation of identity, and potential differences therein between PA and smoking.

This scoping review concentrates on middle-aged and older adults (>45 years old) because research indicates longer engagement in behaviour increases the likelihood of it becoming engrained in one's identity.²⁹ Besides, health risks of physical inactivity and smoking increase exponentially after the age of 45,^{30–33} emphasising the importance of studying this demographic when trying to understand how identity and behaviour are related. The primary aim of this scoping review is to synthesise and compare how PA-related and smoking-related identity are conceptualised and operationalised, and their

relationship with the respective behaviours, and precursors thereof, in individuals aged 45 and above.

PA and smoking behaviours and identities may vary depending on personal, PA-related and/or smoking-related characteristics. To illustrate, men³⁴ and individuals with lower socioeconomic positions (SEPs)^{35 36} tend to be less physically active and smoke more. Additionally, older individuals²⁹ and those with greater nicotine addiction¹⁴ tend to identify more strongly with smoking. Therefore, a subsidiary aim of this review is to synthesise, if data are available, the role of personal-related, PA-related and/or smoking-related characteristics in the relation between smoking-related and PA-related identities and behaviours.

MATERIALS AND METHODS

A scoping review was most fitting, allowing us to comprehensively synthesise and compare findings across diverse research areas, employing diverse methodologies. The most important parts of the methodology are detailed in steps 1–6, and changes made to the original protocol are detailed below. The full methodology is detailed in our published scoping review protocol.³⁷ Materials and methods in this review follow guidelines outlined in Levac *et al*'s³⁸ methodological framework for scoping reviews and align with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines³⁹ and those by the Joanna Briggs Institute.⁴⁰

Changes to protocol

Overall, we closely adhered to the review protocol, although some changes were made. First, the scoping review protocol originally had two research aims.³⁷ However, the methodologies for studies providing answers to the first aim varied widely, while those addressing the second aim were more uniform. To ensure comprehensive coverage of our research aims and to adequately represent the evidence from retrieved studies, we opted to conduct two separate reviews: a scoping review addressing the first aim and a systematic review addressing the second. The present scoping review aggregates and synthesises existing knowledge about identity in the contexts of PA and smoking. The parallel systematic review examines interventions aimed at influencing PA-related and smoking-related identity. Second, the focus on the 45+ age group in this review represents another amendment to the initial protocol. Without this age restriction, findings from 268 studies should have been described and discussed (instead of the current number of 45 studies, see [figure 1](#)), which would not have been possible in an equally comprehensive manner. We chose to focus on the 45+ group (vs a younger group) for theoretical and societal reasons. That is, behaviours may be more engrained in identity at this age, and quitting smoking and increasing PA become more urgent with increasing risk of adverse health outcomes. Third, we included studies with

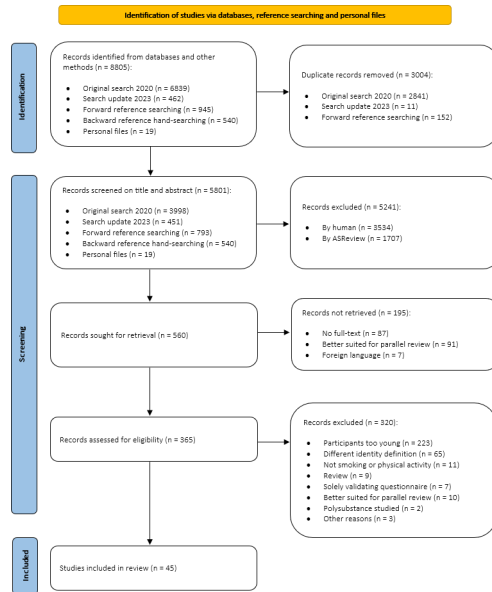


Figure 1 PRISMA flow chart. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

sufficiently and insufficiently physically active individuals, rather than only insufficiently active individuals. This decision was made as this enriches our understanding of the identity processes involved in the (gradual) differences between levels of activity. Fourth, when performing the search and data extraction, it became apparent that the literature allowed for an exploration of precursors of PA and smoking behaviour (eg, intention), relationships between identity and behaviour, and a narrative comparison between identity processes in the context of PA and smoking. As the current scoping review aimed to capture the available knowledge, these topics were included in the review as well. Finally, the procedure used for the consultation phase (step 6) was adapted to better fit the manuscript we had at that stage. We included experts in (health) behaviour change and identity to help us triangulate the findings in view of the existing literature and to clarify and structure the narrative of the review. Finally, we chose not to include people who smoke/are insufficiently physically active nor coaches in the consultation phase. Their participation was deemed more important for the development of the digital ‘Perfect Fit’ intervention (see⁴¹) that was built based on, among other things, the insights of this scoping review and the systematic review on the effectiveness of identity-based interventions.

Step 1: research questions

1. How is identity related to PA and smoking conceptualised and operationalised in individuals aged 45 and older, and what differences and similarities exist between the two behaviours?
2. What is known about how PA-related and smoking-related identity relates to PA and smoking behaviour, and precursors thereof, in adults aged 45 and over, and what similarities and differences exist between the two behaviours?

3. What part do personal characteristics (eg, demographics, smoking-related and PA-related) play in the relation between PA-related and smoking-related identity and behaviour?

Step 2: identifying relevant studies, eligibility criteria, information sources and search Eligibility criteria

Retrieved records were assessed against the PRISMA-ScR Concepts, Context and Participants criteria detailed in the protocol.³⁷ The full list of eligibility criteria can be found in online supplemental file 1.

Concepts

This scoping review includes empirical studies examining identity related to PA and smoking on the one side and physical (in)activity and/or smoking behaviours, or precursors of behaviour (eg, intention, attitudes, motivation) on the other.

In this review, PA refers to ‘bodily movements produced by skeletal muscles that require energy expenditure’,⁴² like walking, gardening or exercising. Smoking behaviour refers to using tobacco (any type) or electronic cigarettes. Identity refers to self-perceptions that we have of ourselves as an individual (eg, self-identity, such as ‘I am a person who smokes’) and based on group memberships (eg, group identity or social identity, such as ‘I belong with people who smoke’). Records studying concepts differing from above definitions were excluded (full list of excluded/included concepts in online supplemental file 2).

Types of evidence

The review includes published, peer-reviewed empirical studies with no restrictions regarding the publication year. Conference abstracts, book(s) chapters and commentaries were excluded, but their reference lists were searched for relevant studies. To include original data only, reviews were eliminated after examining their reference lists.

Participants

This review includes studies with participants aged 45+ (on average) within studies investigating identity in PA and smoking. This study did not include direct involvement from patients or the public in its design, conduct or analysis.

Identifying relevant studies, information sources and search

Following Joanna Briggs Institute guidelines,⁴⁰ we employed a three-step search strategy (full details in the protocol). The search strategy was refined three times to retrieve relevant records from PubMed, PsycINFO, Embase, Emcare, Web of Science Core Collection, Wiley Cochrane Library, Psychology, Behavioural Sciences Collection and Academic Search Premier (see online supplemental file 3 for the search strings). Backward reference searching was done after title and abstract screening and forward reference searching after full-text



screening. The initial search was carried out in December 2020 and a search update in May 2023.

Step 3: screening and selecting studies

Once duplicates were removed, results of database searches were uploaded to ASReview⁴³ and Rayyan QCRI,⁴⁴ as explained in the protocol. Two independent reviewers (MHMV and KMP) conducted two rounds of title and abstract screening, and two reviewers (EFVH and KMP) independently screened full texts against eligibility criteria. Most full texts were available online. If not, the authors were contacted by email and requested to send the full-text version. Records marked as ‘included’ during title and abstract screening were exported to an Excel file, and their full texts screened against eligibility criteria. Reasons for exclusion were meticulously recorded (see figure 1). The screening manual was developed iteratively (see Anderson *et al*⁴⁵); the final version can be found in online supplemental file 1.

During title and abstract screening, records were categorised as appropriate for the scoping review or the systematic review on interventions (EFVH). Categorisation was verified during full-text screening (KMP). In both phases, the second reviewer (KMP) screened 10% of the records. For title and abstract screening, we achieved moderate agreement with Cohen’s k ⁴⁶ of 0.59 (weak-to-moderate) and absolute agreement of 86.4% (moderate-to-high). For full-text screening, agreement was moderate-to-high, with a Cohen’s k of 0.73 (moderate) and absolute agreement of 94.7% (high).⁴⁷ Disagreement was resolved through discussion among reviewers or consultation with an additional coauthor (EM). Before full-text screening, the age criterion (focusing on participants 45+ years of age) was applied to studies categorised as appropriate for the current scoping review (see figure 1).

Step 4: data charting

Two reviewers (EFVH and KMP) independently charted data from full-texts in Excel, extracting key information: study details (author(s), publication year, language, studied behaviours (PA and/or smoking), country), aim(s), methodology (design, measures, participants, procedure, analyses), findings related to the scoping review concepts and study limitations. When available, information about study participants’ demographic characteristics (age, gender, body mass index (BMI), ethnicity, SEP, marital status), PA-related characteristics (amount and type of PA) and smoking-related characteristics (smoking heaviness, smoking years, smoking onset, smoking type, previous quit attempts, nicotine dependence) was also extracted. Where required, authors of included studies were contacted to request full texts or missing/additional information.

Step 5: collating, summarising and reporting the results

None of the included articles studied smoking and PA together, therefore, the evidence was summarised separately for both health behaviours. First, we compiled

descriptive numerical summaries of study characteristics. Second, we compiled descriptive numerical summaries of how identity was conceptualised and operationalised (RQ1), and organised findings in three sections: (1) terminology related to identity, (2) identity labels employed, which represent concrete expressions of identity and (3) tools used to measure identity. Similarities and differences here between PA and smoking were identified and synthesised. Within the section on identity terminology, we classified terms as ‘individual level’, reflecting self-perceptions of oneself or ‘interpersonal level’, referring to self-perceptions as (non)member of a certain group or social category, based on degree of identification with others from that group. Third, we synthesised the relationship between PA-related and smoking-related identity and behaviour (RQ2), and the role of personal characteristics (RQ3). We organised these findings into key themes and compared similarities and differences between PA and smoking. ChatGPT was used to correct spelling and grammatical errors and to shorten the manuscript.

Step 6: consultation

As part of their methodological framework for scoping reviews, Levac *et al*³⁸ recommend a consultation phase. This phase allows authors to garner feedback and to gain additional insights on the findings of the review (see also⁴⁸). An early version of this review was presented to a group of eleven Behavioural Scientists and Health Psychologists with substantial expertise in (health) behaviour change (see Acknowledgement section). Next, a revised version was presented to three experts on identity in the context of smoking and/or PA behaviours (RW, BvdP, CvL, see Acknowledgement section). In both rounds, the experts were asked to reflect on the content and structure of the present review. All of them provided useful suggestions to present the content more clearly, and the three identity experts in particular also indicated that, to their knowledge, the results fully captured the relevant literature.

Patient and public involvement

None.

RESULTS

The two systematic search rounds across 9 databases yielded 8805 records. Following the removal of duplicates ($n=3004$), we screened 5801 titles and abstracts, and subsequently assessed 365 full-text articles for eligibility. Among these, 45 articles fulfilled the eligibility criteria and were incorporated into this review. See figure 1 for details on the inclusion/exclusion process.

Description of the included studies

Most included studies focused on PA ($n=35$) rather than smoking ($n=10$), with none examining both health behaviours. There was no apparent difference in research design, participants’ background, or country of origin between studies focused on PA versus smoking. The only

notable difference was that only studies on PA employed possible future-self methodologies. See online supplemental file 4 for an overview of study characteristics.

Conceptualisation and operationalisation of PA-related and smoking-related identity

Identity terminology

Across studies, eight identity constructs were classified as individual level, and two as interpersonal level. Despite nuances and variation in terminology used, there appears to be significant overlap, for example, the individual level term 'self-identity' resembles 'self-definition', 'self-schema', 'self-concept' and 'self-perceptions'. Similarly, the interpersonal-level terms 'social identity', 'group identity' and 'collective self-esteem' were used almost interchangeably. The terms 'possible selves', 'role identity' and 'integrated regulation' at the individual level were distinct from the others, and therefore, placed in a separate category. An overview of the identity terminology used in included studies is presented in [table 1](#).

Summary of findings and similarities and differences between PA and smoking

The terminology used in both PA and smoking studies was diverse, but associated definitions presented much overlap. There was more consistency in the terms used in studies on smoking compared with studies on PA, namely 'self-identity' at the individual level and 'social identity' at the interpersonal level.

Identity labels

An overview of identity labels employed in included studies is presented in [table 2](#). Included studies reported a variety of identity labels specific to either PA or smoking, which illustrates variety in the expression of identity in relation to PA and smoking.

In studies on PA, a greater number of identity labels were identified on the individual level than on the interpersonal level. Individual-level labels typically leaned towards physical inactivity (eg, 'not a gym person'), physical capability (eg, 'someone who is physically inclined') or PA-intensity, with a distinction between general PA such as walking or doing household chores (eg, 'someone who keeps physically active') and exercise (eg, 'runner'). Overall, 'exercise self-identity' was the most frequently used label, followed by 'physical activity identity'. Although some labels reflected the type of sports one engages in (eg, 'volleyball player'), interpersonal-level identity ones generally reflected a sense of belonging to a group engaging in certain PA (eg, 'runner group identity').

In smoking studies, identity labels predominantly revolved around smoking and not smoking, at both the individual level (eg, 'smoker self-identity', 'ex-smoker') and interpersonal level (eg, 'smoker social identity', 'non-smoker social identity'). Individual-level labels often depicted internal negotiations when behaviour and identity did not (fully) align, such as indicating behaviour change ('someone who does not now smoke') or attempts at behaviour change ('smoker trying to quit smoking').

Some labels highlighted complex relationships with the smoking-related identity, including when people identified as smokers but enforced abstinence ('smoker self-forced to abstain'), identified as smokers only in specific social settings ('social smoker'), or chose to quit smoking while still identifying as smokers ('smoker who has chosen to no longer smoke'). Some even actively denied their smoker identity while continuing to smoke ('non-identifying smoker'). On the interpersonal level, identity labels were less varied and diverse, did not include negotiations, and generally reflected identification with specific social groups (eg, 'smoker social identity'). Furthermore, the label 'vaper' underscored the existence of a distinct self- and social vaping identity among e-cigarette users, separate from an identity related to smoking tobacco.

Summary of findings and similarities and differences between PA and smoking

In studies on smoking, identity labels mainly reflected a smoking/non-smoking dichotomy and highlighted negotiations in identity expression misaligned with behaviour. Conversely, in studies on PA, identity labels extended beyond the engagement/non-engagement dichotomy and reflected physical inactivity, PA capabilities, PA intensity and belonging to a group engaging in certain PA.

Identity measurement

Identity measurement involved quantitative and qualitative methods, with various approaches. An overview of tools used to measure identity in included studies is presented in [table 3](#).

Qualitative methodologies were used in both studies on PA and smoking. Identity-related themes emerged from participant interviews or focus groups, with three approaches: (1) asking participants to describe their perceptions and experiences related to PA and/or smoking, and extracting identity-related themes during data analysis, (2) asking questions about identity in relation to PA or smoking directly and (3) asking participants to describe possible future selves related to PA, triggering reflection about their identity and the extent to which certain behaviours were in line with it, and extracting identity-relevant data during data analysis.

Quantitative methodologies were also used in both studies on PA and smoking, with distinct variations. Validated questionnaires, measurement tools priorly used in research and methodologies related to possible future selves were only used in studies on PA, while single-item questionnaires were exclusively used in studies on smoking.

In the majority of PA studies using the Exercise Identity Scale,⁴⁹ the scale was adapted to ask about PA rather than exercise, that is, 'I consider myself an exerciser' was adapted to 'I consider myself a physically active person'. This adaptation was based on the preference of middle-aged/older individuals, who found 'physical activity' more representative of the type and intensity of their PA than 'exercise'.⁵⁰ Importantly, this adaptation was not found to affect the internal consistency of the questionnaire.⁵⁰

**Table 1** Overview of identity-related terminology used in included studies (n=45)

Identity constructs			Number of studies	References
Individual level	Similar definitions	Self-identity (Self-perceptions of the self within the social and physical environment—definition from Identity Theory ³)	29	<i>Physical activity</i> : Dionigi ⁵⁸ 2002; Eynon ⁸⁸ 2018; Hardcastle ⁵¹ 2005; Havitz ⁶⁰ 2013; Hansen ⁶⁴ 2014; Huffman ⁵⁴ 2022; Jin ⁶⁸ 2021; Kenter ⁸⁶ 2015; Liechty ⁶¹ 2014; Lorentzen ⁹⁰ 2007; Murray ⁶⁵ 2022; Perras ⁷¹ 2015; Perras ⁷² 2016; Pentecost ⁷⁵ 2011; Rhodes ⁵⁷ 2023; Rossing ⁵³ 2016; Schumacher ⁶⁶ 2019; Son ⁶² 2009; Son ⁶³ 2011; Springer ⁸⁹ 2013; Strachan ⁵⁰ 2010 <i>Smoking</i> : Callaghan ⁷⁸ 2021; Farrimond ⁸⁴ 2017; Leas ⁷⁹ 2015; Meijer ⁸⁰ 2018; Notley ⁸¹ 2018; Smith ⁹² 2020; Vangeli ⁸³ 2012; Vangeli ⁸² 2010
		Self-concept (Subjective importance of the behaviour to the conception of self—definition from article)	1	<i>Smoking</i> : Rodriguez ⁹¹ 2019
		Self-perceptions (Self-perceptions of ourselves and our abilities—theoretical ground of definition not specified—definition from the Cognitive approach to the self-concept ¹²⁰ and Self-Perception Theory ¹²¹)	4	<i>Physical activity</i> : Leavy ⁷⁰ 2010; Sheehy ⁷⁶ 2017; Whaley ⁸⁵ 2005 <i>Smoking</i> : Brown ⁷⁷ 1996
		Role identity (How behaviour has been integrated in one's identity—definition from article)	1	<i>Physical activity</i> : Huffman ⁵⁴ 2022*
		Self-definition (Self-views about the self—definition from article)	3	<i>Physical activity</i> : Hays ⁵² 2005; Hays ⁵⁵ 2010; Morgan ⁹⁴ 2021
		Self-schema(ta) (Information and beliefs about the self which guide perceptions of the world and processing of self-related information—definition from the Self-Schema Model ¹²²)	2	<i>Physical activity</i> : Hays ⁵² 2005; Whaley ⁹³ 2002
	Distinct definitions	Integrated regulation (The highest form of extrinsic motivation in which behaviour is self-congruent—definition from Self-Determination theory ¹²³)	1	<i>Physical activity</i> : Huffman ⁵⁴ 2022
		Role identity (An internalised meaning of and behavioural response to a role that one applies to themselves (eg, parent, teacher)—definition from Identity Theory ³).	7	<i>Physical activity</i> : Bailis ⁶⁷ 2008; Hardcastle ⁵¹ 2005; Kenter ⁸⁶ 2015; Kullman ⁶⁹ 2023; Perras ⁷¹ 2015; Perras ⁷² 2016 <i>Smoking</i> : Vangeli ⁸³ 2012
		Possible selves (Ideas about what one might become in the future which can guide behaviour by connecting the present self to the future-self—definition from Possible Selves Theory ⁵)	7	<i>Physical activity</i> : Kenter ⁸⁶ 2015; Perras ⁷¹ 2015; Perras ⁷² 2016; Sheehy ⁷⁶ 2017; Whaley ⁷⁴ 2003; Whaley ⁸⁵ 2005; Yoshigai ⁸⁷ 2023
	Interpersonal level	Similar definitions	Social/group identity (The degree of identification with others who have comparable characteristics, an in-group—definition from Social Identity Theory ⁴)	16
Collective self-esteem (Self-evaluation as a member of a social group—definition from Crocker and Luthanen ¹²⁴)			1	<i>Physical activity</i> : Bailis ⁶⁷ 2008

For conciseness purposes, only the first author of each publication is mentioned in this table.

*In this study, the term 'role identity' was used to refer to what other studies using the same measurement device referred to as 'self-identity' and was therefore placed within the individual level category.

This preference was confirmed in several reviewed studies with different research designs.^{51–53}

One PA study⁵⁴ compared two validated questionnaires, the Exercise Identity Scale and the Behavioural Regulation in Exercise Questionnaire version 3

(which measures extrinsic and intrinsic motivation for engaging in a behaviour). The study found both questionnaires to be valid and reliable for measuring PA-related identity. However, when using the Exercise Identity Scale, scholars interested in measuring

Table 2 Overview of identity labels employed in included studies (n=45)

Behaviour	Identity level	Identity label	Number of studies	References	
Smoking	Individual level	Related to smoking/vaping	Smoker	6	Brown ⁷⁷ 1996; Callaghan ⁷⁸ 2021; Meijer ⁸⁰ 2018; Notley ⁸¹ 2018; Vangeli ⁸² 2010; Vangeli ⁸³ 2012
			Vaper	1	Farrimond ⁸⁴ 2017
			Non-identifying smoker	1	Leas ⁷⁹ 2015
			Addicted smoker	1	Smith ⁹² 2020
			Relapsed smoker	1	Notley ⁸¹ 2018
		Related to not smoking	Smoker self-forced to abstain	1	Vangeli ⁸³ 2012
			Smoker trying to quit	1	Callaghan ⁷⁸ 2021
			Social smoker (ie, who smokes only in social situations)	1	Smith ⁹² 2020
			Smoker who has chosen to no longer smoke	1	Callaghan ⁷⁸ 2021
			Non-smoker	7	Brown ⁷⁷ 1996; Callaghan ⁷⁸ 2021; Meijer ⁸⁰ 2018; Notley ⁸¹ 2018; Rodriguez ⁹¹ 2019; Vangeli ⁸² 2010; Vangeli ⁸³ 2012
	Interpersonal level	Related to smoking	Someone who does not now smoke	1	Notley ⁸¹ 2018
			Ex-smoker	2	Vangeli ⁸³ 2012; Vangeli ⁸² 2010
		Related to not smoking	Smoker social identity	2	Notley ⁸¹ 2018; Vangeli ⁸³ 2012
			Vaper/vaping social identity	1	Farrimond ⁸⁴ 2017
			Non-smoker social identity	2	Brown ⁷⁷ 1996; Vangeli ⁸³ 2012
Team stop-smoker	1	Vangeli ⁸³ 2012			
Physical activity (PA)	Individual level	Related to physical activity	Physical activity identity	7	Hansen ⁶⁴ 2014; Leavy ⁷⁰ 2010; Lorentzen ⁹⁰ 2007; Perras ⁷¹ 2015; Perras ⁷² 2016; Rhodes ⁵⁷ 2023; Strachan ⁵⁰ 2010
			Physically active self	2	Springer ⁸⁹ 2013; Tierney ⁷³ 2011
			Someone who keeps physically active	1	Whaley ⁹³ 2002
			Active person	2	Springer ⁸⁹ 2013; Whaley ⁹³ 2002
		Related to exercise	Exercise identity	12	Eynon ⁸⁸ 2018; Hardcastle ⁵¹ 2005; Hays ⁵² 2005; Huffman ⁵⁴ 2022; Murray ⁶⁵ 2022; Pentecost ⁷⁵ 2011; Rossing ⁵³ 2016; Schumacher ⁶⁶ 2019; Sheehy ⁷⁶ 2017; Son ⁶² 2009; Son ⁶³ 2011; Whaley ⁹³ 2002
			Runner	1	Kullman ⁶⁹ 2023
			Volleyball player	1	Kirby ⁵⁹ 2013
			Athletic identity*	1	Sheehy ⁷⁶ 2017
			Functional exerciser	1	Leavy ⁷⁰ 2010
			Related to physical capabilities	Physically capable person	2
	Related to physical inactivity	Someone who is physically inclined	1	Whaley ⁹³ 2002	
		Not a gym person	1	Tierney ⁷³ 2011	
		Not a sporty person	1	Tierney ⁷³ 2011	
	Interpersonal level	Related to physical activity	Not a real athlete	1	Rossing ⁵³ 2016
			PA social identity	2	Rossing ⁵³ 2016; Sheehy ⁷⁶ 2017
			Related to exercise	Sports social identity	1
		Social exerciser	1	Jin ⁶⁸ 2021	
		Volleyball player	1	Kirby ⁵⁹ 2013	
		Runner group identity	1	Kullman ⁶⁹ 2023	

For conciseness purposes, only the first author of each publication is mentioned in this table. Certain labels were used in multiple studies.

*In the study using this identity label (Sheehy *et al*⁷⁶), the term athletic identity is used in relation to leisure exercise, not (competitive) sports as might be deducted from the athletic component of the identity label.

Table 3 Overview of identity measurement tools used in included studies (n=45)

Characteristics			Number of studies	References
Qualitative	Interviews or focus groups	Participants asked about perceptions of and/or experiences with smoking or PA behaviours and identity-related themes extracted during data analysis	16	PA: Dionigi ⁵⁸ 2002; Eynon ⁸⁸ 2018; Hays ⁵² 2005; Jin ⁶⁸ 2021; Kirby ⁵⁹ 2013; Kullman ⁶⁹ 2023; Leavy ⁷⁰ 2010; Liechty ⁶¹ 2014; Notley ⁸¹ 2018; Pentecost ⁷⁵ 2011; Rossing ⁵³ 2016; Springer ⁸⁹ 2013; Tierney ⁷³ 2011; Whaley ⁹³ 2005; Yoshigai ⁸⁷ 2023 <i>Smoking</i> : Brown ⁷⁷ 1996
		Participants asked about self-views in relation to smoking and PA during interview (eg, 'Do you view yourself differently now that you are not smoking compared with when you were smoking?').	5	PA: Hardcastle ⁵¹ 2005; Kenter ⁸⁶ 2015; Sheehy ⁷⁶ 2017; Whaley ⁹³ 2002 <i>Smoking</i> : Vangel ⁸³ 2012
		Participants asked to describe possible future selves related to smoking or PA (approach specific to studies on possible future selves).	2	PA: Perras ⁷¹ 2015; Kenter 2015
Quantitative	Validated questionnaires	Exercise Identity Scale ⁴⁹	10	PA: <i>Original 9-item scale</i> : Murray ⁶⁵ 2022; Schumacher ⁶⁶ 2019; Son ⁶² 2009; Son ⁶³ 2011 <i>Modified version</i> : Huffman ⁵⁴ 2022 (PA identity*); Lorentzen ⁹⁰ 2007 (PA-identity* and 4-item version); Perras ⁷¹ 2015 (PA-identity*); Perras ⁷² 2016 (PA-identity*); Rhodes ⁵⁷ 2023 (Only the role identity sub-scale); Strachan ⁵⁰ 2010 (PA-identity*) ^{71 90}
		Behavioural Regulation in Exercise Questionnaire, including subscale for integrated regulation ^{125 126}	1	PA: Huffman ⁵⁴ 2022
		Modified Involvement Scale (of which two subscales are 'identity affirmation' (a proxy for social PA identity) and 'identity expression' (a proxy for PA self-identity)) ¹²⁷	1	PA: Havitz ⁶⁰ 2013
		Social Identity Questionnaire for Sport by Bruner and Benson ¹²⁸	1	PA: Lin ⁵⁶ 2022
		Physical Activity Self-Definition Model by Kendzierski and Morganstein ¹²⁹	1	PA: Morgan ⁹⁴ 2021
	Questionnaires used in prior research	Possible Selves Instrument ¹³⁰	4	PA: Perras ⁷¹ 2015; Perras ⁷² 2016; Whaley ⁷⁴ 2003; Whaley ⁹³ 2005
		Collective self-esteem scale ¹²⁴	1	PA: Bailis ⁶⁷ 2008
		Exercise Schemata Scale ^{131 132}	1	PA: Whaley ⁹³ 2002
	Self-developed measurement tool	Exercise Self-Definition Scale ⁵²	2	PA: Hays ⁵² 2005; Hays ⁵⁵ 2010
		Subjective Importance of Smoking (Final validation phase of the questionnaire)	1	<i>Smoking</i> : Rodriguez ⁹¹ 2019
		Ranking of statements reflecting personal views and understanding including identity-related statements: 'To stop vaping would be to lose part of myself', 'I'm proud to be labelled a 'vaper', 'I'm not a vaper, I'm just someone who happens to use e-cigarettes'.	1	<i>Smoking</i> : Farrimond ⁸⁴ 2017
		Degree to which four statements were self-descriptive for own PA (eg, 'Being physically active is a part of being the person I am')	1	PA: Hansen ⁶⁴ 2014

Continued

Table 3 Continued

Characteristics		Number of studies	References
Single-item questionnaire	Self-labelling as a response to the question: 'How do you think of yourself?' with answer options 'Definitely a nonsmoker', 'A reluctant nonsmoker', 'A smoker who is not smoking'.	1	Smoking: Vangeli ⁸² 2010
	Agreement with statements pertaining to smoker self-identity (ie, 'I see myself as a person who smokes') and nonsmoker self-identity (ie, 'I would rather be a nonsmoker').	1	Smoking: Meijer ⁸⁰ 2018
	Answer to the question: 'How would you describe yourself now?' Answer options: 'A smoker trying to quit', 'A smoker who has chosen to no longer smoke', 'A non-smoker' or an 'ex-smoker'	1	Smoking: Callaghan ⁷⁸ 2021
	Yes/No answer to the question: 'Do you consider yourself a smoker?'	1	Smoking: Leas ⁷⁹ 2015

For conciseness purposes, only the first author of each publication is mentioned in this table. Some studies used multiple measurement tools.

*'PA-identity' indicates that a modified version of the Exercise Identity Scale was used. Items inquired about 'PA' rather than 'exercise'.

PA, physical activity.

PA-identity specifically are recommended to use only the 'role identity' subscale.

Summary of findings and similarities and differences between PA and smoking

Qualitative methods were consistently employed in both studies on PA and smoking. However, distinct variations emerged in the quantitative measurement tools for PA-related and smoking-related identity.

The association between identity and behaviour in the context of PA and smoking

Four themes related to the relationship between PA-related/smoking-related identity and behaviour emerged during data analysis: (1) the direct relationship between PA-related/smoking-related identity and behaviour, (2) the indirect relationship between the two, (3) identity processes related to PA and smoking and (4) the relationship between PA-related/smoking-related identity and personal characteristics. These themes, their interconnections and the associated section of

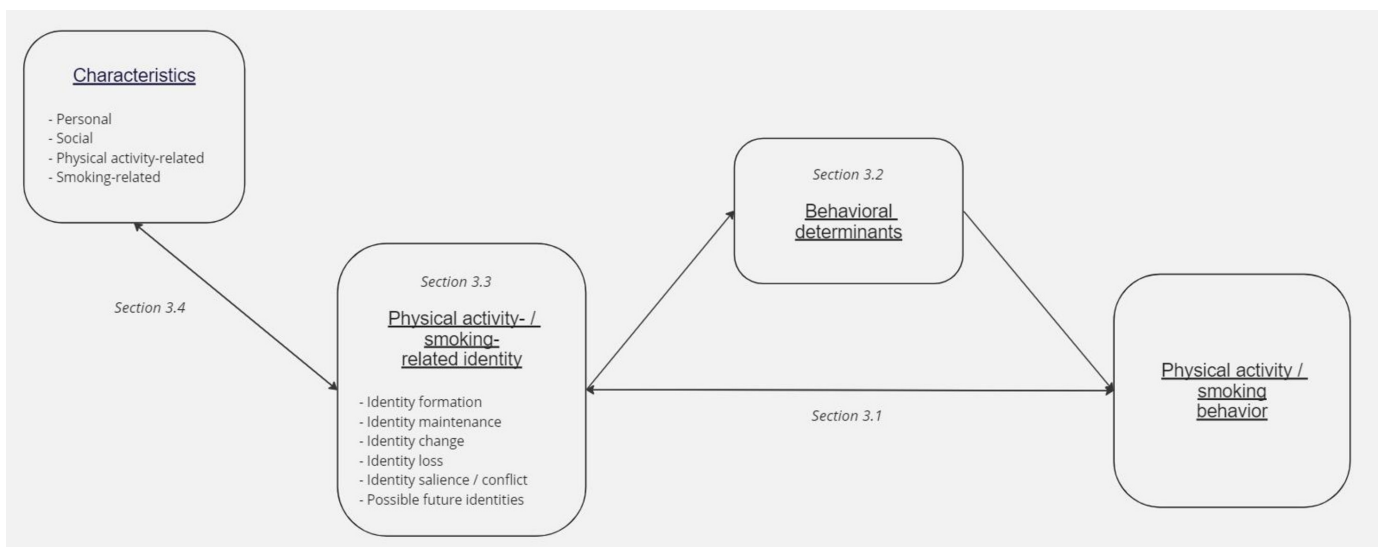


Figure 2 Visual representation of the association between PA-related/smoking-related identity and behaviour established from findings of included studies, including the number of the subsection in which the theme is addressed in the narrative summary. PA, physical activity.



the narrative summary in which they are presented are visually presented in [figure 2](#). Each section ends with a synthesis of the findings and of the similarities and differences between PA and smoking. An overview of all identified similarities and differences between PA and smoking is presented in [table 4](#).

Direct relationship between PA-related/smoking-related identity and behaviour

Direct relationship between identity and behaviour

For PA, all but one study⁵⁵ found a direct relation between the strength of PA-related identity and PA behaviour. This relation was present for identity on both the individual and interpersonal level, regardless of whether individuals held identities related to physical inactivity, physical capabilities or PA intensity, and for a wide range of PAs (ie, dancing,⁵⁶ running,⁵⁷ competitive sports (eg, volleyball, triathlon, aerobics, archery)^{58 59} and leisure time PA^{58 60–63}). Specifically, in all but the one study, a strong identity reflecting physical inactivity or weaker PA-related identity was linked to lower engagement in PA, while a stronger PA-related identity was related to higher duration, intensity^{56 62–66} and frequency of PA.^{50 52 54 56 58 60–74} The relationship persists across healthy individuals and patient populations, even after considering factors like age, gender, SEP, marital status and health status.^{54 57 60 64 65 67 73 75 76} However, Hays *et al*⁵⁵ found no significant relationship between exercise self-definition and exercise adoption, after controlling for age, race, perceived health, mobility difficulties and exercise levels. None of the studies examined the relationship between PA-related identity and smoking behaviour.

Studies on smoking consistently showed a direct association between the strength of smoking-related identity and smoking behaviour. This association applied to both tobacco^{77–83} and e-cigarette use,⁸⁴ at both the individual and interpersonal level. Specifically, holding a smoker self-identity or social identity was linked to continued smoking,^{77 78 80–83} while identifying as ‘non-smoker’ or ‘ex-smoker’ was positively linked to quitting⁸⁰ and continued abstinence.^{77 78 80 81} Notably, a stronger non-smoker self-identity was more strongly associated with quitting than a weaker smoker self-identity.⁸⁰ In the study on e-cigarettes,⁸⁴ a strong self-identity or social identity as ‘vapers’ and a neutral stance or even rejection of a vaping identity were positively paired with consumption of e-cigarettes. However, included studies did not extend to other forms of smoking (eg, cigars, cigarillo’s), or smoking behaviours like intensity, duration and frequency. No study examined the relationship between smoking-related identity and PA-behaviour.

Identity as strong(est) predictor of behaviour

Several studies highlighted PA-related identity to be the strongest (although not only) predictor of PA. For example, Rhodes *et al*⁵⁷ found that PA social identity remained the strongest predictor of changes in intention and actual PA during the COVID-19 pandemic,

even after considering relevant factors like perceived capability to engage in PA and behavioural regulation. Similarly, Hansen *et al*⁶⁴ found PA-related self-identity to be the strongest predictor of PA compared with weight, self-efficacy for performing PA, perceived control over engagement in PA, social support from family and friends in performing PA, and community attributes (eg, facilities). Notably, Whaley and Schrider⁸⁵ found that PA-related identity and perceived skills predicted exercise initiation and maintenance. Furthermore, possessing a PA-identity and motivation to engage in PA, along with and expecting benefits, were found to help overcome constraints to engage in PA.⁶²

For smoking, Callaghan *et al*⁷⁸ revealed that smoking-related identity ranked second strongest in predicting relapse, behind past quit duration, postquit urges to smoke, abstinence self-efficacy, enjoyment of smoking and perceived importance of smoking to one’s life.

Relationship between identity and behaviour endures over time

The positive relationship between PA-related identity and behaviour was found to endure over time.^{52 54 57 67} To illustrate, Huffman *et al*⁵⁴ observed a persistent relation between PA-related identity and increased engagement in PA after controlling for the 4 weeks between measurements. Another study⁶⁷ found that collective self-esteem, reflecting social PA-related identity, remained significantly associated with PA over a period of 6 years. Similarly, a quantitative longitudinal study found that the higher the baseline PA, the stronger the PA-related social and self-identity at 6-month follow-up.⁵² However, a retrospective study conducted during the COVID-19 pandemic indicated a weakening of postpandemic PA-related self-identity and social identity, following 2 years of limited PA due to governmental protection measures.⁵⁷ Moreover, one study with overweight and obese adults revealed PA-related identity was no longer linked to PA levels 6 months after the initial increase of PA.⁶⁶ Nevertheless, the majority of studies support a lasting relationship between PA-related identity and behaviour.

Studies on smoking revealed a persistent association between smoking-related identity and behaviours. To illustrate, one study found that a non-smoker self-identity at baseline was strongly associated with attempting to quit 1 year later.⁸⁰ Moreover, Callaghan *et al*⁷⁸ found that former smokers identifying as non-smokers or ex-smokers at baseline were less likely to have relapsed 1 year later than those still identifying with smoking at follow-up. This remained true after considering sociodemographic variables, smoking urges, quit attempt duration, smoking enjoyment and perceived importance of smoking to one’s life.

Relationship between past and future behaviour and identity

Studies indicated a positive association between PA-identity and past PA, and between possible future identities and current behaviour. To illustrate, individuals with a history of intensive PA tended to have stronger current

Table 4 Similarities and differences in the relationship between identity and behaviour and identity processes for physical activity and smoking in adults aged 45 and over

Characteristics	Similarities between physical activity and smoking	Differences between physical activity and smoking	Unclear
Direct relationship between physical activity- and smoking-related identity and behaviour	<ul style="list-style-type: none"> ▶ Direct relationship between identity and behaviour, both for individual and interpersonal levels identity. ▶ Identity predicted behaviour, also when controlled for other relevant predictors (eg, self-efficacy, perceived capability to change behaviour). ▶ The relationship between identity and behaviour seems to endure over time. 	<ul style="list-style-type: none"> ▶ While all studies on smoking found a significant direct relation between identity and behaviour, a singular study in the context of physical activity did not observe such a relation. ▶ For physical activity, identity labels reflected various physical activity types, intensities, durations and frequencies. For smoking, identity labels primarily reflected the binary distinction of smoking vs non-smoking, and this only for two types of smoking (tobacco, e-cigarettes). ▶ Physical activity-related identity appeared as the strongest predictor of physical activity, while smoking-related identity appeared as the second strongest predictor of smoking behaviour. ▶ There is a direct relationship between future possible identities and current behaviour as well as between physical activity behaviour and current identity for physical activity, but findings are lacking for smoking. 	<ul style="list-style-type: none"> ▶ The relationship between physical activity identity and behaviour in the context of smoking. ▶ Whether individual-level or interpersonal-level identity is more strongly associated with physical activity and/or smoking behaviour, or whether they are equally strongly associated with behaviour. ▶ Whether there is a relationship between physical activity-related identity and smoking behaviour and/or between smoking-related identity and physical activity behaviour.
Indirect relationship between physical activity- and smoking-related identity and behaviour	<ul style="list-style-type: none"> ▶ Identity is indirectly related to behaviour through a positive association with behavioural determinants (eg, intention, commitment, confidence, attitudes towards the behaviour). 	<ul style="list-style-type: none"> ▶ Different behavioural determinants in the indirect relationship between identity and behaviour. ▶ The important role of possible future selves in the relationship between identity and behaviour is discussed in multiple physical activity studies, while it is not in studies in the context of smoking. 	<ul style="list-style-type: none"> ▶ The role of possible future selves in the relation between smoking-related identity and behaviour.

Continued

Table 4 Continued

Characteristics	Similarities between physical activity and smoking	Differences between physical activity and smoking	Unclear
Physical activity-related and smoking-related identity processes	<ul style="list-style-type: none"> ▲ Identity formation takes time and effort but is possible regardless of prior levels of behaviour and can occur later in life, at both individual and interpersonal levels. ▲ To facilitate engagement in behaviour, identity needs to be of the same polarity, that is, an identity which indicates physical activity, aligned with engagement in physical activity, and an identity which indicates not smoking, aligned with non-engagement in smoking. ▲ Identity formation and maintenance may be facilitated and hindered by a range of factors, some of which are common to both behaviours (eg, facilitators: valuing benefits from the behaviour, social support; barriers: changing out of altruism, conflict with another identity). ▲ All factors facilitating/hindering the formation of an identity were also found to facilitate/hinder the maintenance of said identity. However, additional facilitators and barriers were reported for identity maintenance. ▲ Once formed, identity can be maintained over time and oftentimes even consolidated. ▲ Identity-behaviour discrepancy is often paired with distress and the implementation of strategies to alleviate it. ▲ Identity is prone to change, even at older age. ▲ Common factors instigating identity change are health motives and the influence of societal norms. ▲ Feelings of identity loss have been found to be common following identity and behaviour change. Many experiencing identity loss will employ strategies to regain (parts of) the lost identity. ▲ The most salient identity (eg, not a sporty person) typically determines behaviour (eg, avoid gyms). ▲ Identities specific to an older generation with specific generational norms and standards were found to sometimes conflict with physical activity-related and smoking-related identity. 	<ul style="list-style-type: none"> ▲ Physical activity-related identity formation seems to follow a phased approach, whereas a phased approach is not explicitly mentioned in the formation of a smoking-related identity. ▲ For physical activity, identity formation was found to take anywhere between a few weeks to 6 months but for smoking, the amount of time was unspecified. ▲ Factors facilitating and hindering the formation and maintenance of identity. ▲ For physical activity, it is desirable to form and maintain an identity which reflects engagement in the behaviour while for smoking, it is desirable to form and maintain an identity which reflects non-engagement in the behaviour. ▲ Causes for identity change differ between physical activity and smoking. ▲ For physical activity, identity conflict oftentimes happens with an identity unrelated to physical activity whereas for smoking, identity conflict most often pertains to smoker vs non-smoker identity. ▲ For physical activity but not for smoking, being a woman and having an African/Caribbean cultural identity have been reported to lead to internal conflicts with a physical activity-related identity, but results are lacking for smoking. ▲ In the context of physical activity, it seems that an individual-level identity can exist independently of an interpersonal-level identity, but it is unclear whether this distinction also exists in the context of smoking. 	<ul style="list-style-type: none"> ▲ Whether formation of a smoking-related identity follows a phased approach. ▲ How long it takes for a smoking-related identity to form. ▲ Whether the difference in facilitators and barriers to identity formation and maintenance is primarily attributable to natural differences between physical activity and smoking, or from differences in study methodologies. ▲ Whether gender and cultural identities do conflict with smoking-related identity. ▲ Whether an individual-level smoking-related identity can exist independently of an interpersonal-level smoking-related identity. ▲ The content of smoking-related possible future selves.

Continued

Table 4 Continued

Characteristics	Similarities between physical activity and smoking	Differences between physical activity and smoking	Unclear
Relationship of physical activity-related and smoking-related identity with personal, physical activity-related and smoking-related characteristics	<p>▲ Personal-related, social-related and behaviour-related characteristics were associated with identity. Specifically, being female, older and having engaged in the behaviour for a greater number of years were positively associated with stronger physical activity-related and smoking-related identity.</p>	<p>▲ Other personal characteristics as well as behaviour-specific characteristics which relate to identity differed between physical activity and smoking.</p>	<p>▲ Whether physical activity-related characteristics are associated with smoking-related identity, and/or smoking-related characteristics with physical activity-related identity.</p>

PA-related identity,^{50 53 70 73 86} and both feared and hoped-for possible future selves were found to guide PA behaviour in the present.^{71 72 74 85 86} However, difficulty envisioning hoped-for or feared PA-self can hinder engagement in PA.⁸⁷ Furthermore, perceiving a physically active possible future self as important, likely and attainable was related to a stronger PA-identity, and having a greater number of PA-related possible future selves was positively associated with stronger PA-identity.⁷²

Studies on smoking did not examine the association between current smoking-related identity and past smoking behaviour or examine possible future selves, leaving gaps in the current knowledge.

Difference in association with behaviour for individual-level versus interpersonal-level identity

The association between engagement in PA and PA-related identity was reported at both individual and interpersonal levels of identity, yet it is unclear for which level the association is strongest. As an example, while Liechty *et al*⁶¹ found that individual and interpersonal level PA-related identities are equally important for PA behaviour, Havitz *et al*⁶⁰ reported that social PA-identity had a stronger association with leisure time PA.

Studies on smoking did not examine differences in how individual- vs interpersonal-level identity relates to behaviour.

Summary of findings and similarities and differences between PA and smoking

Studies consistently showed a direct enduring relationship between PA-related identity and PA-behaviour, and between smoking-related identity and smoking behaviour, for both individual and interpersonal levels of identity. While all studies on smoking reported this association, a singular PA study reported a statistically non-significant relationship between identity and behaviour. For PA, studies showed that identity is associated with various types, intensities, durations and frequencies of PA, while for smoking, identity was primarily linked to smoking type and the binary distinction of smoking versus not smoking. In studies comparing different predictors of behaviours, PA-related identity ranked as strongest predictor of PA-behaviour whereas smoking-related identity ranked as second strongest predictor of smoking behaviour, although in only one study. PA studies revealed relationships between past behaviour and current identity, as well as future identity and current behaviour, while this was not researched in studies on smoking. Based on the included studies, it remains unclear whether individual or interpersonal-level identity is more important for behaviour. Identified similarities and differences are summarised in [table 4](#).

Indirect relationship between PA-related/smoking-related identity and behaviour

PA-related identity is indirectly related to PA through a positive association with behavioural determinants. For



example, strong PA-related identity encourages prioritising and planning PA,^{50 51 63 69 88} greater intention to engage in PA,^{57 75} expressing and maintaining commitment to exercising regularly,^{51 88 89} being confident about own physical abilities,^{52 61 69 70} perceiving and valuing the health benefits of PA^{52 61 70 73 88 89} and employing strategies to engage in PA despite constraints (eg, lacking facilities)^{61 62 69} which, in turn, facilitate engagement in PA. Furthermore, in two studies,^{73 90} stronger PA-identity was related to greater readiness for behaviour change, and subsequently greater chances of engaging in PA, an association which remained significant after controlling for age, gender, BMI, country of origin and education.⁹⁰ Additionally, possible future selves play a role in the relationship between PA-related identity and behaviour, but it is unclear whether they influence PA through the activation of a PA-related identity⁷² or whether a PA-related identity prompts the formation of potential PA future selves, thereby promoting PA engagement.⁸⁵

Smoking-related identity and behaviour were also found to have an indirect relationship. For example, negative emotions while smoking mediated the association between identifying as smoker at baseline and continued smoking abstinence 24 weeks later.⁹¹ Smith's research⁹² suggests that the relationship between an identity as smoker and a successful quit attempt is influenced by seriousness about quitting. Additionally, Vangeli and West⁸³ propose an indirect relationship between social smoking-related identity and smoking, influenced by factors like sense of accomplishment, motivation to stay abstinent and determination to set a positive example. This study also suggests an indirect relationship between a weak identity as non-smoker and relapse, influenced by positive perceptions of smoking.

No study on smoking looked at possible future selves, leaving a gap in understanding their potential role in the relation between smoking-related identity and smoking.

Summary of findings and similarities and differences between PA and smoking

Studies showed that identity and behaviour are related through positive relations with behavioural determinants like intention, commitment, confidence or attitudes towards the behaviour. The specific determinants through which identity is related with behaviour appear to differ between PA and smoking. While several PA studies underscore the significance of possible future selves in shaping the connection between identity and behaviour, this aspect remains underexplored in the context of smoking. Similarities and differences between PA and smoking, as emerging from the included studies, are summarised in [table 4](#).

PA- and smoking-related identity processes

Identity formation

There would be no relation between identity and behaviour without identity formation. All studies on PA underscore the importance of developing an identity

which reflects engagement in PA. Formation of such an identity can vary in duration, ranging from a few weeks to 6 months.⁵¹ Formation seems to involve phases: self-acknowledgement and acceptance before full adoption and expression to others.^{51 68 69 89 93} Jin and Roumell⁶⁸ propose that once adopted, individuals reach a so-called 'plateau-stage' in which they experience a stable and harmonious sense of identity. PA-related identity can evolve from being extrinsically motivated such as accountability to a doctor, to being intrinsically enjoyable and/or self-relevant.⁵¹ PA-related identity can strengthen over time,⁵² and studies indicate that it can form in in previously inactive individuals and at older ages.^{51-53 58 68 70 88 93}

Studies on smoking consistently underscore the importance of adopting an identity reflecting non-engagement in smoking. To illustrate, studies demonstrate that identifying as 'non-smoker', 'former smoker' or 'ex-smoker' precedes successful quit attempts and smoking abstinence, even among heavy smokers.^{77 78 82 83 92} While duration for developing this new identity is unspecified, results suggest it takes time and effort.^{77 81 83} One study proposes that forming a non-smoker identity may take longer in individuals with a longer smoking history.⁸² Additionally, identity formation was observed at both individual and interpersonal levels, with indications that it can also occur at older ages.^{77 78 82 83 92}

Suggested facilitators and barriers of identity formation

Suggested facilitators and barriers to identity formation for PA and smoking can be found in online supplemental file 5. Studies on PA reported a multitude of factors co-occurring with the formation of a PA-related identity. Some may be considered facilitators of identity formation and some barriers. To name a few, formation of a PA-related identity appears to be initiated and facilitated by engagement in PA,^{51-53 58 68 70 88 93} noticing positive outcomes when engaging in PA^{51 53 68} or a sense of belonging to and social interactions with a physically active social group.^{51 70 87 93}

Factors which were suggested to hinder the formation of a PA-related identity included engaging in PA solely out of accountability (eg, towards a doctor),⁵¹ physical restrictions (eg, reduced mobility)^{68 73 86} and discomfort due to perceptions that one's body and physical capacities do not match that of someone with a PA-identity.^{53 68 86}

Numerous factors were identified as helpful to the formation of a non-smoker identity. These factors included abstinence from smoking,^{77 78 81-83 92} the redefinition of smoking from something relaxing and pleasurable to something undesirable, unwise, or costly, and a family who does not nag to quit smoking.⁷⁷ No study reported factors facilitating the formation of a smoker identity.

The primary suggested barrier to the formation of an identity indicating non-engagement in tobacco smoking is (residual) identification with smoking.^{77 78 81 83 91} Other potential barriers included smoking cessation as an act of altruism rather than being something coming from the person,⁸² and a lack of seriousness about quitting.⁹² In

the study on e-cigarettes, Farrimond⁸⁴ reported viewing e-cigarettes as a practical means to quit or being ambivalent towards e-cigarettes to thwart the formation of a non-vaping identity.

Identity maintenance and consolidation

Once formed, individuals often process information to confirm and consolidate their new identity, a process called assimilation by Jin and Roumell.⁶⁸ Longitudinal studies suggest that PA-related identity persists over time and can be maintained⁵⁴ and consolidated^{52 66} through engagement in PA. Nevertheless, individuals could experience satisfaction or distress with their (new) PA-identity, often due to discrepancies between PA-behaviours and identity.⁶⁸ Satisfaction or distress may depend on personal factors such as personal PA history, inclination towards PA, public self-consciousness or experience with ageing. Coping with distress from identity-behaviour discrepancy involved behaving in a way that matched the PA-related identity, or adjusting the identity itself.^{51 53 68 88} For long-term active individuals, PA became an integral part of their self, or a way to express their authentic self,^{58 73 86 89} contributing to the maintenance of PA and their PA-related identity.

Even after resuming smoking and thereby reclaiming their smoker identity, many individuals still identify as non-smoker.⁸³ This suggests that a non-smoker identity is usually maintained, although the authors propose that this may be for social desirability reasons rather than one actually embracing the identity. In former smokers, any degree of maintained identification with smoking was paired with distress and a higher likelihood of relapse,⁸¹ feeling vulnerable to relapse⁸² and actual relapse.⁷⁸ This held true even after adjusting for age, gender, SEP, ethnicity, country of origin, smoking history, quit duration, survey mode (completed over the phone or online), and year of recruitment (any of the 9 years from this longitudinal study).⁷⁸ Identification with smoking gradually decreases with longer abstinence,^{78 82 83} and urges became easier to overcome once a 'non-smoker' or 'ex-smoker' identity was established.^{77 81 83} An identity as non-smoker/ex-smoker can also serve to confirm higher-order identities (eg, 'good parent', 'healthy person') which are not necessarily directly linked to smoking.⁹² While some individuals may still feel drawn to smoking after years of abstinence,⁷⁸ adopting a non-smoker identity may help reduce feeling vulnerable to relapse.⁸²

Suggested facilitators and barriers of identity maintenance

Suggested facilitators and barriers to identity formation for PA and smoking can be found in online supplemental file 5. Various factors may facilitate the maintenance of the developed identity. For PA, most factors found to contribute to the formation of a PA-related identity also applied to the maintenance of said identity, except the factors of Self-Determination Theory named in Springer *et al.*⁸⁹ Interestingly, expressing a PA-related identity to others seems more important for PA maintenance

than for PA formation.⁵² Furthermore, being physically active enhances perceived ability to engage in PA and continued efforts to stay active, aiding in maintaining the new PA-related identity.⁹⁴

Similarly, factors suggested to hinder identity formation also impeded identity maintenance. Studies on patient groups suggested unique barriers to maintaining a PA-related identity, such as concerns about worsening symptoms and decreased PA self-efficacy due to physical limitations.^{65 76}

Former smokers employ various strategies to maintain and consolidate their new abstinent status and identity, such as coping with cravings,^{77 83} reaffirming the new non-smoker identity, pride at being a non-smoker and greater regard for non-smokers.⁸¹ Certain factors aiding identity formation such as commitment and ownership of the decision to quit appeared to also help maintain and consolidate a non-smoker identity.⁷⁷

The study on e-cigarettes⁸⁴ is the only study to have suggested a factor assisting the maintenance of a vaping identity, which is to view e-cigarettes as enjoyable.

Identity change

Maintaining consistent identity levels is not always achieved, leading to potential identity changes.⁶⁸ To illustrate, PA-related identity was found to be fluid, sometimes even vulnerable and unstable, and to vary in strength naturally,⁵⁴ following life events (eg, moving, disease, divorce) or life experiences (eg, taking up a hobby, health reasons, experiences of ageing, feeling more vulnerable to injury following a fall).^{53 58 68 86} Societal norms, for example, concerning health and fitness,⁵³ can also prompt identity shifts at older age.^{58 59 68} Identity changes are often gradual and not sudden.⁸⁶ PA-related identity change can happen to anyone, regardless of the initial strength of PA-related identity. To illustrate, Leavy and Åberg⁷⁰ documented that retirees who were physically active during employment could experience a shift in PA relevance and therefore identity postretirement. Similarly, Rhodes *et al.*⁵⁷ noted strengthened PA-related identity in individuals having maintained prepandemic PA-levels and those with strong PA intentions, while weakening was observed in previously active individuals having reduced activity postpandemic and with weaker PA intentions. This held true after controlling for age, gender, employment status and education.

Former smokers were found to undergo a gradual individual-level identity transition from 'smoker' to 'non-smoker' or 'ex-smoker' after quitting smoking^{77 83} and an interpersonal-level identity transition from 'smoker' to 'non-smoker'.⁸³ Redefining oneself as a 'non-smoker' was reported important for successful smoking cessation efforts.^{80 83 91} For certain former smokers quitting through a group programme,⁸³ shift in smoking-related social identity was enhanced by the support of friends and family, and by attachment to fellow programme participants. Following this transition, newly quit smokers perceived smokers as an unwelcome out-group, and non-smokers

as the new superior in-group.⁸³ Smith⁹² suggested that a change in smoking-related identity indicated 'being serious' about living smoke-free. For certain older individuals, redefining their smoking-related identity was prompted by health warnings associated with smoking not prevalent during their initial smoking years.⁷⁷ For others, factors like increased cigarette price, social disapproval of smoking⁷⁷ contributed to reshaping their identity postcessation.^{77 83}

Identity loss

Individuals may feel like having lost part of themselves (identity loss), following changes in behaviour and identity. Kullman *et al*⁶⁹ found that disbandment of a running group due to COVID-19 restrictions resulted in identity loss among its members. To cope and regain part of their lost identity, individuals engaged in new behaviours like virtual contact with members of the running group, or solo running to strengthen their running self-identity in the absence of possibilities to strengthen their runner group identity. Similar feelings of identity loss occurred following forced changes from life events,^{53 86} injury or disease.^{65 76}

Studies on smoking indicated that quitting smoking was often paired with identity loss.^{77 81 83 91} (Re)lapse was sometimes seen as a way to reclaim the lost smoker self-identity.⁸¹

Identity salience and conflicting identities

PA-related identity facilitates PA participation, yet other identities may override it, impede its formation or maintenance, hindering engagement. For example, a salient identity as 'not a group person' may lead to avoiding parks and gyms, limiting PA involvement.⁷⁰ Similarly, a salient identity as an 'unsuccessful sports person' can create discomfort when engaging in sports.⁵³ Pentecost and Taket⁷⁵ found conflicts between African/Caribbean identities associated with larger body sizes, and PA-related identities, often synonym with smaller body sizes. Gender roles can also conflict with PA-related identities and behaviours, especially for women with nurturing identities and a strong sense of duty to their families.^{70 75 87} Furthermore, many older individuals perceive a conflict between holding a PA-related identity and old age, which they associated with diminished physical capital, health and agility.^{59 70 75 86 93} Last but not least, Leavy and Åberg⁷⁰ suggest that PA-identity may be situational, such as in the workplace, and that retirees sometimes no longer identify with PA postretirement.

Studies on smoking emphasised that during urges to smoke, an identity as a non-smoker or ex-smoker must take precedence over any lingering identity as a smoker to prevent (re)lapses.^{77 78 81–83} The most common identity conflict seems to be between smoker and non-smoker/ex-smoker identities.^{77 83} Additionally, smoking-related identity may conflict with role identities, like being a good friend or being someone who fits with new versus old generational norms and standards.⁷⁷

Independence of individual-level and interpersonal-level identity

Rossing *et al*⁵³ suggest the existence of an independent exercise self-identity, separate from an exerciser social identity. For example, following the choice to engage in PA in a self-chosen, self-relevant way rather than trying to match societal standards of being an 'exerciser'. Conversely, individuals may adopt a social PA-related identity without a corresponding self-identity.⁵⁹ This phenomenon may relate to the communal nature of interpersonal level identities, where group norms and goals prevail over individual preferences and identities.⁶⁹

In the context of smoking, findings imply that individuals lacking identification with other e-cigarette users (ie, vaping-related interpersonal-level identity) are unlikely to acknowledge a vaping self-identity.⁸⁴ However, this proposed interdependence between smoking-related social- and self-identities is based on a single study, lacking conclusive evidence for broader application.

Content of possible future identities

The content of PA-related possible future selves, or possible future identities, typically revolved around body image (weight, attractiveness), health and (in)dependence (ie, related to potential incapacitation or requiring care)^{71 72 74 85 87} or physical capacities (ie, being mobile and healthy).⁸⁵ The content of possible future selves could evolve over time. Whaley and Schrider⁸⁵ found that 10 weeks after an exercise programme, hoped-for future selves focused on body image and remaining healthy, while feared selves centred on avoiding dependence and negative health consequences. The content of possible future selves varied by exercise level.⁷⁴ When listing their hoped for and feared possible future-selves, non-exercisers emphasised body-image while long-term exercisers emphasised physical health. Notably, long-term exercisers were generally more confident than non-exercisers about their possible future self would becoming reality, and found it important and likely that it would.⁷⁴

No study on smoking examined possible future selves, therefore it is unknown what the content of smoking-related possible future selves may be.

Summary of findings and similarities and differences between PA and smoking

Formation of a PA-related or smoking-related identity is a complex process that demands time and effort, regardless of prior behaviour levels, and can occur later in life at both individual and interpersonal levels. To enhance behaviour engagement, it is important that identity aligns with behaviour of the same polarity, that is, indicating participation in PA or non-smoking. PA-related identity formation appears phased and to take weeks to months, while for smoking phases and timing of identity formation were unspecified. Factors suggested helpful and unhelpful to identity formation seemed to vary between the two behaviours, with some commonalities, and overlap with factors (un)helpful to identity maintenance. Evidence from included studies furthermore showed that

identity generally persists, often even consolidating over time. However, discrepancies with identity may lead to distress and prompt coping strategies. Identity is subject to change, spurred by, for example, health motives or societal norms, which can lead to feelings of identity and subsequent strategies to regain the lost identity. Studies showed that the most salient identity typically determines behaviour, potentially conflicting with identities specific to older generations. While individual-level PA-related identity can exist independently of interpersonal-level identity, this distinction's existence in smoking remains unclear. The content of possible future selves for PA often revolved around body image and health.

Relationship of PA-related and smoking-related identity with personal, PA-related/smoking-related characteristics

Personal characteristics

Studies indicated a relation between PA-related identity and personal characteristics. Exercise self-definitions were significantly more acknowledged by women aged 65+ vs 50–65, African-American versus Caucasian women, and women who consider having less vs more mobility problems.⁵² In addition, individuals with lower BMI and identifying as non-white exhibited stronger exercise identities across genders.⁶⁶ Females tended to have a stronger PA-related collective self-esteem—reflecting social PA-identity—than males, and older individuals with stronger collective self-esteem maintained higher PA levels to a later age than older individuals with lower PA-related collective self-esteem.⁶⁷ In contrast, Lin *et al*⁵⁶ found no gender differences in PA-related group identity.

In studies on smoking, women, older people and individuals with smoking-related health issues⁸⁰ exhibited significantly stronger identification with smoking. Notably, women were also found to identify with non-smoking significantly more than males.⁸⁰ Females scoring higher on general anxiety were more likely to report negative emotions about being smokers.⁹¹ Furthermore, Leas *et al*⁷⁹ identified a subgroup of ‘non-identifying smokers’, comprising individuals who smoke but do not see themselves as smokers, constituting approximately 10% of the smoker population. Non-identifying smokers were more likely to be 65+, male, daily smokers, from ethnic minorities (except Hispanic white) and to not reject identification with addiction.

Social characteristics

Individuals with a stronger PA-related identity tend to express this identity to others^{52 61 89} and to promote exercise to others (eg, spouse, parent).⁵¹ For individuals contemplating a change in their PA, support from family but not from friends was more important when PA-identity was low than when it was high.⁹⁰

For smoking, being around other smokers was found to help rationalise (re)lapses, as it tends to evoke ones retained identity as smoker, and to alleviate feelings of isolation or detachment from other smokers.⁸¹ Conversely, findings by Brown⁷⁷ insinuate that for individuals who

currently smoke, being around non-smokers facilitates quit attempts because it promotes and reinforces an identity as non-smoker.

PA-related characteristics

One study reported that exercise self-definitions were significantly more acknowledged by women who perform 30+ vs less than 30 min of walking per week.⁵² Studies proposed that the longer the PA history, the stronger PA-related identity,^{50 53 70 73 86} and that the longer a PA-related identity has been held, the greater the engagement in PA-behaviour.^{70 86}

No study on smoking assessed the relationship between PA-related characteristics and smoking-related identity.

Smoking-related characteristics

The more cigarettes⁸⁰ and years one smoked,⁸² and the higher the physical nicotine dependence,⁹¹ the more important smoking was to their sense of self. Furthermore, those with a longer smoking history⁸² exhibited a stronger identification with smoking.

No study on smoking assessed the relationship between smoking-related characteristics and PA-related identity.

Summary of findings and similarities and differences between PA and smoking

Evidence from the included studies showed that identity intertwines with personal, social and behaviour-related characteristics, showing positive associations with being female, older and having a longer history of engagement bolstering PA and smoking identities. Conflicts with PA-related identity were noted in women and those with an African/Caribbean cultural identity. Disparities in personal and behaviour-specific traits related to identity were observed between PA and smoking, warranting further investigation into the association between PA-related characteristics and smoking-related identity, and vice versa. See [table 4](#) for a summary of similarities and differences between PA and smoking.

DISCUSSION

This review offers a state-of-the-art synthesis of how identity is conceptualised and operationalised in relation to PA and smoking among adults aged 45+ engaging in both behaviours in varying levels. It explores and compares how identity relates to a health-promoting and health-compromising behaviour, and integrates the role of personal, PA-related and smoking-related characteristics play in this relationship.

Findings highlight the significance of both individual-level and interpersonal-level identity in PA and smoking behaviour. Strong identification with PA and physically active peers is positively associated with more frequent, varied and intense PA, consistent with previous findings in younger^{10 25 26 95–98} and moderately to vigorously active individuals.²⁶ For smoking, stronger identification with non-smoking and non-smokers is positively associated



with smoking cessation and staying abstinent, which also corroborates previous evidence in younger populations.^{12–14 27 98} While one reviewed study⁵⁵ reported a non-significant association between PA-related identity and behaviour, it employed a scale measuring individual and interpersonal identity levels, which may mask independent existence of identity on both levels.^{53 59} To mitigate this, we suggest using separate sum scores for individual and interpersonal identity levels to avoid measurement bias.

This review reveals that the identity-behaviour relationship is rather similar for PA and smoking, suggesting that identity processes may be comparable for health-promoting and health-compromising behaviours more generally. However, discernible differences and remaining uncertainties imply that certain aspects of the relationship and certain identity processes may be unique to each behaviour. Future research on identity-behaviour dynamics in PA and smoking should address as-of-yet unresolved elements, and explore whether findings for PA and smoking as example behaviours can be generalised to other health-promoting and health-compromising behaviours. Nonetheless, the insights gleaned from this review offer valuable guidance for developing effective identity-related interventions to influence PA and smoking, as well as other health behaviours.

This review opens multiple interesting avenues for future research. First, the causal relationship between identity and behaviour. Two reviewed studies investigated whether the relationship between possible future identities and PA-behaviour is mediated by PA-identity⁷² or whether possible future identities act as mediator.⁸⁵ Contradictory results and the absence of formal testing underscores the need for further investigation. Second, the association between past/future identities and current behaviour, as identified in this review, hints at a reciprocal dynamic relationship between identity and behaviour. While this aspect was not explicitly explored in the reviewed studies, prior research on smoking among younger individuals demonstrated a reciprocal relationship between smoking-related identity and behaviour,¹² opening up intriguing avenues for future research. Third, there may be a stronger association of individual-level smoking-related identity with behaviour than interpersonal-level identity,¹² but this remains to be formally tested.

Certain identity processes may be specific to older adults. For example, older women may encounter obstacles in forming a PA-related identity due to conflicts with altruistic, caring domestic or familial identities,^{51 70 87} a phenomenon likely more pronounced in generations with more traditional gender roles. Older generations may also have felt pressured to reshape their smoking-related identity amid increased health warnings and stigma surrounding smoking.⁷⁷ The health status of older adults appears pivotal in adopting and maintaining a PA-related identity,^{70 75 86 93} and changes in smoking-related identity.⁷⁷ Finally, older adults identify more strongly with

PA than with exercise.^{50 52} More research is warranted to formally assess potential age and generational differences in identity processes.

Aligned with identity theories^{28 99} and prior empirical research (eg,^{13 90}), this review illustrates that identity is mutable. For example, individuals strongly identifying as smokers can transition to ex-smoker identity post-cessation, and former smokers can revert to a smoker identity.^{81–83} This prompts inquiry into the fate of former identities: do they remain dormant, possibly reactivated by triggers? Do they retreat behind a dominant identity? Or do they vanish entirely? There seems to be limited research on this topic, with the exception of McConnell,¹⁰⁰ but it forms another interesting avenue for future research.

This scoping review revealed diverse yet overlapping identity-related terms and measurement tools, a common thread in identity research. To illustrate, already a decade ago, Oyserman and Destin¹⁰¹ observed the interchangeable use of ‘self-concept’ and ‘identity’ in the literature. Varied terminology and measurement methods may be attributed to different research disciplines (eg, Sociology, Health Psychology, Public Health). Consequently, fostering interdisciplinary collaborations and involving non-scholars to establish one clear, common, theoretically sound definition and measurement device for (PA-related/smoking-related) identity,¹⁰² appears advantageous. Categorising identity-related terms into an individual-level and interpersonal-level identity, as done in this review, may aid consensus building, as may collaborative ontology development.^{103 104} Terms more or less related to identity identified in this review (see online supplemental file 3) may help refine existing ontologies in the field.

This review pioneers cataloguing identity labels related to PA and smoking, uncovering internal negotiations when behaviour diverges from identity. Certain labels may feel constraining (‘smoker’), while others indicating intentions for behaviour change (‘smoker considering quitting’) or reflecting accomplished change (‘smoker who has chosen to no longer smoke’) may feel more personally self-relevant. Adapting one’s identity to align with behaviour (eg,¹⁹⁷) and aligning behaviour with identity are coping strategies proposed by identity theories to reduce identity-behaviour dissonance. Stimulating the ‘right’ identity may be key to promoting corresponding behaviour, helping to overcome identity conflict and resolve ambivalence.^{93 105}

Possible future selves interventions are more prevalent in research on PA than on smoking. Results indicate their effectiveness in changing PA-behaviours.^{106–109} Exploration of such interventions for smoking cessation is relatively recent^{10 25 26 95 96}; only a few studies have applied them with varying success.^{14 110–112} Insights from our ongoing parallel review on identity interventions may elucidate reasons for this discrepancy. Nonetheless, considering the parallels in the role of identity in PA and smoking, we anticipate possible future selves interventions to also

show promise for smoking cessation and encourage more research.

Prior studies show a significant relationship between smoking and PA-behaviours,^{113 114} a positive synergy between PA-uptake and intention to quit smoking,²³ and a significant relationship between smoking- and PA-related identities.⁹⁸ This highlights the potential of multi-behaviour/multi-identity interventions, previously touted as the ‘future of preventive medicine’.¹¹⁵ While some studies have explored this approach and tested interventions addressing both smoking and PA simultaneously,¹¹⁶ to our knowledge, only two have considered PA- and smoking-related identity and behaviour.^{98 117} Both studies observed a reduction in smoking following increased PA, underscoring the potential of interventions targeting both behaviour and identity for PA and smoking. One potential reason for the observed reduction in smoking in these studies is the activation of a higher-order identity like ‘healthy person’, which may conflict with the smoker identity. Therefore, in addition to testing the effectiveness of a multi-behaviour/multi-identity approach, future interventions could investigate whether reinforcing a higher-order identity (eg, ‘healthy person’) can induce changes in multiple health behaviours.

Strengths and limitations

This scoping review offers a comprehensive synthesis and comparison of identity’s conceptualisation, operationalisation and role in both smoking and PA. Its strengths reside in adhering to several methodological frameworks for scoping reviews,^{39 40 118} using two artificial intelligence technologies for study selection, and incorporating input from 14 experts to synthesise evidence spanning 30 years. In addition, it focuses on two different health behaviours and includes research originating from numerous research disciplines.

There are however limitations to consider. First, while focused on middle-aged to older adults, including younger populations could enhance generalisability. Second, while the included studies spanned various research disciplines, our research team solely comprised individuals from the field of Health Psychology, potentially leading to a biased interpretation of the findings. Nevertheless, we sought to mitigate this limitation by incorporating input from experts in various disciplines within Psychology and Behavioural Science. Third, quality assessment of included studies may have enhanced findings, though challenges exist in selecting reliable tools for this purpose.¹¹⁹ The detailed summaries of identity conceptualisation and operationalisation serve as an initial step towards quality assessment in this respect. Fourth, the employed scoping review methodology allowed for a thorough synthesis of available evidence but did not allow for hypothesis-testing.

CONCLUSIONS

This review pioneers in the synthesis and comparison of identity’s terminology, labels, measurement and role in

relation to (quitting) smoking and physical (in)activity, among adults aged 45+. It reveals a complex enduring relationship between identity and behaviour in both PA and smoking, along with numerous identity processes encompassing identity formation, maintenance, change and loss. Despite variations, the relationship between identity and behaviour and underlying identity processes may not differ fundamentally between health-promoting and health-compromising behaviours. Diverse identity terms and measurement tools exist, yet there is overlap in defining and measuring PA-related and smoking-related identities. Establishing a unified definition and measurement tool for PA-related and smoking-related identity on individual and interpersonal levels is recommended. Personal, social, PA-related and smoking-related characteristics play a part in the relationship between identity and behaviour, although differently for PA and smoking. Future research avenues include investigating causality in the identity-behaviour relationship, the fate of replaced identities, unresolved points from this review and age group differences. The takeaway from this review is that the relationship between identity and behaviour, including associated processes, may not fundamentally differ between health-promoting (PA) and health-compromising (smoking) behaviours.

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ORCID iDs

Kristell M Penfornis <http://orcid.org/0000-0002-9758-9004>

Milon H M van Vliet <http://orcid.org/0000-0001-9036-6206>

Eline Meijer <http://orcid.org/0000-0001-7078-5067>

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