

ARTICLE

All the Mistakes I Made: Critical Reflections on Applying Intervention Mapping in the Real World

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Abstract

Intervention Mapping is the most comprehensive approach to systematic behavior change but applying Intervention Mapping can be daunting. In this paper, I discuss the mistakes I made when applying Intervention Mapping in the design, implementation, and evaluation of an intervention aiming to reduce stigma related to human immunodeficiency virus (HIV) in health care settings in the Netherlands. For each of the six steps in Intervention Mapping, I discuss what the step entails, how that step was navigated in our project, outputs from that step, and, importantly lessons learned. I finish with overarching lessons learned.

Key words: Intervention Mapping, interventions, HIV, stigma

Intervention Mapping is the most comprehensive approach to systematic behavior change (O’Cathain et al., 2019) but applying Intervention Mapping can be daunting. In this paper, I discuss the mistakes I made when applying Intervention Mapping in the design, implementation, and evaluation of an intervention aiming to reduce stigma related to human immunodeficiency virus (HIV) in health care settings in the Netherlands.

Using Intervention Mapping to address stigmatization

Although Intervention Mapping has traditionally been applied to improve health, it can also be used for interventions aiming to change social behaviors, including blood donation (Klinkenberg et al., 2021; Thijsen et al., 2021), pro-environmental behaviors (Kok et al., 2011), and stigmatization (Mevisen et al., 2017; Stutterheim et al., 2025b,a).

Stigmatization is a socially and culturally constituted process by which a person is labelled as different and then devalued, leading to status loss and discrimination (Pescosolido and Martin, 2015; Stutterheim and Ratcliffe, 2021). Stigmatization occurs in social interactions and is amplified by power differentials (Link and Phelan, 2014). HIV stigma manifests in a number of ways. It can be overt, as is the case with exclusion and blame, but it can also be subtle and manifest as, for example, awkward social interactions (Stutterheim et al., 2022). Stigmatization occurs across a number of contexts including with friends or family, at work, and in the health care sector (Geter et al., 2018; Stutterheim et al., 2022). HIV stigma is driven by beliefs about the perceived infectiousness and severity of HIV, as well as attributions of personal responsibility. Additionally, HIV stigma layers with other forms of marginalization and negative beliefs about behaviors frequently associated with HIV such as having multiple partners, sex between men, sex work, and drug use (Stutterheim et al., 2011a).

Context for intervention

The impetus for the intervention described here was my doctoral work (Stutterheim et al., 2011b, 2012, 2011a, 2009, 2011b) where, in the context of a needs assessment on HIV stigma in the Netherlands, we ascertained that stigma in health care is particularly detrimental to the health and well-being of people with HIV. That work led to funding for an intervention to reduce HIV stigma in health care settings, initially termed Care4Care and, later, relabelled as Postief Zorgt (Positive Care). The ultimate goal of the intervention was to optimize interactions between newly diagnosed people with HIV and health care providers not working in HIV care.

Table 1*Tasks per Intervention Mapping Step*

Step	Tasks
Step 1: Needs Assessment and Logic Model of the Problem	<ol style="list-style-type: none"> 1) establish and work with a planning group; 2) conduct a needs assessment to create a logic model of the problem; 3) describe the context for the intervention; 4) state intervention goals.
Step 2: Intervention Outcomes and Objectives	<ol style="list-style-type: none"> 1) state expected outcomes for the behavior and environment; 2) specify performance objectives; 3) select determinants; 4) construct matrices of change objectives; 5) create a logic model of the change.
Step 3: Intervention Design	<ol style="list-style-type: none"> 1) generate, together with the planning group, ideas for possible intervention themes and components, and perhaps also scope and sequence; 2) select theory-based change methods that can bring about change in determinants of behaviors and in environmental levels; 3) design practical applications that leverage the methods in ways that fit the intervention context and recipient population, and that take the methods' parameters for use into account.
Step 4 Intervention Production	<ol style="list-style-type: none"> 1) refine intervention structure and organization, taking the anticipated reach of the intervention, budget, and time constraints into account; 2) prepare plans for intervention materials 3) draft culturally-relevant intervention messages, materials, and protocols; 4) pretest, refine, and produce materials.
Step 5 Implementation Plan	<ol style="list-style-type: none"> 1) conduct an implementation needs assessment and identify intervention adopters and implementers; 2) state adoption, implementation, and maintenance outcomes and objectives; 3) choose theoretical methods for implementation and design implementation strategies; 4) produce implementation protocols or materials; 5) evaluate implementation outcomes.
Step 6 Evaluation Plan	<ol style="list-style-type: none"> 1) write effect and process evaluation questions; 2) develop or select indicators and measures for assessment; 3) design the evaluation studies; 4) complete the evaluation plan.

Step 1: What's the problem?

Step 1 hones in on understanding the problem and its determinants (see Table 1 for tasks, Bartholomew Eldredge et al., 2016; Stutterheim et al., 2025b).

The first task is to establish a **planning group**. Planning groups ideally comprise representatives of the eventual intervention's recipient populations, people with potential influence for later adoption and implementation, and people with relevant expertise (Bartholomew Eldredge et al., 2016; Stutterheim et al., 2025b). In our planning group, we had representation from people with HIV, people working in HIV service provision, and behavioral scientists. What we fundamentally lacked, and should have more actively recruited, was health care providers not working in HIV care as these people were to be one of the two recipient populations for our intervention, alongside newly diagnosed people with HIV. We should have also recruited people in positions of power and influence in health facilities such as hospital administrators and board members.

Planning groups are fundamental to intervention success and reflect principles of meaningful engagement. They ensure relevance, appropriateness, and acceptability of an intervention (Bartholomew Eldredge et al., 2016; Stutterheim and Ratcliffe, 2021). What I did not recognize at the outset is that planning groups are also dynamic. People change jobs or tasks get shifted within organizations or they lose interest, and new people may join as the project progresses. Each planning group member has interests and priorities, and this means that, as planning groups evolve and adapt, the project's priorities, focus, and course may also shift. In retrospect, this seems obvious but, to me, at the outset, it was not. I envisioned a static planning group for the duration of the project. The dynamic nature of planning groups cannot be mitigated but steps can be taken to nonetheless ensure continuity within planning groups. Continuity can be supported by creating a small, core group of stable members that, if participating in the context of

their occupation, have guaranteed employment for the duration of the project. This does not circumvent voluntary job changes but does reduce the likelihood that planning groups change as a result of involuntary turnover (Bushe and Chu, 2011). When planning groups members participate in a professional capacity, continuity can also be supported by framing participation as an organizational priority rather than something linked to a specific person with specific expertise (Coleman et al., 2020). Furthermore, continuity can be supported by ensuring transparent documentation of meetings, decisions, and priorities, such that those who join the project part way through can follow what came before (Coleman et al., 2020; Trainer et al., 2020) and by creating an on-boarding document for new members (Coleman et al., 2020). Lastly, continuity can be enabled by clearly defining planning group members' roles and responsibilities so that these can be reallocated when a member leaves (Driskell et al., 2017). If feasible, roles could be shared so that, if one member leaves, the role is still maintained (Coleman et al., 2020).

The second task in Step 1 is conducting a **needs assessment** to establish the context and determinants of the problem. In our needs assessment, we investigated a number of topics relating to stigma and health care, both qualitatively and quantitatively, from the perspectives of people with HIV and health care providers (Stutterheim et al., 2016b, 2014). We also interviewed health care providers with HIV to unpack not only their interactions with health care providers as health professionals but also as colleagues (Stutterheim et al., 2017). Lastly, we qualitatively explored the unique experiences of substance users with HIV, both in the context of health care but also more generally (Stutterheim et al., 2016a, 2017). All of this research was participatory, and the findings were rich, but the interviews with health care providers indicated that they did not recognize HIV stigma in health care as a problem. It was evident that we needed to do extra work to get health care providers involved in, and excited about, the project. I thus compiled a list of all professional associations for each health care profession in the Netherlands, and contacted them to invite them to an expert meeting where I would present the needs assessment findings and we would subsequently discuss how to move forward. The professional associations were kind and polite, but, as anticipated, not excited or overly interested in HIV stigma. We figured that, if they were not interested in the content, we could perhaps tempt them with good food so we hosted a high tea in a convenient location, and hoped for the best. Ultimately, 12 people attended, most of whom were members of the planning group or health care professionals specialized in HIV. We were preaching to the choir, and we knew it. Thus, when our planning group drafted an **intervention goal**, it was not 'Reduce HIV stigma in health care' as this was likely to produce resistance among health care providers and deter them from participating in the intervention. Rather, we opted for a positive framing and established the following goal: 'Optimize interactions between health care providers and people with HIV'. In retrospect, I see two fundamental mistakes here. First, intervention goals should ideally be SMART – specific, measurable, achievable, relevant, and time-bound (Bjerke and Renger, 2017). Second, positively framing the intervention goal is unlikely to solve the problem of health care providers not seeing HIV stigma as a problem. Additionally, we did not finalize this step with a **logic model of the problem**, which would have been helpful moving forward. A logic model of the problem is a visualization of needs assessment outcomes, that is then 'flipped' in Step 2 when the logic model of change is drafted (Bartholomew Eldredge et al., 2016; Said and Peters, 2025). Further down the road, the logic model of change can be used to ascertain what to measure in Step 6 evaluations.

Lessons learned from Step 1

- 1) *Planning groups are dynamic, not static.*
 - 2) *When the needs assessment shows limited impetus for the problem, reevaluate intervention focus. In our case, this would have meant shifting our focus from reducing HIV stigma in health care settings to first making HIV stigma reduction in health care settings a priority.*
 - 3) *Draft intervention goals that are SMART.*
 - 4) *A logic model of the problem helps visualize needs assessment outcomes and serves as the basis for the logic model of change, which is, in turn, helpful for ascertaining what to measure in the evaluation.*
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Step 2: What is the desired situation?

Step 2 in Intervention Mapping makes the move from understanding the problem to figuring out *what* needs to be changed, but not yet *how*. Here, we specify who and what will change as a result of the intervention by drafting a number of outcomes and objectives (Bartholomew Eldredge et al., 2016; Kok et al., 2017; Said and Peters, 2025; Stutterheim et al., 2025b). We start by drafting **behavioral and environmental outcomes**. To do this, we ask, '*What behavior or change in the environment is needed to reach the intervention goal?*'. Essentially, we explicate what outcomes we want to see in behavior and the environment. Then, we break those behavioral and environmental outcomes down into sub-behaviors (Peters, 2014; Said and Peters, 2025). We call these **performance objectives**. In drafting performance objectives, we ask, '*What do members of the recipient population need to do to perform the behavioral outcome?*' and '*What do environmental agents need to do to make the environmental change stated in the environmental outcome?*' (Said and Peters, 2025). Sometimes, these are sequential steps; sometimes they are not (Peters, 2014). When they are not, it is helpful to ask, '*What does that behavioral /environmental outcome look like?*' (Bartholomew Eldredge et al., 2016).

In our project, we initially drafted behavioral outcomes for health care providers focusing on their interactions with people with HIV and with colleagues with HIV. We also drafted an environmental outcome about health care institutions offering a supportive environment for the equal treatment of people with HIV. Analogously, we drafted behavioral outcomes for people with HIV focusing on empowerment and resilience in the face of negative interactions with health care providers. We then, as a planning group, choose to not move forward with the environmental outcome. Our reasoning was that the needs assessment had shown that, in the Netherlands, there are not many structures and policies that impede positive interactions between health care providers and people with HIV. Anti-discrimination policies and legislation were, and still are, in place, as are protocols for the use of universal precautions.

The original behavioral and environmental outcomes, and their corresponding performance objectives, are listed in Table 2. The first column shows the originals, the second reflects corrections that I think should have been made, and the third explains why those corrections are called for. The main problems I retrospectively identified are: 1) lack of specificity in actors (also termed agents), actions, and the contexts in which those actions should occur; 2) outcomes and objectives reflecting the absence of a

(undesirable) behavior rather than the presence of a (desired) behavior; 3) outcomes reflecting intention, rather than action (i.e., the use of the word ‘will’), and 4) performance objectives reflecting changes in determinants (i.e., change objectives) rather than actions needed to achieve the behavioral or environmental outcomes.

Once performance objectives for the behavioral and environmental outcomes had been drafted, we ascertained and **selected determinants** for performance objectives. Determinants should be selected based on their relevance or importance to the attainment of the performance objectives, and their changeability. At the time, in Intervention Mapping practice, assessing the relevance of a determinant was mostly extrapolated from theory, experience, and common sense, and that is indeed how we approached the selection of determinants in Care4Care. Since then, confidence-interval based estimations of relevance (CIBER) have emerged as an important tool for selecting determinants (Crutzen et al., 2017). In CIBER, visualizations of confidence intervals for correlation coefficients and means allow for the better selection of determinants that are sufficiently related to the performance objective, or behavioral or environmental outcome (as reflected in the correlation coefficient; i.e., relevance), and where there is room for improvement (as reflected by the mean; i.e., changeability) (Crutzen et al., 2017; Said and Peters, 2025). In the absence of CIBER, we leaned on our own expertise and selected the following determinants: knowledge, awareness, attitudes, subjective norm, self-efficacy, and skills. We then drafted **change objectives**. To draft change objectives, we ask, ‘*What needs to change in the determinant for recipient populations or environmental agents to do the performance objective?*’

There are many ways to formulate change objectives. What I have found handy is to look at change objectives as having ‘heads’ and ‘tails’. For each determinant, there are number of appropriate ‘heads’ that reflect the determinant and employ action verbs. For example, knowledge can be ‘State..’, ‘List...’, ‘Describe...’; attitude is often ‘Express positive feelings towards...’; social norms can be ‘Describe that others...’; self-efficacy is ‘Express confidence to...’; and skills is often ‘Demonstrate ability to...’, or ‘Demonstrate capability to...’. Change objectives do not usually use derivatives of the determinant (e.g., ‘know’ for knowledge, ‘have a positive attitude’ for attitude) as ‘heads’ for change objectives. The ‘tails’ for change objectives are then derived from the performance objectives. Sometimes, they are simply the end part of the performance objective but when the performance objective can be broken down into additional sub-behaviors, the ‘tails’ reflect those sub-behaviors. When that is the case, there will be multiple change objectives for that performance objective (see also Said and Peters, 2025).

The change objectives I drafted for this project often lacked action verbs and included derivatives of the determinants. For example, one knowledge change objective was: ‘Know that confidentiality is part of health care providers’ duty of professional conduct.’ This would have been better if I had replaced ‘know’ with ‘state’. Also, some of the change objectives for attitudes started with terms like ‘feel’ or ‘believe’. It would have been better to make these more concrete and observable with action verbs (e.g., ‘Express positive feelings towards...’) so that their achievement can be adequately measured in an evaluation.

The final task in Step 2 is creating a **logic model of change** (i.e., the ‘flip’ of the logic model of the problem) and, because we had not drafted a logic model of the problem in Step 1, we also did not draft a logic model of change in Step 2. Logic models are helpful, particularly for determining what to evaluate in Step 6, but my sense is that its absence did not impede the ultimate effectiveness of the intervention.

In this project, the work in Step 2 was completed by the behavior change specialists in the planning group. The remaining planning group members were consulted and asked if the outcomes and objectives drafted were congruent with their experience, but they were not directly involved in the actual drafting of outcomes and objectives.

Lessons learned from Step 2:

- 1) Use the guiding questions to draft outcomes and objectives in Step 2.
 - 2) Change objectives can be drafted easily when thought of in terms of ‘heads’ that reflect the determinant and ‘tails’ that reflect the performance objective or sub-behaviors of the performance objective.
 - 3) Use action verbs and avoid derivatives of determinants when drafting change objectives.
 - 4) Have [a] behavior change expert[s] review outcomes and objectives.
 - 5) A logic model of change is helpful for developing the evaluation plan in Step 6.
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Table 2

Original and Corrected Outcomes and Objectives in Care4Care

Original outcomes/objectives	Corrected outcomes/objectives	Reasoning
BO1: Health care providers will interact with all people with HIV in a non-stigmatizing fashion.	BO1: Health care providers provide equal and inclusive treatment to all patients, including people with HIV.	‘Will’ reflects intention, not action; Non-occurrence of stigmatization is not a behavior.
<i>PO1.1:</i> Apply the same precautions with all patients.	PO1.1: Health care providers apply universal precautions with all patients, including patients with HIV.	Reformulation is more concrete. I find it helpful to always include the actor/agent in performance objectives.
<i>PO1.2:</i> Protect the confidentiality of people with HIV.	PO1.2: Health care providers protect patient confidentiality in conversations with others and in patient dossiers.	Reformulation is more specific and agent is now included.
<i>PO1.3:</i> Do not ask how patients with HIV acquired HIV.	PO1.3: Health care providers respect the privacy of people with HIV with regard to how HIV was acquired.	‘Do not ask’ is the absence of a behavior. Respecting privacy could be seen as an action; Agent is now included.

Original outcomes/objectives	Corrected outcomes/objectives	Reasoning
<i>PO1.4:</i> Acknowledge the detrimental impact of stigmatizing behavior.	-	'Acknowledge' is not an action but likely reflects a determinant (e.g., awareness). As such, some variation of this performance objective would likely arise as change objectives for PO1.1-PO1.3.
<i>PO1.5:</i> Convey normalcy in interactions with PLWH.	-	It is unclear what 'conveying normalcy' entails. PO1.1-1.3 reflect equal and inclusive treatment and thus likely cover what we were hoping to achieve here.
BO2: Health care professionals will interact with all colleagues with HIV in a non-stigmatizing fashion.	BO2: Health care professionals include and accept colleagues with HIV.	'Will' reflects intention, not action; Non-occurrence of stigmatization is not a behavior.
<i>PO2.1:</i> Protect confidentiality of colleagues with HIV.	PO2.1: Health care professionals protect the confidentiality of colleagues with HIV in conversations with others and in work correspondence.	Reformulation is more specific and agent is now included.
<i>PO2.2:</i> Do not ask how colleagues with HIV acquired HIV.	PO2.2: Health care professionals respect the privacy of colleagues with HIV with regard to how HIV was acquired.	'Do not ask' is the absence of a behavior. Respecting privacy could be seen as an action; Agent is now included.
<i>PO2.3:</i> Do not unnecessarily restrict work duties based on HIV status.	PO2.3: Health care professionals offer colleagues with HIV the same opportunities and work tasks they would offer a colleague who does not have HIV.	'Not restricting work duties' is the absence of a behavior. Here, the shift is made towards promoting equal treatment; Agent is now included.
<i>PO2.4:</i> Acknowledge the detrimental impact of stigmatizing behavior.	-	Acknowledge is not an action but reflects awareness, which is a determinant. Some variation of this performance objective would likely arise as change objectives for PO2.1-PO2.3.
<i>PO2.5:</i> Convey acceptance of colleagues who have HIV.	-	Acceptance is now included in BO2, with PO2.1-PO2.3 reflecting more specific and concrete forms of acceptance ('What does inclusion and acceptance look like?').
EO3: Health care institutions will provide a health care environment that supports the equal treatment of people with HIV.	EO3: Executive board members and department heads in health care institutions provide a health care environment that supports the equal treatment of people with HIV.	It is wise to specify people (i.e., agents) within an organization, rather than just the organization, in the EO and corresponding POs.
<i>PO3.1:</i> Health care institutions and organizations of health professionals update protocols such that they are nondiscriminatory with respect to people with HIV.	PO3.1: Executive board members and department heads in health care institutions, and administrators at organizations of health professionals, update all protocols to reflect equal treatment and inclusivity for all patients, including people with HIV.	'Nondiscriminatory' now flipped to an action, namely equal treatment and inclusivity; Agents added.
<i>PO3.2:</i> Health care institutions implement non-discriminatory institutional policy on HIV.	PO3.2a: Executive board members in health care institutions appoint policy advisors to draft institutional non-discrimination policy. PO3.2b: Executive board members in health care institutions roll out institutional non-discrimination policy.	The drafting of said policy, rather than just implementation, is now added; Agents added.
<i>PO3.3:</i> Health care institutions convey non-discriminatory policy on HIV to employees.	PO3.3: Executive board members and department heads in health care institutions convey and champion institutional non-discrimination policy.	'Conveying' is likely not sufficient so 'championing' has been added; Agents added.

Original outcomes/objectives	Corrected outcomes/objectives	Reasoning
<i>PO3.4:</i> Health care institutions and organizations of health professionals make policies and protocols on HIV easy to access.	PO3.4: Executive board members and department heads in health care institutions, and administrators at organizations of health professionals, make policies and protocols on HIV easy to access.	Agents added.
<i>PO3.5:</i> Health care institutions and organizations of health professionals support the consistent application of universal precautions.	PO3.5: Executive board members and department heads in health care institutions, and administrators at organizations of health professionals, promote the consistent application of universal precautions.	‘Support’ has been replaced with ‘promote’ to make the action more proactive; Agents added.
<i>PO3.6:</i> Health care institutions make PEP available to health professionals after needle stick injuries.	PO3.6: Executive board members and department heads in health care institutions make PEP available to health care providers professionals after needle stick injuries in interactions with patients with a detectable viral load.	Specification of when PEP is called for is added; Agents added.
BO4: People with HIV will be empowered in their interactions with health care providers.	BO4: People newly diagnosed with HIV take an empowered stance in their interactions with health care providers.	‘Will’ reflects intention, not action; More specification of actor now present and in line with selected recipient population; ‘Empowerment’ now reflected in an action.
<i>PO4.1:</i> Navigate the Dutch health care system.	PO4.1: People newly diagnosed with HIV navigate the Dutch health care system in accordance with their rights and duties.	‘In accordance with their rights and duties’ added; Agent added.
<i>PO4.2:</i> Prevent stigmatizing experiences.	-	Prevention of stigmatizing experiences is not the responsibility of people with HIV so I would remove this PO.
<i>PO4.3:</i> Take effective action when discriminatory behavior presents.	PO4.3a: People newly diagnosed with HIV, when confronted with discriminatory behavior in health care, explore options for effective action against discrimination. PO4.3b: People newly diagnosed with HIV take effective action when discriminatory behavior presents in health care settings.	Health care setting now specified; Agent added. One could ask what ‘effective action’ entails and if this could be more specific (e.g., confronting health care provider; filing a formal complaint) but what ‘effective action’ entails is likely context specific. For this reason, an extra PO on ascertaining what action should be taken has been added.
BO5: People with HIV will be resilient against the negative effects of perceived HIV stigma from health professionals.	BO5: People newly diagnosed with HIV show resilience against the negative effects of HIV stigma in health care settings.	‘Will’ reflects intention, not action; Specification of actor now present; ‘Resilience’ now reflected in an action.
<i>PO5.1:</i> Cope adequately with stigmatizing experiences.	-	PO5.2-5.4 reflect adaptive coping so this PO can be removed.
<i>PO5.2:</i> Externally attribute stigmatizing behavior.	<i>PO5.2:</i> People newly diagnosed with HIV externally attribute stigmatizing behavior experienced in health care settings.	Setting and agent now specified.
<i>PO5.3:</i> Seek social support.	<i>PO5.3:</i> People newly diagnosed with HIV seek social support when faced with negative experiences in health care settings.	Setting and agent now specified.
<i>PO5.4:</i> Positively reappraise negative experiences.	<i>PO5.4:</i> People newly diagnosed with HIV positively reappraise negative experiences in health care settings.	Setting and agent now specified.

Original outcomes/objectives	Corrected outcomes/objectives	Reasoning
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BO = Behavioral outcome; EO = Environmental outcome; PO = Performance objective.

Steps 3 & 4: How do we get there?

Steps 3 and 4 focus on how to achieve change and designing the intervention (Bartholomew Eldredge et al., 2016; Kok, 2014; Kok et al., 2016; Metz et al., 2025; Peters et al., 2013; Stutterheim et al., 2025b). All steps in Intervention Mapping are iterative but my experience is that particularly Step 3 and 4 are interwoven. You can start with theory-based methods and then design practical applications that you subsequently piece together into intervention components. Alternatively, you can start by thinking about what the intervention should look like, and then decide which methods are suitable for use in the context of those intervention components. Often, the second approach better reflects reality. Most funders want to know what form the intervention will take at the outset, and this was indeed the case in Care4Care. When we submitted the grant proposal, we indicated that, although the intervention format was not set in stone, we foresaw the intervention to be an ‘in-person modulated training program comprising four weekly two-hour sessions’. Clearly, in light of our needs assessment finding that HIV stigma in health care was not seen as a problem by health care providers, we knew, when we got to Step 3, that there would be little impetus for participation in an intensive training program. We needed an intervention that was quick and convenient, and that would fit the busy schedules of health care providers. We concluded that the best platform for intervention delivery would be a website. We thus returned to the funder and requested a change in intervention format and a reallocation of the remaining budget to accommodate this change. Fortunately, the funder approved our request.

I then set to work compiling a list of behavior change **methods** (Bartholomew Eldredge et al., 2016; Kok et al., 2016; Metz et al., 2025), and their corresponding parameters for use, that could be leveraged to change the determinants identified in Step 2: knowledge, awareness, attitudes, subjective norm, self-efficacy, and skills. I also explored behavior change methods that impact stigma directly (Bartholomew Eldredge et al., 2016; Stutterheim et al., 2025b). The behavior change methods, their definitions, and their parameters for use are described in Table 3.

Table 3
Behavior Change Methods

Behavior change method: Theoretical basis	Definition	Parameters for use	Determinant targeted
Modeling: Social Cognitive Theory; Theories of Learning (Kazdin, 2013; Kelder et al., 2015; Luszczynska and Schwarzer, 2020)	Providing an appropriate model; being reinforced for the desired action.	Attention, remembrance, self-efficacy and skills; reinforcement of model; identification with model; coping model instead of mastery model.	Basic behavior change method; targets all determinants
Persuasive communication: Communication-Persuasion Matrix; Elaboration Likelihood Model; Diffusion of Innovations Theory (McGuire, 2001; Petty et al., 2009; Rogers et al., 2014).	Guiding individuals and environmental agents toward the adoption of an idea, attitude, or action by using arguments or other means.	Messages need to be relevant and not too discrepant from the beliefs of the individual; can be stimulated by surprise and repetition; will include arguments.	Basic behavior change method; targets all determinants
Feedback: Theories of Learning; Goal-Setting Theory, Social Cognitive Theory (Kazdin, 2013; Locke and Latham, 2019; Luszczynska and Schwarzer, 2020)	Giving information to individuals and environmental agents regarding the extent to which they are accomplishing learning or performance, or the extent to which performance is having an impact.	Feedback needs to be individual, follow the behavior in time, and be specific.	Basic behavior change method; targets all determinants
Belief selection: Theory of Planned Behavior; Reasoned Action Approach (Ajzen and Schmidt, 2020; Fishbein and Ajzen, 2011)	Using messages designed to strengthen positive beliefs, weaken negative beliefs, and introduce new beliefs.	Requires investigation of the current attitudinal, normative, and efficacy beliefs of the individual before choosing the beliefs on which to intervene.	Basic behavior change method; targets all determinants

Behavior change method:			
Theoretical basis	Definition	Parameters for use	Determinant targeted
Elaboration: Theories of Information Processing; Elaboration Likelihood Model (Mayer, 2012; Petty et al., 2009)	Stimulating the learner to add meaning to the information that is processed.	Individuals with high motivation and high cognitive ability; messages that are personally relevant, surprising, repeated, self-pacing, not distracting, easily understandable, and include direct instructions; messages that are not too discrepant and cause anticipation of interaction.	Knowledge
Framing: Protection Motivation Theory (Orbell et al., 2020)	Using gain-framed messages emphasizing the advantages of performing the healthy behavior; or loss-framed messages, emphasizing the disadvantages of not performing the healthy behavior.	Requires high self-efficacy expectations. Gain frames are more readily accepted and prevent defensive reactions.	Awareness and risk perception
Consciousness-raising: Health Belief Model; Precaution-Adoption Process Model; Trans-Theoretical Model (DiClemente and Graydon, 2020; Orbell et al., 2020; Weinstein et al., 2020)	Providing information, feedback, or confrontation about the causes, consequences, and alternatives for a problem or a problem behavior.	Can use feedback and confrontation; however, raising awareness must be quickly followed by increase in problem-solving ability and (collective) self-efficacy.	Awareness and risk perception
Cultural similarity: Communication-Persuasion Matrix (Kreuter and McClure, 2004; McGuire, 2001)	Using characteristics of the recipient population in source, message, and channel.	Using surface characteristics of the recipient population enhances receptivity. Using social-cultural characteristics leads to a more positive reception of the message.	Attitudes
Information about other's approval: Theory of Planned Behavior; Reasoned Action Approach; Social Comparison Theory; Self-Determination Theory (Ajzen and Schmidt, 2020; Fishbein and Ajzen, 2011; Gerber et al., 2018; Hagger et al., 2020)	Providing information about what others think about the person's behavior, and whether others will approve or disapprove of any proposed behavior change.	Positive expectations are available in the environment.	Subjective norm
Provide opportunities for social comparison: Social Comparison Theory (Gerber et al., 2018)	Facilitating observation of nonexpert others in order to evaluate one's own opinions and performance abilities.	Upward comparison may help to set better goals; downward comparison may help one feel better or more self-efficacious.	Subjective norm
Goal-setting: Goal-Setting Theory; Theories of Self-Regulation (Cameron et al., 2020; Locke and Latham, 2019)	Prompting planning what the person will do, including a definition of goal-directed behaviors that result in the behavior.	Commitment to the goal; goals that are difficult but available within the individual's skill level.	Self-efficacy and skills
Planning coping responses: Attribution Theory; Theories of Self-Regulation (Cameron et al., 2020; WEINER, 2010)	Prompting people to list potential barriers and ways to overcome these.	Identification of high-risk situations and practice of coping response.	Self-efficacy and skills; Stigma

Behavior change method:			
Theoretical basis	Definition	Parameters for use	Determinant targeted
<i>Empathy induction:</i> Perspective-Taking (Batson et al., 2002; Todd et al., 2012)	Stimulating people to empathize with another person, i.e., imagining how the other person feels.	Requires being willing and able to identify with the other, being able to imagine how the other would feel (rather than imagining how you would feel as this can lead to empathy but also distress).	Stigma
<i>Interpersonal contact:</i> Contact Theory (Allport, 1954; Dovidio et al., 2017)	Bringing people with and without the stigmatized identity or condition in contact with one another. Contact can be direct or indirect (vicarious, extended, or imagined contact).	Requires positive experiences. Most effective when status is equal, contact is intensive; contact is externally sanctioned, and there are common or shared goals.	Stigma
<i>Provision of stereotype inconsistent information:</i> Theories of Stigma and Discrimination (Bos et al., 2008)	Providing positive examples of people with a stigmatized identity or condition.	Requires multiple examples (to avoid subtyping) and examples cannot be too discrepant from original stereotype.	Stigma

Adapted from Kok et al., (2016) & Stutterheim et al., (2025b).

Then, we, as a planning group, came together for two intensive days to brainstorm intervention components and translate the behavior change methods into **practical applications**. We took the needs assessment results, the **intervention goal**, the matrices of change objectives, and the list of theory-based methods drafted, and got to work. We determined that the website would be best utilized if it offered two entry points: one for people recently diagnosed with HIV and one for health professionals not specialized in HIV care. For both entry points, we worked iteratively: I described the behavior change methods fitting for the determinants selected and the planning group members brainstormed potential applications. We established that many of the behavior change methods I had compiled could be applied through digital story-telling in the form of short films, alongside supportive text and written testimonials. These digital stories offered opportunities to increase knowledge and awareness, and improve self-efficacy. They also enabled virtual contact between people with HIV and health care providers, and aimed to contribute to the empowerment of people with HIV. Digital story-telling was an efficient application for multiple methods. Additionally, we developed quizzes to enable consciousness-raising, increase awareness, and improve knowledge. Furthermore, with longer term sustainability and reach in mind, we decided that the website should be integrated into an existing compilation of paper and digital products, produced by the Dutch Association of People with HIV.

We then moved onto the actual **production** of the intervention. This included contracting film producers, a graphic designer, and a web developer. It also entailed bringing a communication specialist into our planning group and intensifying collaboration with members of our recipient populations. Working with creative consultants is incredibly inspiring but I also found it challenging. Each contributor to intervention production comes to the table with their own experience and expertise (Stutterheim et al., 2025b). When we were filming, there were moments when the film producers wanted to take the filming in one particular direction while I was trying to keep the scripts in line with the change objectives and the selected behavior change methods. This required negotiation to maintain focus on the desired behavior change while acknowledging the skills and expertise of the film producers. I, personally, found that being present and onsite during filming was helpful to ensure alignment between the creative product (e.g., short films) and the change objectives. It allowed for frequent checks and recalibration. It is easy to lose sight of the intervention building blocks from Steps 1 through 3 when we embark on actual intervention production (Kok et al., 2016, 2017). Keeping the outputs from the previous steps close on hand proved to be beneficial. I recognize, however, that being present during production, and having immediate feedback loops, is a luxury not available to all intervention developers. When hands-on involvement is not possible, extensive documentation (e.g., scripts, working documents), clear communication (e.g., easy explanations of the various outcomes and objectives to be met, the change methods selected, and the conditions under which those methods work), short feedback loops, and the selection of creative producers that have affinity with the problem being addressed by the intervention are helpful in ensuring that Step 4 optimally reflects the outputs of the previous steps (i.e., list of methods and practical applications in Step 3; change matrices in Step 2).

The final task is Step 4 is **pretesting** to ensure intervention components are appropriate for recipient populations. Pretesting usually entails presenting preliminary intervention components to assess attention, relevance, and comprehension, as well as strong or weak aspects of the component (Bartholomew Eldredge et al., 2016; Stutterheim et al., 2025b). In our project, the planning group and the people filmed were involved in film editing and reviewing website texts. This reflected principles of meaningful engagement, and being part of the production was reported to be empowering by both the people with HIV and the health professionals that were filmed. However, ideally, we would have pretested the intervention components with people that had not been involved in the development and production of the intervention (Bartholomew Eldredge et al., 2016).

Lessons learned from Steps 3 and 4:

- 1) *Step 3 and 4 are iterative. You can start with change methods, translate them into practical applications, and then compile practical applications into intervention components. You can also start with a format for the intervention and develop intervention components that integrate change methods operationalised in practical applications. A mix of both is also possible.*
 - 2) *Multiple methods can be integrated in one practical application.*
 - 3) *Planning groups likely require expansion to include creative consultants at this stage.*
 - 4) *Creative consultants and intervention developers come to the table with their own expertise. Negotiation that respects each party's expertise and experience may be necessary. Clear and transparent, but not overly technical, communication about the intervention's outcomes and objectives, the chosen change methods, and conditions under which the chosen change methods work, is needed.*
 - 5) *Intensive full day sessions with planning group members are helpful for translating change methods into practical applications and intervention components.*
 - 6) *For the sake of transparency and replicability, it is important to document production processes.*
 - 7) *Interventions are ideally pretested with recipient population members that were not involved in intervention development and production.*
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Step 5: Planning for implementation

Intervention Mapping is not complete once an intervention is produced. It explicitly includes planning for intervention adoption, implementation, and sustainability, and this should be considered right from the outset (Bartholomew Eldredge et al., 2016; Kok et al., 2017). In Step 5, also termed Implementation Mapping (Fernandez et al., 2019), we follow a parallel process to Intervention Mapping proper but then for intervention adoption and use. You design an intervention for the use of your intervention.

Due to time constraints, we did not conduct Step 5 as stipulated by Intervention Mapping. We did **identify, early on, potential adopters and implementers**, and made sure they were represented in the planning group, except, as indicated, we did not ensure that health care providers or decision-makers in health facilities were in the planning group, and this was a fundamental error that I am sure impeded effective implementation. We did tie into existing networks of people with HIV that could easily promote the website, and we embedded the intervention in existing paper and digital products already distributed by the Dutch Association of People with HIV, and this likely contributed to expanding intervention reach for people with HIV but not health care providers. Additionally, in the hopes that it would bolster implementation, we sent out a press release that was picked up extensively by various national and international media outlets. We further presented the website and needs assessment data at national and international conferences, and published articles in national magazines and international peer-reviewed journals. However, media attention is passing, and presentations and articles often preach to the choir. Neither really fundamentally contributed to implementation, and although efforts to share insights outside of the academic sphere may have had some societal impact, they did not effectively contribute to the adoption or implementation of the intervention. We did ensure sustainability of the intervention by transferring ownership to the Dutch Association of People with HIV. The website remained online for many years, and various intervention components are, over a decade later, still being used in continuing education for healthcare professionals.

Overall, looking back, I would conclude that our failure to do the tasks in Step 5 was the most fundamental error in this project. We systematically developed a theory and evidence-based intervention for an important problem, but did not adequately follow through to ensure implementation. Unfortunately, our project is not unique in this regard. Kemp and colleagues (2019), in their systematic review of implementation studies of stigma reduction interventions in low- and middle-income countries, described that most interventions fail to move beyond their pilot phase, in part because existing implementation tools and frameworks (e.g., Consolidated Framework for Implementation Research (CFIR), RE-AIM) (Damschroder et al., 2009; Glasgow et al., 2019) are not effectively put to use. Ideally, intervention planners combine Implementation Mapping (the 'how') with frameworks within Implementation Science (the 'what') to attain better implementation outcomes (Bartholomew Eldredge et al., 2016; Stutterheim et al., 2025b).

Lessons learned from Step 5:

- 1) *Engage with potential adopters, implementers, and maintainers as early as possible when designing an intervention. If, over time, more potential adopters and implementers become apparent, bring them on board as soon as possible.*
 - 2) *Plan sufficient time to actually conduct Implementation Mapping (Step 5) and effectively design adoption and implementation interventions.*
 - 3) *To work efficiently, apply Core Processes (see Crutzen and Nalukwago (2025); ?) to ascertain if primary data collection is needed for the implementation needs assessment. If so, consider embedding this in the Step 1 needs assessment.*
 - 4) *Take the time to draft adoption, implementation, and maintenance outcomes and objectives that can later be assessed for their attainment.*
 - 5) *Efforts to promote societal impact and knowledge transfer (e.g., press releases, presentations, and articles) do not necessarily equate to implementation.*
 - 6) *Put existing implementation tools to use. Utilize insights from Implementation Science and other frameworks for implementation.*
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Step 6: Planning for evaluation

The final step in Intervention Mapping is planning for evaluation (Bartholomew Eldredge et al., 2016; Harms et al., 2025; Stutterheim et al., 2025b). Effect evaluations quantitatively assess intervention outcomes while process evaluations tend to be qualitative or mixed methods, and focus on implementation (Bartholomew Eldredge et al., 2016; Harms et al., 2025). **Process evaluations** thus provide context for effect evaluation results, if present. They can provide insight on whether an intervention was implemented as intended (fidelity, completeness) and the extent to which aspects of the broader environment affected

implementation (context). They can also reveal barriers and facilitators to implementation, show the extent to which intended participants were satisfied, and offer opportunities for critical reflection on intervention design (Bartholomew Eldredge et al., 2016; Harms et al., 2025; van Lieshout et al., 2017).

Effect evaluations generally call for a randomized control trial with an intervention group and (waiting list) control group completing a baseline survey, a post intervention survey, and a follow-up (e.g., three or six months). Such evaluations ideally hone in on the attainment of change objectives (i.e., changes in determinants) and they may also investigate the attainment of performance objectives, and behavioral and environmental outcomes (Stutterheim et al., 2025b). In Care4Care, the time between completion of the needs assessment (Step 1) and launch of the intervention was short. Within five months, we drafted behavioral and environmental outcomes, performance objectives, and change objectives (Step 2), selected change methods and crafted practical applications (Step 3), and produced the website (Step 4). As such, we did not prioritize designing a baseline survey for an effect evaluation. This is not uncommon but it is unfortunate. Because evaluations inevitably take place at the tail end of a project timeline, they are often passed over or cut short due to limited time and remaining resources (Harms et al., 2025; Rao et al., 2019). However, they are fundamentally important to the continuation and sustainability of interventions as showing what works is important for acquiring funding to expand and scale up effective interventions.

Recently, **cyclic evaluations** have emerged as an alternative for randomized control trials (see also Harms et al., 2025; Metz, 2024) particularly for web-based interventions, whereby randomization is difficult due to their widespread accessibility. Cyclic evaluation processes employ mixed methods and entail four phases: 1) analysis of intended use and the expected behavior change via Acyclic Behavior Change Diagrams (ABCDs, see also Metz et al., 2025) that visualize the causal-structural chains posited to underlie an intervention (see e.g., Metz et al., 2023a, 2022); 2) analysis of actual use via web analytics (see e.g., Metz et al., 2023a, 2022); 3) exploration of end-user perceptions via a think-aloud study (Eccles and Arsal, 2017), in which members of the intervention's recipient populations articulate their thoughts while freely engaging with the intervention, and participate in a semi-structured interview (see e.g., Metz et al., 2022); and 4) optimization of the intervention based on the outputs of the preceding phases (see e.g., Metz et al., 2023b).

While the process of cyclic evaluation (Harms et al., 2025; Metz, 2024) had not yet been described in the literature when we were evaluating our intervention, we did conduct a process evaluation that reflected phases 2 and 3 of the cyclic evaluation process (Stutterheim and Boss, 2015). We explored Google Analytics and Vimeo statistics to determine reach and exposure, and we conducted a think-aloud study with people with HIV (n=8) and health care providers not specialized in HIV care (n=8), in which participants freely navigated the website while an interviewer posed open-ended questions about the various website components (Stutterheim and Boss, 2015). Not unexpectedly, we found that the website was known and visited more by people with HIV than by health care providers, and that none of the health care providers that participated in the think-aloud study had previously heard of the website but would nonetheless recommend it to others (Stutterheim and Boss, 2015). Evidently, these results exemplified the need to work further on implementation of the intervention with health care providers.

Lessons learned from Step 6:

- 1) *When drafting grant proposals, build in ample time for evaluation of the intervention.*
 - 2) *Consider the use of the cyclic evaluation process (Harms et al., 2025; Metz, 2024) as an alternative to randomized control trials.*
 - 3) *When measuring effect, focus on measuring the attainment of change objectives (i.e., changes in determinants) and performance objectives. If time allows, it might also be feasible to measure the attainment of behavioral and environmental outcomes, if formulated SMART.*
 - 4) *In process evaluations, consider incorporating concepts from known implementation frameworks (e.g., CFIR; RE-AIM).*
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Summary and conclusion

Applying Intervention Mapping in the real world, where there are contingencies related to time, resources, and interests, is not easy. However, as the most comprehensive approach to intervention design, Intervention Mapping is worth the effort. It increases the likelihood of effective interventions, even when it is not strictly applied (Bakhuys Roozeboom et al., 2021; ten Hoor et al., 2022). Overarching lessons I learned in the process of conducting Intervention Mapping is that having a robust understanding of behavior and environmental change theory, or alternatively, ensuring that a behavior and environmental change expert is in your team, is incredibly valuable. I have also learned how imperative a good planning group is. Working together with people who are committed, and who function as both visionaries and doers is valuable. Accordingly, the embeddedness of planning groups in intervention design creates opportunities to lean on existing expertise and networks. There is already so much out there. We would do well to make optimal use of that expertise and those networks. In similar vein, meaningful engagement with members of recipient populations is paramount. This can make or break an intervention, and particularly its implementation. It is key to sustainability and also prevents us from reinventing the wheel, which is both inefficient and disrespectful, not only to recipient populations but also to the history of the field within which you operate. This, however, does not mean that everything should be fully determined by members of recipient populations. We have expertise in behavior and environmental change and it is wise to own that. Sometimes you need to hold your ground and insist on that which is fitting with the theory and the evidence. At the end of the day, an intervention designed using Intervention Mapping increases the likelihood that the behaviors and environmental conditions you set out to change in the first place actually do change, and, ultimately, that is why we do this work.

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