

Research

Personalized Medicine and Personalized Health Promotion Based on Motivation and Reward Proceedings

by Maren M. Michaelsen ¹

¹Institute for Integrative Health Care and Health Promotion, School of Medicine, Witten/Herdecke University, 58455 Witten, Germany

As the number of patients with lifestyle-related chronic diseases continues to increase worldwide [1], the need for personalized medicine is growing. At the same time, the development and implementation of prevention and health promotion interventions to help individuals change their health behaviors is becoming increasingly important. While personalized medicine focuses on the development and application of therapeutic strategies tailored to specific patient characteristics, such as specific antibodies, personalized health promotion focuses on specific patient lifestyle characteristics, such as diet, exercise and relaxation behaviors (or stress management). Thus, supporting patients change specific negative health behaviors that they perform on a regular basis is the focus of contemporary health promotion. Examples of tools with this objective include technological applications such as fitness trackers that connect to mobile phone apps and suggest behaviors based on the measurement (e.g., walking more steps the next day). However, these technological advances are often available to clients before their effectiveness has been examined in research studies. In addition, the development of health behavior change techniques often occurs without an adequate theoretical basis about the psychological or neurobiological processes involved in health behavior change. This imposes the risk of decreasing patient engagement over time because extrinsic motivational incentives are not strong enough to build sustained engagement.

To better understand patients' engagement in health behavior change processes, in [2], we have analyzed the role of motivation and reward proceedings at different stages of behavior change processes. Our analysis is based on the triad of motivation and reward mechanisms, which include

approach motivation (wanting) with its associated reward pleasure, aversive motivation (avoiding) with its associated reward relief, and assertion motivation (non-wanting) with its associated reward quiescence. In our Model of Engagement (Figure 1), individuals first proceed from being unaware of the benefits of a particular behavior change to becoming aware of the benefits. At these first two stages, individuals are not engaged in a health behavior change process (non-engagement). Once they begin contemplating about changing their behavior and move to the planning stage, they become motivationally engaged. The transition to the initiation stage, where the new behavior is performed for the first time and then continually performed until the new behavior is maintained (has become a habit), is characterized by executive engagement. Motivation and reward proceedings play distinct roles at these stages. During non-engagement, assertive motivation is active because no need to change behavior is yet considered relevant. Parasympathetic activity and the release of endogenous opiates, oxytocin and related neurotransmitters are involved. During contemplation, planning, initiation and continued action, an individual progresses in response to appetitive motivational stimuli or appetitive motivational goals (see [2] for a distinction between stimulus-driven behavior and goal-directed behavior), involving, for example, the mesocortical dopamine pathway in the frontal cortex. An alternative to appetitive motivational salience is aversive motivational salience, which can lead to the same behavioral outcomes. However, because of the negative emotions involved (e.g., fear), appetitive motivational salience is preferred. In fact, repeated activation of appetitive motivational salience can lead to other positive resources [3], i.e., an upward spiral of

positive emotions. At the maintenance stage, individuals are steered by assertive motivational

saliency, i.e., the desire to maintain the new status quo. This phase is characterized by the involvement

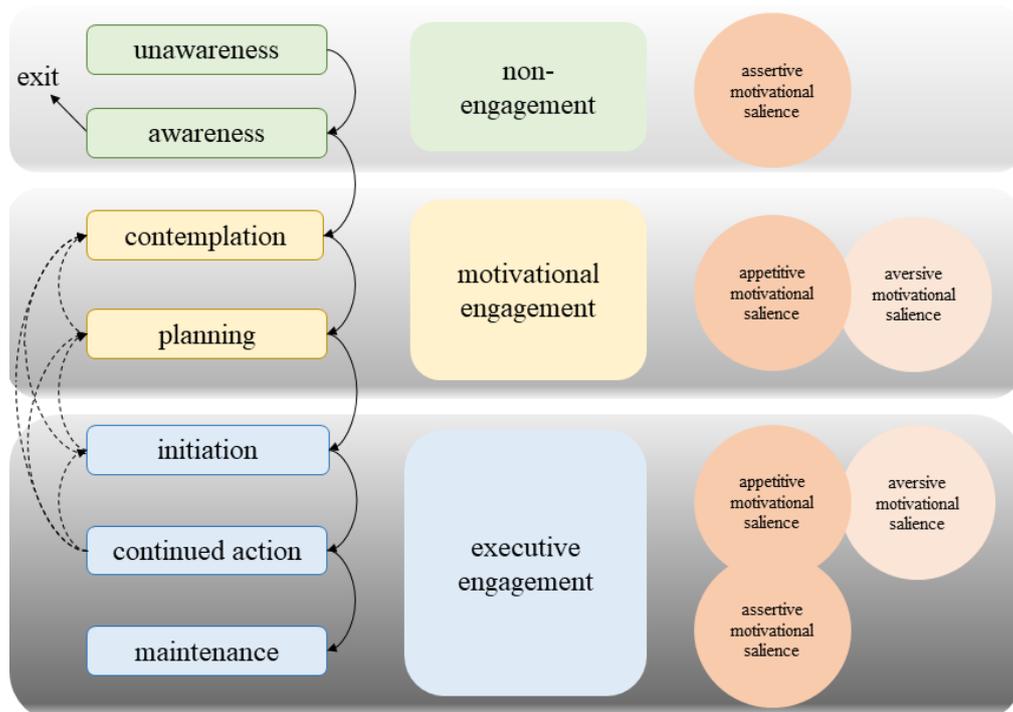


Figure 1: Model of Engagement (adapted from [1]).

of the hippocampus, which stores memories of past affect (rewards) from specific behaviors.

By applying motivational interviewing or other tools, it is possible to determine which stage of a particular health behavior change process an individual currently is at and what is needed to progress to another stage. For example, imagine a person who regularly watches Netflix series for relaxation in the evening and has just learned that breath awareness meditation leads to a physiologically better relaxation response. This person has just moved from the unawareness stage to the awareness stage. To progress to the contemplation stage, motivational cues are needed that activate appetitive motivational saliency and thereby make the new behavior more attractive.

This motivational cue could be the information that by replacing one episode per day by a meditation session, the person might sleep better at night and thus experience increased sense of well-being. Various behavior change techniques can be chosen to convey this information, such as a nudging technique like social comparison (e.g., showing a short movie about a person who meditates and sleeps well at night), or a facilitating technique such as providing a flyer with an explanation (e.g., in a patient counseling session). Such behavior change techniques increase reward expectancy and are therefore likely to support lasting health behavior change when applied according to an individual's current type of engagement.

References

- [1] World Health Organization. (2022). *Fact sheets - Noncommunicable diseases*. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- [2] Michaelsen, M. M., & Esch, T. (2021). Motivation and reward mechanisms in health behavior change processes. *Brain Research*, 1757. <https://doi.org/10.1016/j.brainres.2021.147309>
- [3] Cappellen, P. van, Rice, E. L., Catalino, L. I., & Fredrickson, B. L. (2018). Positive affective processes underlie positive health behaviour change. *Psychology & Health*, 33(1), 77–97.