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Mapping the evidence on identity processes and identity-related interventions in the smoking and physical activity domains: a scoping review protocol

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ABSTRACT

Introduction Smoking and insufficient physical activity (PA), independently but especially in conjunction, often lead to disease and (premature) death. For this reason, there is need for effective smoking cessation and PA-increasing interventions. Identity-related interventions which aim to influence how people view themselves offer promising prospects, but an overview of the existing evidence is needed first. This is the protocol for a scoping review aiming to aggregate the evidence on identity processes and identity-related interventions in the smoking and physical activity domains.

Methods The scoping review will be guided by an adaption by Levac *et al* of the 2005 Arksey and O'Malley methodological framework, the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses: Extension for Scoping Review (PRISMA-ScR) and the 2017 Joanna Briggs Institute guidelines. It will include scientific publications discussing identity (processes) and/or identity-related interventions in the context of smoking (cessation) and/or physical (in)activity, in individuals aged 12 and over. A systematic search will be carried out in multiple databases (eg, PubMed, Web of Science). Records will be independently screened against prepiloted inclusion/exclusion criteria by two reviewers, using the Active Learning for Systematic Reviews machine learning artificial intelligence and Rayyan QCRI, a screening assistant. A prepiloted charting table will be used to extract data from included full-text articles. Findings will be reported according to the PRISMA-ScR guidelines and include study quality assessment.

Ethics and dissemination Ethical approval is not required for scoping reviews. Findings will aid the development of future identity-related interventions targeting smoking and physical inactivity.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ We ensure a clear, transparent and replicable review process through the use of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review and Levac *et al* methodological frameworks.
⇒ We employ a three-step systematic literature search developed in collaboration with an experienced university librarian.
⇒ Validity of the title and abstract screening is heightened by the use of both machine learning artificial intelligence (Active Learning for Systematic Reviews) and a screening assisting software (Rayyan QCRI).
⇒ No forward reference searching is applied, however, the risk of omitting relevant records is mitigated by the use of backward reference searching in two stages of the review process.

INTRODUCTION

Smoking and insufficient physical activity (PA), individually but especially in conjunction, are key preventable factors of disease (eg, cardiovascular diseases and cancer)[1–3] and (premature) death.[4 5] It is unlikely that new risk factors will be identified which have a similar or larger impact on health,[6] especially when co-occurring.[7–9] Despite this, worldwide, one-fifth of the population still smokes regularly[4] and one-third to half fails to engage in regular PA.[10] The most effective actions to reduce health risks are to quit smoking and increase levels of PA.[3 11 12] While over the past decennia, an impressive number of smoking cessation and/or PA-enhancement interventions have been developed and tested, reviews show that they typically only have small to medium (short-term) effects.[13 14] With only mildly successful interventions but impactful health risks, there is need for new and effective strategies to achieve successful smoking cessation and increased PA.

Identity theories and identity-related interventions (ie, which aim to influence how people view themselves) offer promising prospects in facilitating smoking cessation and increased PA. Identity typically starts forming

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around the age of 12 and continues to form throughout adolescence until adulthood.[15] According to identity theories, people prefer to act in line with their self-identity—the way one sees and perceives oneself[16–21]—and/or group identity—perceptions of the self derived from being part of groups or social categories.[17 22] Identity theories consider identity an important motivator of (health) behaviour, including smoking, a health compromising behaviour, and PA, a health promoting behaviour. They also posit that behaviour change is unlikely unless the new (smoking/PA) behaviour matches the person's self and/or group identity.

Empirical studies in the context of smoking and PA illustrate the importance of identity-behaviour congruence. For example, it has consistently been found that, in order to (intend to) quit smoking successfully, smokers need to see themselves more as quitters or non-smokers and less as smokers.[23–33] Seeing oneself as (physically) active may also facilitate smoking cessation, because holding such a health-promoting identity may feel incompatible with engaging in health-compromising behaviour such as smoking.[34] By the same token, (greater) exercise intention and enactment has been shown to be facilitated by holding PA-related identities, for example, 'exerciser',[35 36] 'weightlifter',[37] 'runner'[34] or 'participant in sports'.[38] However, despite clear indications that identity plays an important motivational role for both a health compromising (smoking) and health promoting behaviour (PA), existing evidence is somewhat scattered across the scientific literature. This makes it difficult to fully comprehend the role of identity processes in smoking (cessation) and physical (in)activity. Evidence for identity processes in the PA domain has been previously aggregated in two systematic reviews including meta-analyses,[39 40] while in the smoking domain, a meta-analysis,[41] meta-synthesis[19] and meta-ethnography[32] have addressed identity. However, these articles are either outdated,[19] review only qualitative data,[40] look only at young adults or youth,[39 40] or study multiple addictive substances altogether.[41] In addition, none focus on smoking as well as inactivity simultaneously, while as mentioned earlier, the combination of both lifestyle behaviours increases the incidence of health risks. Moreover, it is unclear what (type of) identity-related interventions are being employed and why, and whether they are effective in stimulating identity change and behaviour change. Without a thorough understanding of the role of identity in (changing) smoking and PA behaviours, it will likely remain difficult to develop effective identity-related interventions targeting both health behaviours. This may also be why, to date, only two identity-related interventions,[34 42] which targets both health behaviours in conjunction, have been reported on in the scientific literature.

In a nutshell, the research field is in need of a comprehensive overview encapsulating the role of identity in the contexts of smoking (cessation) and (insufficient) PA to guide the development of identity-based interventions targeting both health risk factors at once. The review to which this protocol belongs aims to provide such an overview.

Personal characteristics have been found to be associated with differences in smoking and PA, and identities. For example, smoking and insufficient PA have been found to be especially prevalent and co-occurring among socioeconomically disadvantaged individuals,[8 43–47] men[8] and those with lower levels of health literacy.[45] Also, PA[48] and the likelihood of quitting smoking[49] tend to decline with age. Furthermore, findings show that individuals who started smoking young—around the age of 14–16,[50 51] who are more nicotine dependent[32 50 52 53] and who are heavy smokers (ie, who smoke 10+cigarettes per day)[54] are less likely to quit smoking. With regard to personal characteristics and smoking-related and PA-related identities, empirical studies have found that individuals with lower socioeconomic position (SEP),[29] individuals who are more nicotine dependent[31 52] and older individuals[32] generally identify more with smoking than with quitting.

In sum, smoking and PA-identities and behaviours have been found to vary based on demographic characteristics. Plausibly, this makes personal characteristics highly relevant to consider in a review aiming to synthesise the role of identity in smoking (cessation) and physical (in) activity. Additionally, investigating variations in the role of identity on the two health behaviours depending on personal characteristics will prove useful in developing identity-related interventions for specific target groups. The scoping review will therefore take into consideration demographic characteristics (ie, SEP, health literacy, age, sex), smoking-specific characteristics (ie, age at onset smoking, heaviness of smoking) and PA-specific characteristics (ie, levels of physical (in)activity) when mapping the available evidence.

In short, the current article describes the protocol for a scoping review aiming to map the available scientific evidence regarding identity processes and identity-related interventions and possible personal characteristics in the contexts of smoking and PA. A scoping review was chosen over other types of syntheses because it allows to uncover and analyse (different types of) evidence about the topic and to inform areas for practice and future research.[55 56] Findings are expected to aid the development of future identity-related interventions aiming to facilitate smoking cessation and increased PA. One such intervention is Perfect Fit (see the Funding statement), a virtual coaching intervention being developed by the authors of this review as part of a large Dutch consortium, which will employ identity-related interventions to motivate people to quit smoking and increase their PA levels.

Next to being the first to provide a comprehensive overview of the evidence on the role of identity, in the domains of smoking and PA, and to directly inform the development of interventions such as Perfect Fit, this scoping review will also be innovative methodologically. It will be the first in the field to make use of Active Learning for Systematic Reviews (ASReview), a machine learning

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technology to select relevant literature (see stage 3 of Methods and Analysis).

METHODS AND ANALYSIS

We conducted Preliminary searches of the Open Science Framework (OSF), Cochrane Database of Systematic Reviews, Joanna Briggs Institute (JBI) Evidence Synthesis and PROSPERO in December 2020, at the inception of the study, in February 2021, before preregistering the protocol on OSF (https://osf.io/hkd9c/), and, as additional verification, in September 2021, after finalising the protocol manuscript. No current or underway systematic reviews or scoping reviews on the topic were identified. The current study is expected to run from February 2021 to December 2022.

The present scoping review protocol follows the adapted methodological framework for scoping reviews of Levac *et al*,[57] originally developed by Arksey & O'Malley.[58] This protocol as well as the final scoping review also conform to the guidelines published by the JBI[59] and the recent Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review (PRISMA-ScR) guidelines.[60] These guidelines were developed as a result of increasing popularity of scoping reviews and as a means to improving their quality.

Stage 1: identifying the research questions

Guided by the PRISMA-ScR Population, Concept, Context (PCC) principles, the research team agreed on articulating the following research questions:

RQ1—What is known about identity (processes) in adolescents and adults, in the contexts of smoking and PA, taking into consideration certain demographic characteristics (ie, SEP, health literacy, age, sex), smoking-specific characteristics (ie, age at onset smoking, heaviness of smoking, number of smoking years) and PA-specific characteristics (ie, levels of physical (in)activity)?

RQ2—What identity-related interventions are being used to influence smoking and PA in adolescents and adults, taking into consideration possible differences in implementation based on demographic characteristics (ie, SEP, health literacy, age, sex), smoking-specific characteristics (ie, age at onset smoking, heaviness of smoking, number of smoking years) and PA-specific characteristics (ie, levels of physical (in)activity)?

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

Eligibility criteria

Inclusion of literature will happen according to the PCC eligibility criteria mentioned hereafter. Chosen criteria for the review are presented here in reverse order, that is, CCP, for readability purposes.

Context

In terms of context, we will include published, peer-reviewed scientific research papers and conference abstracts, written in English, Dutch or French.

Concept

When it comes to concept criteria, we will include literature which describes identity processes relating to smoking (cessation) and/or physical (in)activity (RQ1) and/or describes identity-related interventions implemented in the context of smoking (cessation) and/or physical (in)activity (RQ2). Preferably, the literature also considers demographic characteristics (age, SEP, health literacy, sex), smoking-related characteristics (heaviness of smoking, age at smoking onset) and PA-related characteristics (levels of physical (in)activity), although not considering these factors will not automatically lead to exclusion.

Population

With regard to population criteria, literature will be included when it studies individuals aged 12+ (on average), who smoke or have smoked tobacco (any type) or electronic cigarettes, and/or do or have engage(d) in less than their age-specific recommended levels of PA.[47] In line with the explorative nature of a scoping review, no restrictions are formulated in terms of study design or publication year. Literature will be excluded when written in another language than English, Dutch or French, and/or smoking (cessation) or physical (in)activity and related interventions are discussed without relation to identity, and/or the target population is limited to individuals younger than 12 years old (on average).

Identifying relevant studies, information sources and search

In line with JBI guidelines,[59] a three-step search strategy will be designed and used with the assistance of an experienced academic librarian from the Leiden University Medical Centre. Step 1 will consist of an initial limited search of PubMed, PsycINFO and Web of Science, using pre-defined keywords extracted from a dozen known key articles, to identify additional relevant keywords and index terms. Step two will include a second search across all relevant databases, that is, PubMed, PsycINFO, Embase, Emcare, Web of Science Core Collection, Wiley Cochrane Library, Psychology, Behavioural Sciences Collection and Academic Search Premier, OpenGrey.eu and British Library EthOS, using all identified keywords and index terms. In step 3, the reference list of the key articles will be handsearched for additional sources (ie, backward reference searching[61]) and missing search/index terms. A new search will be carried out using updated search and index terms and adapted to all databases (see online supplemental materials 1 for the final search string used for PubMed, which yielded the most records). Search strings for other databases are available on request). Once full-text screening is completed, backward reference searching of included articles[61] will be used to identify new and/or missing records. Additionally, once data charting is complete, and before finalising the synthesis, a new search using the search strategy established in step two will be carried out to identify relevant newly published records.

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Stage 3: screening and selecting studies

Title and Abstract screening

Following the search, and after removal of duplicates, titles and abstracts of identified records will be collated and uploaded into (1) ASReview, a free and open-access machine learning technology,[62] and (2) Rayyan QCRI, a free title and abstract screening assistant.[63] Following a pilot test of the screening manual, 10% of titles and abstracts will be independently assessed against eligibility criteria by two reviewers. One experienced reviewer (MHMVV) will screen titles and abstracts using ASReview. A second reviewer (KMP) will screen a random portion of titles and abstracts using Rayyan QCRI.

ASReview was chosen as primary screening tool for several reasons, the first being time-efficiency. A study by Ferdinands *et al*[64] evaluated the technology using six systematic review datasets from different research fields, and showed that only 8.3%–36.1% of titles and abstracts needed screening to identify the relevant ones. With each inclusion/exclusion decision, the ASReview algorithm learns what the reviewer finds relevant, and it subsequently sorts and presents the most relevant records first.[62] As a result, considerably fewer screening hours are needed to arrive at the final selection. A second reason for choosing ASReview is its 'human-in-the-loop' machine learning technique.[65] Through this technique, the reviewer maintains control over the entire screening process by having the final say in the relevance of every record. The reviewer is not dependent on a technology to include the relevant citations, but is aided by it. Finally, ASReview was chosen because it presents only titles and abstracts, and no authors or journal names. This allows the reviewer to judge each citation for its content rather than irrelevant metadata, and thereby removes a potential layer of "authority bias" in the choice of relevance.[65] Despite substantial advantages, ASReview remains a new, undertested technology. This is why, to mitigate possible early technological kinks, we decided to have the second reviewer (KMP) manually perform independent double screening of a portion (ie, 10%) of the titles and abstracts in Rayyan QCRI, a widely used and appreciated screening assistant.[63] Rayyan QCRI facilitates the screening process by highlighting pre-defined keywords in the title and abstract, and makes easy to assign and track reasons for inclusion/exclusion. Additionally, Rayyan QCRI permits to screen from anywhere thanks to its offline functionality, and allows reviewers to collaborate on a project while being blind to others' screening decisions.[63 66]

Regardless of the software used, screened titles and abstracts will be marked 'included (for full-text screening)' or 'excluded' based on assessment against the eligibility criteria. Screening in ASReview will stop after 150 consecutive records marked 'excluded'. ASReview software developers advised to stop after 100–120 consecutive irrelevant records. However, with very little prior research to guide screen-stop decision in scoping reviews,[67 68] and none using ASReview, we choose to apply a more conservative heuristic of 150 consecutive irrelevant records.

As previously mentioned, the second reviewer (KMP) will additionally randomly double screen a small portion of the total number of records using Rayyan QCRI. The review team agreed on a double screening amount of 10% of retrieved records. This amount was chosen because screening more would undermine the purpose, time-saving benefits and intelligence of ASReview, as also confirmed by its developers when consulted on the matter. Additionally, the review team expects the search string to yield a substantial amount of records. Therefore, after double screening 10%, we expect the second reviewer (KMP), to have a sufficient feel of the literature to help validate the screening decisions made in ASReview by the first reviewer (MHMVV).

After double screening is complete, a Cohen's κ inter-rater agreement rate (IRA)[69] will be calculated for the titles and abstracts screened by both reviewers. If IRA reaches at least 80%—level from which IRA is considered strong[70]—double screening will stop. In case IRA is below 80%, a new random 10% of titles and abstracts will be double screened, and so on until 80% IRA is reached or all records have been double screened.

Full-text screening

Full texts of articles included based on title and abstract screening will be managed in Microsoft Excel, and marked 'included' or 'excluded' based on assessment against eligibility criteria. Reason(s) for exclusion will be recorded and reported in the inclusion flowchart of the scoping review. Where a full-text is unavailable, but the article is assessed as relevant in the title and abstract screening phase, the authors of the paper will be contacted to request a copy of the manuscript. In case key unpublished or missing data remains unobtainable after contact with the authors, or in case the record proves irrelevant to the research after all, the record will be excluded. Full-text screening decisions will be thoroughly documented and reported in the final scoping review. A complete overview of screening decisions will be available on request.

In accordance with PRISMA-ScR,[60] a flow diagram of the search and the study inclusion process will be presented in the final scoping review. Disagreement about screening decisions will be resolved through discussion among the two reviewers, and if necessary coauthors, until consensus is reached.

Stage 4: data charting process and data items

Data will be charted from eligible full-texts by two independent reviewers (KMP and MHMVV) using a data charting tool developed by the entire review team. The data charted will include information about the source (eg, author, year of publication, country of origin) of the record, its methodology, its aims, and findings relevant to the review questions (main outcomes). Where available, information about demographic, smoking-specific characteristics and PA-specific characteristics will also

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be charted. Where required, authors of papers will be contacted to request missing or additional data. A draft charting table will be pilot tested on usability prior to starting full-text screening, and updated as necessary. As recommended by Levac *et al*[57] in their methodological advice for scoping reviews, the charting table will be a living document, modified and revised as necessary during the process of charting data from each included evidence source. Modifications will be summarised in the scoping review.

In-depth assessment of how research pertaining to our review questions is conducted is, as of yet, lacking. However, such assessment could help synthesise and make sense of the findings in the final scoping review. Consequently, and although not a requirement in scoping reviews,[60] we aim to critically appraise the quality of each included evidence source, using the JBI Critical Appraisal Tools.[71] These tools allow to assess the quality of numerous types of evidence sources, from randomised controlled trials to qualitative studies. Two reviewers (KMP and MHMVV) will independently assess the quality of each included full-text record, using the tool appropriate to the study design. Disagreement will be resolved through discussion among assessors, and if necessary coauthors, until consensus is reached.

Stage 5: collating, summarising and reporting the results

Results will be summarised into a narrative descriptive synthesis, and may include visual overviews (eg, graph, diagram or table) of the findings (conform the PRISMA-ScR guidelines[60]). Depending on the available data, results will be presented following the PCC principles, that is per health behaviour (smoking, PA), separately for adolescents and adults, and per moderator (heaviness of smoking, SES, health literacy, sex, age at smoking onset and physical (in)activity levels).

Stage 6: consultation

Consistent with Arksey and O'Malley's framework,[58] we will convene a team of stakeholders to assess the validity of the findings. Stakeholders will consist of clinicians and coaches who counsel individuals with regard to their smoking (cessation) and physical (in)activity, experts in identity in the field of either one or both health behaviours, experts in smoking cessation and/or PA-enhancement interventions, and smokers/individuals who are not sufficiently physically active. They will be asked to reflect on and discuss together the results of the scoping review to facilitate reporting of the findings and to inform future works in the field, including the further development of the Perfect Fit virtual coach. A detailed design of the consultation process will be created after stage 5 of the methodological framework (see above) has been completed.

Patient and public involvement

Patients or the public will not be directly involved in the conception, design and planning of this review, but will be involved, with explicit written consent, in the consultation phase (stage 6) of the scoping review.

Ethics and dissemination

This study did not require ethical approval as it did not involve human participation. Generally speaking, scoping reviews do not require ethical approval, as they analyse published literature. The final scoping review will be the first in the field to aggregate evidence regarding identity processes and interventions in the contexts of both smoking and PA, two key risk factors of numerous diseases, using a systematic approach. Findings are expected to aid the development of future identity-related interventions targeting smoking and PA, including the Perfect Fit virtual coaching intervention. Review findings will be presented to other key stakeholders, at scientific conferences and published in an open-access peer-reviewed journal.

Amendment protocol

In case of amendments, a separate version of the protocol will be maintained showing all modifications with tracked changes. Modifications will be reported and substantiated in the final scoping review.

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REFERENCES

1 Lee I-M, Shiroma EJ, Lobelo F, *et al*. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 2012;380:219–29.
2 Scarborough P, Bhatnagar P, Wickramasinghe KK, *et al*. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006-07 NHS costs. *J Public Health* 2011;33:527–35.
3 National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. *The Health consequences of smoking - 50 years of progress: a report of the Surgeon General*, 2014.
4 World Health Organisation. Data and statistics, tobacco, 2021. Available: https://www.euro.who.int/en/health-topics/disease-prevention/tobacco/data-and-statistics [Accessed 9 Jun 2021].
5 World Health Organisation. Data and statistics, physical activity, 2021. Available: https://www.euro.who.int/en/health-topics/disease-prevention/physical-activity/data-and-statistics [Accessed 9 Jun 2021].
6 World Health Organisation, editor. *Global health risks: mortality and burden of disease attributable to selected major risks*. Geneva, Switzerland: World Health Organization, 2009.
7 French S, Rosenberg M, Knuiman M. The clustering of health risk behaviours in a Western Australian adult population. *Health Promot J Austr* 2008;19:203–9.
8 Noble N, Paul C, Turon H, *et al*. Which modifiable health risk behaviours are related? A systematic review of the clustering of smoking, nutrition, alcohol and physical activity ('SNAP') health risk factors. *Prev Med* 2015;81:16–41.
9 Poortinga W. The prevalence and clustering of four major lifestyle risk factors in an English adult population. *Prev Med* 2007;44:124–8.
10 World Health Organisation. Prevalence of insufficient physical activity among adults aged 18+ years, 2018. Available: https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/insufficient-physical-activity [Accessed 9 Jun 2021].
11 El Ansari W, Salam A. Is achieving the guidelines of four forms of physical activity associated with less self-reported health complaints? cross-sectional study of undergraduates at the University of Turku, Finland. *Int J Environ Res Public Health* 2020;17:E5595.
12 Haskell WL, Lee I-M, Pate RR, Powell KE, *et al*. Physical activity and public health: updated recommendation for adults from the American College of sports medicine and the American heart association. *Circulation* 2007;116:1081–93.
13 Hartmann-Boyce J, Livingstone-Banks J, Ordóñez-Mena JM, *et al*. Behavioural interventions for smoking cessation: an overview and network meta-analysis. *Cochrane Database Syst Rev* 2021;1:CD013229.
14 Villanti AC, West JC, Klemperer EM, *et al*. Smoking-Cessation interventions for U.S. young adults: updated systematic review. *Am J Prev Med* 2020;59:123–36.
15 Erikson EH. *Identity and the life cycle*. New York, NY, US: W W Norton & Co, 1980.
16 Berkman ET, Livingston JL, Kahn LE. Finding the "self" in self-regulation: The identity-value model. *Psychol Inq* 2017;28:77–98.
17 Burke PJ, Stets JE. *Identity theory*. Oxford, NY: Oxford University Press, 2009.
18 Côté JE. The role of identity capital in the transition to adulthood: the individualization thesis examined. *J Youth Stud* 2002;5:117–34.
19 Kearney MH, O'Sullivan J. Identity shifts as turning points in health behavior change. *West J Nurs Res* 2003;25:134–52.
20 Oyserman D, Fryberg SA, Yoder N. Identity-based motivation and health. *J Pers Soc Psychol* 2007;93:1011–27.
21 West R, Brown J. *Theory of addiction*. Second edition. West Sussex, UK: Wiley Blackwell: ChichesterAddiction Press, 2014.
22 Tajfel H, Turner JC. An integrative theory of intergroup conflict. In: *Austin Wg, Worchel S*. Monterey: The social psychology of intergroup relationsCA: Brooks/Cole Publishing Company, 1979: 33–47.
23 Brown TJ, Bauld L, Hardeman W, *et al*. Re-configuring identity postpartum and sustained abstinence or relapse to tobacco smoking. *Int J Environ Res Public Health* 2019;16:3139.
24 Callaghan L, Yong H-H, Borland R, *et al*. What kind of smoking identity following quitting would elevate smokers relapse risk? *Addict Behav* 2021;112:106654.
25 Falomir-Pichastor JM, Blondé J, Desrichard O, *et al*. Tobacco dependence and smoking cessation: the mediating role of smoker and ex-smoker self-concepts. *Addict Behav* 2020;102:106200.
26 Høie M, Moan IS, Rise J. An extended version of the theory of planned behavour: prediction of intentions to quit smoking using past behaviour as moderator. *Addict Res Theory* 2010;18:572–85.
27 Meijer E, Gebhardt WA, Dijkstra A, *et al*. Quitting smoking: the importance of non-smoker identity in predicting smoking behaviour and responses to a smoking ban. *Psychol Health* 2015;30:1387–409.
28 Meijer E, Gebhardt WA, Van Laar C, *et al*. Socio-Economic status in relation to smoking: the role of (expected and desired) social support and quitter identity. *Soc Sci Med* 2016;162:41–9.
29 Meijer E, van Laar C, Gebhardt WA, *et al*. Identity change among smokers and ex-smokers: findings from the ITC Netherlands survey. *Psychol Addict Behav* 2017;31:465–78.
30 Meijer E, Vangeli E, Gebhardt WA, *et al*. Identity processes in smokers who want to quit smoking: a longitudinal interpretative phenomenological analysis. *Health* 2020;24:493–517.
31 Penfornis KM, Gebhardt WA, Rippe RCA, *et al*. My future-self has (not) quit smoking: an experimental study into the effect of a future-self intervention on smoking-related self-identity constructs. *Manuscript Submitted for Publication*; Institute of Psychology. *Health, Medical and Neuropsychology* 2021.
32 Tombor I, Shahab L, Brown J, *et al*. Positive smoker identity as a barrier to quitting smoking: findings from a national survey of smokers in England. *Drug Alcohol Depend* 2013;133:740–5.
33 Tombor I, Shahab L, Brown J, *et al*. Does non-smoker identity following quitting predict long-term abstinence? Evidence from a population survey in England. *Addict Behav* 2015;45:99–103.
34 Priebe CS, Beauchamp M, Wunderlich K, *et al*. "I'm a runner not a smoker": Changes in identity as predictors of smoking cessation and physical activity. *Psychol Sport Exerc* 2020;49:101702.
35 Hardcastle S, Taylor AH. Finding an exercise identity in an older body: "It's redefining yourself and working out who you are". *Psychol Sport Exerc* 2005;6:173–88.
36 Strachan SM, Brawley LR, Spink KS, *et al*. Self-regulatory efficacy's role in the relationship between exercise identity and perceptions of and actual exercise behaviour. *Psychol Sport Exerc* 2015;18:53–9.
37 Kendzierski D, Furr RM, Schiavoni J. Physical activity self-definitions: correlates and perceived criteria. *J Sport Exerc Psychol* 1998;20:176–93.
38 Lau PWC, Fox KR, Cheung MWL. Psychosocial and Socio-Environmental Correlatesof sport identity and sport Participationin secondary school-age children. *Eur J Sport Sci* 2004;4:1–21.
39 Babic MJ, Morgan PJ, Plotnikoff RC, *et al*. Physical activity and physical self-concept in youth: systematic review and meta-analysis. *Sports Med* 2014;44:1589–601.
40 Rhodes RE, Kaushal N, Quinlan A. Is physical activity a part of who I am? A review and meta-analysis of identity, schema and physical activity. *Health Psychol Rev* 2016;10:204–25.
41 Montes KS, Pearson MR. I am what I am: a meta-analysis of the association between substance user identities and substance use-related outcomes. *Psychol Addict Behav* 2021;35:231–46.
42 Taylor A, Thompson TP, Ussher M, *et al*. Randomised controlled trial of tailored support to increase physical activity and reduce smoking in smokers not immediately ready to quit: protocol for the trial of physical Activity-assisted reduction of smoking (tars) study. *BMJ Open* 2020;10:e043331.
43 Bommelé J, Nagelhout GE, Kleinjan M, *et al*. Prevalence of hardcore smoking in the Netherlands between 2001 and 2012: a test of the hardening hypothesis. *BMC Public Health* 2016;16:754.
44 Moor I, Rathmann K, Lenzi M, *et al*. Socioeconomic inequalities in adolescent smoking across 35 countries: a multilevel analysis of the role of family, school and Peers. *Eur J Public Health* 2015;25:457–63.
45 Stewart DW, Adams CE, Cano MA, *et al*. Associations between health literacy and established predictors of smoking cessation. *Am J Public Health* 2013;103:e43–9.
46 Stewart DW, Cano MA, Correa-Fernández V, *et al*. Lower health literacy predicts smoking relapse among racially/ethnically diverse smokers with low socioeconomic status. *BMC Public Health* 2014;14:716.
47 World Health Organisation. *Global recommendations on physical activity for health*. Geneva: World Health Organization, 2010. https://www.who.int/dietphysicalactivity/global-PA-recs-2010.pdf
48 Gropper H, John JM, Sudeck G, *et al*. The impact of life events and transitions on physical activity: a scoping review. *PLoS One* 2020;15:e0234794.

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49 Yong H-H, Borland R, Siahpush M. Quitting-related beliefs, intentions, and motivations of older smokers in four countries: findings from the International tobacco control policy evaluation survey. *Addict Behav* 2005;30:777–88.
50 Caponnetto P, Polosa R. Common predictors of smoking cessation in clinical practice. *Respir Med* 2008;102:1182–92.
51 Pesce G, Marcon A, Calciano L, *et al*. Time and age trends in smoking cessation in Europe. *PLoS One* 2019;14:e0211976.
52 Blondé J, Falomir-Pichastor JM. Accounting for the consequences of tobacco dependence on cravings, self-efficacy, and motivation to quit: consideration of identity concerns. *Span J Psychol* 2020;23:e34.
53 Blondé J, Falomir-Pichastor J-M. Tobacco dependence and motivation to quit smoking: an identity-based framework. *Int J Soc Psychol* 2021:1–26.
54 Kotz D, Fidler J, West R. Very low rate and light smokers: smoking patterns and cessation-related behaviour in England, 2006-11. *Addiction* 2012;107:995–1002.
55 Daudt HML, van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. *BMC Med Res Methodol* 2013;13:48.
56 Munn Z, Peters MDJ, Stern C, *et al*. Systematic review or scoping review? guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol* 2018;18:143.
57 Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci* 2010;5:69.
58 Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.
59 Aromataris E, Munn Z, eds. *JBI Manual for Evidence Synthesis*. JBI, 2020. https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-01
60 Tricco AC, Lillie E, Zarin W, *et al*. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;169:467–73.
61 Wohlin C. Guidelines for snowballing in systematic literature studies and a replication in software engineering. *8th*. *Int Conf Eval Assess Softw Eng EASE 2* 2014;14:1–10.
62 Van de Schoot R, De Bruin J, Schram R. ASReview: open source software for efficient and transparent active learning for systematic reviews, 2020. Available: http://arxiv.org/abs/2006.12166 [Accessed 23 Nov 2020].
63 Ouzzani M, Hammady H, Fedorowicz Z, *et al*. Rayyan-a web and mobile APP for systematic reviews. *Syst Rev* 2016;5:210.
64 Ferdinands G, Schram RD, de BJ. Active learning for screening prioritization in systematic reviews - a simulation study. *OSF Preprints* 2020.
65 Van de Schoot R, de Bruin J. *Researcher-in-the-loop for systematic reviewing of text databases*. In: Zenodo: SciNLP: Natural Language Processing and Data Mining for Scientific Text, 2020.
66 Cleo G, Scott AM, Islam F, *et al*. Usability and acceptability of four systematic review automation software packages: a mixed method design. *Syst Rev* 2019;8:145.
67 Marshall IJ, Wallace BC. Toward systematic review automation: a practical guide to using machine learning tools in research synthesis. *Syst Rev* 2019;8:s13643-019–1074–9.
68 Ros R, Bjarnason E, Runeson P. A machine learning approach for semi-automated search and selection in literature studies. In: *Proceedings of the 21st International Conference on Evaluation and Assessment in Software Engineering*. New York, NY, USA. *Association for Computing Machinery* 2017:118–27.
69 Cohen J. A coefficient of agreement for nominal scales. *Educ Psychol Meas* 1960;20:37–46.
70 McHugh ML. Interrater reliability: the kappa statistic. *Biochem Med* 2012;22:276–82.
71 Joanna Briggs Institute. Critical appraisal tools, 2020. Available: https://jbi.global/critical-appraisal-tools [Accessed 23 Jun 2021].

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Supplementary Material 1: Search Strategy Developed for PubMed

("Identification, Psychological"[majr] OR "Social Identification"[majr] OR "identity"[ti] OR "Self Concept"[majr:noexp] OR "Self Concept"[ti] OR "self perception*"[ti] OR "self image*"[ti] OR "self view*"[ti] OR "sense of self"[ti] OR "sense of identity"[ti] OR "sense of identities"[ti] OR "Social Identification"[majr] OR "Social Identification"[ti] OR "self identity"[ti] OR "self identities"[ti] OR "social identity"[ti] OR "social identities"[ti] OR "identity formation*"[ti] OR "identity maintenance"[ti] OR "identity change*"[ti] OR "identity process*"[ti] OR "identity related intervention*"[ti] OR "self conception"[ti] OR "self conceptions"[ti] OR ("identit*"[ti] AND ("construct*"[ti] OR "chang*"[ti] OR "creat*"[ti])) OR "self schema"[ti] OR "self schemata"[ti] OR "self schema*"[ti] OR "selfschema"[ti] OR "selfschemata"[ti] OR "selfschema*"[ti] OR "self definition"[ti] OR "self defin*"[ti] OR "selfdefinition"[ti] OR "selfdefin*"[ti] OR "possible self"[ti] OR "possible selves"[ti] OR "possible self*"[ti] OR "possible selv*"[ti] OR "future self"[ti] OR "future selves"[ti] OR "future self*"[ti] OR "future selve*"[ti] OR "prototype self"[ti] OR "prototype selves"[ti] OR "prototype self*"[ti] OR "prototype selv*"[ti])

AND ("Smoking"[majr] OR "Smoking"[ti] OR "Smoking Cessation"[majr] OR "Smoking Devices"[majr] OR "cigar"[ti] OR "cigars"[ti] OR "cigarette"[ti] OR "cigarettes"[ti] OR "tobacco"[ti] OR "smoker"[ti] OR "smoker*"[ti] OR "smokers"[ti] OR "smoking behavior*"[ti] OR "smoking behaviour*"[ti] OR "tobacco use cessation*"[ti] OR "nicotine use cessation"[ti] OR "quitting smoking*"[ti] OR "quit smoking*"[ti] OR "stop smoking*"[ti] OR "smoking reduction"[ti] OR "smoking abstinence"[ti] OR "cessation"[ti]

OR "Exercise"[majr] OR "Exercise"[ti] OR "Exercis*"[ti] OR "Physical Activity"[ti] OR "Physical Activit*"[ti] OR "Physically Activ*"[ti] OR "Physical Inactivit*"[ti] OR "Physically Inactiv*"[ti] OR "physical exercise*"[ti] OR "Sports"[majr] OR "sports"[ti] OR

"sport"[ti] OR "Physical Fitness"[majr] OR "Athletic Performance"[majr] OR "fitness"[ti] OR "physical training"[ti] OR "athletic activity"[ti] OR "Athletic Performance"[ti])

NOT ("Animals"[mesh]

NOT "Humans"[mesh])

Search strategies developed for the PsycINFO, Embase, Emcare, Web of Science Core Collection, Wiley Cochrane Library, Psychology, Behavioural Sciences Collection and Academic Search Premier, OpenGrey.eu and British Library EthOS databases are available upon request.

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"sport"[ti] OR "Physical Fitness"[majr] OR "Athletic Performance"[majr] OR "fitness"[ti] OR "physical training"[ti] OR "athletic activity"[ti] OR "Athletic Performance"[ti])

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