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Report on the development of a European competency framework for health and other professionals to support behaviour change in the self-management of chronic disease and the associated learning outcomes-based curriculum

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Pushing the boundaries of behaviour change support education in chronic disease

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Related publications

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Executive summary

Chronic diseases represent a significant burden for the society and health systems; addressing this burden is a key goal of the European Union policy. Supporting the self-management of chronic disease, in the wider context of self-care, is critical to achieve better health outcomes sustainably. Self-management involves tasks such as medication-taking, a healthy diet or engaging in physical activity, which are intrinsically linked to behaviour change.

Health and other professionals are expected to deliver behaviour change support to persons with chronic disease. A skill gap in behaviour change support has been identified, and there is room for improvement. Train4Health is a strategic partnership involving seven European Institutions in five countries, which seeks to improve behaviour change support competencies for the self-management of chronic disease. The project envisages a continuum in behaviour change support education, in which an interprofessional competency framework, relevant for those currently practising, guides the development of a learning outcomes-based curriculum and an educational package for future professionals (today's undergraduate students). This innovative educational package is aligned with the European agenda on digital transformation in education and training.

This document reports the work that paved the way to the development of the Train4Health educational package, subsumed in an initial work package of the project.

One of its core sections reports on consensualising a European competency framework on behaviour change support for self-management in chronic disease. This activity (A2.1) was led by Cathal Cadogan, Judith Strawbridge and Afonso Cavaco. A two-round Delphi study, using an interprofessional panel of 48 experts from 12 European countries, yielded a 26 competency statements framework (14 behaviour change competencies and 12 foundational competencies). Additionally, a core list of behaviour change techniques from a standardised taxonomy was developed, through the involvement of an *ad-hoc* panel of behavioural psychologists.

Another core section of this document reports on the development of a learning outcomes-based curriculum, informed by the competency framework. This activity (A2.2) was led by Afke Kerkstra and Cristina Baixinho. A total of 57 learning outcomes were developed, 34 associated with behaviour change competencies and 23 associated with foundational competencies.

These outputs provide a sound basis for developing the innovative Train4Health educational package on behaviour change support in chronic disease and offer a consistent approach to educating professionals across Europe.

Introduction

Chronic diseases are a global epidemic, responsible for most deaths worldwide. Cardiovascular diseases, cancers, diabetes and chronic lung diseases present the highest prevalence, which is expected to increase in the coming years (World Health Organization, 2017). In addition to human suffering, chronic diseases place a considerable burden on health budgets, both in terms of direct and indirect costs. For instance, cardiovascular diseases cost European healthcare systems almost EUR 111 billion in 2015, approximately €18 billion due to ischaemic heart disease and more than €20 billion due to stroke (Wilkins, Wilson, Wickramasinghe, & Bhatnagar, 2017). Additionally, chronic diseases have significant societal costs, as they erode workforce participation, decrease labour productivity, and increase early retirement (European Commission, 2020).

It has long been recognised that persons with chronic disease find it challenging to take medication routinely and adopt beneficial lifestyle changes (Lindner et al., 2003). These difficulties are associated with poorer disease management, health complications and increased costs, which threaten the sustainability of healthcare systems.

Addressing the burden posed by chronic diseases is one of the key goals of European Union (EU) health policy. Promoting self-management is critical to achieve this goal. Self-management is defined as “tasks performed by an individual to minimise the impact of one’s disease, with or without the support of health professionals. Tasks can holistically be categorised under medical management (e.g. taking medication, adhering to a diet, engaging in physical activity), role management (e.g. redefining life roles considering chronic disease) and emotional management (e.g. dealing with anger and frustration) and are related to a set of skills” (Lorig et al., 2003).

There is evidence to support self-management interventions for chronic disease, in conditions such as chronic obstructive pulmonary disease (Zwerink et al., 2014) and diabetes mellitus (Pal et al., 2013). However, there is scope to improve the effective support of self-management by health and other professionals in people living with chronic disease, particularly in what concerns promoting behaviour change. For example, a Dutch study in primary care concluded that nurses prioritised the optimisation of medical treatment and seldom focused on behaviour change (Westland et al., 2018). Furthermore, competent behaviour change counselling was regarded as still uncommon in clinical practice (Vallis et al., 2017), suggesting a global healthcare workforce problem.

A strategic partnership among seven European institutions of higher education across five countries (Portugal, Ireland, Slovenia, the Netherlands, Belgium), who are involved in the

education of nursing, pharmacy and sports science students, seeks to improve behaviour change support competencies for self-management in chronic disease, through an innovative educational package (Figure 1).

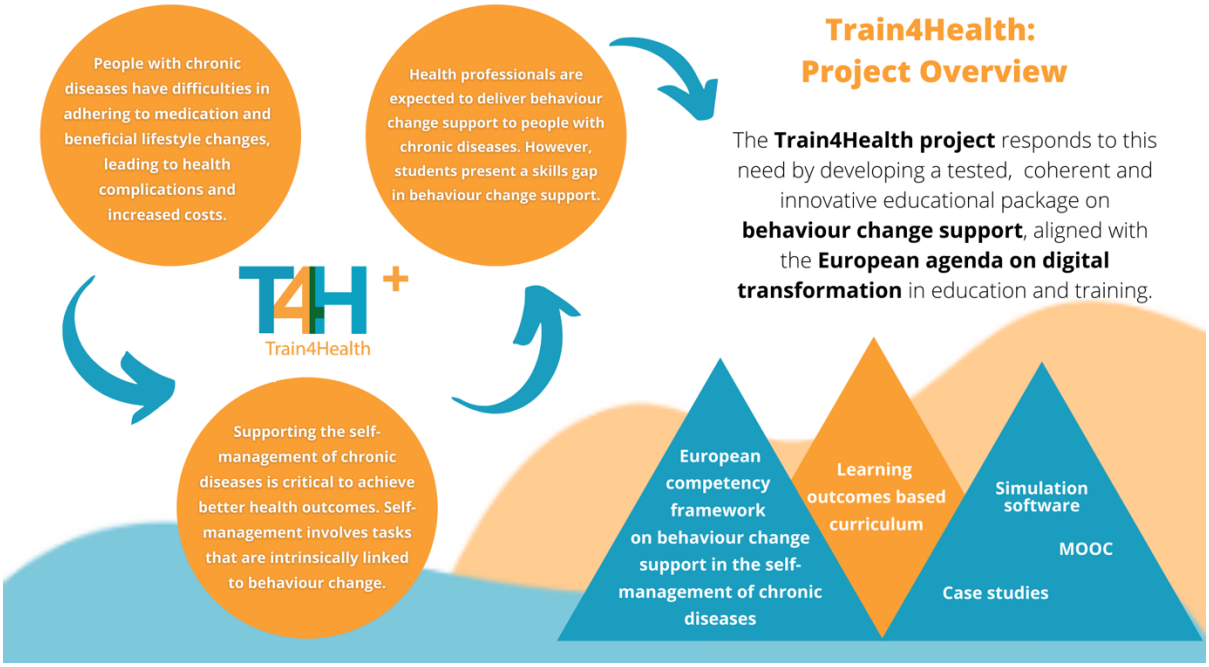

Figure 1 | Overview of the Train4Health project

The project envisages a continuum in behaviour change support education, in which an interprofessional competency framework, relevant for those currently practising, guides the development of a learning outcomes-based curriculum and an educational package for future professionals (today's undergraduate students). The educational package, comprising case studies, a massive open on-line course and a simulation software package, align with the European Union policy on digital transformation in education and training, which encourages open learning resources and the integration of digital technologies in teaching and learning.

A competency framework has been defined as "a structure that sets out and defines each competency (such as problem-solving or people management) required by individuals working in an organisation or part of an organisation" (CIPD, 2020). Competency frameworks are relevant to healthcare professionals and have been pursued globally by governments, regulatory and professional bodies; they are also useful for informing curricula, together with aligned learning activities and assessments (Thistlethwaite et al., 2014).

The advantages of competency-based education include (Hawkins et al., 2015):

- A focus on the outcomes and in what the learner should achieve;
- Multimodal assessment that embraces formative and summative approaches;
- The potential for supporting a flexible, time-independent trajectory through the curriculum;
- Improving the information and coordination of stakeholders through a shared set of expectations and a common language for education, assessment and regulation.

Competency-based education implies a curriculum, in which learners and educators are more accountable, the programme is flexible and adaptable to learner progress, and learners take responsibility for their own learning and development (Weller, Naik, and Ryan, 2020). Competency-based education begins with the consideration of the competencies needed in the health and other professions workforce to address health care priorities and provides a vehicle for integrating the health needs of people with the values of the professions (Gruppen, Mangrulhar, and Kolars, 2012).

The design of a competency-based curriculum can be embedded in a philosophy of interprofessional education. There is a movement towards transforming systems for health through interprofessional education and collaborative practice with the purpose of improving care (Bogetz et al., 2015; Khalili, et al., 2019, Freeth, Savin-Baden, & Thistlethwaite, 2020). This is particularly important when considering the complexity of chronic diseases and the potential for different professionals to support self-management through behaviour change.

This report summarises the work undertaken to date in developing a European competency framework and an interprofessional associated learning outcomes-based curriculum. Work was undertaken by Activity 2.1 and Activity 2.2 teams, respectively, subsumed in work package 2 (“Paving the way to the development of key educational products”).

The development of the competency framework was linked to a set of behaviour change techniques (BCTs) from a current, widely accepted standardised taxonomy. A scoping review found that BCTs remain underused in self-management interventions (Riegel et al., 2020). One reason that may explain this shortcoming is the poor permeation of behavioural science, and BCTs in particular, into the education and training of health and other professionals.

Development of a European competency framework for health and other professionals to support behaviour change in persons self-managing chronic disease[1]

Aims

The primary aim of this study was to develop an inter- professional competency framework for health and other professions to support behaviour change for the self- management of chronic disease at a European level. A secondary aim was to derive a set of standardised BCTs to link with framework competencies that directly support behaviour change.

Overview of the methods

In this section, the method used to address the primary and secondary study aims are described in turn. In essence, a Delphi method was used to consensualise the behaviour change competency framework, based on a draft list of competencies compiled from existing frameworks (Part 1). Deriving a set of BCTs to be linked with framework competencies was achieved through a combination of a literature search with feedback from an expert panel of behavioural psychologists (Part 2).

Part 1: Development of the behaviour change competency framework

The Delphi technique is a widely used method for achieving a consensus from experts within a particular field (Hsu & Sandford, 2007). It allows stakeholders' views and experiences to be captured as part of a consensus-building exercise (Junger et al., 2017). The study methodology outlined below is adapted from previous Delphi studies (Cooper et al., 2014; Barry et al., 2016). Ethical approval was granted by the RCSI Research Ethics Committee (REC201911014).

[1] Reproduced from the paper by Guerreiro et al (2021), https://doi.org/10.1186/s12909-021-02720-w, licensed under a Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/).

Preparatory work

Compiling a draft list of competencies for inclusion in the Delphi study

Members of the research team reviewed existing health behaviour change competency frameworks to inform the initial draft list of competencies (Vallis et al., 2017; Dixon & Johnston, 2010; Payne et al., 2010; de Jong et al., 2013; Hoge et al., 2014; Health Behaviour Change and Education Development Working Group, 2016; Miller et al., 2016), herein designated as "reference documents". Competencies that were included in, or derivable from, these reference documents were identified and extracted. Each competency was drafted as a statement of the activity that the professional must undertake (e.g. 'knowledge of', 'ability to').

The competencies were initially categorised based on whether they were primarily knowledge or skills focused. The drafted competencies were compared across the reference documents to create a single merged long-list of 47 competencies. Each competency framework that included, or from which each competency was derived, was recorded in a tabular format, to assist in determining where there was some level of agreement in the reference documents. The long-list was prepared by one member of the research team and reviewed by another member for accuracy and completeness. The research team subsequently reviewed and refined this long-list of competencies, retaining 25 included in, or derived from, three or more competency frameworks. The remainder were included or excluded based on discussion among the research team. Statements that were not identified as part of the scoping exercise, but which were deemed to be of importance, such as competencies on BCTs, were added where appropriate. A refined list of 27 competencies was then circulated to the wider Train4Health consortium for review. To provide greater clarity, the competencies were divided into two categories (1) competencies that directly support behaviour change in the self-management of chronic disease, and (2) foundational competencies required for effective delivery of behaviour change support. The final refined list, comprising 27 competency statements, was recirculated for approval by the research team, and inclusion in Round 1 of the Delphi study.

Delphi consensus on competencies

Specification of the target population

The competency framework was developed for health and other professions, using the pharmacy, nursing and exercise physiologists' groups as a starting point. These disciplines are representative of the Train4Health consortium and can contribute to self-management

behaviours in chronic disease (e.g. medication adherence, smoking cessation, physical activity, weight loss), both individually and collectively.

Delphi panel selection

For the purpose of this study, an individual was considered an expert if the following criteria were fulfilled:

- Being involved in either behaviour change support education in chronic disease or in delivering behaviour change support in practice and,
- Professional credentials (e.g. track-record in the field evidenced by publications or professional experience) and/or status (e.g. job title) within each group.

As there is no universally agreed sample size for Delphi studies (Boulkedid et al., 2011), the sampling strategy followed a maximum variability approach and sought to obtain a range of perspectives from academic educators and healthcare professionals with backgrounds in relevant disciplines (e.g. pharmacy, nursing, sports sciences). Eighty individuals across European countries complying with the aforementioned definition of “expert” were suggested by members of the Train4Health consortium and invited to take part in the study. Eight additional individuals were invited during Round 1 based on the recommendation of those initially invited.

Data collection and analysis

The Delphi study comprised two rounds of online questionnaires. The initial questionnaire was piloted using a convenience sample of academics from the Train4Health consortium, to check the questionnaire’s face validity and the usability of the online survey software tool SurveyGizmo®. These responses were not included in the final analysis.

Round 1 of the Delphi study took place between June and July 2020 and Round 2 took place in August 2020.

During each round, panellists received an email with a link to the online questionnaire together with instructions on completing it. Panellists also received a glossary of key terms used throughout the questionnaire (Annex 1). Up to two email reminders per participant in each round were employed to maximise the response rate.

In line with previous Delphi studies (Cooper et al., 2014; Barry et al., 2016), panellists used a 5-point Likert scale to rate their level of agreement with each statement (1 = strongly disagree,

5 = strongly agree). For each statement, the median response value and interquartile range was calculated. Statements were then rejected or included in Round 2 of the Delphi study using a priori consensus rules:

- A lower quartile ≥4 indicated consensus amongst panellists and the statement was accepted (consensus "in").
- An upper quartile ≤2 indicated disagreement and the statement was rejected (consensus "out").
- If the interquartile range included 3, this indicated a lack of agreement amongst panellists and a need for further review of the particular statement (no consensus). In the event of such cases, the statements were to be reviewed by the research team and either revised and included in the next round of the Delphi study or rejected based on the panellists' additional comments.

In Round 1, participants had the opportunity to add free-text comments to each statement and to suggest additional statements for inclusion in the questionnaire. In Round 2, participants were provided with a summary of Round 1 scores showing summary group-level statistics for each statement's rating. The same analysis and application of consensus rules was undertaken as per Round 1.

Part 2: Deriving a set of BCTs to be linked with framework competencies

Preparatory work

Applying BCTs in the context of chronic disease requires addressing specific behaviours in persons living with chronic conditions, and identifying which BCTs are associated with greater effectiveness in this context. As articulated by NICE guidance, "being trained to deliver one behaviour change intervention does not necessarily mean that a practitioner is then competent to deliver other behaviour change interventions" (National Institute for Health and Care Excellence, 2014). These considerations set the rationale for the steps detailed below: narrowing chronic diseases (firstly) to those recognised as high priority for self-management, detailing target behaviours and identifying BCTs for which evidence of effectiveness existed in relation to specific behaviours in these populations.

Selecting high priority chronic diseases and relevant target behaviours

Seven high priority chronic diseases were identified based on two EU funded projects addressing self-management: COMPAR-EU (Ballester et al., 2020) and PRO-STEP (PRO-STEP Project Consortium, 2018):

- Type 2 diabetes, chronic obstructive pulmonary disease (COPD), obesity, heart failure (Ballester et al., 2020);
- Asthma, hypertension and ischaemic heart disease (PRO-STEP Project Consortium, 2018).

Then, key international clinical guidelines (American Diabetes Association, 2019; Global Initiative for Chronic Obstructive Lung Disease, 2020; Williams et al., 2018; Ponikowski et al., 2016; Yumuk et al., 2015; Global Initiative for Asthma, 2020; Knuuti et al., 2019) were searched to identify target behaviours relevant for the self-management of each chronic disease. The authors used their knowledge and experience of disease management to select up-to-date European or internationally recognised clinical guidelines, such as those issued by the European Society of Cardiology (Williams et al., 2018; Ponikowski et al., 2016; Knuuti et al., 2019), the Global Initiative for Chronic Obstructive Lung Disease (Global Initiative for Chronic Obstructive Lung Disease, 2020), the Global Initiative for Asthma (Global Initiative for Asthma, 2020) and the American Diabetes Association (American Diabetes Association, 2019). Table 1 depicts key target behaviours for the self-management of each of these high priority chronic diseases.

Table 1 | Target behaviours for the self-management of high priority chronic diseases

	Diet (including alcohol intake)	Physical activity	Medication adherence	Smoking cessation	Symptom monitoring and management
Type 2 diabetes (Cosentino et al., 2019)	•	•	•	•	•
COPD (Global Initiative for Chronic Obstructive Lung Disease, 2020)	•	•	•	•	•
Hypertension (Williams et al., 2018)	•	•	•	•	
Heart failure (Ponikowski et al., 2016)	•	•	•	•	•
Obesity (Yumuk et al., 2015)	•	•	•		
Asthma (Global Initiative for Asthma, 2020)	•		•	•	•
Ischaemic heart disease (Knuuti et al., 2019)	•	•	•	•	•

Literature search on effective BCTs in high priority chronic diseases

A literature search was undertaken to identify evidence of effective BCTs to address key target behaviours in high priority chronic diseases. Due to the timeframe and available resources, only systematic reviews were considered. Inclusion criteria comprised systematic reviews of self-management intervention trials, in which BCTs were detailed, in any of the seven high priority chronic diseases. Another eligibility criterion was the use of the BCTTv1 to code BCTs

(Michie et al., 2013; Michie et al., 2015). Studies reporting interventions targeting healthcare professionals were excluded, as well as reviews reporting clusters instead of individual BCTs.

The first search was piloted and run in PubMed, without year or language restrictions, using relevant keywords (behaviour change technique, type 2 diabetes, chronic obstructive pulmonary disease, obesity, heart failure, asthma, hypertension, ischaemic heart disease) with the aid of Boolean operators and, to account for variations, the wildcard asterisk (*). A systematic review filter was employed. The search was subsequently adapted to the Cochrane Database of Systematic Reviews and the Database of Abstracts of Reviews of Effects (DARE), restricted to systematic reviews published after 2013, which was the year of publication of the Behaviour Change Techniques Taxonomy v.1 (Michie et al., 2013). Backward and forward citation searching were conducted to identify additional records potentially eligible, by manually searching the reference list of all the reviews included and checking studies citing these reviews in Google Scholar, respectively. Both study selection and data extraction into summary tables were performed by a single reviewer. Five systematic reviews were identified through PubMed, targeting type 2 diabetes (n = 2) (Cradock et al. 2017a; Cradock et al., 2017b), obesity (n = 1) (Samdal et al., 2017), cardiovascular disease (n = 1) (Duff et al., 2017) and cardiometabolic conditions (n = 1) (Kassavou & Sutton, 2017). The target behaviours included in the reviews were diet, physical activity and medication adherence. The reviews covered a total of 155 studies, of which 152 were randomised controlled trials, including 68,315 patients. Reasons for excluding reviews based on full text screening were: BCTs coded with different taxonomies (Bartlett et al., 2014; Denford et al., 2014; Olander et al., 2013), no evidence of BCT effectiveness (Heron et al., 2016; Newham et al., 2017; Williams et al., 2017), inability to distinguish effective BCTs due to cluster analysis (Miller et al., 2017) and inability to extract data for the target diseases previously considered (Tsoli et al., 2018). As depicted in Table 2, a total of 29 BCTs with evidence of effectiveness were identified for three of the five target behaviours. No evidence of effectiveness was uncovered for BCTs addressing smoking cessation and symptom monitoring and management in persons living with the high priority chronic diseases. There was a predominance of the clusters “Goals and planning” and “Feedback and monitoring” (six BCTs each). A breakdown by target behaviour showed 21 effective BCTs in diet interventions, 27 in physical activity and one in medication adherence. For the first two behaviours, there was a number of common BCTs across each disease. For example, “1.2 Problem solving” was effective in promoting physical activity in type 2 diabetes, obesity and cardiovascular disease.

Table 2 | Effective BCTs (BCTTv1) by target behaviour

Taxonomy Cluster	BCT	Diet	Physical activity	Medication adherence
1.Goals and planning	1.1 Goal setting (behaviour)	●	●	
	1.2 Problem solving	●	●	
	1.3 Goal setting (outcome)	●	●	
	1.4 Action planning	●	●	
	1.5 Review behaviour goal(s)	●	●	
	1.7 Review outcome goal(s)	●	●	
2. Feedback and monitoring	2.2 Feedback on behaviour	●	●	
	2.3 Self-monitoring of behaviour	●	●	
	2.4 Self-monitoring of outcome(s) of behaviour	●	●	
	2.5 Monitoring outcome(s) of behaviour by others without feedback	●	●	
	2.6 Biofeedback		●	
	2.7 Feedback on outcome of behaviour	●	●	
3. Social support	3.1 Social support (unspecified)	●	●	

Taxonomy Cluster	BCT	Diet	Physical activity	Medication adherence
	3.2 Social support (practical)		•	
	3.3 Social support (emotional)		•	
4. Shaping knowledge	4.1 Instruction on how to perform a behaviour	•	•	
5. Natural consequences	5.1 Information about health consequences			•
6. Comparison of behaviour	6.1 Demonstration of the behaviour	•	•	
	6.2 Social comparison	•		
7. Associations	7.1 Prompts/cues		•	
8. Repetition and substitution	8.1 Behavioural practice/rehearsal	•	•	
	8.7 Graded tasks	•	•	
9. Comparison of outcomes	9.1 Credible source	•	•	
	9.2 Pros and cons	•	•	
10. Reward and threat	10.4 Social reward		•	
11. Regulation	11.1 Pharmacological support		•	

Taxonomy Cluster	BCT	Diet	Physical activity	Medication adherence
	11.2 Reduce negative emotions		•	
12. Antecedents	12.3 Avoidance/reducing exposure to cues for the behaviour	•	•	
	12.5 Adding objects to the environment	•	•	

Expert feedback on BCTs

An expert panel of six behavioural psychologists from five countries (Canada, UK, Ireland, Finland, Portugal) was convened, all of whom were affiliated with academic and/or research institutions. The purpose of convening this panel was overcoming uncertainties and evidence gaps emerging from the previous phase. Experts were identified by the research team through published work and snowballing. Feedback was collected through a structured form. One aspect covered was generalising the evidence on effective BCTs from the conditions considered by systematic reviews to the set of seven high priority chronic diseases considered in the project. BCTs were regarded as generalisable to this wider set of conditions if at least four experts agreed. Experts were also asked to suggest additional BCTs for the range of target behaviours, as the absence of evidence on effectiveness does not necessarily equate to a lack of effectiveness. Suggested BCTs were considered if at least two experts agreed. Experts' scoring and comments were then discussed within the research team, who included a behavioural psychologist, to reach a decision on the final list of BCTs to be linked with the framework competencies.

Results

Figure 2 depicts the relationship between results of Parts 1 and 2 of this study. It also illustrates the relationship between the primary and secondary aims, their respective methods, and the link between framework competencies and BCTs.

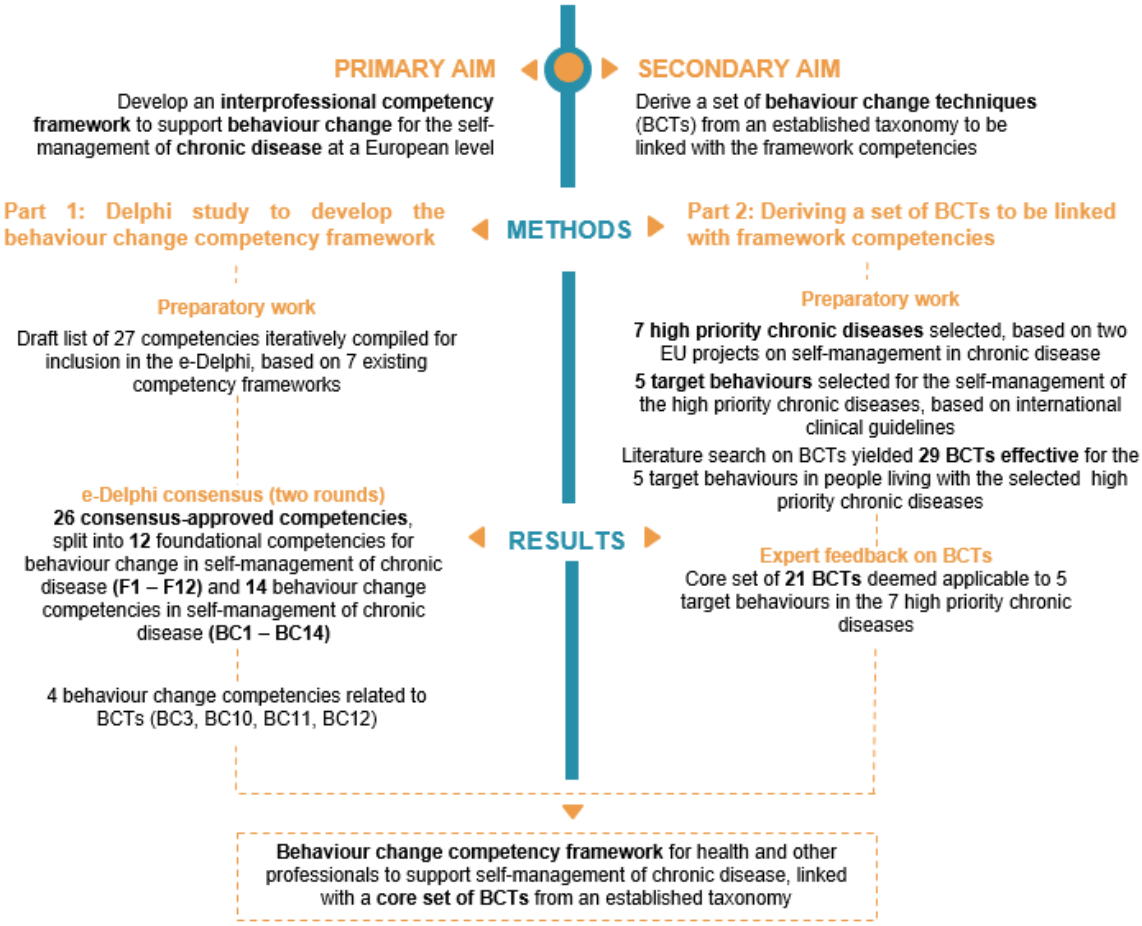

Figure 2 | Overview of the development of the Train4Health competency framework and core set of linked behaviour change techniques

Part 1: Delphi consensus on competencies

Sixty-one individuals responded to the invitation to participate in the Delphi study, of whom 55 agreed to receive the link to the questionnaire. Of the six individuals who declined the invitation, five cited a lack of relevant expertise and one cited a lack of time. Forty-eight individuals subsequently completed Round 1 of the Delphi study.

Panellists represented pharmacy (43.8%, n = 21), nursing (25%, n = 12) and sports sciences/physiotherapy (16.7%, n = 8), as well as several other disciplines (14.6%, n =7), including general practice, nutrition, psychology and public health. Panellists originated from 12 European countries: Belgium (14.6%, n = 7), Estonia (2.1%, n = 1), Finland (2.1%, n = 1), Ireland (12.5%, n = 6), Lithuania (2.1%, n = 1), Malta (4.2%, n = 2), Netherlands (6.3%, n = 3), Norway (4.2%, n = 2), Portugal (20.8%, n =10), Serbia (2.1%, n = 1), Spain (2.1%, n = 1), Switzerland (2.1%, n = 1), Turkey (4.2%, n = 2), UK (20.8%, n = 10).

Consensus was achieved for all 27 competency statements in Round 1. Following a review of the panellists' additional comments, the research team made the following amendments: two statements were removed, one statement was added, and 14 statements were modified. The remaining eleven consensus-approved statements were not carried forward to Round 2. This round was therefore composed of 15 statements. The second round was completed by 40/48 panel members from Round 1. The lack of time was cited as the reason for non-participation by one individual and no reason was provided by the remaining individuals. Consensus was achieved for all 15 statements. This resulted in 26 statements being included in the final competency framework, schematically depicted in Figures 3 and 4. Table 3 details the competency statements.

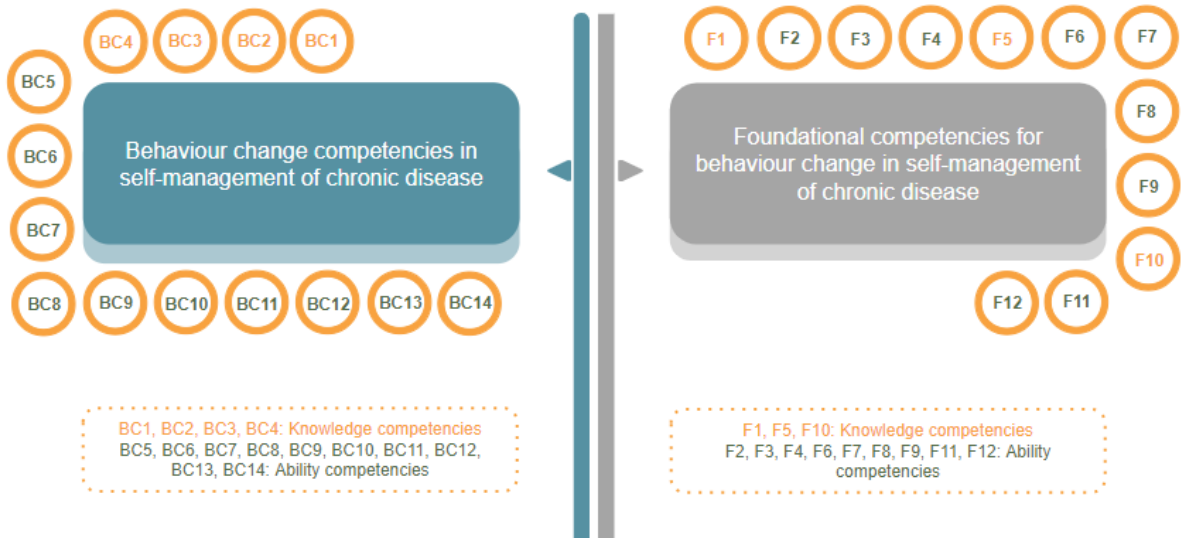

Figure 3 | Overview of the Train4Health Competency Framework

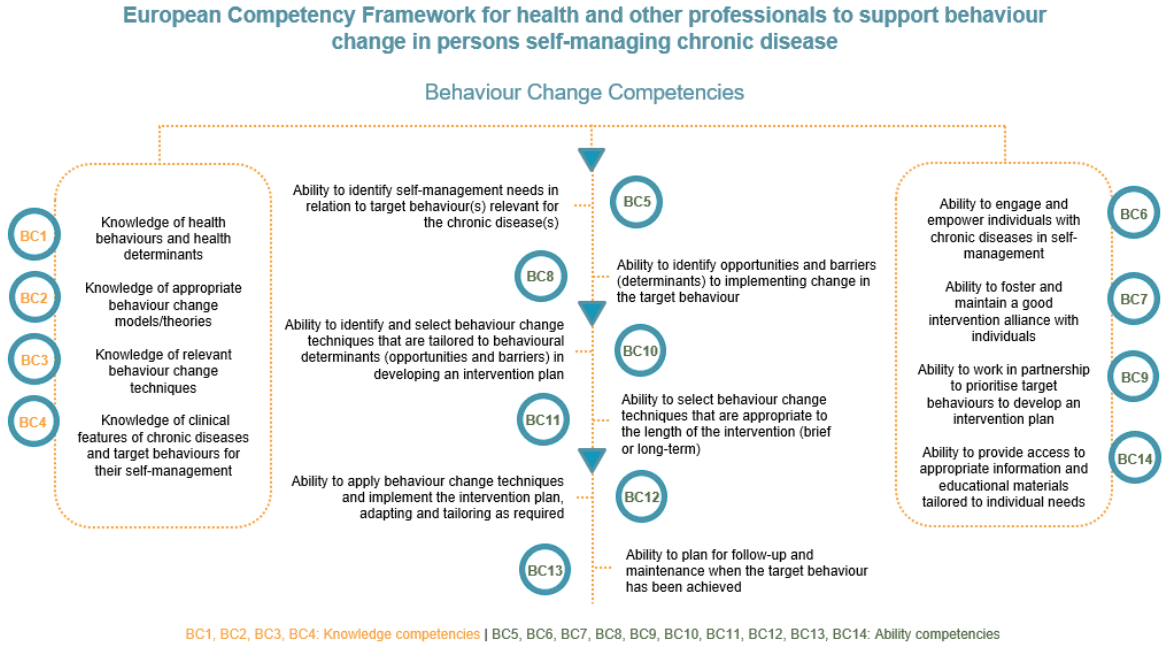

Figure 4 | Train4Health Competency Framework (Behaviour Change Competencies)

Table 3 | The Train4Health competency framework v.1

Category	Statement
Behaviour change competencies in self-management of chronic disease	BC1 Knowledge of health behaviour and health beliefs
	BC2 Knowledge of appropriate behaviour change models/theories
	BC3 Knowledge of relevant behaviour change techniques
	BC4 Knowledge of clinical features of chronic diseases and target behaviours for their self-management
	BC5 Ability to identify self-management needs in relation to target behaviour(s) relevant for the chronic disease(s)
	BC6 Ability to engage and empower individuals with chronic diseases in self-management
	BC7 Ability to foster and maintain a good intervention alliance with individuals
	BC8 Ability to identify opportunities and barriers (determinants) to implementing change in the target behaviour

Category	Statement
	BC9 Ability to work in partnership to prioritise target behaviours to develop an intervention plan
	BC10 Ability to identify and select behaviour change techniques that are tailored to behavioural determinants (opportunities and barriers) in developing an intervention plan
	BC11 Ability to select behaviour change techniques that are appropriate to the length of the intervention (brief or long-term)
	BC12 Ability to apply behaviour change techniques and implement the intervention plan, adapting and tailoring as required
	BC13 Ability to plan for follow-up and maintenance when the target behaviour has been achieved
	BC14 Ability to provide access to appropriate information and educational materials tailored to individual needs
Foundational competencies for behaviour change in self-management of chronic disease	F1 Knowledge of the roles of other professionals in the local health system
	F2 Ability to maintain effective interprofessional relationships
	F3 Ability to provide interventions that are person-centred and consider the context (e.g., culture, family, local health system)
	F4 Ability to screen for readiness for behaviour change
	F5 Knowledge of the foundational aspects of effective communication
	F6 Ability to communicate effectively in partnership with people and families
	F7 Ability to communicate effectively with others (e.g., health care providers, administrators)
	F8 Ability to engage and partner with people individually and in groups
	F9 Ability to explore and manage expectations of individuals and groups
	F10 Knowledge of professional and ethical guidelines

Category	Statement
	F11 Ability to demonstrate professional behaviour
	F12 Ability to reflect, self-evaluate and continuously develop these competencies

A complete summary of the progression of the competency statements through the Delphi study is provided in Annex 2.

Part 2: Expert feedback on BCTs

Table 4 provides an overview of the expert panel's agreement on BCTs for the five target behaviours in the seven high priority chronic diseases considered. Agreement was not reached on applying two BCTs for "diet" in type 2 diabetes, obesity, cardiovascular and cardiometabolic diseases to the wider set of high priority chronic diseases considered, which included asthma and COPD; these were "2.5 Monitoring outcome(s) of behaviour by others without feedback" and "6.2 Social comparison". The same happened regarding four BCTs in physical activity (in addition to the 2.5., previously mentioned, "3.1 Social support unspecified", "10.4 Social reward" and "12.3 Avoidance/reducing exposure to cues for the behaviour" did not reach agreement). Additional BCTs suggested by at least two experts ranged from two for physical activity and 20 for medication adherence.

Table 4 | Experts' feedback on BCTs for the five target behaviours in seven high priority chronic diseases

	No. of evidence-based BCTs in persons living with either type 2 diabetes, obesity, cardiovascular or cardiometabolic diseases	No. of consensus-approved BCTs for the set of high priority chronic diseases considered	Additional BCTs suggested by at least two experts	Total number of BCTs
Diet (including alcohol intake)	21	19	7	26
Physical activity	27	23	2	25
Medication adherence	1	1	20	21
Smoking cessation	0	0	7	7
Symptom monitoring and management	0	0	9	9

The discussion within the research team led to a core set of 21 BCTs, common to the five target behaviours in the seven high priority chronic diseases considered (type 2 diabetes, COPD, obesity, heart failure asthma, hypertension, and ischaemic heart disease). Additional BCTs were organised in supplementary sets per target behaviour; both the core and supplementary lists of BCTs are presented in Annex 3.

Development of the associated learning outcomes-based curriculum

Aim

The Train4Health Competency Framework was the starting point for developing of the learning outcomes-based curriculum. The aim was to develop a curriculum in alignment with the two categories of competencies (behaviour change and foundational), both for knowledge and ability-based competencies. Two principles guided curriculum development: the interprofessional nature of behaviour change support and the importance of Interprofessional education. To develop collaborative practitioners, educators need interprofessional curricula with proper cognitive demand, methods of delivery and assessment (Karuguti, Phillips, & Barr, 2017).

Typically, in education the term “curriculum” refers to a set of components in a course: learning outcomes, teaching strategies, student activities and assessments, which should be aligned (Kennedy, 2006; Cedefop, 2017). The course may vary in size and scope (Schneiderhan, Guetterman & Dobson, 2019). The designation “learning outcomes-based curriculum”, used in the Train4Health project, intends to stress the pivotal role of learning outcomes in developing content to be included in the educational products.

Learning outcomes led curricula encourage educators and students to develop teaching and learning responsively and flexibly (CAIPE, 2017). Learning outcomes, or statements of what a learner is expected to know, be able to do and understand at the end of a learning sequence, play an increasingly important role in efforts to improve the quality and relevance of education (Cedefop, 2017).

Specifically, the objectives of Activity 2.2 were to develop learning outcomes associated with the Train4Health competency statement and the content of the curriculum, i.e., the subject matter to be learnt. In other words, what do we intend students to learn and what is the content of the curriculum?

Overview of the methods

The first step was to reflect on the needs assessment undertaken at the time of the grant application of the Train4Health project. Information on curricula on behaviour change for self-management in chronic disease was collated in the partner institutions. This information was complemented with a literature search to develop a master list of learning outcomes. This exercise served to further highlight the learning outcomes that were covered in existing curricula and gaps according to the competency framework.

The draft list of learning outcomes was then compiled, for each competency statement. The learning outcomes were written in accordance with recommendations for best practice (Kennedy, 2006; Cedefop, 2017), using the style "The learner is (or will be) able to", followed by an action verb, so that students can demonstrate what they have learnt. Verbs such as 'know' or 'understand' were avoided, because it is not clear to the learner the level of understanding or amount of knowledge required. Different verbs were used to demonstrate different levels of learning in accordance with Bloom's Taxonomy of Learning (Bloom et al., 1964; Kennedy, 2006).

The learning outcomes and the content of the curriculum were iteratively developed. The first draft (v0.0) obtained through discussion within A2.2 was circulated to a restricted group within the Train4Health team for comments and suggestions. Content was determined by working backwards from the learning outcomes associated with behaviour change competencies; those related to foundational competencies were deemed as more comprehensively addressed by existing curricula and therefore were not subjected to the process of determining content. Each learning outcome was numbered in relation to a competency statement.

The first loop of feedback was incorporated and an updated draft (v0.1) was disseminated to all consortium partners via email. In addition to individual comments and suggestions in writing, feedback was collated using a structured approach in an on-line meeting. Attendees were divided into smaller groups, with representatives from different work packages and professional areas; each group discussed a set of learning outcomes, in terms of wording and alignment with the respective competency framework statements. Suggestions were collated in writing and presented to the wider team. This strategy made it possible to use the expertise of the team to assess the adequacy and completeness of each learning outcome and its alignment with the competency framework. The suggestions were analysed and introduced into the next version (v0.2).

A subsequent step was to get additional feedback from the Project Coordinator (Mara Guerreiro) and Project Manager (Isa Félix), who resorted to their experience, their bird's-eye

view of the project and literature published meanwhile (Dixon & Johnston, 2020) to propose further changes to the learning outcomes and to expand the suggested content. At this stage, another loop of feedback was received from WP3 leaders. This resulted in version (v0.3). Finally, the last draft version was revised by one of the WP2 leaders (Judith Strawbridge).

This version was used to guide the work of case studies, MOOC and simulation software developers, in work package 3. In particular, MOOC developers worked from general topics listed as content to more granular topics, based on their expert knowledge, which in turn led to fine-tuning the learning outcomes and proposed content.

Results

Thirty-four learning outcomes associated with behaviour change competencies were initially developed: 13 related to knowledge and 21 to ability. Iterations during the MOOC production led to the deletion of one learning outcome, deemed as subsumed in other learning outcomes (BC7.2), to the addition of one learning outcome (BC3.3A) and to changes in the wording of several others. Table 6 presents the current version of the learning outcomes associated with behaviour change competencies, including Bloom's taxonomy level, and the proposed content.

Moreover, 23 learning outcomes were associated with foundational competencies (Table 7), for which pre-essential learning is needed.

Table 5 | Learning outcomes associated with behaviour change competencies

	Competency statement	**Learning outcome** (The learner will be able to…)	Bloom's taxonomy level	Proposed content
Category 1: competencies that directly support behaviour change in the self-management of chronic diseases	BC1 Health behaviour and health beliefs	BC1.1 Differentiate between health behaviour and behaviour determinants	Cognitive 2: comprehension	• Concept of health behaviour. Protective health behaviours and risk health behaviours; examples • Influence of health behaviours on health • Concept of behaviour determinant; examples
		BC1.2 Describe target behaviours in the self-management of chronic disease	Cognitive 2: comprehension	• Overview of target behaviours in high priority chronic diseases, based on international guidelines
	BC2 Appropriate behaviour change models/theories	BC2.1 Describe the approach of different models and theories to behaviour change in health	Cognitive 1: define	• Definition of model and theory • Overview of behaviour change models and theories
		BC2.2 Provide a rationale for using behaviour change models and theories	Cognitive 3: application	• Role of models and theories in supporting health behaviour change in practice • Evidence on the effectiveness of behaviour change models and theories
		BC2.3 Explain how different models and theories predict self-management behaviours in chronic disease and allow an understanding of interventions that can change these behaviours	Cognitive 5: synthesis	• Application of behaviour change models or theories to self-management behaviours in chronic disease.

	Competency statement	Learning outcome (The learner will be able to…)	Bloom's taxonomy level	Proposed content
	BC3 Relevant behaviour change techniques	BC3.1 Identify standardised sources of behaviour change techniques (BCTs)	Cognitive 1: define	• BCTs definition and their importance in behaviour interventions • Behaviour Change Techniques Taxonomy Version 1 (BCTTv1): overview and resources (e.g. mobile app) • Compendium of self-enactable techniques to change and self-manage motivation and behaviour version 1.0: overview
		BC3.2 Identify core BCTs for the self-management of chronic disease	Cognitive 2: comprehension	• List of core behaviour change techniques applicable to self-management in high priority chronic diseases
		BC3.3A Provide examples of determinants in selected target behaviours	Affective 2: responding	• Determinants in selected target behaviours: examples
		BC3.3 Explain how behaviour determinants (opportunities and barriers) influence the selection of BCTs	Cognitive 5: synthesis	• Main determinants (opportunities and barriers) of key target behaviours in high priority chronic diseases, examples based on the literature • Matching BCTs to behaviour determinants: examples
		BC3.4 Apply core BCTs in different target behaviours	Cognitive 4: application	• Modes of delivery of core BCTs: examples • Combining BCTs: examples
	BC4 Clinical features of chronic diseases and target behaviours	BC4.1 Explain the concept of self-management in chronic diseases	Cognitive 2: comprehension	• Concept of self-management in chronic diseases

	Competency statement	Learning outcome (The learner will be able to…)	Bloom's taxonomy level	Proposed content
	for their self-management	BC4.2 Identify higher and lower-level target behaviours for specific chronic diseases, based on appropriate guidance	Cognitive 2: comprehension	• Distinction between higher and lower-level target behaviours for high priority chronic diseases • Examples of lower-level target behaviours for these diseases • Incorporating the person's perspective in defining lower-level target behaviours
		BC4.3 Discuss health behaviour determinants in light of clinical hallmarks, progression and complications of chronic diseases	Cognitive 2: comprehension	• Behaviour determinants engendered by clinical hallmarks, progression or complications of chronic diseases
	BC5 Identify self-management needs in relation to target behaviour(s) relevant for the chronic disease(s)	BC5.1 Assess the person's behaviour in self-management using appropriate measures	Cognitive 5: synthesis	• Instruments to assess target behaviours in the self-management of chronic disease and interpretation of results: examples
		BC5.2 Compare actual versus desirable health behaviours to identify self-management needs, based on assessment data	Cognitive 6: evaluation	• Actual behaviour, based on assessment data, versus desirable behaviour: examples
	BC6 Engage and empower individuals with chronic diseases in self-management	BC6.1 Generate with the person opportunities for behavioural change	Cognitive 5: synthesis	• Communication skills: questioning skills and empathic listening • Structuring a behaviour change interaction: setting the stage (ABCD approach)

	Competency statement	Learning outcome (The learner will be able to…)	Bloom's taxonomy level	Proposed content
		BC6.2 Assess the extent to which the person wishes and is able to become co-manager of his/her chronic disease	Cognitive 6: evaluation	• Overview of key concepts: patient empowerment and shared decision-making in behaviour change interventions • Communication skills: questioning skills and empathic listening • Structuring a behaviour change interaction: setting the stage, obtain a commitment (ABCD approach)
		BC6.3 Demonstrate how to promote coping skills to manage the physical, emotional, and social impacts of chronic disease in everyday life	Cognitive 3: application	• Concept of coping skills • Applying strategies to promote coping skills in persons self-managing chronic disease
		BC6.4 Assist the person to become co-manager of his/her chronic disease in partnership with professionals	Affective 2: responding	• Overview of key concepts: patient empowerment and shared decision-making in behaviour change interventions • Communication skills: questioning skills and empathic listening • Structuring a behaviour change interaction: setting the stage, establish an information base, obtain a commitment, negotiate an intervention plan (ABCD approach)

	Competency statement	Learning outcome (The learner will be able to…)	Bloom's taxonomy level	Proposed content
	BC7 Foster and maintain a good intervention alliance with individuals	BC7.1 Apply strategies to support the co-operative working relationship between the person and the professional	Affective 2: responding	• Overview of key concepts: person-centredness. • Communication skills: questioning skills and empathic listening. • Optimising the use of verbal language. • Structuring a behaviour change interaction: setting the stage, establish an information base, obtain a commitment, negotiate an intervention plan (ABCD approach)
		BC7.2 Deleted due to unnecessary redundancy		
	BC8 Identify opportunities and barriers (determinants) to implementing change in the target behaviour	BC.8.1 Demonstrate the importance of collecting holistic information about the person to tailor the behaviour intervention	Affective 4: organisation	• Tailoring behaviour change interventions to each person: examples
		BC8.2 Demonstrate how to assess behaviour determinants through structured questionnaires, interview and other approaches	Affective 3: valuing	• Measures to assess determinants in the self-management of chronic diseases and interpretation of results (e.g. Bartel index for activities of daily living, Beliefs about medicines questionnaire) • Communication skills: questioning skills and empathic listening • Structuring a behaviour change interaction: establish an information base (ABCD approach)

	Competency statement	Learning outcome (The learner will be able to…)	Bloom's taxonomy level	Proposed content
		BC8.3 Discuss opportunities and barriers that influence target behaviours in a person-centred fashion	Cognitive 5: synthesis	• Communication skills: questioning skills and empathic listening • Optimising the use of verbal language • Structuring a behaviour change interaction: establish an information base (ABCD approach)
	BC9 Work in partnership to prioritise target behaviours to develop an intervention plan	BC9.1 Recognise the person's views, knowledge and skills, developed through his/her experience with chronic disease, to aid prioritisation of target behaviours	Affective 5: characterisation	• Communication skills: questioning skills and empathic listening. • Optimising the use of verbal language. • Structuring a behaviour change interaction: establish an information base (ABCD approach)
	BC10 Identify and select behaviour change techniques that are tailored to behavioural determinants (opportunities and barriers) in developing an intervention plan	BC10.1 Discuss BCTs addressing behaviour determinants (opportunities and barriers) with the person	Affective 3: valuing	• Communication skills: questioning skills and empathic listening • Optimising the use of verbal language • Structuring a behaviour change interaction: negotiate an intervention plan (ABCD approach)
		BC10.2 Among BCTs addressing behavioural determinants, decide on which can be included in the intervention plan, according to the person's views and resources	Cognitive 6: evaluation	• Communication skills: questioning skills and empathic listening. • Optimising the use of verbal language. • Structuring a behaviour change interaction: negotiate an intervention plan (ABCD approach)

	Competency statement	Learning outcome (The learner will be able to…)	Bloom's taxonomy level	Proposed content
	BC11 Select behaviour change techniques that are appropriate to the length of the intervention (brief or long-term)	BC11.1 Demonstrate critical understanding of BCTs appropriate for brief or long-term behaviour interventions	Cognitive 3: application	• Distinction between brief and long-term behaviour change interventions • Examples of the application of BCTs according to the length of the intervention
	BC12 Apply behaviour change techniques and implement the intervention plan, adapting and tailoring as require	BC12.1 Apply BCTs according to the intervention plan	Cognitive 3: application	• Applying core BCTs as part of an intervention plan: examples
		BC12.2 Assess the person's target behaviour regularly using appropriate data collection approaches	Cognitive 6: evaluation	• Assessing the person's target behaviour as part of monitoring the intervention plan: examples
		BC12.3 Demonstrate how to monitor the implementation of BCTs as part of the intervention plan	Affective 2: responding	• Monitoring BCTs implementation as part of the intervention plan: examples
		BC12.4 Demonstrate how to redefine the intervention plan as appropriate	Affective 2: responding	• Changing the plan based on the experience gained when the intervention is not working: examples

	Competency statement	**Learning outcome** (The learner will be able to…)	**Bloom's taxonomy level**	**Proposed content**
	BC13 Plan for follow-up and maintenance when the target behaviour has been achieved	BC13.1 Plan the end of the intervention and the use of BCTs and resources beyond its end to promote maintenance of the target behaviour	Cognitive 5: synthesis	• Strategies for signalling termination at a near point in time and for dealing with concerns. • Examples of potentially useful resources
		BC13.2 Demonstrate how the person could deal with an unsuccessful maintenance plan	Affective 2: responding	• Strategies for dealing with an unsuccessful maintenance plan
	BC14 Provide access to appropriate information and educational materials tailored to individual needs	BC14.1 Share information and adequate educational materials according to individual factors (e.g., knowledge gaps, health literacy level and preferences)	Affective 5: characterisation	• Concept of health literacy • Examples of available educational resources (e.g. websites) • Tailoring information to individual factors: examples

Table 6 | Learning outcomes associated with foundational competencies

	Competency statement	**Learning outcomes** (The learner will be able to…)	Bloom's taxonomy level	Proposed content
Category 2: Foundational competencies for behaviour change in self-management of chronic disease	F1 Knowledge of the roles of other professionals in the local health system	F1.1 Describe the roles, expertise, and overlapping scopes of practice of disciplines that commonly support behaviour change in the local health system	Cognitive 2: comprehension	Pre-essential learning
	F2 Ability to maintain effective interprofessional relationships	F2.1 Respect the role of each team member, especially the person and family	Affective 3: valuing	Pre-essential learning
		F2.2 Demonstrate how to work in cooperation with different professional groups to construct an interprofessional intervention plan for behaviour change	Affective 4: organisation	Pre-essential learning
	F3 Ability to provide interventions that are person-centred and consider the context (e.g. culture, family, local health system)	F3.1 Value aspects, such as ethnicity, education level, deprivation, religion, sexual orientation and cultural environment.	Affective 3: valuing	Pre-essential learning
		F3.2 Demonstrate capacity to deliver person-centred interventions	Affective 4: organisation	Pre-essential learning
	F4 Ability to screen for readiness for behaviour change	F4.1 Evaluate readiness for behaviour change	Cognitive 6: evaluation	Pre-essential learning
	F5 Knowledge of foundational aspects of effective communication	F5.1 Describe a range of techniques and strategies for effective communication	Cognitive 2: comprehension	Pre-essential learning

	Competency statement	Learning outcomes (The learner will be able to…)	Bloom's taxonomy level	Proposed content
		F5.2 Outline the principal barriers to communication with people with chronic diseases	Cognitive 4: analysis	Pre-essential learning
	F6 Ability to communicate effectively in partnership with people and families	F6.1 Practice effective communication skills in interactions with people with chronic diseases' and their families (e,g, respond appropriately to verbal and non-verbal communication; use effective listening techniques; provides and/or accept feedback)	Affective 5: characterisation	Pre-essential learning
		F6.2 Accept the limits of personal communication capabilities	Affective 3: valuing	Pre-essential learning
	F7 Ability to communicate effectively with others (e.g., health care providers, administrators)	F7.1 Communicate effectively with others in teams and/or networks to deliver or improve services and document interventions	Affective 4: organisation	Pre-essential learning
		F7.2 Apply appropriate terminology when documenting the actions/interventions	Cognitive 3: application	Pre-essential learning
		F7.3 Manage the documentation and information relating to the behaviour change intervention for the self-management of chronic disease	Cognitive 5: synthesis	Pre-essential learning
	F8 Ability to engage and partner with people individually and in groups	F8.1 Demonstrate effective communication skills in partnership with people individually and with groups	Affective 4: organisation	Pre-essential learning

	Competency statement	Learning outcomes (The learner will be able to…)	Bloom's taxonomy level	Proposed content
	F9 Ability to explore and manage expectations of individuals and groups	F9.1 Manage peoples' expectations that impact on health behaviour and the self-management of chronic disease	Affective 2: responding	Pre-essential learning
	F10 Knowledge of professional and ethical guidelines	F10.1 Analyse ethics standards associate applicable to health care provision	Cognitive 4: analysis	Pre-essential learning
		F10.2 Explain the codes of practice applicable to one's profession in each national context	Cognitive 6: evaluation	Pre-essential learning
		F10.3 Describe legislation applicable to one's context of practice	Cognitive 2: comprehension	Pre-essential learning
	F11 Ability to demonstrate professional behaviour	F11.1 Demonstrate shared decision-making with other healthcare professionals in the context of behaviour change	Affective 4: organisation	Pre-essential learning
		F11.2 Demonstrate critical appraisal of scientific and technical information sources for decision-making	Affective 4: organisation	Pre-essential learning
		F11.3 Manage the documentation of adverse events	Affective 2: responding	Pre-essential learning
	F12 Ability to reflect, self-evaluate, and	F12.1 Assess one's knowledge and skills in relation to these competencies and develop an improvement plan when needed	Affective 2: responding	Pre-essential learning

	Competency statement	**Learning outcomes** (The learner will be able to…)	**Bloom's taxonomy level**	**Proposed content**
	continuously develop these competencies	F12.2 Question how one's values, beliefs, and behaviours influence practice	Affective 3: valuing	Pre-essential learning

Concluding remarks

This report outlines the work undertaken by the Train4Health consortium in developing a European competency framework on behaviour change for self-management in chronic disease and the corresponding learning outcomes-based curriculum.

Behaviour change support for the self-management of chronic disease is ideally suited for interprofessional education. The involvement of different professions is a hallmark of the Train4Health project. Accomplishing interprofessional education is, however, more challenging than using different professionals to develop resources, having different students from different professions using the same resource, and showcasing the roles of the different professionals. Interprofessional education requires students to learn with, from and about each other and therefore different professions should learn together. This is a key challenge to be addressed, as existing curricula for health and other professions in many European countries still function in silos. While the approach pursued by the Train4Health project is strictly speaking not interprofessional education, it is a step-forward, which is expected to help students prepare for collaborative practice.

To authors' knowledge this is the first interprofessional competency framework on behaviour change support for the self-management of chronic disease developed at European level. The framework comprises 26 competency statements, classified into two categories: behaviour and foundational competencies. These competency statements were consensually approved by panellists from several European regions and from various disciplines. It is therefore reasonable to assume that the competency framework will be useful across Europe for a wide range of professions involved in behaviour change support for the self-management of chronic disease. Nonetheless, its European dimension will ultimately be determined by adoption beyond the five countries comprising the project strategic partnership (Portugal, Belgium, Ireland, Netherlands, and Slovenia). One of the final Train4Health deliverables will be a White Paper with recommendations for large-scale implementation of the educational products (case studies, massive on-line open course, simulation software), combining lessons learned during the project lifetime with findings from qualitative interviews with key stakeholders. This White Paper may also contribute to the adoption of the competency framework, given its intertwining nature with associated learning outcomes, curriculum and learning activities.

The Train4Health competency framework is associated with a list of 21 core BCTs from a commonly accepted taxonomy; the list is expected to enable a clearer description of behaviour change support in practice. Some existing competency frameworks encompassed BCTs (de Jong et al., 2013; Dixon & Johnston, 2010, 2020; Health Behaviour Change and Education

Development Working Group, 2016; Payne et al., 2010), albeit not always embracing standardisation or making explicit the process underlying their selection. In this study a literature search in conjunction with expert feedback was employed; the literature search can be replicated periodically to strengthen the evidence base of the BCTs set.

Using BCTs to train health or other professions is gaining acceptance, both in a research and practice context. The novelty of the Train4Health project is directing training to undergraduate students, facilitating future performance, and reducing workforce challenges.

The Train4Health curriculum encompasses 23 learning outcomes associated with foundational competencies and 34 related to behaviour change competencies, with different levels in Bloom's taxonomy, both cognitive and affective. As others highlighted, these learning outcomes provide an overview of the knowledge, skills, and attitudes needed by healthcare graduates (Pontefract, & Wilson, 2019).

For curriculum development three central questions are important, and the first has been addressed – “what do we intend students to learn i.e. what learning outcomes do we want them to achieve”? (Cedefof, 2017; Stupans, 2017; Kennedy, Hyland & Ryan, 2007). Foci of on-going work are assessment tasks and criteria that will indicate that students have achieved the learning outcomes. The ability to evaluate the effectiveness of teaching depends, in part, on the ability to assess students’ learning (Stupans, 2017); this is an important consideration for curricula design, especially in a field as complex as behaviour change for self-management in chronic disease.

There are no absolute rules on the ideal number of learning outcomes for an educational module. It will depend on the level and nature of the module, and its workload (European Union, 2015). There are perils in being overly ambitious about the number of learning outcomes; when in doubt it may be sensible to limit them.

It is important to be aware of the relation between Bloom’s taxonomy level and teaching methods (Kennedy, 2006). The lower level of cognitive learning outcomes, for example, can be taught in a MOOC. For higher level cognitive learning outcomes, there is a need for more interactive teaching methods to enhance analysis, syntheses, and evaluation. For the latter, case studies can be a good option. These case studies will also be the basis of the simulation software. For the affective learning outcomes to be achieved, there is a need for interactive group work.

Educators should create a learning environment with activities appropriate to achieve the desired learning outcomes (Biggs, 2003; 2014). One of the key principles of good practice in curriculum design is aligning outcomes, learning opportunities and assessment (Biggs, 2003;

Stupans, 2017; Alfauzan, & Tarchouna, 2017). Meij and Merx (2018) also pointed out the importance of curriculum alignment in realising learning outcomes. Therefore, a critical step is the clear definition of links between learning outcomes, teaching strategies, student activities and assessment tasks (Kennedy, 2006). Constructive alignment enables this linkage in a coordinated fashion (Biggs, 2003). Assessment tasks should mirror learning outcomes since, as far as the students are concerned, assessment is the curriculum: “From our students’ point of view, assessment always defines the actual curriculum” (Ramsden, 2003). In summary, these are important considerations for on-going work on educational products, in work package 3.

One expected impact of the competency framework and the learning outcomes-based curriculum is improved comparability of required competencies and learning outcomes across countries and higher education institutions throughout Europe. This may raise awareness about the potential need for curricular transformation and pave the way for benchmarking and the identification of best practices.

The competency framework and the corresponding curriculum may be adapted to derive similar tools for less complex interventions than behaviour change in chronic disease. These include encouraging a healthy lifestyle in general (increasing physical activity, adopting a healthy diet) and promoting active ageing.

When discussing the curriculum, it is important to consider that there is no single students’ learning journey and the three educational products can be used stand-alone or in combination, as part of a module. Flexibility was highlighted as a preference by participants in a multicentric focus group study, part of work package 2 to co-produce the educational products.

Another challenge is understanding which learning outcomes are best achieved by interprofessional learning, and if there are differences between them. It is valuable to understand if there are differences in achieving learning outcomes by different students because of the content that they already worked on their bachelor.

It is envisaged that the Train4Health approach to behaviour change support education will not only enable a smoother transition of learners from higher education institutions to professional practice, but will also influence positively access and sharing of open educational resources meaningful for both academia and life-long learning. Moreover, it may contribute to unravelling the full potential of professionals in effectively supporting self-care in people with chronic disease.

References

Alfauzan, A.H., Tarchouna, N. (2017). The Role of an Aligned Curriculum Design in the Achievement of Learning Outcomes. *Journal of Education and e-Learning Research*; 4(3), 81-91. https://doi.org/10.20448/journal.509.2017.43.81.91

American Diabetes Association (2019). 5. Lifestyle management: Standards of medical care in diabetes 2019. *Diabetes Care, 42* (Supplement 1): S46–60.

Ballester, M., Orrego, C., Heijmans, M., Alonso-Coello, P., Versteegh, M. M., Mavridis, D., … Sunol, R. (2020). Comparing the effectiveness and cost-effectiveness of self-management interventions in four high-priority chronic conditions in Europe (COMPAR-EU): a research protocol. *BMJ Open*, *10*(1), 1–8. https://doi.org/10.1136/bmjopen-2019-034680

Barry, E., O'Brien, K., Moriarty, F., Cooper, J., Redmond, P., Hughes, C. M., … Smith, S. M. (2016). PIPc study: Development of indicators of potentially inappropriate prescribing in children (PIPc) in primary care using a modified Delphi technique. *BMJ Open*, *6*(9). https://doi.org/10.1136/bmjopen-2016-012079

Bartlett, Y. K., Sheeran, P., & Hawley, M. S. (2014). Effective behaviour change techniques in smoking cessation interventions for people with chronic obstructive pulmonary disease: A meta-analysis. *British Journal of Health Psychology*, *19*(1), 181–203. https://doi.org/10.1111/bjhp.12071

Biggs, J.B. (2003). Teaching for quality learning at university (second edition). Buckingham: Open University Press/Society for Research into Higher Education.

Biggs, J.B. (2014). Constructive alignment in university teaching. HERDSA Review of Higher Education. Available from: https://www.herdsa.org.au/herdsa-review-higher-education-vol-1/5-22

Bloom, B.S., Masia, B.B., & Krathwohl, D.R. (1964),Taxonomy of Educational Objectives Volume II: The Affective Domain. New York: McKay.

Bogetz, J.F., Rassbach, C., Bereknyei, S., Mendoza, F., Sanders L., & Braddock, C.H. (2015). Training Health Care Professionals for 21st-Century Practice. *Academic Medicine*. 90(11),1561-1572. https://doi.org/10.1097/ACM.0000000000000773

Boulkedid, R., Abdoul, H., Loustau, M., Sibony, O. & Alberti C. (2011). Using and reporting the Delphi method for selecting healthcare quality indicators: a systematic review. *PLoS One*, 6(6): e20476. https://doi.org/10.1371/journal.pone.0020476

CAIPE (2017). Interprofessional Education Guidelines. Available from: https://www.abeffarmacia.com.br/wp-content/uploads/sites/777/2017/12/CAIPE-2017-Interprofessional-Education-Guidelines-2.pdf

Cedefop (2017). Defining, writing and applying learning outcomes: a European handbook. Luxembourg: Publications Office. http://dx.doi.org/10.2801/566770

CIPD. (2020). Competence and competency frameworks. https://doi.org/10.1201/9781315378572-1

Colorado Consensus Conference. (2016). *Establishing Core Competencies for Behavioral Health Providers Working in Primary Care*.

Cooper, J., Ryan, C., Smith, S., Wallace, E., Bennett, K., Cahir, C., … Hughes, C. (2014). The development of the PROMPT (Prescribing Optimally in Middle-aged People's Treatments) criteria. *BMC Health Services Research*, *14*(1). https://doi.org/10.1186/s12913-014-0484-6

Cosentino, F., Grant, P. J., Aboyans, V., Bailey, C. J., Ceriello, A., Delgado, V., … Chowdhury, T. A. (2019). 2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD. *European Heart Journal*, 1–69. https://doi.org/10.1093/eurheartj/ehz486

Cradock, K. A., Ólaighin, G., Finucane, F. M., Gainforth, H. L., Quinlan, L. R., & Ginis, K. A. M. (2017a). Behaviour change techniques targeting both diet and physical activity in type 2 diabetes : A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *14*(18), 1–17. https://doi.org/10.1186/s12966-016-0436-0

Cradock, K. A., ÓLaighin, G., Finucane, F. M., McKay, R., Quinlan, L. R., Martin Ginis, K. A., & Gainforth, H. L. (2017b). Diet behavior change techniques in type 2 diabetes: A systematic review and meta-analysis. *Diabetes Care*, *40*(12), 1800–1810. https://doi.org/10.2337/dc17-0462

de Jong, J., Dikkeboer, B., & Bruining, C. (2013). *European Bachelor Physical Activity and Lifestyle (PAL)* (Vol. 53).

Dekhtyar, M., Colford, C., Whisenant, E., Huber, J., Johnson, E., Thomas, P….., Wilkerson, L. (2020). Development of Learning Objectives to Guide Enhancement of Chronic Disease Prevention and Management Curricula in Undergraduate Medical Education. *Teaching and Learning in Medicine*, 32(3), 241-249. https://doi.org/10.1080/10401334.2020.1724791

Denford, S., Taylor, R. ., Campbell, J., & Greaves, C. J. (2014). Effective Behavior Change Techniques in Asthma Self-Care Interventions: Systematic Review and Meta- Regression. *Health Psychology*, *33*(7), 577–587. https://doi.org/10.1037/a0033080

Dixon, D., & Johnston, M. (2010a). *Health behaviour change competency framework: competences to deliver interventions to change lifestyle behaviours that affect health*.

Dixon, D., & Johnston, M. (2020). What Competences Are Required to Deliver Person-Person Behaviour Change Interventions: Development of a Health Behaviour Change Competency

Framework. *International Journal of Behavioral Medicine*. https://doi.org/10.1007/s12529-020-09920-6

Duff, O.M., Walsh, D.M.J., Furlong, B.A., O'Connor, N.E., Moran, K.A., & Woods, C.B. (2017). Behavior change techniques in physical activity eHealth interventions for people with cardiovascular disease: Systematic review. *Journal of Medical Internet Research*, *19*(8), 1–12. https://doi.org/10.2196/jmir.7782

Dunston, R., Forman, D., Moran, M., Rogers, G.D., Thistlethwaite, J. & Steketee, C. (2016). Curriculum Renewal in Interprofessional Education in Health: Establishing Leadership and Capacity. Canberra, Commonwealth of Australia, Office for Learning and Teaching.

European Union (2015). ECTS Users' Guide. Available from:

https://ec.europa.eu/education/ects/users-guide/docs/ects-users-guide_en.pdf

European Commission. (2020). Cost of Non-Communicable Diseases in the EU. Retrieved from https://ec.europa.eu/jrc/en/health-knowledge-gateway/societal-impacts/costs

Freeth, D., Savin-Baden, M., & Thistlethwaite, J. (2020). Interprofessional Education. In Understanding Medical Education (eds T. Swanwick, K. Forrest and B.C. O'Brien). https://doi.org/10.1002/9781119373780.ch14

Global Initiative for Asthma. (2020). *Global strategy for asthma management and prevention*.

Global Initiative for Chronic Obstructive Lung Disease. (2020). *Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease*. *Global Initiative for Chronic Obstructive Lung Disease*.

Gruppen, L.D., Mangrulkar, R.S. & Kolars, J.C. (2012). The promise of competency-based education in the health professions for improving global health. *Human Resource Health,* 10, 43. https://doi.org/10.1186/1478-4491-10-43

Hawkins, R.E., Welcher, C.M., Holmboe, E.S., Kirk, L.M., Norcini, J.J, Simons, K.B., & Skochelak, S.E. (2015). Implementation of competency-based medical education: are we addressing the concerns and challenges? *Medical Education*; 49(11), 1086-102. https://doi.org/10.1111/medu.12831

Health Behaviour Change and Education Development Working Group. (2016). *Core Competences for the Health Behaviour Change and Education Component for Cardiovascular Disease Prevention and Rehabilitation Services*. Retrieved from http://www.bacpr.com/images/BACPR Core Competences for the Health Behaviour Change and Education Component 2016.pdf

Heron, N., Kee, F., Donnelly, M., Cardwell, C., Tully, M. A., & Cupples, M. E. (2016). Behaviour change techniques in home-based cardiac rehabilitation: A systematic review. *British Journal of General Practice*, *66*(651), e747–e757. https://doi.org/10.3399/bjgp16X686617

Hoge, M. A., Morris, J. A., Laraia, M., Pomerantz, A., & Farley, T. (2014). *Core Competencies for Integrated Behavioral Health and Primary Care*. Retrieved from www.integration.samhsa.gov

Hsu, C.C. & Sandford, B.A. (2007). The Delphi technique: making sense of consensus. *Practical Assessment, Research and Evaluation,* 12:1–8.

Junger, S., Payne, S.A., Brine, J., Radbruch, L. & Brearley, S.G. (2017). Guidance on conducting and Reporting Delphi studies (CREDES) in palliative care: recommendations based on a methodological systematic review. *Palliative Medicine*, 31(8):684–706. https://doi.org/10.1177/0269216317690685.

Kassavou, A., & Sutton, S. (2017). Automated telecommunication interventions to promote adherence to cardio-metabolic medications: meta-analysis of effectiveness and meta-regression of behaviour change techniques. *Health Psychology Review*, *12*, 1–19. https://doi.org/10.1080/17437199.2017.1365617

Karuguti, W.M., Phillips, J., & Barr, H. (2017). Analysing the cognitive rigor of interprofessional curriculum using the Depth of Knowledge framework. *Journal of Interprofessional Care*;31(4), 529-532. https://doi.org/10.1080/13561820.2017.1310718.

Khalili, H., Thistlethwaite, J., El-Awaisi, A., Pfeifl e, A., Gilbert, J., Lising, D., M… Xyrichis, A. (2019). Guidance on Global Interprofessional Education and Collaborative Practice Research: Discussion Paper. A joint publication by Interprofessional Research Global, & Interprofessional Global. Retrieved from: www.research. interprofessional.global

Kennedy, D. (2006). Writing and using learning outcomes: a practical guide, Cork, University College Cork.

Kennedy, D., Hyland, A., & Ryan, N. (2007). Writing and using learning outcomes: A practical guide. In Bologna Handbook. Accessed on-line:\\www.bologna musmt.ez/files/learningoutcomes.palf.

Knuuti, J., Wijns, W., Saraste, A., Capodanno, D., Barbato, E., Funck-Brentano, C., … Clapp, B. (2019). 2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes. *European Heart Journal*, *00*, 1–71. https://doi.org/10.1093/eurheartj/ehz425

Lindner, H., Menzies, D., Jill, K., Taylor, S., & Shear, M. (2003). Coaching for Behaviour Change in Chronic Disease: A Review of the Literature and the Implications for Coaching as a Self-management Intervention. *Australian Journal of Primary Health*, *9*(2&3), 1–9. https://doi.org/10.1071/PY03044

Lorig K, Holman H. Self-management education: history, definition, outcomes and mechanisms. Ann Behav Med. 2003;26(1):1–7. https://doi. org/10.1207/S15324796ABM2601_01

Meij, L.W., & Merx, S. (2018). Improving curriculum alignment and achieving learning goals by making the curriculum visible. *International Journal for Academic Development.* 23(3), 219-231. https://doi.org/10.1080/1360144X.2018.1462187

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Annals of behavioral medicine, 46*(1), 81–95. https://doi.org/10.1007/s12160-013-9486-6

Michie, S., Wood, C. E., Johnston, M., Abraham, C., Francis, J. J., & Hardeman, W. (2015). Behaviour change techniques: the development and evaluation of a taxonomic method for reporting and describing behaviour change interventions (a suite of five studies involving consensus methods, randomised controlled trials and analysis of qualitative data). *Health technology assessment (Winchester, England), 19*(99), 1–188. https://doi.org/10.3310/hta19990

Miller, B.F., Gilchrist, E.C., Ross, K.M., Wong, S.L., Blount, A., Peek, C.J. (2016). Core Competencies for Behavioral Health Providers Working in Primary Care. Prepared from the Colorado Consensus Conference. Accessed on-line: http://cchn.org/wp-content/uploads/2018/02/Core-Competencies-for-Behavioral-Health-Providers-Working-in-Primary-Care.pdf

Miller, L., Schüz, B., Walters, J., & Walters, E. H. (2017). Mobile Technology Interventions for Asthma Self-Management: Systematic Review and Meta-Analysis. *JMIR MHealth and UHealth*, *5*(5), e57. https://doi.org/10.2196/mhealth.7168

National Institute for Health and Care Excellence (2014). Behaviour Change: Individual Approaches. Public Health Guideline [PH49]. 2014. Accessed on-line: www.nice.org.uk/guidance/ph49

Newham, J. J., Presseau, J., Heslop-Marshall, K., Russell, S., Ogunbayo, O. J., Netts, P., … Kaner, E. (2017). Features of self-management interventions for people with COPD associated with improved health-related quality of life and reduced emergency department visits: A systematic review and meta-analysis. *International Journal of COPD*, *12*, 1705–1720.

Olander, E. K., Fletcher, H., Williams, S., Atkinson, L., Turner, A., & French, D. P. (2013). What are the most effective techniques in changing obese individuals' physical activity self-efficacy and behaviour: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *10*(29), 1–15.

Ornstein, A.C., & Hunkins, F.P. (1998). Curriculum: Foundations, principles, and issues (3rd ed.). Needham Heights, MA: Allyn & Bacon

Pal, K., Eastwood, S. V, Michie, S., Farmer, A. J., Barnard, M. L., Peacock, R., … Murray, E. (2013). Computer-based diabetes self-management interventions for adults with type 2 diabetes mellitus. *Cochrane Database of Systematic Reviews*, (3). https://doi.org/10.1002/14651858.CD008776.pub2

Payne, K., De Normanville, C., Stansfield, K., Barnnet, N., Machaczek, K., Qutishat, D., … Smewing, C. (2010). *Prevention and Lifestyle Behaviour Change A Competence Framework*. Retrieved from https://www.makingeverycontactcount.co.uk/media/1017/011-prevention-and-lifestyle-behaviour-change-a-competence-framework.pdf

Pontefract, S.K., & Wilson, K. (2019). Using electronic patient records: defining learning outcomes for undergraduate education. *BMC Medical Education.* 19, 30. https://doi.org/10.1186/s12909-019-1466-5

Ponikowski, P., Voors, A. A., Anker, S. D., Bueno, H., Cleland, J. G. F., Coats, A. J. S., … Davies, C. (2016). 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *European Heart Journal*, *37*(27), 2129-2200m. https://doi.org/10.1093/eurheartj/ehw128

PRO-STEP Project Consortium. (2018). *Promoting Self-management for chronic diseases in Europe Pilot Project on the Promotion of Self-Care in Chronic Diseases in the European Union*.

Ramsden, P. (2003). Learning to teach in Higher Education. (2nd ed). London: Routledge.

Riegel, B., Westland, H., Iovino, P., Barelds, I., Bruins Slot, J., Stawnychy, M. A.,… Jaarsma, T. (2020). Characteristics of self-care interventions for patients with a chronic condition: A scoping review. *International Journal of Nursing Studies*,103713. https://doi.org/10.1016/j.ijnurstu.2020.103713

Samdal, G. B., Eide, G. E., Barth, T., Williams, G., & Meland, E. (2017). Effective behaviour change techniques for physical activity and healthy eating in overweight and obese adults; systematic review and meta-regression analyses. *International Journal of Behavioral Nutrition and Physical Activity*, *14*(1), 1–14. https://doi.org/10.1186/s12966-017-0494-y

Schneiderhan, J., Guetterman, T. C., & Dobson, M. L. (2019). Curriculum development: A how to primer. *Family Medicine and Community Health*, *7*(2), e000046. https://doi.org/10.1136/fmch-2018-000046

Stupans, I. (2017). A Curriculum Challenge-The Need for Outcome (Competence) Descriptors. *Pharmacy* (Basel); 5(1), 7. https://doi.org/10.3390/pharmacy5010007

Thistlethwaite, J. E., Rogers, G. D., Forman, D., Steketee, C., Yassine, T., & Matthews, L. R. (2014). Competencies and Frameworks in Interprofessional Education. *Academic Medicine*, *89*(6), 869–875. https://doi.org/10.1097/acm.0000000000000249

Tsoli, S., Sutton, S., & Kassavou, A. (2018). Interactive voice response interventions targeting behaviour change: A systematic literature review with meta-analysis and meta-regression. *BMJ Open*, *8*(2), 1–14. https://doi.org/10.1136/bmjopen-2017-018974

Vallis, M., Lee-Baggley, D., Sampalli, T., Ryer, A., Ryan-Carson, S., Kumanan, K., & Edwards, L. (2017). Equipping providers with principles, knowledge and skills to successfully integrate behaviour change counselling into practice: a primary healthcare framework. *Public Health*, *154*, 70–78. https://doi.org/10.1016/j.puhe.2017.10.022

Vallis, Michael. (2019). Sustained behaviour change in healthy eating to improve obesity outcomes: It is time to abandon willpower to appreciate wanting. *Clinical Obesity*, *9*(e12299). https://doi.org/10.1111/cob.12299

Weller, J.M., Naik, V.N., & Ryan, J. (2020). Systematic review and narrative synthesis of competency-based medical education in anaesthesia. *British Journal of Anaesthesia*, 124 (6), 748e760. https://doi.org/10.1016/j.bja.2019.10.025

Westland, H., Schröder, C. D., de Wit, J., Frings, J., Trappenburg, J. C. A., & Schuurmans, M. J. (2018). Self-management support in routine primary care by nurses. *British Journal of Health Psychology*, *23*(1), 88–107. https://doi.org/10.1111/bjhp.12276

Wilkins, E., Wilson, L., Wickramasinghe, K., & Bhatnagar, P. (2017). *European Cardiovascular Disease Statistics 2017*. *European Heart Network*. Brussels. Retrieved from www.ehnheart.org

Williams, B., Mancia, G., Spiering, W., Rosei, E. A., Azizi, M., Burnier, M., … Desormais, I. (2018). *2018 practice guidelines for the management of arterial hypertension of the European society of cardiology and the European society of hypertension ESC/ESH task force for the management of arterial hypertension*. *Journal of Hypertension,* 36. https://doi.org/10.1097/HJH.0000000000001961

Williams, M. T., Effing, T. W., Paquet, C., Gibbs, C. A., Lewthwaite, H., Katrina Li, L. S., … Johnston, K. N. (2017). Counseling for health behavior change in people with COPD: Systematic review. *International Journal of COPD*, *12*, 2165–2178. https://doi.org/10.2147/COPD.S111135

World Health Organization. (2017). Non-communicable diseases. *World Health Organization*. https://doi.org/10.5005/jp/books/11410_18

Yumuk, V., Tsigos, C., Fried, M., Schindler, K., Busetto, L., Micic, D., & Toplak, H. (2015). European Guidelines for Obesity Management in Adults. *Obesity Facts*, *8*(6), 402–424. https://doi.org/10.1159/000442721

Zwerink, M., Brusse-Keizer, M., van der Valk, P. D. L. P. M., Zielhuis, G. A., Monninkhof, E. M., van der Palen, J., … Effing, T. (2014). Self-management for patients with chronic obstructive pulmonary disease (Review). *Cochrane Database of Systematic Reviews*, *3*(CD002990), 1–121. https://doi.org/10.1002/14651858.CD002990.pub3.www.cochranelibrary.com

Annex 1 | Glossary v.3

Behaviour	Anything a person does in response to internal or external events. Actions may be overt (motor or verbal) and directly measurable or, covert (activities not viewable but involving voluntary muscles) and indirectly measurable; behaviours are physical events that occur in the body and are controlled by the brain (Davis, Campbell, Hildon, Hobbs, & Michie, 2015).
Behaviour change	Refers to any transformation or modification of human behaviour.
Behaviour change intervention	An intervention that has the aim of influencing human behaviour (Michie et al., 2020).
Behaviour change competency framework	Describes the knowledge and skills required to deliver interventions to people to help them change their behaviour (Dixon & Johnston, 2010).
Behaviour change model/theory	A set of concepts and/or statements which specify how phenomena relate to each other, providing an organizing description of a system that accounts for what is known, and explains and predicts phenomena (Davis, Campbell, Hildon, & Michie, 2015). In the context of behaviour change, theories seek to explain why, when and how a behaviour does or does not occur and identify sources of influence to be targeted in order to alter behaviour.
Behaviour change support education (behavioural support education)	An activity or coordinated set of activities provided to healthcare professionals or students to acquire knowledge and skills to support behaviour change in health.
Behaviour change support in health	An activity or coordinated set of activities provided by a healthcare professional that aims to get an individual to behave differently from how she or he would have acted without such an action (adapted from NICE, 2014).
Behaviour change technique (BCT)	An observable, replicable, an irreducible component of an intervention designed to change behaviour and a postulated active ingredient within the intervention (Michie, Atkins, & West, 2014). For examples, please refer to the document on core BCTs.
Behavioural determinants	Factors that influence the behaviour either in a positive or a negative way.
Brief intervention	Intervention delivered in a short interaction between the provider and the individual, often carried out when the opportunity arises, typically taking no more than a few minutes. Although short in duration, a brief intervention can be delivered in several sessions (adapted from NICE, 2014).
Chronic disease	Disease that persists over a long period of time and generally has slow progression, requiring ongoing attention from healthcare professionals. Cardiovascular diseases (e.g. heart failure and stroke), cancers, respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes are the most common chronic diseases (WHO, 2016).

Collaborative management	Care that strengthens and supports self-care in chronic illness while assuring that effective medical, preventive, and health maintenance interventions take place (Von Korff *et al.*, 1997).
Curriculum	Typically refers to the learning outcomes students are expected to achieve, the teaching strategies, student activities and assessments to evaluate student learning in a given course. All these components should be aligned (Kennedy, 2006; Cedefop, 2017).
Empowerment	Equipping patients (and their informal caregivers whenever appropriate) with the capacity to participate in decisions related to their condition to the extent that they wish to do so; to become "co-managers" of their condition in partnership with health professionals; and to develop self-confidence, self-esteem and coping skills to manage the physical, emotional and social impacts of illness in everyday life (EMPATHiE 2014).
Family	A social unit or collective whole composed of people connected through blood, kinship, emotional or legal relationships, with the unit or whole being seen as a system, greater than the sum of its parts (ICN, 2019).
Health behaviour	Any behaviour that a person engages in that can affect their health in either a positive or negative way (British Association for Cardiovascular Prevention and Rehabilitation, 2016).
Intervention alliance	Refers to a co-operative working relationship between the patient and their healthcare professional.
Intervention content	A planned process that is part of a behaviour change intervention and is intended to be causally active in influencing the outcome behaviour (Michie et al., 2020).
Long-term intervention	Intervention delivered in a longer interaction (e.g. around 30 minutes) between the provider and the individual, which has a structured plan, and consists of multiple sessions over time (adapted from NICE, 2014).
Learning outcomes	Statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning (Kennedy, Hyland, & Ryan, 2007).
Mode of delivery	A part of a behaviour change intervention that is the means by which the content (e.g. BCT) is provided. For example, face-to-face is a mode of delivery involving an intervention source and recipient being together in the same location and communicating directly (Marques et al., 2020).
Person-centred care	Key dimension of high-quality healthcare and represents how the person, the workers and the system share responsibility and work together to support the achievement of better health and wellbeing as defined by the person, supporting informed decisions, with a focus on the relationship between the practitioner–patient relationship, valuing of people's experiences and a process of empowerment (Pulvirenti, McMillan, & Lawn, 2014).

Self-management	Defined as tasks performed by an individual to minimize the impact of one's disease, with or without the support of health professionals. Tasks can holistically be categorized under medical management (e.g. taking medication, healthy eating, engaging in physical activity), role management (e.g. redefining life roles in light of a chronic disease) and emotional management (e.g. dealing with anger and frustration) and are related to a set of skills (adapted from Lorig & Holman, 2003 and PRO-STEP, 2018).

Glossary references

British Association for Cardiovascular Prevention and Rehabilitation. (2016). *Core Competences for the Health Behaviour Change and Education Component for Cardiovascular Disease Prevention and Rehabilitation Services*. London.

Cedefop (2017). Defining, writing and applying learning outcomes: a European handbook. Luxembourg: Publications Office. http://dx.doi.org/10.2801/566770

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health Psychology Review*, *9*(3), 323–344. https://doi.org/http://dx.doi.org/10.1080/17437199.2014.941722

Dixon, D. & Johnston, M. (2010). Health Behaviour Change Competency Framework: Competences to deliver interventions to change lifestyle behaviours that affect health. BPS.

EMPATHiE: Empowering patients in the management of chronic diseases. FINAL SUMMARY REPORT. 2014

Internacional Council of Nursing. (2019). International Classification for Nursing Practice (ICNP). Geneve: ICN. Available from: https://www.icn.ch/what-we-do/projects/ehealth-icnptm/icnp-browser

Kennedy D, Hyland A and Ryan N. Writing and Using Learning Outcomes: A Practical Guide. University College Cork, 2007.

Lorig, K.R., Holman, H. Self-management education: history, definition, outcomes, and mechanisms (2003). *Annals Behavioural Medicine*; 26(1):1-7. doi:10.1207/S15324796ABM2601_01

Marques, M.M., Carey, R., Norris, E., Evans, F., Finnerty, A.N., Hastings, J., Jenkins, E., Johnston, M., West, R., & Michie, S. Delivering Behaviour Change Interventions: Development of a Mode of Delivery Ontology. *Wellcome Open Research* (Accepted).

Michie S., West R., Finnerty A.N., Norris E., Wright A.J., Marques M.M., Johnston M., Kelly M.P., Thomas J. Hastings J. Representation of behaviour change interventions and their evaluation: Development of the Upper Level of the Behaviour Change Intervention Ontology. *Wellcome Open Research* (Accepted)

Michie, S., Atkins, L., & West, R. (2014). *The Behavior Change Wheel: A Guide To Designing Interventions* (First edit). London: Silverback Publishing.

National Institute for Health and Care Excellence. (2014). *NICE Guidance: Behaviour change: individual approaches*. Retrieved from https://www.nice.org.uk/guidance/ph49

PRO-STEP Project Consortium. (2018). *Promoting Self-management for chronic diseases in Europe Pilot Project on the Promotion of Self-Care in Chronic Diseases in the European Union*.

Pulvirenti, M., McMillan, J., & Lawn, S. (2014). Empowerment, patient centred care and self-management. *Health expectations : an international journal of public participation in health care and health policy*, *17*(3), 303–310. https://doi.org/10.1111/j.1369-7625.2011.00757.x

Roth, D.L., Fredman, L., Haley, W.E. (2015). Informal Caregiving and Its Impact on Health: A Reappraisal From Population-Based Studies, *The Gerontologist*; 55(2):309–19. doi: https://doi.org/10.1093/geront/gnu177

Von Korff, M., Gruman, J., Schaefer, J., Curry, S.J., Wagner, E.H. (1997). Collaborative management of chronic illness. *Annals Internal Medicine*. 5;127(12):1097-102. doi: 10.7326/0003-4819-127-12-199712150-00008. PMID: 9412313.

WHO (2016). Noncommunicable Diseases. Available from http://www.who.int/topics/noncommunicable_diseases/en/

Annex 2 | Summary of progression of the competency statements through the Delphi study

Statement	Round 1 ratings (median, IQR)	Outcome	Revised statement	Round 2 ratings (median, IQR)	Outcome
1. Knowledge of health behaviour and health beliefs	5 (4 -5)	Accept	N/A	N/A	N/A
2. Knowledge of appropriate behaviour change models/theories	4 (4 -5)	Accept	N/A	N/A	N/A
3. Knowledge of relevant behaviour change techniques	5 (4 -5)	Accept	N/A	N/A	N/A
4. Knowledge of clinical features of chronic diseases and target behaviours for their self-management	4 (4 -5)	Accept	N/A	N/A	N/A
5. Ability to identify self-management needs in relation to target behaviour(s) relevant for the chronic disease(s)	5 (4 -5)	Accept	N/A	N/A	N/A
6. Ability to engage and activate individuals with chronic diseases in self-management	5 (4 -5)	Revise based on additional comments	Ability to engage and empower individuals with chronic diseases in self-management	5 (4.75 -5)	Accept
7. Ability to foster and maintain a good intervention alliance	4 (4 -5)	Revise based on additional comments	Ability to foster and maintain a good intervention alliance with individuals	4 (4 -5)	Accept
8. Ability to identify opportunities and barriers to implementing behaviour change interventions	5 (4 -5)	Revise based on additional comments	Ability to identify opportunities and barriers (determinants) to implementing change in the target behaviour	5 (4 -5)	Accept

Statement	Round 1 ratings (median, IQR)	Outcome	Revised statement	Round 2 ratings (median, IQR)	Outcome
9. Ability to prioritise target behaviours to develop an intervention plan	4 (4 -5)	Revise based on additional	Ability to work in partnership to prioritise target behaviours to develop an intervention plan	5 (4 -5)	Accept
10. Ability to develop an intervention plan by selecting behaviour change techniques that are tailored to behaviour determinants and decide on their mode of delivery and content, depending on whether it is a brief or long-term intervention	4 (4 -5)	Revise based on additional comments	Ability to identify and select behaviour change techniques that are tailored to behavioural determinants (opportunities and barriers) in developing an intervention plan	4 (4 -5)	Accept
			New statement: Ability to select behaviour change techniques that are appropriate to the length of the intervention (brief or long-term)	4 (4 -5)	Accept
11. Ability to effectively implement the plan developed for the brief or long-term intervention	4 (4 -5)	Revise based on additional comments	Ability to apply behaviour change techniques and implement the intervention plan, adapting and tailoring as required	4 (4 -5)	Accept
12. Ability to plan for follow-up and maintenance when the target behaviour has been achieved	4 (4 -5)	Accept	N/A	N/A	N/A
13. Ability to provide access to appropriate information and educational materials	4 (4 -5)	Revise based on additional comments	Ability to provide access to appropriate information and educational materials tailored to individual needs	5 (4 -5)	Accept
14. Ability to plan for addressing any other target behaviours that require attention	4 (4 -5)	Removed based on additional comments	N/A	N/A	N/A

Statement	Round 1 ratings (median, IQR)	Outcome	Revised statement	Round 2 ratings (median, IQR)	Outcome
15. Knowledge of the roles of the other team members	4 (4 -5)	Revise based on additional comments	Knowledge of the roles of other professionals in the local health system	4 (4 -5)	Accept
16. Ability to work as part of an interprofessional team	5 (4 -5)	Revise based on additional comments	Ability to maintain effective interprofessional relationships	5 (4 -5)	Accept
17. Ability to provide culturally responsive, whole person and family-orientated interventions	5 (4 -5)	Revise based on additional comments	Ability to provide interventions that are person-centred and consider the context (e.g. culture, family, local health system)	5 (5 -5)	Accept
18. Ability to screen for behavioural health factors e.g. use of substances, cognitive impairment, mental health	4 (4 -5)	Removed based on additional comments	N/A	N/A	N/A
19. Ability to screen for readiness and suitability for behaviour change	4 (4 -5)	Revise based on additional comments	Ability to screen for readiness for behaviour change	4 (4 -5)	Accept
20. Knowledge of the foundational aspects of effective communication	5 (4 -5)	Accept	N/A	N/A	N/A
21. Ability to communicate effectively in partnership with people and families	5 (5 -5)	Accept	N/A	N/A	N/A
22. Ability to communicate effectively with others (e.g. health care providers, administrators)	5 (4 -5)	Accept	N/A	N/A	N/A

Statement	Round 1 ratings (median, IQR)	Outcome	Revised statement	Round 2 ratings (median, IQR)	Outcome
23. Ability to work with patient groups	4 (4 -5)	Revise based on additional comments	Ability to engage and partner with people individually and in groups	4 (4 -5)	Accept
24. Ability to manage expectations	4 (4 -5)	Revise based on additional comments	Ability to explore and manage expectations of individuals and groups	4 (4 -5)	Accept
25. Knowledge of professional and ethical guidelines	5 (4 -5)	Accept	N/A	N/A	N/A
26. Ability to demonstrate professional behaviour	5 (4 -5)	Accept	N/A	N/A	N/A
27. Ability to reflect and evaluate one's own support to continuously develop these competencies	5 (4 -5)	Revise based on additional comments	Ability to reflect, self-evaluate and continuously develop these competencies	5 (4 -5)	Accept

Annex 3 | Behaviour Change Techniques related to the T4H Competency Framework

Core set of BCTs applicable to all target behaviours

BCT (BCTT v.1)	Definition (Michie et al., 2014)
1.1 Goal setting (behaviour)	Set or agree on a goal defined in terms of the behaviour to be achieved
1.2 Problem solving	Analyse, or prompt the person to analyse, factors influencing the behaviour and generate or select strategies that include overcoming barriers and/or increasing facilitators
1.3 Goal setting (outcomes)	Set or agree on a goal defined in terms of a positive outcome of wanted behaviour
1.4 Action planning	Prompt detailed planning of performance of the behaviour (must include at least one of context, frequency, duration and intensity). Context may be environmental (physical or social) or internal (physical, emotional or cognitive) (includes 'Implementation Intentions')
1.5 Review behaviour goal(s)	Review behaviour goal(s) jointly with the person and consider modifying goal(s) or behaviour change strategy in light of achievement. This may lead to re-setting the same goal, a small change in that goal or setting a new goal instead of (or in addition to) the first, or no change
1.6 Discrepancy between current behaviour and goal	Draw attention to discrepancies between a person's current behaviour (in terms of the form, frequency, duration, or intensity of that behaviour) and the person's previously set outcome goals, behavioural goals or action plans (goes beyond self-monitoring of behaviour)
1.7 Review outcomes goal(s)	Review outcome goal(s) jointly with the person and consider modifying goal(s) in light of achievement. This may lead to resetting the same goal, a small change in that goal or setting a new goal instead of, or in addition to the first
2.2 Feedback on behaviour	Monitor and provide informative or evaluative feedback on performance of the behaviour (e.g. form, frequency, duration, intensity)
2.3 Self-monitoring of behaviour	Establish a method for the person to monitor and record their behaviour(s) as part of a behaviour change strategy
2.4 Self-monitoring of outcome(s) of behaviour	Establish a method for the person to monitor and record the outcome(s) of their behaviour as part of a behaviour change strategy
2.6 Biofeedback	Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behaviour change strategy

BCT (BCTT v.1)	Definition (Michie et al., 2014)
2.7 Feedback on outcome(s) of behaviour	Monitor and provide feedback on the outcome of performance of the behaviour
3.1 Social support (unspecified)	Advise on, arrange or provide social support (e.g. from friends, relatives, colleagues,' buddies' or staff) or noncontingent praise or reward for performance of the behaviour. It includes encouragement and counselling, but only when it is directed at the behaviour
3.2 Social support (practical)	Advise on, arrange, or provide practical help (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behaviour
3.3 Social support (emotional)	Advise on, arrange, or provide emotional social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behaviour
4.1 Instruction on how to perform a behaviour	Advise or agree on how to perform the behaviour (includes 'Skills training')
5.1 Information about health consequences	Provide information (e.g. written, verbal, visual) about health consequences of performing the behaviour
8.3 Habit formation	Prompt rehearsal and repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour
11.2 Reduce negative emotions	Advise on ways of reducing negative emotions to facilitate performance of the behaviour (includes 'Stress Management')
12.1 Restructuring the physical environment	Change, or advise to change the physical environment in order to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour (other than prompts/cues, rewards and punishments)
12.5 Adding objects to the environment	Add objects to the environment in order to facilitate performance of the behaviour

Specific sets of BCTs applicable to target behaviours

Diet	Physical activity	Medication adherence	Smoking cessation	Symptom monitoring and management	BCT definition (Michie et al., 2014)
6.1 Demonstration of the behaviour	6.1 Demonstration of the behaviour				Provide an observable sample of the performance of the behaviour, directly in person or indirectly e.g. via film, pictures, for the person to aspire to or imitate (includes 'Modelling').
7.1 Prompts/cues	7.1 Prompts/cues	7.1 Prompts/cues		7.1 Prompts/cues	Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behaviour. The prompt or cue would normally occur at the time or place of performance
8.1 Behavioural practice/rehearsal	8.1 Behavioural practice/rehearsal	8.1 Behavioural practice/rehearsal			Prompt practice or rehearsal of the performance of the behaviour one or more times in a context or at a time when the performance may not be necessary, in order to increase habit and skill
8.7 Graded tasks	8.7 Graded tasks	8.7 Graded tasks			Set easy-to-perform tasks, making them increasingly difficult, but achievable, until behaviour is performed
9.2 Pros and cons	9.2 Pros and cons	9.2 Pros and cons	9.2 Pros and cons		Advise the person to identify and compare reasons for wanting (pros) and not wanting to (cons) change the behaviour (includes 'Decisional balance')
	11.1 Pharmacological support				Provide, or encourage the use of or adherence to, drugs to facilitate behaviour change

Diet	Physical activity	Medication adherence	Smoking cessation	Symptom monitoring and management	BCT definition (Michie et al., 2014)
12.3 Avoidance/reducing exposure to cues for the behaviour			12.3 Avoidance/reducing exposure to cues for the behaviour		Advise on how to avoid exposure to specific social and contextual/physical cues for the behaviour, including changing daily or weekly routines
	13.1 Identification of self as role model				Inform that one's own behaviour may be an example to others