

MODULE 3 | LECTURE 3B

Mechanisms of change

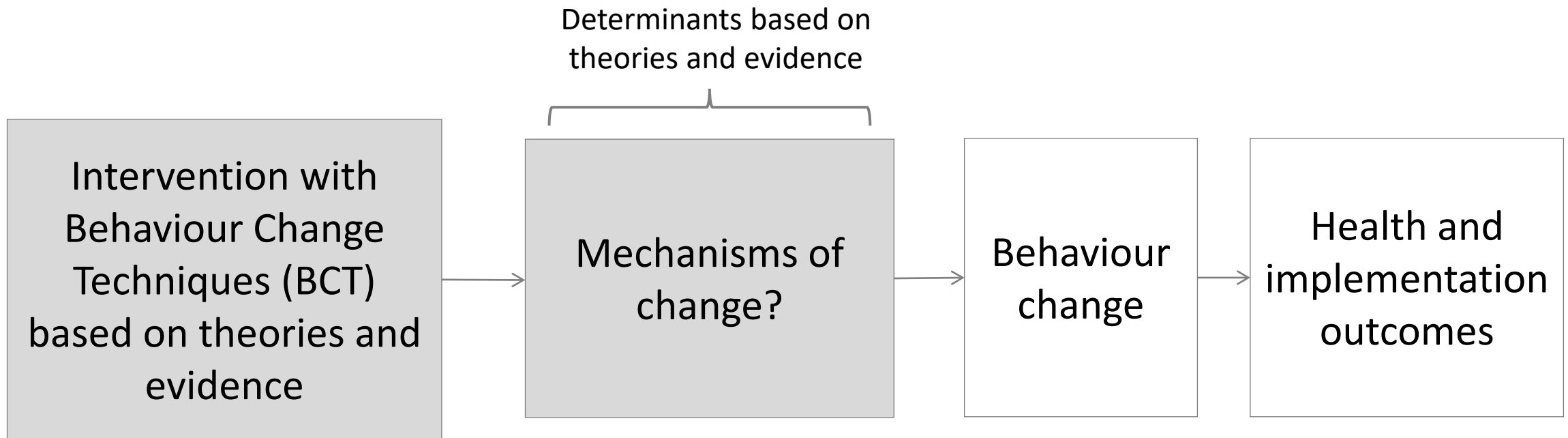
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Lecture overview

- Overview of theories relevant to behaviour change
- Techniques to change determinants
- Practical examples of utilisation of theories

Intervention effect on individual level (participant and implementer)

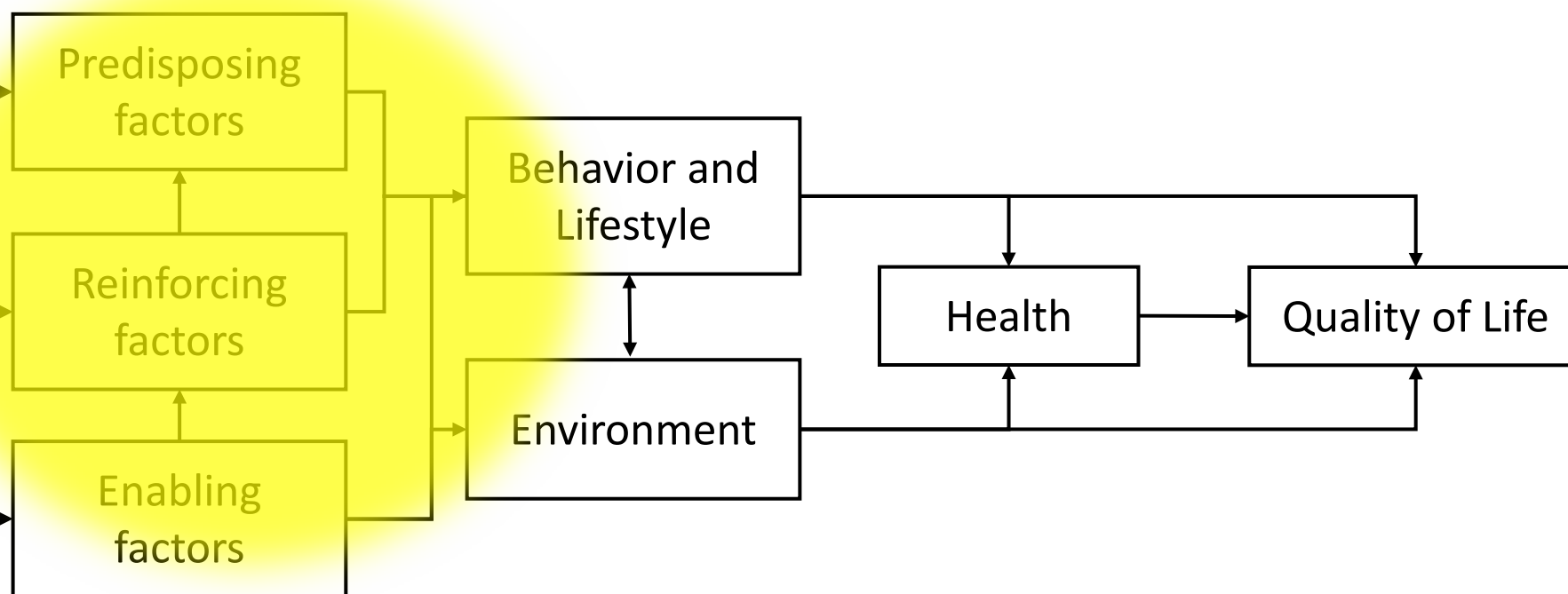
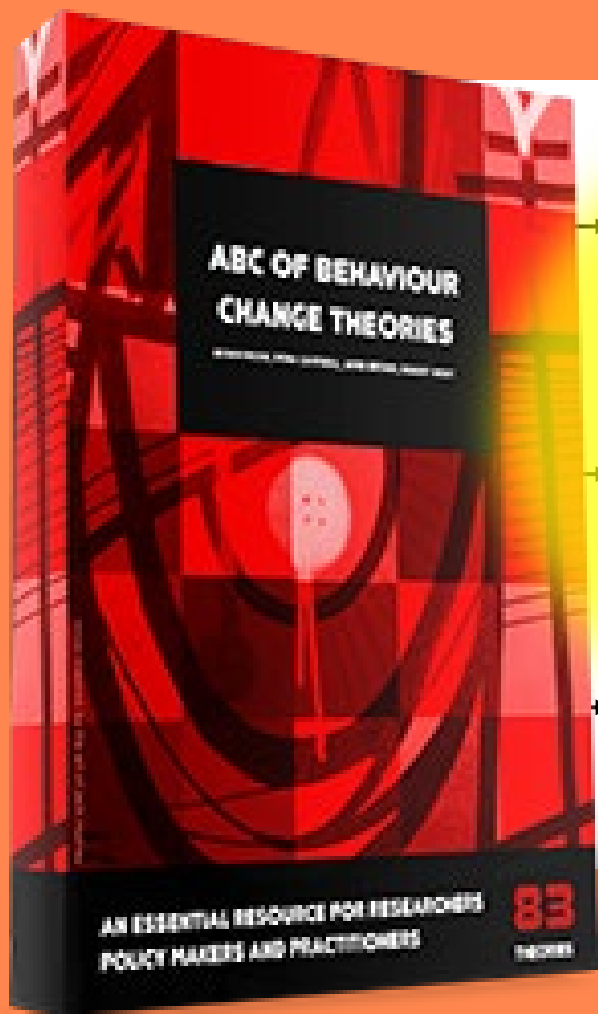


Need for systematic intervention planning based on behaviour change science

Why need to understand change mechanisms behind evidence-based interventions?

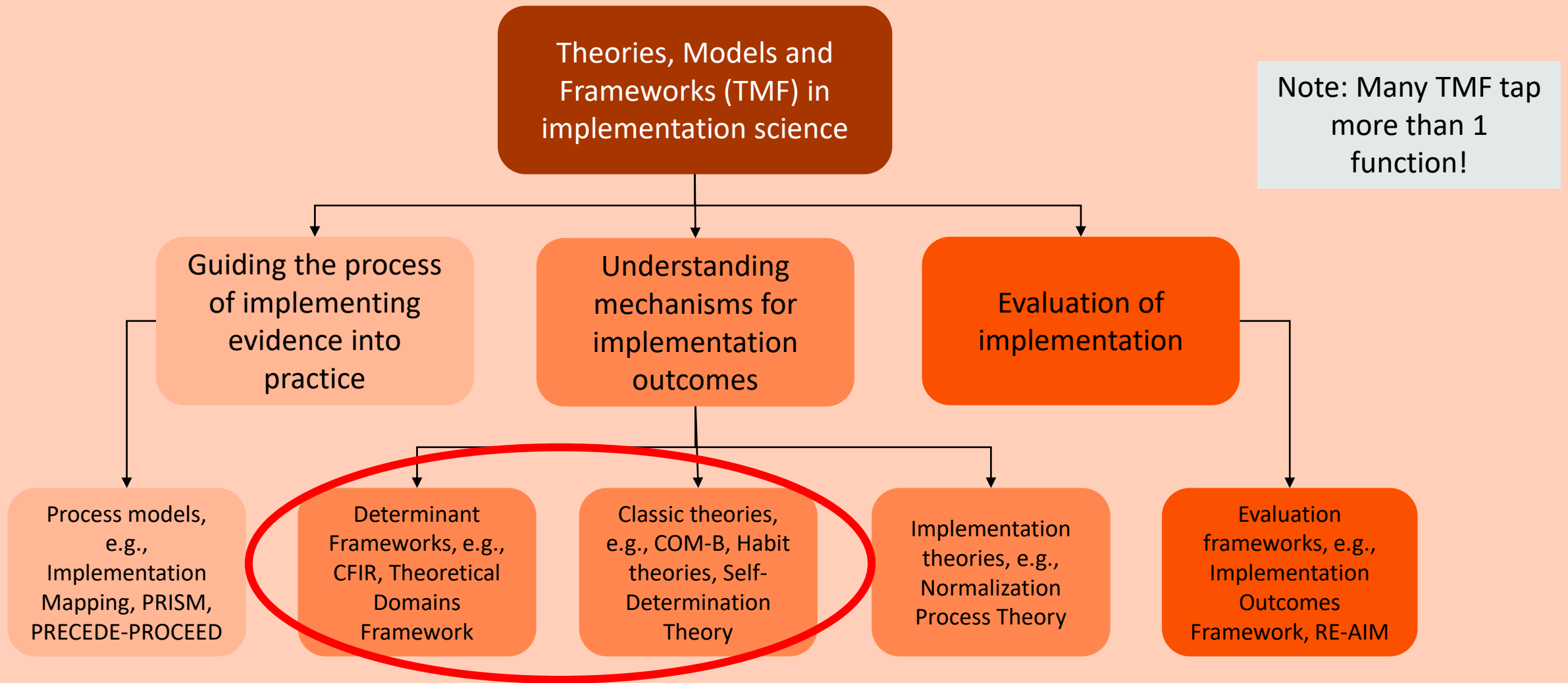
- Haven't change mechanisms utilised in EBI already been identified in basic research and confirmed in efficacy trials?
- When EBI involve human behaviour, the answer is: Often we still don't know sufficiently
 - Most of the behaviour change theories have been developed in Western countries
 - They have often been tested in selected populations
 - There is still very little research on their applicability to other contexts and populations, so more research is needed
- Also: many of the same theories could be applied to implementer behaviours – but this still happens too rarely

Theories help to identify determinants



Green & Kreuter: PRECEDE-PROCEED Model
Michie S, West R, Campbell R, et al. An ABC of behaviour change theories.
London: Silverback Publishing, 2014.

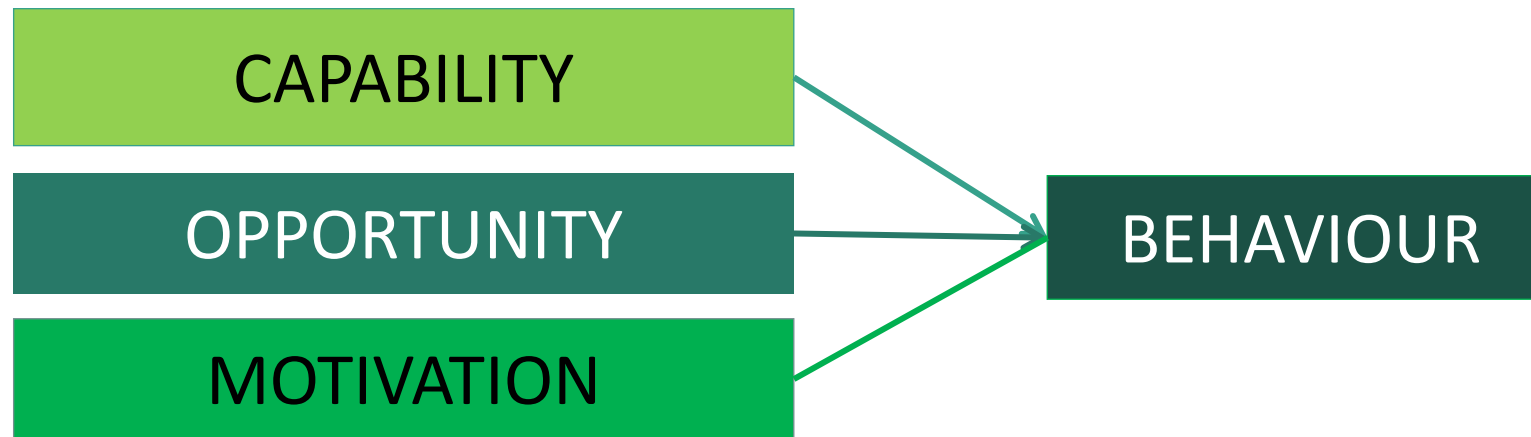
Functions of Theories, Models, and Frameworks in IS



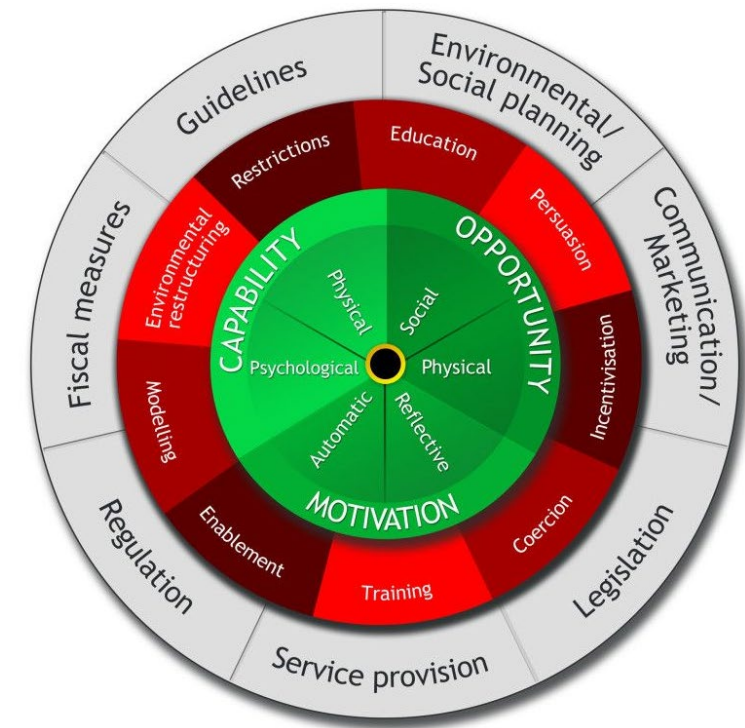
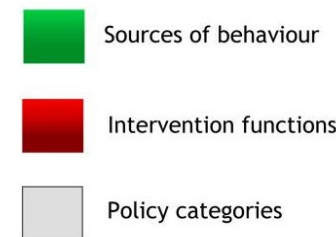
COM-B model: “Necessary preconditions” or sources for behaviour*

Do program implementers have sufficient COM for implementation?

Do (potential) participants have sufficient COM for participation and for benefitting from the intervention?



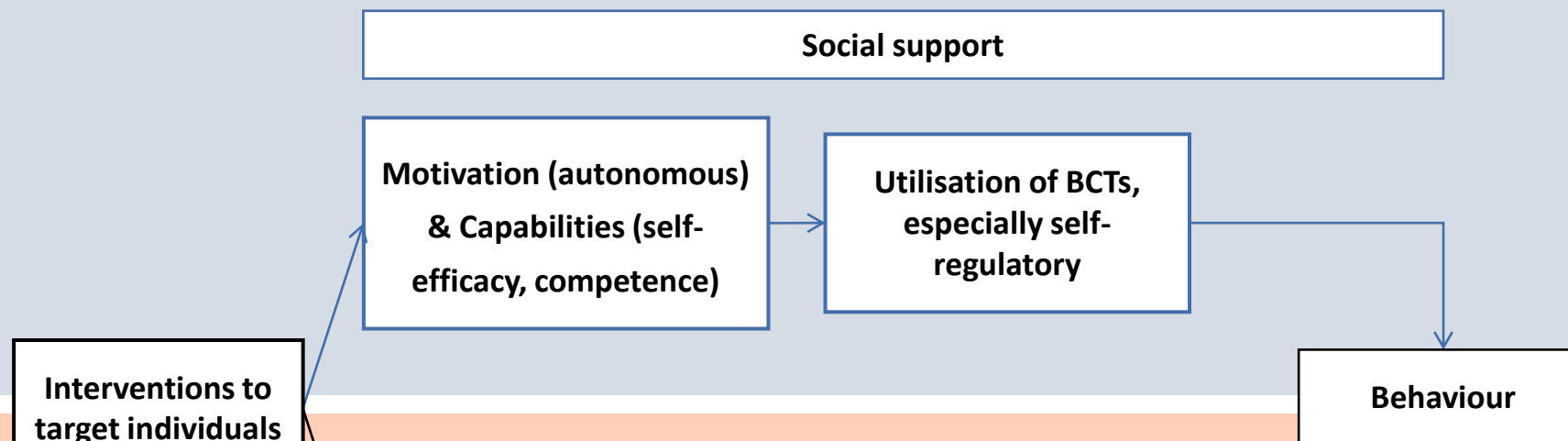
Behaviour Change Wheel



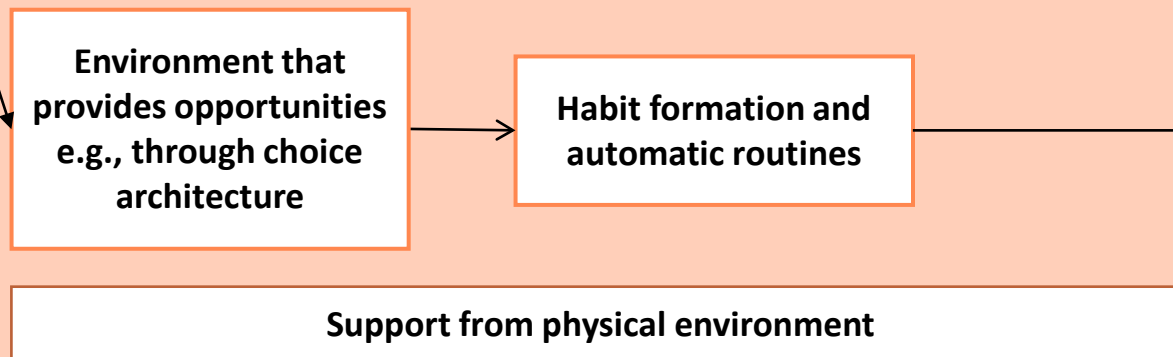
*Michie, S., van Stralen M.M. & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implementation Science, 6, 42.

Useful to consider two types of change processes

Conscious, deliberative process

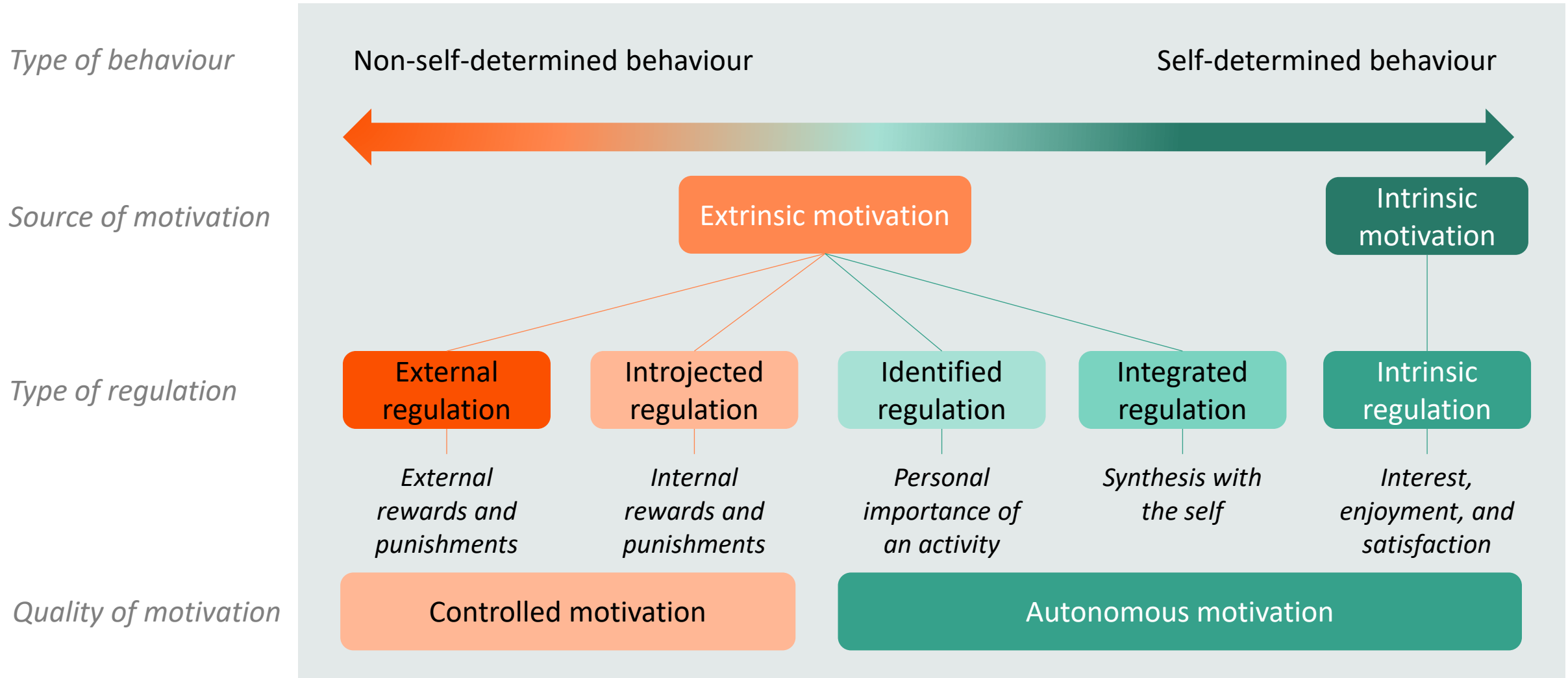


(Mainly) subconscious and automatic processes



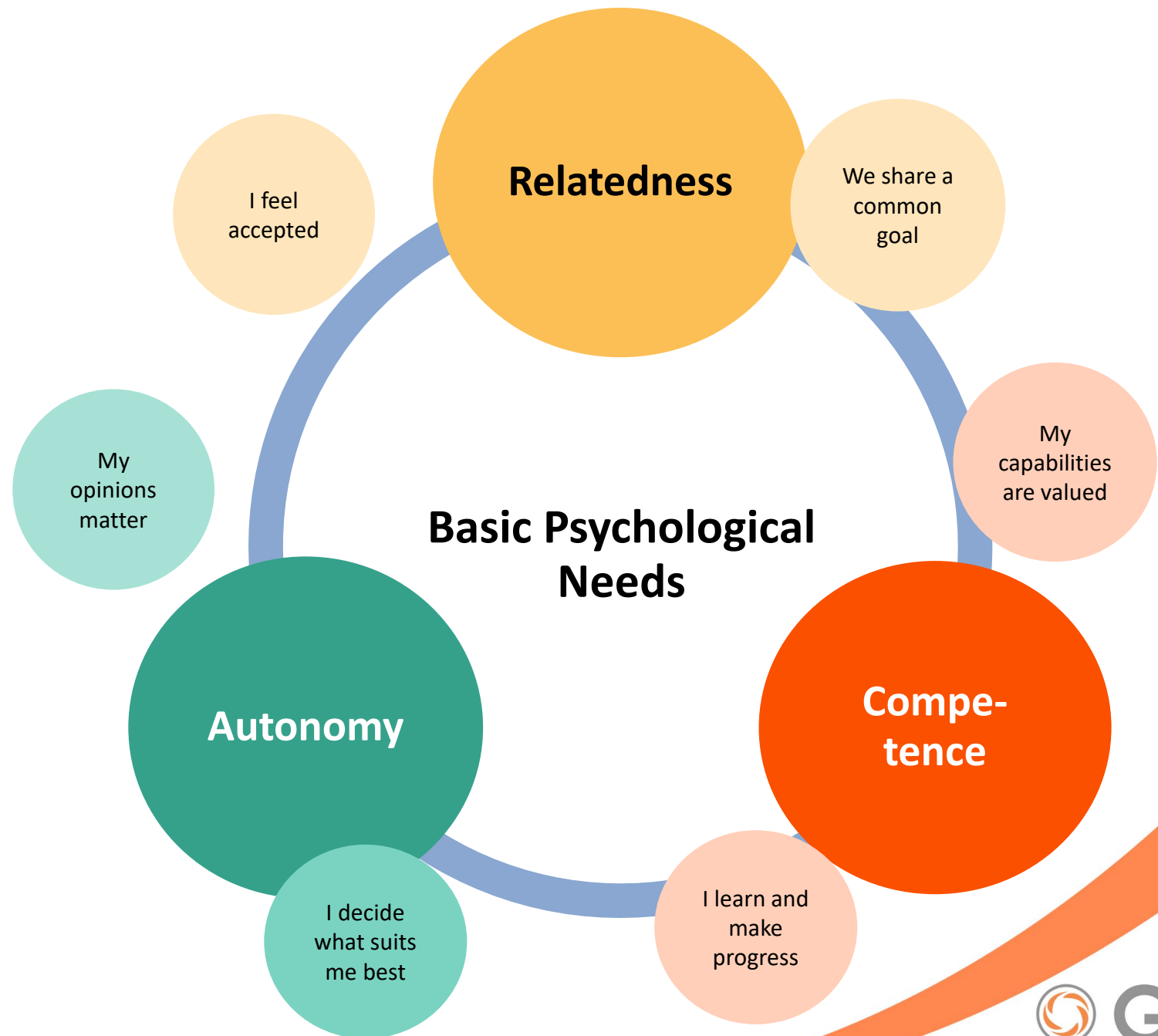
Absetz & Hankonen. Miten auttaa potilaita omaksumaan ja ylläpitämään terveellisiä elämäntapoja? [How to help patients adopt and maintain a healthy lifestyle? A review of behavioral evidence of determinants and means] Duodecim, 2017, 133, 53-59.

Self-determination theory and quality of motivation

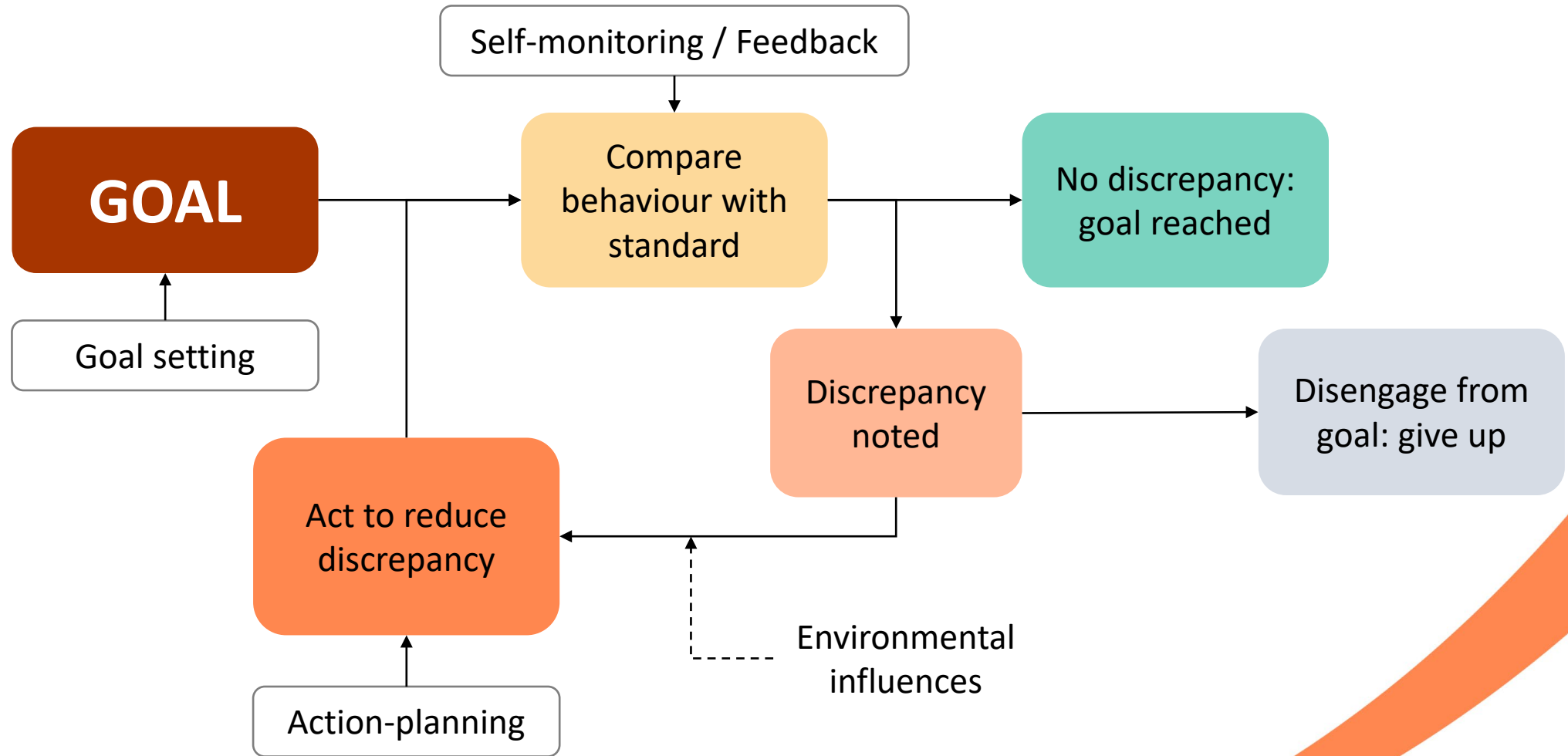


Autonomous motivation – fostered by fulfillment of Basic Psychological Needs – leads to sustained change

BPNT; Deci and Ryan, Psychol Inquiry 11:227–268, 2000; Ryan and Deci, Psychol Inquiry 11:319–338, 2000

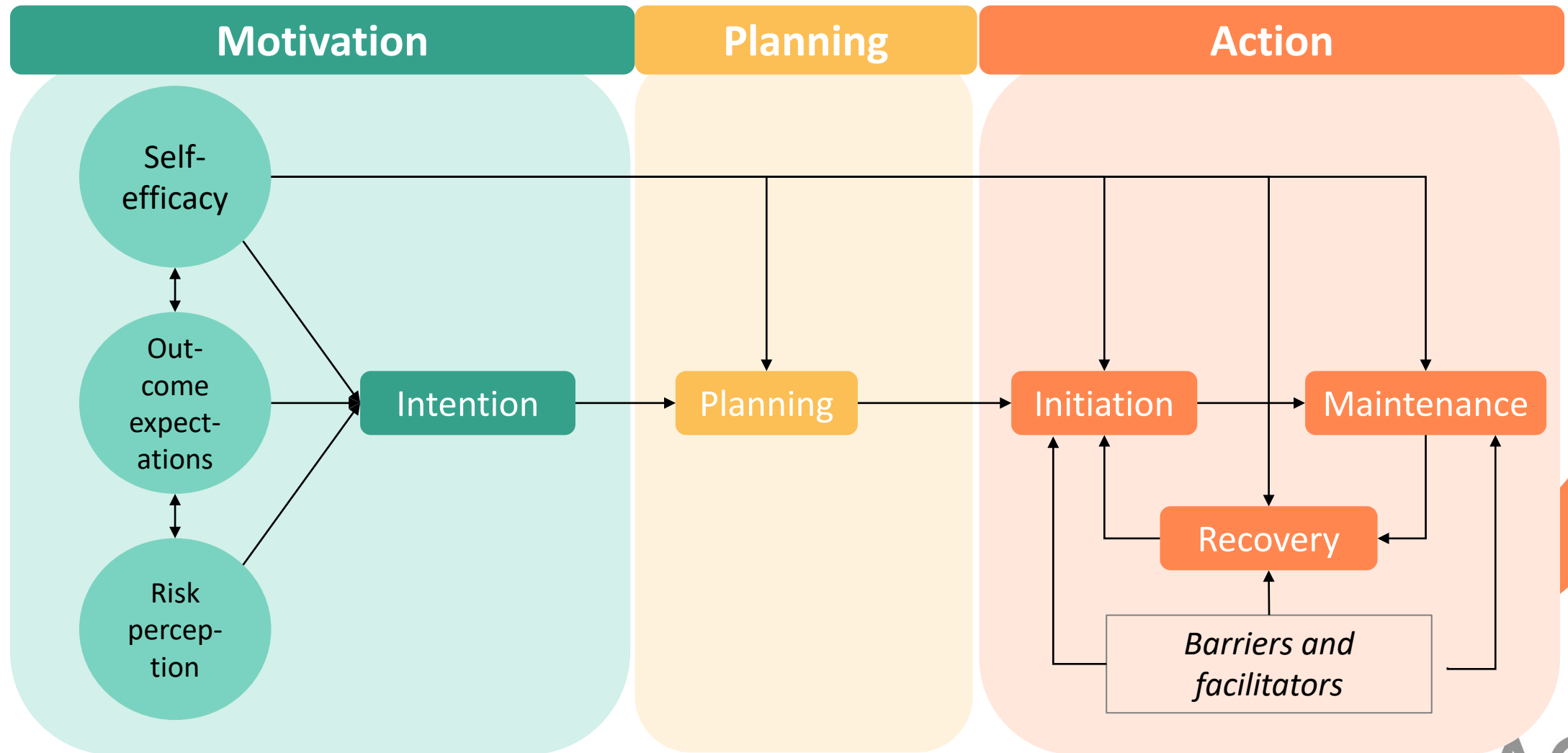


Self-regulation (Control) theory*



*Carver & Scheier, 1982. <https://doi.org/10.1037/0033-2909.92.1.111>

Health Action Process Approach (HAPA-model)



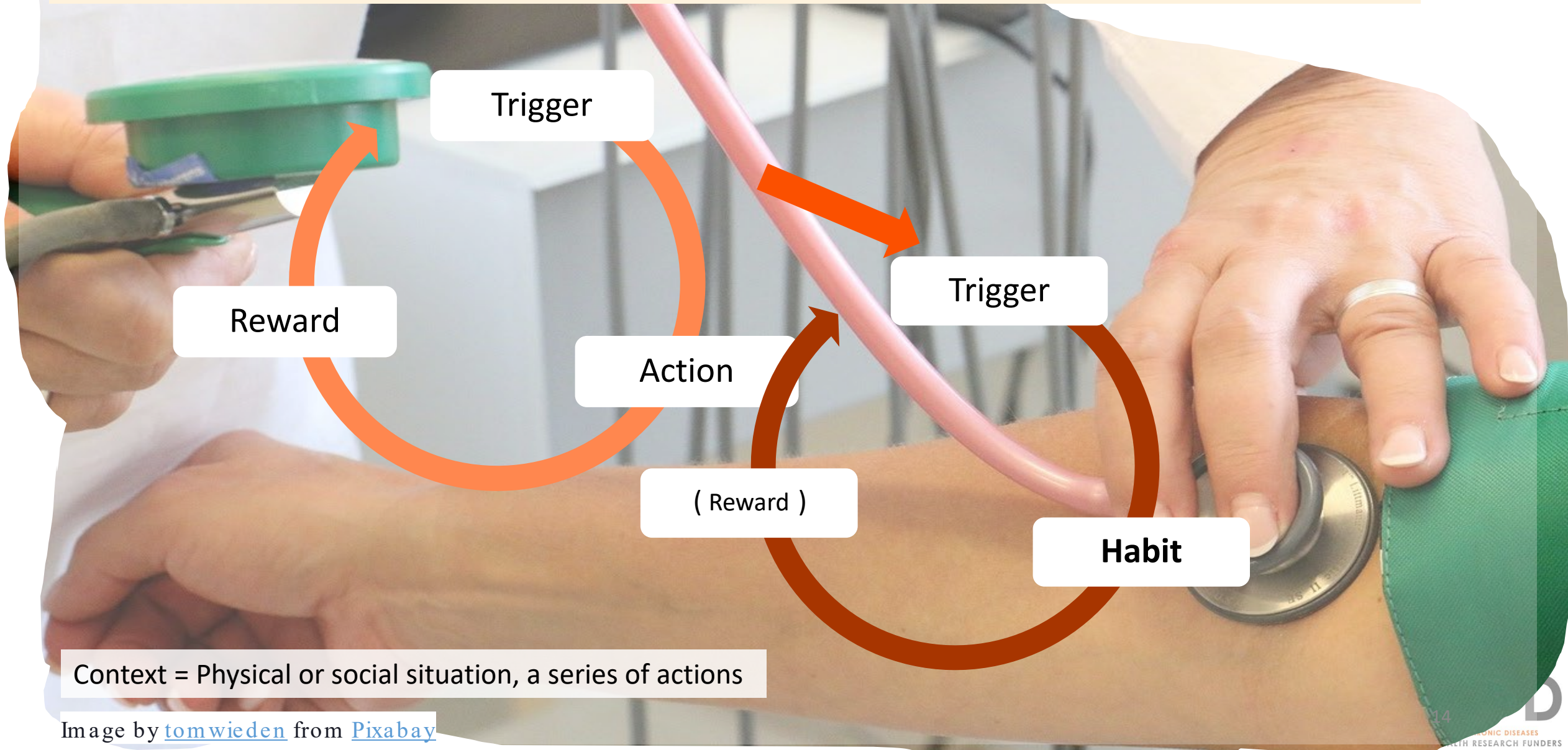
Modified from the HAPA-model by Schwarzer <https://doi.org/10.1111/j.1464-0597.2007.00325.x>

Habit formation through repetition in context



Context = Physical or social situation, a series of actions

Habit formation through repetition in context



Context = Physical or social situation, a series of actions

Theoretical Domains Framework compiles constructs from different theories

1. Knowledge
2. Skills
3. Social / professional role and identity
4. Beliefs about capabilities
5. Optimism
 - Self-confidence
 - Perceived competence
6. Beliefs
 - Self-efficacy
7. Reinforcement
 - Perceived behavioural control
 - Beliefs
 - Self-esteem
 - Empowerment
 - Professional confidence

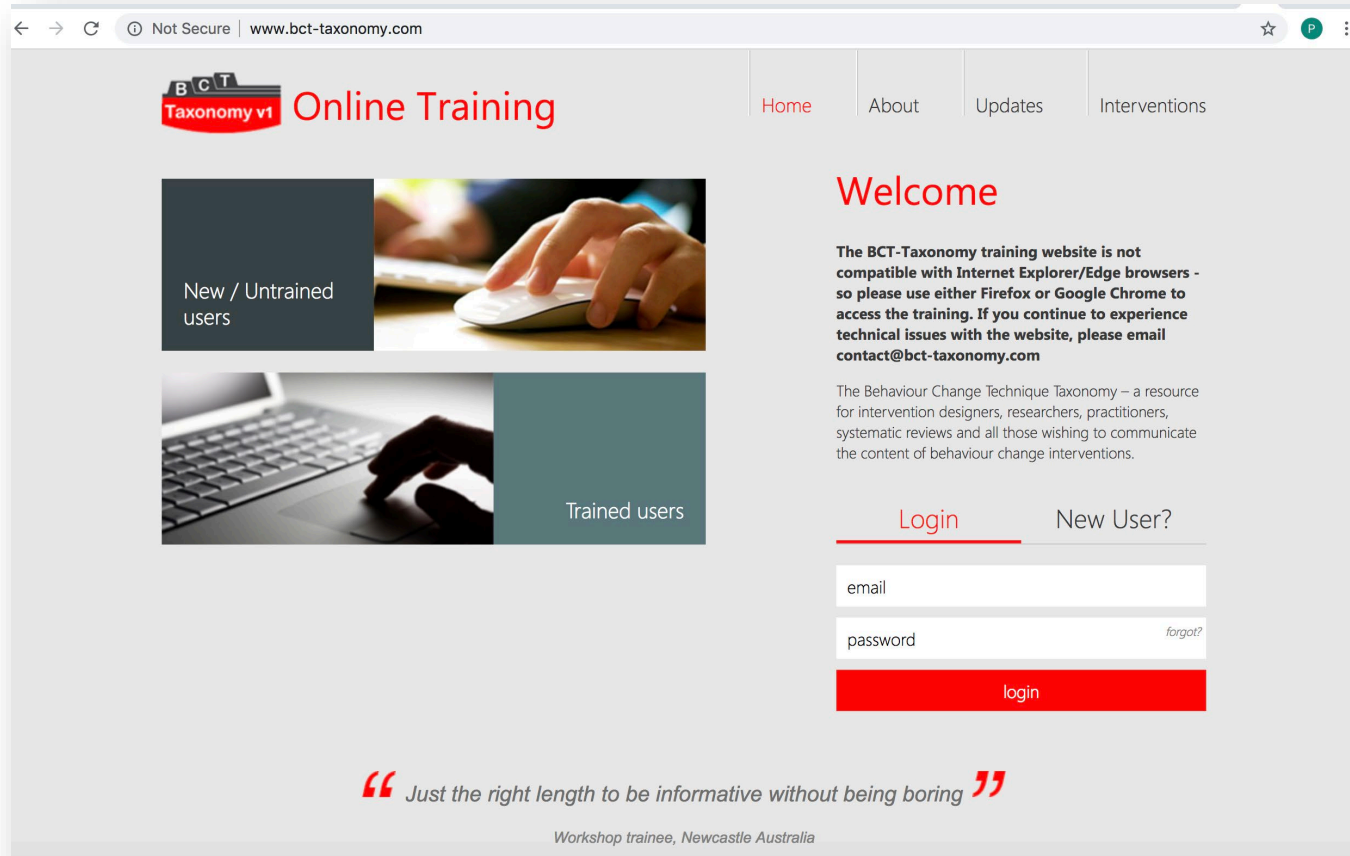
8. Intentions
9. Goals
10. Memory, attention and decision processes
11. Environmental context and resources
12. Social influence
 - Environmental stressors
 - Resources/material resources
13. Emotion
 - Organisational culture/climate
 - Salient events/critical incidents
 - Person x environment interaction
 - Barriers and facilitators
14. Behaviour

Benefits of the framework

- Covers different potential mechanisms of influence
- Makes a distinction between different types of influence
- Easy to link behavior change theories to behavior change techniques

Techniques to change behaviour

Behaviour Change Techniques Taxonomy



Some benefits of taxonomies

- Provide wider selections of techniques for intervention planners.
- Can be mapped with theoretical constructs or determinants (although usually many BCTs applicable to a determinant).
- Provide common terminology.
- Allow researchers to identify effective techniques e.g., with meta-analyses.

Addressing TDF with BCTs

11. Environmental context and resources

- Environmental stressors
- Resources/material resources
- Organisational culture/climate
- Salient events/critical incidents
- Person x environment interaction
- Barriers and facilitators

4. Beliefs about capabilities

- Self-confidence
- Perceived competence
- Self-efficacy
- Perceived behavioural control
- Beliefs
- Self-esteem
- Empowerment
- Professional confidence

Page	Grouping and BCTs	Page	Grouping and BCTs	Page	Grouping and BCTs
1	1. Goals and planning 1.1. Goal setting (behavior) 1.2. Problem solving 1.3. Goal setting (outcome) 1.4. Action planning 1.5. Review behavior goal(s) 1.6. Discrepancy between current behavior and goal 1.7. Review outcome goal(s) 1.8. Behavioral contract 1.9. Commitment	8	6. Comparison of behaviour 6.1. Demonstration of the behavior 6.2. Social comparison 6.3. Information about others' approval	16	12. Antecedents 12.1. Restructuring the physical environment 12.2. Restructuring the social environment 12.3. Avoidance/reducing exposure to cues for the behavior 12.4. Distraction 12.5. Adding objects to the environment 12.6. Body changes
3	2. Feedback and monitoring 2.1. Monitoring of behavior by others without feedback 2.2. Feedback on behaviour 2.3. Self-monitoring of behaviour 2.4. Self-monitoring of outcome(s) of behaviour 2.5. Monitoring of outcome(s) of behavior without feedback 2.6. Biofeedback 2.7. Feedback on outcome(s) of behavior	9	7. Associations 7.1. Prompts/cues 7.2. Cue signalling reward 7.3. Reduce prompts/cues 7.4. Remove access to the reward 7.5. Remove aversive stimulus 7.6. Satiation 7.7. Exposure 7.8. Associative learning	17	13. Identity 13.1. Identification of self as role model 13.2. Framing/reframing 13.3. Incompatible beliefs 13.4. Valued self-identify 13.5. Identity associated with changed behavior
5	3. Social support 3.1. Social support (unspecified) 3.2. Social support (practical) 3.3. Social support (emotional)	10	8. Repetition and substitution 8.1. Behavioral practice/rehearsal 8.2. Behavior substitution 8.3. Habit formation 8.4. Habit reversal 8.5. Overcorrection 8.6. Generalisation of target behavior 8.7. Graded tasks	18	14. Scheduled consequences 14.1. Behavior cost 14.2. Punishment 14.3. Remove reward 14.4. Reward approximation 14.5. Rewarding completion 14.6. Situation-specific reward 14.7. Reward incompatible behavior 14.8. Reward alternative behavior 14.9. Reduce reward frequency 14.10. Remove punishment
6	4. Shaping knowledge 4.1. Instruction on how to perform the behavior 4.2. Information about Antecedents 4.3. Re-attribution 4.4. Behavioral experiments	11	9. Comparison of outcomes 9.1. Credible source 9.2. Pros and cons 9.3. Comparative imagining of future outcomes	19	15. Self-belief 15.1. Verbal persuasion about capability 15.2. Mental rehearsal of successful performance 15.3. Focus on past success 15.4. Self-talk
7	5. Natural consequences 5.1. Information about health consequences 5.2. Saliency of consequences 5.3. Information about social and environmental consequences 5.4. Monitoring of emotional consequences 5.5. Anticipated regret 5.6. Information about emotional consequences	12	10. Reward and threat 10.1. Material incentive (behavior) 10.2. Material reward (behavior) 10.3. Non-specific reward 10.4. Social reward 10.5. Social incentive 10.6. Non-specific incentive 10.7. Self-incentive 10.8. Incentive (outcome) 10.9. Self-reward 10.10. Reward (outcome) 10.11. Future punishment	19	16. Covert learning 16.1. Imaginary punishment 16.2. Imaginary reward 16.3. Vicarious consequences
		15	11. Regulation 11.1. Pharmacological support 11.2. Reduce negative emotions 11.3. Conserving mental resources		

Choice Architecture nudges us in many everyday situations

(Thaler & Sunstein 2008,
Guldborg Hansen 2016)

Availability

Size

Position

Choice
architecture
strategies*

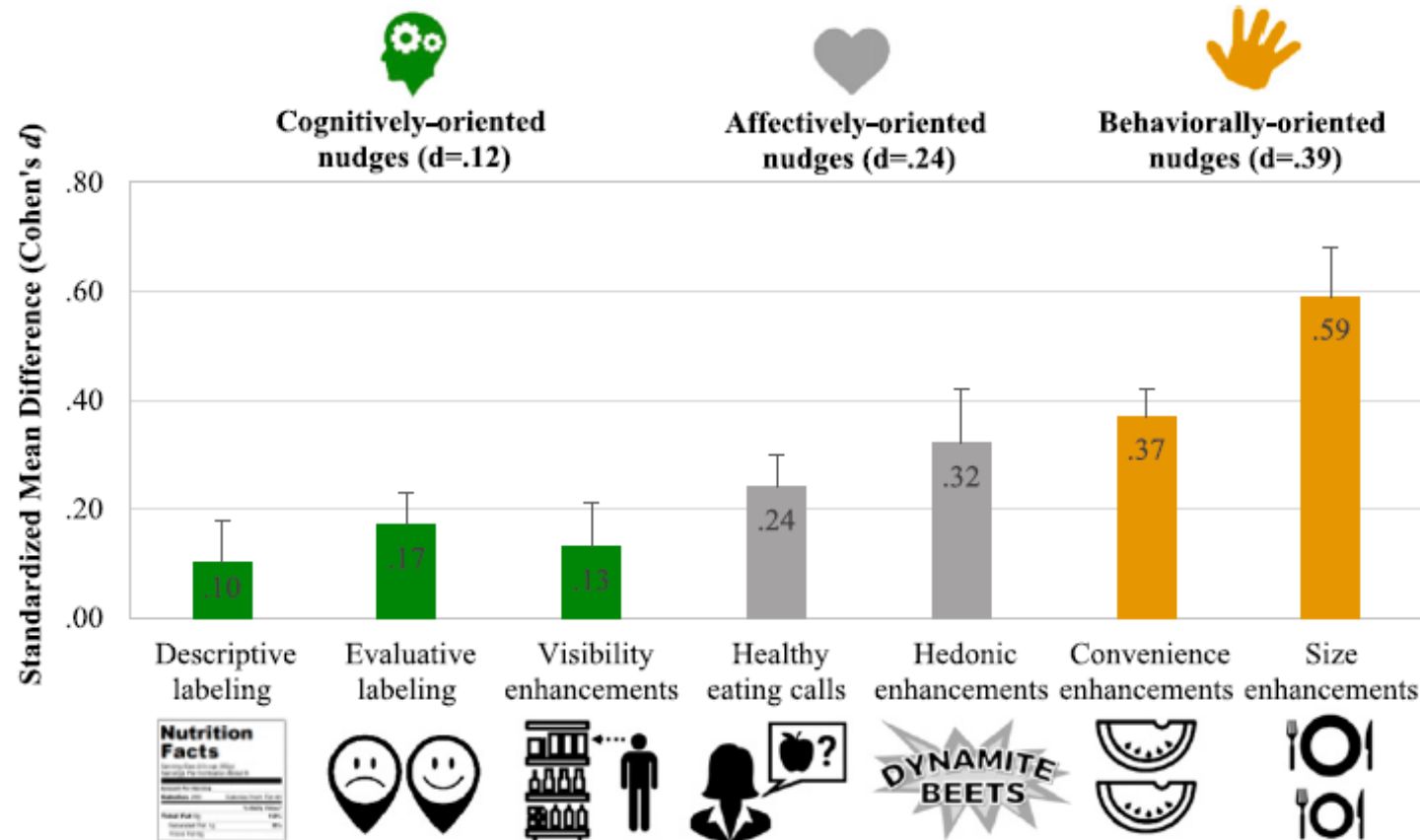
Functionality

Presentation

Information

*Hollands et al. 2017. Typology of Interventions in Proximal Physical Micro-Environments TIPPME.
<https://doi.org/10.1038/s41562-017-0140>

Effect depends on the type of nudges



Note. Error bar represents standard error.

Figure from: Cadario & Chandon, 2019. <https://doi.org/10.1287/mksc.2018.1128>

Policy, system or environmental (PSE) level mechanisms of change

Advocacy Coalition Framework¹

Four pathways to policy change:

1. External uncontrollable subsystem events shift the balance of coalitions.
2. Events within the subsystem like crises or scandals verify or discredit the beliefs of the dominant coalition and their proposed policy option.
3. Policy-oriented learning of new information that alter the assumptions of the coalition.
4. Negotiated agreements between the coalitions.

Community Organizing³

Cycles of learning and action with

1. Assessment/relationship development.
2. Participatory research.
3. Action or mobilization.
4. Evaluation and/or reflection.

Diffusion of Innovations²

Four stages of adoption:

Awareness, Decision, Initial use, Continued use.

Main factors that influence adoption:

1. Relative Advantage - The degree to which an innovation is seen as better than the idea, program, or product it replaces.
2. Compatibility - How consistent the innovation is with the values, experiences, and needs of the potential adopters.
3. Complexity - How difficult the innovation is to understand and/or use.
4. Triability - The extent to which the innovation can be tested or experimented with before a commitment to adopt is made.
5. Observability - The extent to which the innovation provides tangible results.

Adopter categories:

Innovators, Early Adopters, Early Majority, Late Majority, Laggards

¹Sabatier, 1988. <https://doi.org/10.1007/BF00136406>; ²Rogers, Diffusion of Innovations, 1962; ³Christens & Speer, 2015. <https://doi.org/10.1111/sipr.12014>



Some practical examples of using theories

Self-determination theory partially supported in SMART2D in Uganda, South Africa, and Sweden

RESEARCH

Open Access

Motivational determinants of physical activity in disadvantaged populations with (pre) diabetes: a cross-cultural comparison

Jeroen De Man^{1*}, Francis Xavier Kasujja^{2,3}, Peter Delobelle^{4,5,6}, Kristi Sidney Annerstedt⁷, Helle Mölsted Alvesson⁷, Pilvikki Absetz^{8,9}, Edwin Wouters¹⁰, Meena Daivadanam^{7,11,12}, David Guwatudde², Thandi Puoane⁴, Roy Remmen¹, Hanani Tabana⁴ and Josefiën Van Olmen^{1,13}

Abstract

Background: Understanding motivational determinants of physical activity (PA) is essential to guide the implementation of PA at individual and population level. Knowledge about the cross-cultural generalizability of these determinants is lacking and they have mostly been studied as separate factors. This study compares a motivational process model across samples from diverse populations with, or at risk of diabetes.

Methods: Measurement invariance of barrier identified regulation, barrier self-efficacy and social support was assessed in a rural Ugandan sample ($n = 712$) and disadvantaged samples with high proportions of immigrants in urban South Africa ($n = 566$) and Sweden ($n = 147$). These motivational determinants were then compared through multigroup structural equation modeling.

Results: The studied motivational constructs showed scalar invariance. Latent mean levels of perceived social support and barrier self-efficacy were lower in South Africa and Sweden. Structural models (for different PA outcomes) were not consistent across settings except for the association between perceived social support and identified regulation. Identified regulation was only associated with vigorous PA in Uganda and with moderate PA in South Africa. The association between social support and PA outcomes ranged from weak to not significant and the association between self-efficacy and PA was not significant. Self-reported PA was highest in Uganda and lowest in Sweden. Self-reported vigorous PA was significantly related to lower hemoglobin A1c levels, while moderate PA was not.

Conclusions: Findings suggest that: 1) it is feasible to compare a motivational process model across diverse settings; 2) there is lower perceived social support and self-efficacy in the urban, migrant samples; 3) identified regulation is a more promising determinant of PA than self-efficacy or social support in these populations; 4) associations between motivational determinants and PA depend on the perceived type and/or intensity of PA; 5) perceived relatedness functions as a basic psychological need across diverse settings; and 6) people's perception of the PA they perform depends on their perceived level of intensity of PA which would have major implications for health promotion.

Keywords: Physical activity, Self-efficacy, Social support, Self-determination theory, Vulnerable populations, South Africa, Uganda, Sweden, Type 2 diabetes, Measurement invariance

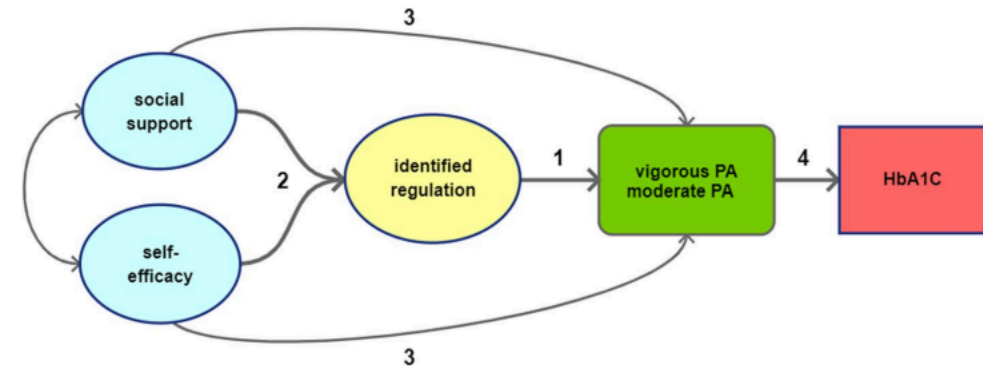


Fig. 1 Motivational Process Model. *Legend:* Representation of the motivational process model that was tested in the three study settings. Numbers relate to the hypothesis discussed in the text

SMART2D—development and contextualization of community strategies to support self-management in prevention and control of type 2 diabetes in Uganda, South Africa, and Sweden

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Abstract

Type 2 diabetes (T2D) and its complications are increasing rapidly in low- and middle-income countries, as well as among socioeconomically disadvantaged populations in high-income countries. Support for healthy lifestyle and self-management is paramount but not well implemented in health systems, and there is need for knowledge on how to design and implement interventions that are contextualized and patient centered and address special needs of disadvantaged population groups. The SMART2D project implements and evaluates a lifestyle and self-management intervention for participants recently diagnosed with or being at increased risk for T2D in rural communities in Uganda, an urban township in South Africa, and socioeconomically disadvantaged urban communities in Sweden. Our aim was to develop an intervention with shared key functions and a good fit with the local context, needs, and resources. The intervention program design was conducted in three steps facilitated by a coordinating team: (a) situational analysis based on the SMART2D Self-Management Framework and definition of intervention objectives and core strategies; (b) designing generic tools for the strategies; and (c) contextual translation of the generic tools and their delivery. This article focuses on community strategies to strengthen support from the social and physical environment and to link health care and community support. Situational analyses showed that objectives and key functions addressing mediators from the SMART2D framework could be shared. Generic tools ensured retaining of functions, while content and delivery were highly contextualized. Phased, collaborative approach and theoretical framework ensured that key functions were not lost in contextualization, also allowing for cross-comparison despite flexibility with other aspects of the intervention between the sites. The trial registration number of this study is ISRCTN11913581.

Implications

Practice: To maintain the effectiveness of lifestyle change and self-management support interventions when transferring from research to routine practice, it is necessary to understand what the active ingredients for change are and to retain those with as much fidelity as possible even when content and (or) delivery have to be contextualized.

Policy: During the implementation of programs for prevention and management of noncommunicable diseases, contextualization is necessary for ensuring feasibility and acceptability, while standardization of functions, that is, retaining active ingredients for change, is necessary to ensure outcome effectiveness.

Research: Future research should focus on how to uncouple the effect of specific active ingredients on specific outcomes within complex interventions and how to adjust for the contextualization factor which is a key aspect of implementation.

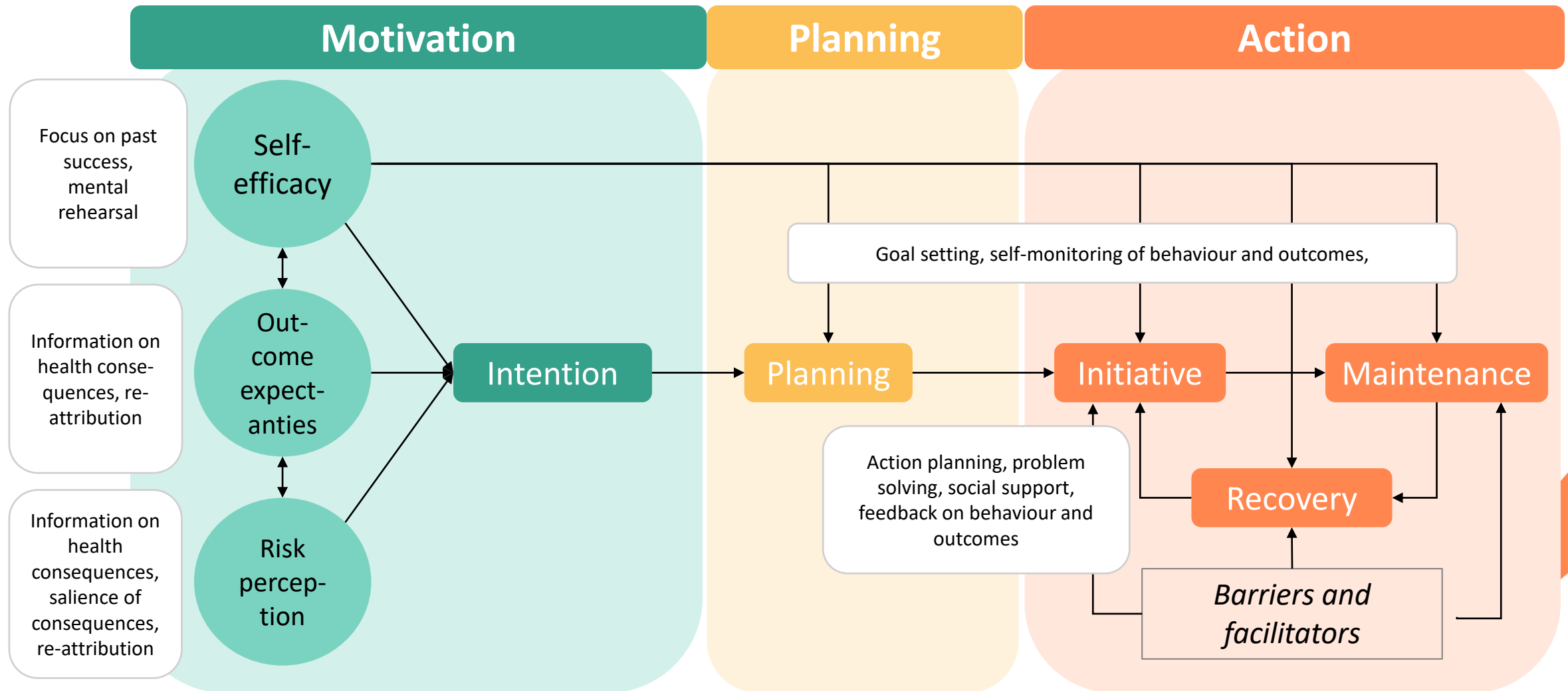
Sub-Saharan Africa [3] and socioeconomically disadvantaged communities in high-income countries [4]. The burden is increased by delayed diagnosis and high prevalence of complications [3,4].

Despite evidence showing that self-management,

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BCTs to address HAPA* determinants in the GOAL trial**



*Modified from the HAPA-model by Schwarzer <https://doi.org/10.1111/j.1464-0597.2007.00325.x>

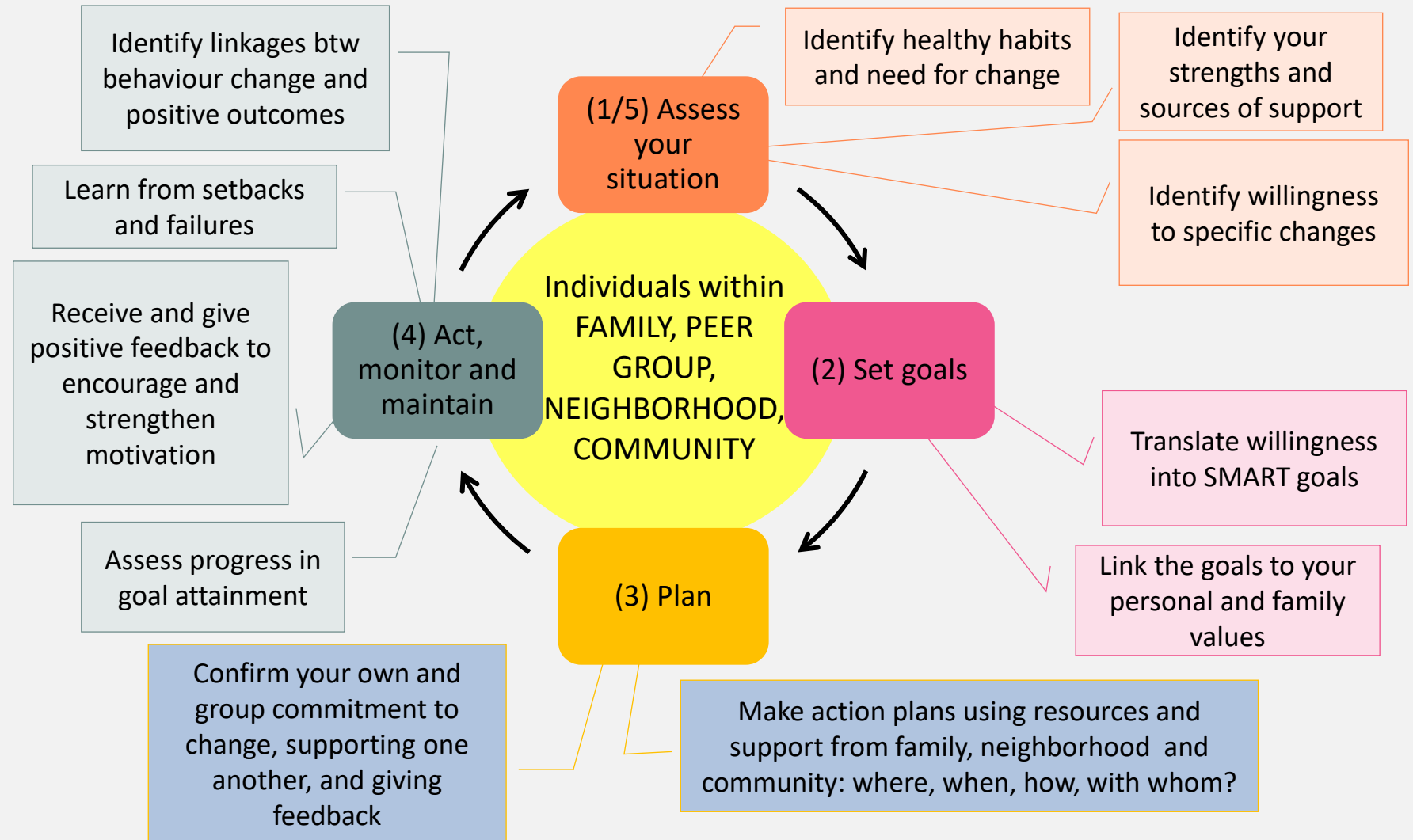
** GOAL Lifestyle Implementation Trial, Absetz et al. 2007 <https://doi.org/10.2337/dc07-0171>

Self-regulation and social support in K-DPP

DIABETES EDUCATION SESSIONS

Information about healthy lifestyle in diabetes prevention and self-management

PEER GROUP MEETINGS



GOAL trial findings supported HAPA for exercise

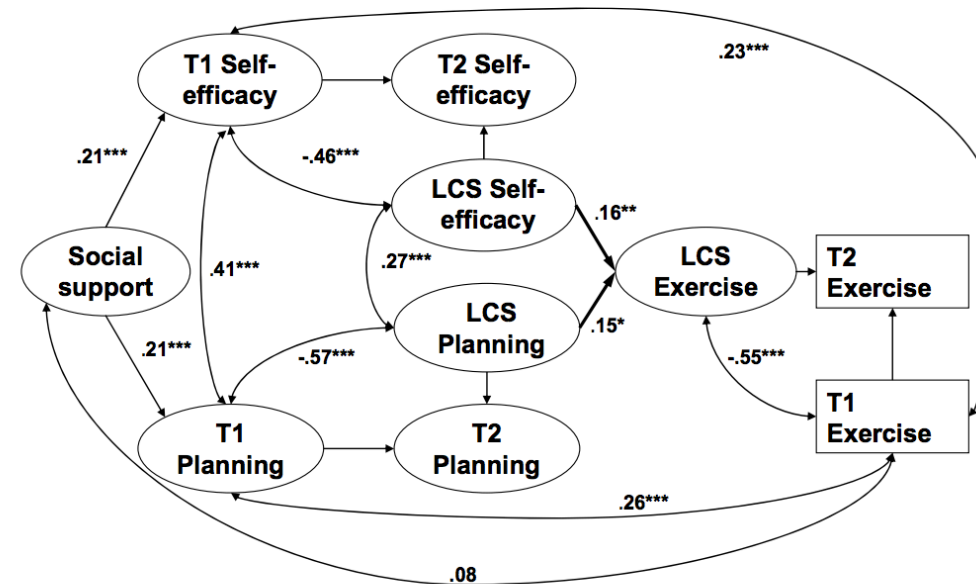
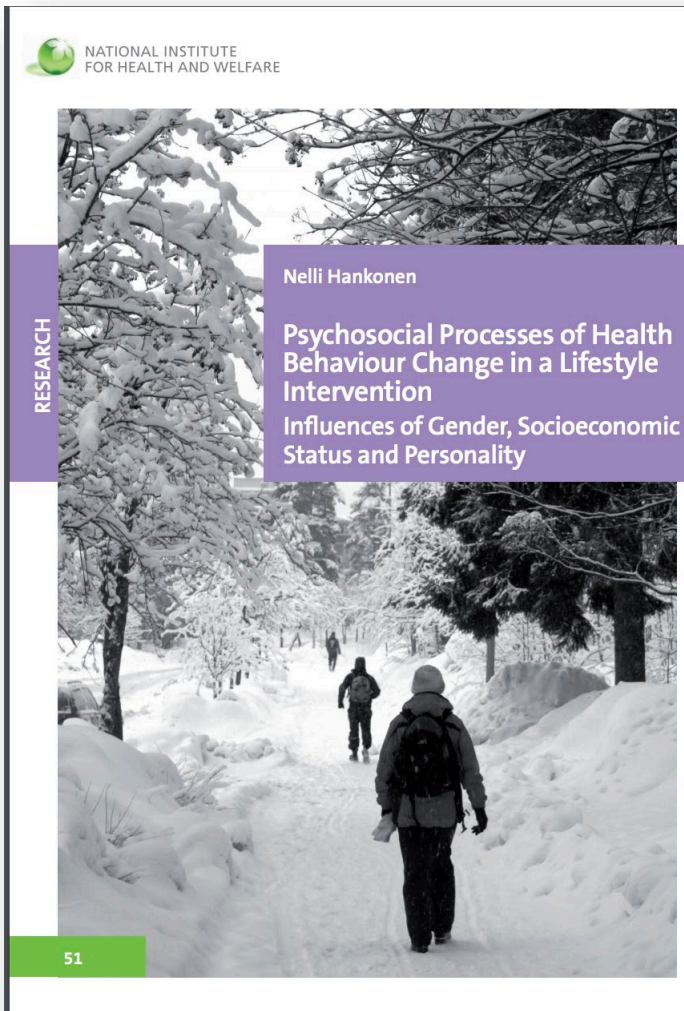


Figure 12: Changes in adoption self-efficacy and action planning as determinants of changes in exercise (Study I).

The overall estimate for the total sample for each parameter is shown. Standardised coefficients. Some of the parameters are excluded for presentation purposes.

T1 = Baseline, T2 = Post-intervention (three months)

*** $p < .001$, ** $p < .01$, * $p < .05$.

<https://helda.helsinki.fi/bitstream/handle/10138/24850/psychoso.pdf?sequence=3>

GGT DPP supported HAPA for dietary behaviours and clinical outcomes



Contents lists available at SciVerse ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed



Predicting changes in lifestyle and clinical outcomes in preventing diabetes: The Greater Green Triangle Diabetes Prevention Project

Tiina Laatikainen ^{a,*}, Benjamin Philpot ^b, Nelli Hankonen ^a, Risto Sippola ^a, James A. Dunbar ^b,
Pilvikki Absetz ^a, Prasuna Reddy ^c, Nathalie Davis-Lameloise ^b, Erkki Vartiainen ^a

T. Laatikainen et al. / Preventive Medicine 54 (2012) 157–161

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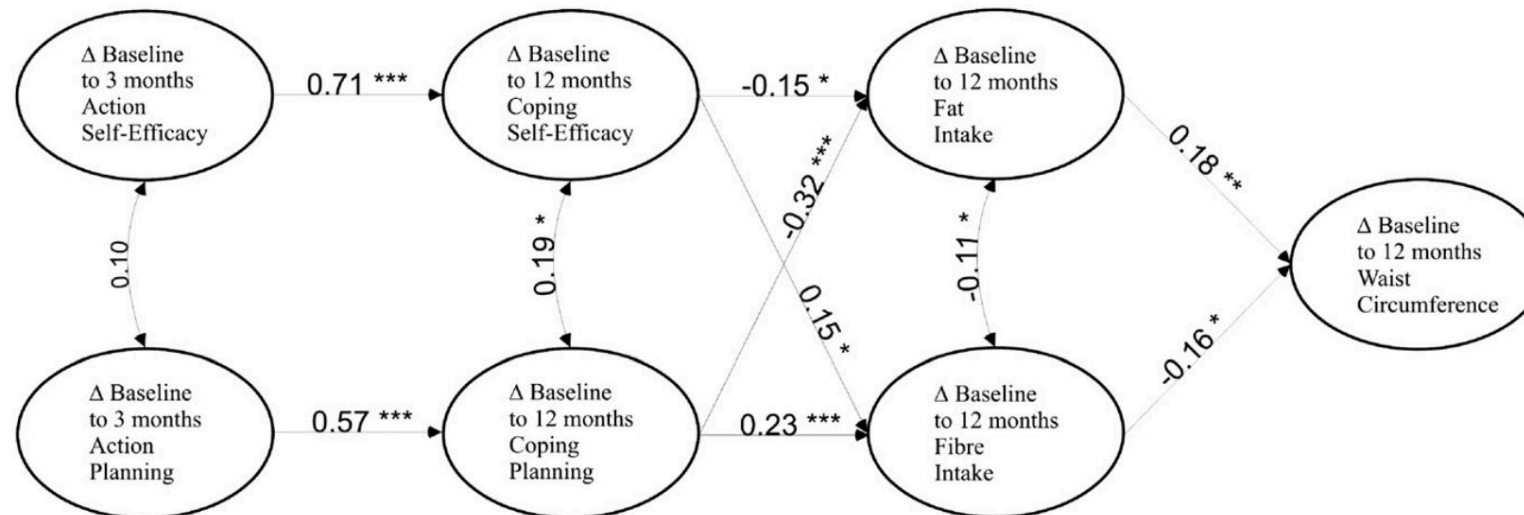


Table 1 Description of strategies implemented in the intervention

#	Strategy	Target/type (subtype) ¹	Setting
	HEALTHY EATING		
1.	Make healthy food/beverage options available.	Availability	Meetings
2.	Increase (decrease) the selection/variety of healthy (less healthy) options.	Availability	Cafeteria
3.	Replace less healthy options with nutritionally better alternatives.	Availability	Meetings
4.	Enhance the placement of healthy options.	Position (visibility, proximity)	Cafeteria
5.	Worsen the placement of less healthy options.	Position (visibility, proximity)	Cafeteria
6.	Serve fruit ready to eat.	Functionality (convenience)	Meetings
7.	Increase perceived variety by serving salad components from individual containers.	Position (visibility), Presentation (attractiveness)	Cafeteria
8.	Use smaller serving dishes for less healthy options.	Size (tableware)	Cafeteria
9.	Use smaller serving utensils for less healthy options.	Size (tableware)	Cafeteria
10.	Use smaller serving sizes for less healthy options.	Size (portion)	Meetings
11.	One plate-policy, i.e., no separate salad/bread plate at lunch.	Functionality (default), Size (tableware)	Cafeteria
12.	Facilitate the recognition of healthy options with the Heart Symbol-nutrition labels at the point of choice.	Information (simplification, prompt)	Cafeteria
13.	Cue better choices with "Follow the heart"-posters that facilitate the recognition of options labelled with the Heart Symbol-nutrition label.	Information (prime)	Cafeteria
14.	Facilitate and remind of drinking water by providing employees with personal, reusable water bottles.	Availability	Personal workstation
15.	Encourage smart packed lunches with a year-long recipe campaign featuring temptingly named and visually attractive packed lunch recipes. The recipes covered various types of packed lunch options, including warm courses, salads, smoothies, and sandwiches with season's vegetables, fruit, and berries. The recipes met the nutritional criteria of national dietary guidelines but did not mention healthiness. Instead, they emphasised appealing sensory properties or ease of preparation. Campaign materials included one recipe for each week of the year, a poster, and a cardboard stand for printed recipe cards. The campaign slogan encouraged to form a habit of enjoying good packed lunches during breaks and featured a rhyme that encouraged to pick up a recipe card, stop by the store, and prepare, pack, and grab the packed lunch.	Presentation (attractiveness), Information (prompt, social norm)	Coffee rooms, lobbies, info screens, intranet, newsletters
16.	Encourage the provision of fruit at work by promoting and providing the "Fruit Crew"-starter set for forming fruit circles whose members take turns to organise fruit serving at work. The starter set included a poster that asked: "Already a member of the fruit crew?", instructions and enrolment form, and a recyclable fruit basket.	Self-regulation (commitment, reciprocity), Information (prompt, social norm)	Coffee rooms

Choice architecture strategies in StopDia@Work

Article

Sensory Appeal and Routines Beat Health Messages and Visibility Enhancements: Mixed-Methods Analysis of a Choice-Architecture Intervention in a Workplace Cafeteria

Eeva Rantala ^{1,2,3,*} , Elina Järvelä-Reijonen ², Kati Pettersson ¹ , Janne Laine ¹, Paula Vartiainen ², Johanna Närväinen ¹ , Jussi Pihlajamäki ^{2,4} , Kaisa Poutanen ¹, Pilvikki Absetz ^{5,†}  and Leila Karhunen ^{2,†} 

Easier recognition and enhanced visibility of healthy options supposedly increase healthy choices, but real-world evidence remains scarce. Addressing this knowledge gap, we promoted nutritionally favourable foods in a workplace cafeteria with three choice-architectural strategies—priming posters, point-of-choice nutrition labels, and improved product placement—and assessed their effects on visual attention, food choices, and food consumption. Additionally, we developed a method for analysing real-world eye-tracking data. The study followed a pretest–posttest design whereby control and intervention condition lasted five days each. We monitored visual attention (i.e., total number and duration of fixations) and food choices with eye tracking, interviewed customers about perceived influences on food choices, and measured cafeteria-level food consumption (g). Individual-level data represents 22 control and 19 intervention participants recruited at the cafeteria entrance. Cafeteria-level data represents food consumption during the trial (556/589 meals sold). Results indicated that the posters and labels captured participants’ visual attention (~13% of fixations on defined areas of interest before food choices), but the intervention had insignificant effects on visual attention to foods, on food choices, and on food consumption. Interviews revealed 17 perceived influences on food choices, the most common being sensory appeal, healthiness, and familiarity. To conclude, the intervention appeared capable of attracting visual attention, yet ineffective in increasing healthier eating. The developed method enabled a rigorous analysis of visual attention and food choices in a natural choice setting. We discuss ways to boost the impact of the intervention on behaviour, considering target groups’ motives. The work contributes with a unique, mixed-methods approach and a real-world setting that enabled a multi-dimensional effects evaluation with high external validity.

**Choice
architecture
can’t override
motivation
and routines**

<https://doi.org/10.3390/nu14183731>

Key messages

- Capabilities, Opportunities and Motivation are necessary preconditions of behaviour, other theories specify how these operate
- Many of the same theories could be applied to implementer behaviours
- More research developing, applying, and testing theories in LMIC settings is needed

Reference list

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- Rantala et al. Effectiveness of workplace choice architecture modification for healthy eating and daily physical activity. BMC Public Health, 2024. <https://doi.org/10.1186/s12889-024-18482-1>



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