

# Value-based motivational strategies combined with technology to encourage a lifestyle that helps to prevent dementia

Stefan Klöppel, Esther Brill, Giovanni B Frisoni, Dag Aarsland, Verena Klusmann-Weißkopf



Lifestyles aimed at reducing dementia risk typically combine physical and cognitive training, nutritional adaptations, and, potentially, an augmentation in social interactions. Interventions at the population level are essential but should be complemented by individual efforts. For efficacy, lasting changes to an individual's lifestyle are needed, necessitating robust motivation and volition. Acting in accordance with one's values is assumed to be rewarding, leading to improved motivation and volition, and produces stable behaviour–outcome relationships. To this end, future preventive endeavours might first evaluate an individual's extant lifestyle, preferences, and values, including considerations of age-related changes to ensure these values remain a motivational source. Digital technology can support lifestyle goals and be targeted to support an individual's values. A digital platform could implement situation-specific, sensing-based feedback to alert users to a target situation (eg, opportunity for exercise) coupled with (smartphone-based) feedback on the extent of accomplished behavioural change to support individually set goals and facilitate their adjustment depending on whether these goals are achieved. This use of the motivational impetus of values, coupled with interpersonal techniques, such as motivational interviewing and SMART goal setting, in combination with sensor technology and just-in-time adaptive interventions, is assumed to hold high potential for dementia prevention.

## Introduction

The risk of dementia can theoretically be reduced by 30–40% through a health-promoting lifestyle (eg, physical exercise, mental and social activities, changes to diet, and reduction in smoking) and elimination of other risk factors (eg, lack of education in childhood and depression).<sup>1</sup> These findings largely result from observational studies and it is clear that long-term behavioural changes are necessary to increase preventive effects.<sup>2</sup> Although strengthening motivation for lifestyle changes can be useful in reducing the risk of a broad spectrum of diseases, international efforts (eg, by WHO<sup>3,4</sup>) have placed special emphasis on brain health, particularly in the context of dementia prevention. Dementia-specific challenges, including stigma-induced fear of cognitive decline, the long interval between initial prevention and disease onset, and the presence of cognitive symptoms in stages where prevention is still meaningful (eg, mild cognitive impairment) make technological support systems particularly relevant. To successfully make behavioural changes, motivation and volition must be promoted to patients and at-risk populations, which has been difficult even in well controlled study settings.<sup>5,6</sup> Whereas motivation provides impetus for behaviour, volition, following after conscious decisions of willpower (which is also called intention formation), encompasses the cognitive process that facilitates the translation of motivation into purposeful goal-oriented actions.<sup>7</sup> Motives are embedded in the individual's value system.<sup>8</sup> Effective promotion of healthy ageing as defined by WHO—"to enable people to be and do what they have reason to value"<sup>9</sup>—should take into account age-related changes in the goal structures as well as in the value systems of the individual, given that value

systems serve as a reference point for goal setting.<sup>7</sup> Values, together with views on ageing, lead to perceived self-efficacy and are assumed to lie upstream of goals and, finally, behaviours.<sup>7</sup> Motivational goals include improving cognitive performance (known as approach goals) or preventing dementia (known as avoidance goals, which also result from dementia worry<sup>10</sup>). As people age, the importance of self-oriented values (eg, hedonism, success, and challenge) decreases, whereas the importance of social-oriented values (eg, benevolence, security, and harmony) increases.<sup>11</sup> This pattern in values is likely to be reflected in the resulting motivational strength and should, therefore, be carefully considered when aiming to increase motivation for healthy ageing or health protective action in particular. This Personal View focuses on individual health choices and how those are best supported; however, interventions at the population level should remain the cornerstone of dementia prevention, given the high societal and clinical leverage. Several modifiable risk factors can be addressed at the population level (eg, childhood education and bans on smoking) and affect high proportions of the population.<sup>1</sup>

## Values and goals as starting points for behaviour change

The motivational and volitional power of values has long been recognised,<sup>8,12–14</sup> but values receive little consideration in approaches to health promotion into older age. Values can be regarded as higher-order goals that determine concrete lower-order goals, often referred to as objectives. They shape and feed goal setting, including in the weighing of pros and cons of specific goals and the assessment of the attainability of goals. Once an

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University Psychiatric Services Bern, University Hospital of Old Age Psychiatry and Psychotherapy, Bern Switzerland (Prof S Klöppel MD, E Brill MSc); Memory Center, University of Geneva and University Hospitals, Geneva, Switzerland (Prof G B Frisoni MD); Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK (Prof D Aarsland PhD); Department of Health, Security, Society, Furtwangen University, Furtwangen, Germany (Prof V Klusmann-Weißkopf PhD)

Correspondence to: Prof Dr Stefan Klöppel, University Psychiatric Services Bern, University Hospital of Old Age Psychiatry and Psychotherapy, CH-3008 Bern, Switzerland stefan.kloepfel@upd.ch

individual is committed to a goal, the positive effects of goal attainment are important.<sup>15</sup> The more immediately and directly the fulfilment of outcome expectancies is perceived, the better.<sup>16</sup>

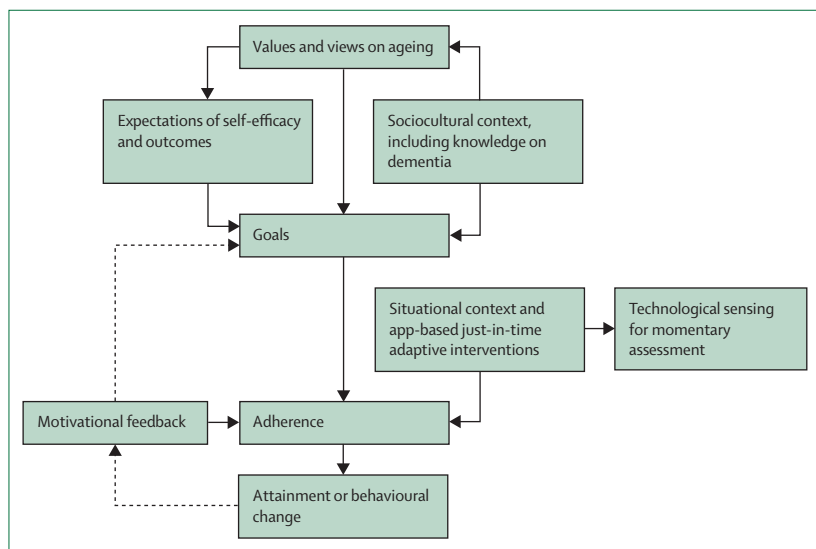
The processes of goal setting and goal pursuit should be viewed in relation to cultural, social, and organisational contextual factors.<sup>15</sup> Specific goal setting and goal striving are fuelled by profound and stable values, which provide a strong and a reliable source of motivation, in that they anchor goals in the self of individuals, given their strong ties to self-concept, identity, and personality.<sup>15</sup> A thematic synthesis including people aged 71–91 years identified nine domains of quality of life values in which goals are formed: autonomy, role and activity, health perception, relationships, attitude and adaptation, emotional comfort, spirituality, home and neighbourhood, and financial security.<sup>17</sup> When being consistent and orchestrated with one's values, behaviour and goals optimally serve to fulfil peoples' needs. In light of increased security or harmony needs throughout older age, or if autonomy becomes more important in the face of a health threat such as incipient dementia, shifts in the value system occur. Consequently, motivation, goals, and then behaviour must also be adapted to meet the changed structure of values, to continue to fulfil needs adequately. Likewise, when it comes to changes in the resources of people, for example if cognitive capacities decrease, behavioural strategies must be adapted.<sup>7</sup> It is assumed that on these occasions, reflecting on and possibly adjusting goals and values can exert tremendous motivational power.

### Using value strength to increase motivation and change behaviour in older people

Following this line of reasoning, the value system and, accordingly, value strength should be used for motivation purposes, particularly in older people. Previous approaches have focused on supporting the adaptation of goal setting through interventions.<sup>18</sup> As an effective behavioural strategy, goal-oriented approaches are widely used in health promotion and prevention up to rehabilitation.<sup>19</sup> Usually, the setting of so-called SMART goals is fostered, that is, goals that are specific, measurable, achievable, realistic, and time-bound. This approach can still be applied for people in the early stages of dementia when behavioural change and functional improvements could be achieved by goal-oriented approaches.<sup>20,21</sup> Partial transfer of specific behavioural changes to other situations were shown in the randomised controlled trial by Clare and colleagues,<sup>20</sup> along with secondary benefits regarding social engagement and reduced caregiver burden. Continuously practising a new behaviour over 3–6 months is necessary to convert it into a relatively stable habit<sup>22</sup> but studies on these long-term effects and the comparison of different motivational strategies are not available yet. In addition, specific needs owing to cognitive impairment, as well as changes in the value system in older people should be considered.<sup>11</sup> In addition, specific needs owing to cognitive impairment, as well as changes in the value system in older people should be considered, which in turn would allow for the reasonable and successful promotion of healthy ageing in the sense of the WHO definition.<sup>3</sup>

### Values-based approaches in practice

Motivational interviewing in clinical practice should be designed as an individualised, value-based approach,<sup>22</sup> in so far as people are enabled to identify their core values, align their goals, their goal setting, and goal striving accordingly and ultimately adapt their behaviour according to their values. Values can be considered as starting points to derive goals, and expectations and feedback on goal attainment can affect attainment and new goal setting (figure 1). Chat-bot and sensing technology could be used to support this process (figure 1). Suggesting that goals are a direct result of values ignores that individuals can live with antithetical values (eg, valuing autonomy but not maintaining a sufficient level of physical activity); however, reflecting on these values might avoid effects cancelling each other out. In practice, it is more common to uncover possible divergences between values, goals, and behaviours (eg, when somebody values autonomy and is physically inactive despite choosing exercise as a goal), which again provides the necessary starting point for adjusting, reformulating, or even setting up new or alternative behavioural goals (iterative motivational feedback, shown in figure 1).



**Figure 1: The interplay of factors shaping behaviour, with values guiding goal setting**  
 Although values affect goals, the effect is partially mediated by expectations concerning self-efficacy but also benefits expected from the outcomes. Goal setting is also shaped by the state of knowledge. The sociocultural context affects goal setting either directly (by the immediate situational context—eg, weather and the goal to exercise outside affecting adherence) or indirectly, given the effect of sociocultural context on values, views on ageing, and self-efficacy and outcome expectations. Just-in-time adaptive interventions support adherence (eg, through registering weather forecasts, ensuring that rain or other weather conditions cannot be used as excuses for non-adherence). The actual attainment is sensed to encourage future adherence as well as goal adjustment.

Goal-oriented approaches such as the Bangor Goal Setting Interview<sup>23</sup> and the Canadian Occupational Performance Measure<sup>24</sup> can be used to consider values and to develop concrete, value-orchestrated goals. Practitioners are advised to pay attention to the strength of goals (ie, how important they are for the individual), behavioural activation, and continuous progress monitoring. Appropriate training opportunities in SMART goal setting for health professionals and interested laypeople in counselling centres are warranted.

Implementation into practice can be reinforced by technology. Digital tools designed to support health behaviours vary from scales monitoring bodyweight to motivating chatbots with a reminder function based on artificial intelligence. Sensor data and mobile devices, such as smartphones, assist in observing goal pursuit in behavioural terms through sensing and ecological momentary assessments and are used to provide feedback regarding goal attainment. Although the use of such data has become customary in the context of monitoring step counts, further applications might be explored. For instance, chat data could be analysed to evaluate goals related to social interaction, or images of food might be automatically assessed to determine alignment with nutritional objectives.<sup>25</sup> In such instances, applications might respond with positive feedback or suggest alternative, more achievable goals and thus avoid repeated confrontation with failure to achieve goals. Similarly, tools could serve to remind users of their values or indicate discrepancies between values, goal pursuit, and behaviour.

To effectively address the needs of older and possibly cognitively impaired populations, flexible software adjustments to cognitive, motor, and visual skills are required. Teams involving health-care professionals from different specialities can help to ensure that technological solutions resonate with the preferences and needs of older people. Investing in these adjustments not only enhances usability but also fosters greater engagement and adherence to health-promoting behaviours among older populations.

Few data encourage the role of digital tools unsupported by a human coach for long-term preventive efforts. This is partly because long-term effects are less frequently studied than short-term effects. However, a 2022 meta-analysis found beneficial effects of digital health interventions on cognitive abilities and showed that unsupervised interventions yielded positive effects; although these effects on physical exercise outcomes (eg, balance and muscle strength) were smaller than for supervised interventions.<sup>26</sup> Encouraging results are even reported in people living with dementia when digital apps have perceived immediate value and benefits and the design is appropriate.<sup>27</sup>

Adding just-in-time adaptive interventions to the situational context (figure 1) has shown potential. These precision medicine tools aim to deliver the optimal



**Figure 2:** Example of the practical implementation of harmony as value and the role of technology-based just-in-time interventions to sense inactivity (eg, based on step count) in the evening to organise a family gathering

intervention to the appropriate individual at the opportune moment.<sup>28</sup> For example, encouraging a specific behaviour (eg, calling family members to arrange a gathering for individuals for whom harmony is a strong value) could in turn increase goal adherence (figure 2). Many additional possibilities exist to enhance value or goal attachment, for example social obligation might be leveraged by enabling the posting of individual goals and their attainment on social media. Moreover, merging data from multiple sources (eg, GPS, time, weather, and day of the week) enables the identification of contextual factors that either facilitate or impede value attachment, goal pursuit, or goal attainment. A specific time of day or the presence of a particular individual that predicts successful goal attainment, if made conscious through technology, might provide additional, effective strategies.

## Conclusions

In summary, combining insights from motivational research with new technology could greatly facilitate long-term behavioural changes. Interdisciplinary knowledge from motivation research and dementia prevention aspects of device design for specific target groups should be combined to show the validity, effectiveness, and efficacy of a value-based motivation approach—ie, its advantage over purely goal-oriented

approaches in terms of success and sustainability. Second-generation memory clinics<sup>4</sup> provide an ideal setting, but the integration of primary care is essential.

There are also possible expansions to this approach, such as integrating the neuroscience of reward (eg, the dopaminergic system).<sup>29,30</sup> This integration might again support effective goal setting and help to come a bit closer to making WHO's decade of the healthy brain a reality.

#### Contributors

SK, EB, and VK-W were responsible for conceptualisation of the manuscript. GBF and DA gave valuable input on the initial draft and were involved in reviewing and editing of the manuscript. Writing and visualisation were conducted by SK, EB, and VK-W.

#### Declaration of interests

EB, and VK-W declare no competing interests relevant to the content of this manuscript. SK has participated on the advisory boards of Biogen and Roche Pharma, Eisai Pharma Switzerland, and Lundbeck and was compensated for speeches for OM Pharma. DA has received research support or honoraria from Roche Diagnostics, Evonik, Daily Colors, and Sanofi and worked as paid consultant for Eli Lilly and Roche Diagnostics. GBF has received funding through the Private Foundation of Geneva University Hospitals from Association Suisse pour la Recherche sur la Maladie d'Alzheimer, Fondation Segré, Ivan Pictet, Race Against Dementia Foundation, Fondation Child Care, Fondation Edmond J Safran, Fondation Minkoff, Fondazione Augusta, McCall Macbain Foundation, Nicole et René Keller, and Fondation AETAS. GBF has also received funding through the University of Geneva or Geneva University Hospitals for Investigator-Initiated Sponsored Study from Roche Pharmaceuticals, OM Pharma, Eisai Pharmaceuticals, Biogen Pharmaceuticals, and Novo Nordisk; for competitive research projects from H2020, Innovative Medicines Initiative, Innovative Medicines Initiative 2, Swiss National Science Foundation, and VELUX Foundation. GBF has received consulting fees from Biogen, Diadem, and Roche. GBF has received payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Biogen, Roche, Novo Nordisk, and GE HealthCare.

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