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Why Do We Harm the Environment or Our Personal Health despite Better Knowledge? The Knowledge Action Gap in Healthy and Climate-Friendly Behavior

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Abstract: Non-communicable diseases, such as hypertension, diabetes, or depression, result from an interplay of physiological, genetic, behavioral, and environmental aspects. Together with climate change, they are arguably among the most significant challenges mankind faces in the 21st century. Additionally, the bidirectional influences of climate change and health on each other are undisputed. Behavioral changes could curb both climate change and the spread of non-communicable diseases. Much effort has been put into information campaigns in both fields, but success has been limited. In the following, the knowledge action gap is compared and analyzed in healthy and climate-friendly behavior from a practical point of view and the supporting theoretical models are highlighted. The analysis shows that self-efficacy plays an essential role in both areas of research for effecting behavioral changes. The models of 'Planned Behavior' and 'Stages of Change' seems helpful and can be applied and adapted to explain behavioral changes in health and climate changes settings. We compared two previously unrelated research fields to uncover new avenues for further study and stimulate fruitful transdisciplinary discussion. Future directions on how behavioral medicine and climate change research can learn from each other are discussed.

Keywords: behavior change; climate change; public health; psychological theory-based; self-efficacy; non-communicable-disease; sustainable behavior

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1. Introduction to the Knowledge-Action-Gap

Human-induced global warming has already caused several observed changes in the climate system. These changes include increases in land and ocean temperatures, as well as more frequent heatwaves in most regions [1]. It is also leading to an increase in the frequency, intensity, and/or amount of heavy precipitation on a global scale, as well as increased drought risk in the Mediterranean region [1]. Any increase in global temperature (even if only +0.5 °C) is expected to affect human health, with predominantly negative consequences. Among other things, heat-related morbidity, and mortality increase. For example, some vector-borne diseases, such as malaria and dengue fever are predicted, and the risk of malnutrition is increasing [1].

While the challenges are significant, limiting warming to below 1.5 °C by the end of the century is still feasible from current emissions levels [2]. However, with every year lost, these challenges and associated costs rise and will, at some point, become insurmountable with warming locked into 1.5 or 2 °C and above [2]. For this reason, it is indispensable for individuals to alter their behavior behave in ways that can counteract climate change. For many years knowledge-based education and information programs were predominantly

used to achieve this; however, it is now well recognized that disseminating knowledge or changing attitudes through educational programs does not generate climate-friendly actions to the required degree [3]. In this context, climate-friendly behavior is defined as behavior that tries to minimize the negative impact of one's actions on the natural and built world, for example, reducing resource and energy consumption, using non-toxic substances, and reducing waste production [4]. Similar challenges have been encountered in field of healthy behavior. For example, it is clear that smoking is bad for health, yet quitting is often very difficult. What we see is comparable: People act "against their better knowledge," but the reasons and backgrounds can be different. Changing health behaviors remains one of the most pressing challenges to the healthcare system [5]. Medical conditions resulting from risk behavior are often associated with repetitive, chronic, and unhealthy behavior [6]. Changing these habits is usually strenuous and demanding. The team around Contento [7] has already found that factual knowledge neither prevents harmful behavior nor facilitates health-protective behavior. The researchers discovered constructs such as self-efficacy expectation, consequence expectations, the perceived threat or vulnerability, the social support, and the balance between costs and benefits as essential to explain the process of change [7]. Simply knowing how harmful behavior is to one's health does not lead to it being changed [8–10]. Even health care professionals seem to find it challenging to adapt their treatment to ever changing and up to date guidelines. However, evidence increasingly shows that treatment that follows guidelines improves survival, quality of care, and quality of life [11]. In addition to economic reasons, attitudes and expectations towards apparently incurable diseases, prognosis and treatment methods, and a lack of expertise are also influencing factors.

The World Health Organization (WHO) recently published data showing that 41 million people worldwide die of non-communicable diseases every year [12]. That corresponds to a share of 71 percent of all deaths. Diabetes, cardiovascular diseases, and respiratory diseases account for a significant proportion of premature non-communicable deaths [12]. Non-communicable diseases also make up about 25 percent of the European health care budget [13]. The WHO [12] reports that these diseases are forcing millions of people into poverty by burdening individual households with treatments costs and income compensations. Excessive alcohol consumption, smoking, physical inactivity, and an unhealthy diet play an essential role in the pathogenesis of these diseases. Since even small changes in daily habits could lead to improvements, it seems that preventive measures would be easy to implement. Still, the experience of previous initiatives shows that this is not the case. To effectively reduce the number of non-communicable diseases, it is essential to change everyday behavior. A whole new field of medicine termed "lifestyle medicine" is trying to address this issue: "Lifestyle medicine is an evidence-based approach to preventing, treating, and even reversing diseases by replacing unhealthy behaviors with positive ones" [14]. Despite those ambitious goals, it is primarily unclear how individuals can be motivated to change their behavior. Even if people apply their knowledge of healthy behaviors, they might end up harming their health. By developing compensatory health beliefs, they assume that the adverse effects of an unhealthy behavior can be compensated by engaging in another healthy behavior, thereby hindering behavior change [15]. Amrein et al. [16] found that compensatory health beliefs regarding physical activity were significantly positively related to unhealthy snack consumption. Further, they discovered that compensatory health beliefs are significantly negatively associated with intention and action planning. In addition, our health is often also affected by the effects of climate change [17].

Numerous theoretical frameworks try to explain the gap between environmental knowledge and awareness and pro-environmental behaviors. Although many hundreds of studies have been conducted, no definitive answers have been found [4]. The present article will focus on the connection of knowledge and action: The internal and external motivators for people to act for their health or pro-climate, and how such responsibility-taking and behavior change can be induced. To close the identified knowledge–action gap,

it is essential to understand human behavior change in different fields of action. Existing analyses of barriers are compiled together from both fields to examine the extent to which action motivators and theories are transferable and can learn from each other. For this purpose, the article highlights similarities and differences in behavior change concerning healthy and climate-friendly action and shows how behavior change can be stimulated and assessed.

2. Behavior Change Theories

When trying to understand behavior change in different settings, it is essential to condense the results of various studies into broader theories and umbrella models. The first behavior change theories were mainly developed to explain health-related behavior. Here we explore the extent to which they are connectable with climate-friendly behavior. To do so, it is essential to identify structures, overlaps, and distinctions between healthy behavior and climate-friendly behavior. There are many facets of those two broad topics, but the two issues can undoubtedly learn from each other. Numerous behavior change models have been developed. In the context of climate-friendly behavior and because otherwise, the scope could be exceeded, and this manuscript is limited to the following models.

2.1. Theory of Planned Behavior

The Theory of Planned Behavior (TPB) [18] is the most frequently used theory for behavior change in environmental psychology [19]. According to the TPB, behavior depends on the intention to perform the pursued behavior, which is determined by an individual's attitude (beliefs and values regarding the outcome of the behavior) and subjective norms (beliefs with respect to what other people think one should do or general social guidelines). A person's perceived behavioral control determines behavior, too (Figure 1) [20]. However, the intention is the most critical variable in predicting behavior change, suggesting that behavior is often related to personal motivation. This indicates that it may be essential to form positive attitudes toward the behavior and emphasize subjective norms or opinions supporting it. People with high levels of perceived behavioral control believe that they can perform the behavior, which is a concept comparable to self-efficacy [20].

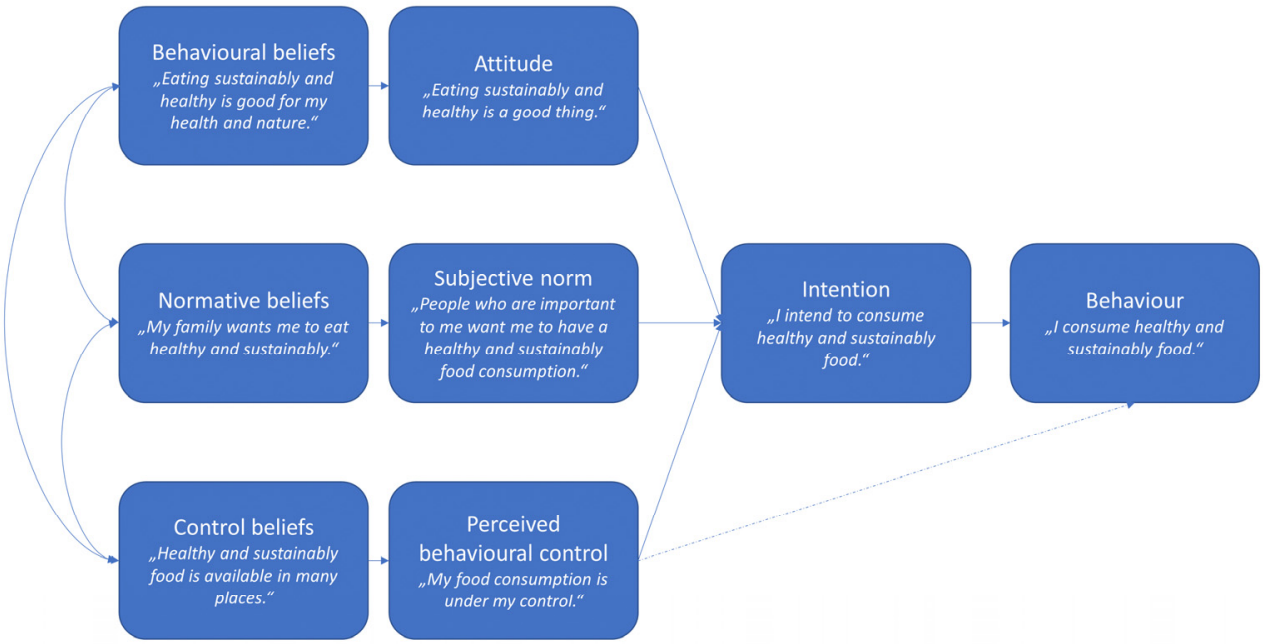

Figure 1. Theory of Planned Behavior, own representation based on [19,20].

The TPB rejects the assumption that people always make rational decisions. Instead, it implies that people's intentions and behaviors consistently follow their beliefs—regardless of how those beliefs were formed [18]. The respective importance of attitudes, subjective norms and perceived behavioral control varies for different types of behavior. Certain behaviors such as car use and energy-saving behavior correlate stronger with perceived behavioral control. Other behaviors, such as recycling and buying organic food, are closely related to attitudes and social norms [19].

2.2. Stages of Change

The Stages of Change Model, described in the Transtheoretical Model (TTM) [21], has been validated in the context of various problematic behaviors. It has been used successfully in health-related interventions, such as smoking cessation, weight control, and physical activity promotion. Studies on the treatment of addictive behaviors consistently confirmed that the change phase at the beginning of therapy significantly influences treatment success [22].

The stages of change are defined as follows (Table 1).

Table 1. Stages of Change, own representation based on [19,20,23].

Stage	Precontemplation	Contemplation	Preparation	Action	Maintenance
	Self-efficacy				
Definition	The person enters a situation but does not think that he/she has a problem. The problem is either not conscious, or it is ignored.	The person begins to realize that a problem exists. However, he/she is still struggling to understand the problem in terms of causation and possible solutions.	The person has tried at least once to change his/her problem behavior. Although this attempt was unsuccessful, he/she has learned from it. He/She plans to address his/her problem behavior again soon.	The person has started to change his/her behavior or environment actively. Difficulties become apparent in the process. However, he/she tries to overcome them and seeks the necessary support.	The person has succeeded in making significant changes and achieving essential treatment goals. However, he/she has difficulty maintaining the changes and fears so that relapse may occur. The treatment he/she is seeking is relapse prevention.
Climate friendly behavior	The person does not consider changing behavior for example to reduce car use. The reason could be that he/she is not fully aware of the environmental problems associated with his/her own behavior.	The person thought about changing behavior for example taking public transport instead of the car but had not started acting yet.	The person has set the intention to change behavior and may at this point have already tried to use the public transport on occasions	The person has changed his/her behavior and most of the time he/she use for example public transport.	The person has managed to make the desired behavior change such as using public transport over time. There is a chance of relapse when the person reverts to one of the earlier stages.

Table 1. *Cont.*

Stage	Precontemplation	Contemplation	Preparation	Action	Maintenance
Healthy behavior	The person is mostly unaware of its problems, for example alcohol exposure. The motivation to change is in many cases conditioned by the external environment.	The person perceives that a problem exists. She or he is thinking about tackling the problem, but it is not clear how to overcome this challenge. For example, reducing alcohol consumption seems to cost too much effort and willpower.	The person has concrete plans to change the problematic behavior. She or he has already tried to reduce the amount of alcohol, but it was not effective yet.	The person has successfully changed the dysfunctional behavior. She or he is for example abstinent from alcohol abuse for a period from one day to six months.	In this stage the person prevents a relapse. In case of addiction, maintenance can last a lifetime.

The TTM provides a theoretical basis for developing behavior change interventions [19]—for example, if a person is in the precontemplation stage, it is important to first raise awareness of the behavior to encourage them to consider changing their behavior. A planned intervention can help people who might get stuck in the early stages because they are confronted with motivation difficulties [20]. Two interesting variables distinguish people in different stages: self-efficacy and the decisional balance between pros and cons. Self-efficacy refers to people's perceived ability to change their behavior. This is comparable to the concept of perceived behavioral control in the TPB. Decisional balance is based on comparing the perceived positive aspects of the new behavior, the pros, the cons, and perceived negative aspects, the cons [19]. For example, health benefits of cycling versus feeling uncomfortable on a rainy, windy day.

Self-efficacy is an essential determinant in several models of behavior change. It describes the relationship between cognitive factors (such as the perception of one's abilities) and actions. As individuals progress through the stages, self-efficacy often increases. This concept has proved useful for predicting the transition from early motivation phases to the action phase [22]. Among the driving forces for movement between stages, self-efficacy (at the individual or group level) has been particularly striking [24,25]. There are different psychometric instruments that assess the practical relevance of behavior change models in research and everyday settings. Various questionnaires have been developed, for example Brief Cope [26], social norms [24], URICA [22], self-efficacy [27], group-efficacy [24], etc... The URICA questionnaire is well suited for analyzing complex problem behaviors because it provides scores for each stage of change rather than categorizing individuals into a single stage. It has also been shown to predict behavior change [28,29].

3. Methods

In this perspective article, we aim to look at the challenge of behavior change concerning health and climate change. For this purpose, the existing literature was searched for scientific studies to provide a descriptive overview. This overview does not meet the criterion of completeness. Based on current theories, interrelationships are to be identified, and differences and commonalities revealed. For this purpose, the research literature was also searched explicitly for examples relating to the applied theories.

To find relevant examples from the existing literature of health behavior, PubMed was searched with text terms combined as follows: "behavior change," "theory-based," "human," and "physical activity." Only original articles and reviews published between 2017 and 2021 in English were included to reflect the current state of research on the selected topics—430 articles resulted from the search. Initially, studies with digital interventions and studies with children were excluded whereupon 80 articles remained. Abstracts

were screened, however, only those articles were taken into further account, which included theory-based studies examining both effectiveness and adapted behavior change techniques. Ultimately, nine articles were selected for the perspective article. A second search combined the keywords "behavior change," "theory-based," and "app"—66 articles remained, and 11 were chosen. As in the previous search, only studies investigating both the effectiveness and the strategies used to change behavior were considered in more detail. The data for climate friendly behavior were collected from the databases PubMed and Google Scholar. Only English-language original articles and reviews published between 2016 and 2021 were included. The following keywords were combined in the PubMed database: "climate change" and "pro-environmental behavior"—65 relevant papers resulted, of which 16 well represent the current state of studies. Eight studies are presented below summarizing the triggers of climate-friendly action and non-action. For a further overview, the search was continued with the database Google Scholar with the keywords, however complemented with the focus "self-efficacy"—2000 papers met those criteria. Due to the high number of papers, a selection was made based on the titles, and, in addition, recommendations from colleagues were included. See more details in the flowchart of the selected literature (Figure 2).

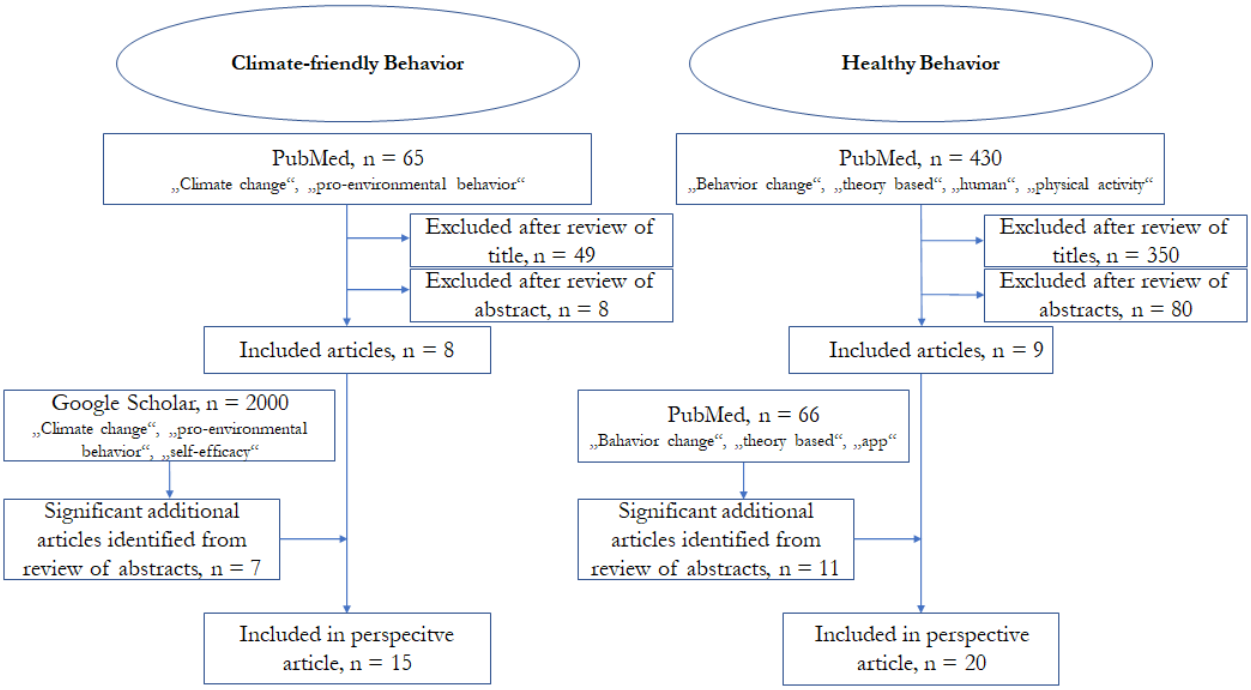

Figure 2. Flowchart of the selected literature.

The results of the selected literature are presented in the following two chapters.

4. Healthy Behavior—Selected Examples from the Existing Literature

Knowledge in and itself does not lead to behavioral change in the health context. Yet, a shift from unhealthy behavior to health-promoting behavior is essential for both the individual and the health system. For this reason, researchers from different fields have analyzed how behavior can be sustainably changed and consolidated in the long-term.

4.1. The Evaluation of Physical Activity Interventions

The following section aims to identify the factors that lead to successful behavior change with different health behaviors and target groups. Because physical inactivity was recognized as one of the significant risk factors for non-communicable disease [30], we concentrate on this behavior in the current overview.

A selected review and meta-analysis included 26 studies to evaluate interventions that aimed at increasing physical activity [31]. The selected studies measured the effectiveness of different behavior change techniques by measuring the behavior change (post-intervention) and the behavior change maintenance (follow-up). The authors concluded that biofeedback, demonstration of behavior, behavior practice, and tasks were the behavior change techniques most associated with a targeted change. Another systematic review [32] included 48 studies, which focused on physical activity and healthy eating. A modest effect on the aimed behavioral change was found in overweight and obese adults. The applied behavior change techniques were similar to the review above. Still, the interventions were less effective. This leads to the question of differences in the participants' willingness to change their behavior.

Applying the transtheoretical model [21] on physical activity interventions, shows that the willingness to change depends on the extent to which unhealthy behavior is already present [33]. Participants with a higher amount of sitting time were less likely to become more physically active. The insufficient movement behavior might be already firmly anchored in overweight adults, making it more difficult to effect change [32]. Interventions which were setting concrete goals and helping participants to self-monitor their behavior were associated with better effects [32]. It was concluded that awareness-raising, creating incentives, offering motivation, and building social norms would be helpful methods to reach the goal [33].

Another meta-analysis [29] and a systematic review [34] investigated whether interventions targeting precisely the stage of change a person is positioning him- or herself are more effective. Interventions were found to be successful in increasing physical activity if they were based on theoretical constructs related to self-efficacy, and the process of change. Han et al. [35] could also see an effect of the interventions on physical activity however, depending on the level of the Transtheoretical Model [21] the participants were at. Participants who were higher placed on the stages of change were, as predicted, much more likely to change.

4.2. Targeted Interventions for Different Groups of People

Various studies show the necessity to adapt behavior change interventions specifically to the characteristics of groups of people. Efforts to change behavior must always consider the circumstances, abilities, and conditions of the target group or individual to achieve the intended results [36]. For example, pregnant women with obesity find it easier to change their behavior if they experience support from their partners. At the same time, the lack of knowledge about safe activities during pregnancy is a barrier to change [37]. Similarly, behavior change interventions for children need to be adapted to their specific conditions. To increase physical activity, especially in primary school children, changes must occur not only in the children but also in the social environment [38].

4.3. App-Based Interventions

A systematic review focused on a relatively new but increasing approach: behavioral health interventions via mobile apps [39]. Fifty-two studies regarding physical activity, diet, drug and alcohol use, and/or mental health were included in their analysis. Although the apps were well received by the participants, the evidence of changed behavior was low. The authors state that the behavior-change techniques have not been appropriately integrated in an evidence-based way into the applications. A research team investigating social media interventions for positive nutrition behavior in adolescents observed higher effectiveness [40]. The interventions to promote healthier behavior were social support, behavioral instructions, self-monitoring, goalsetting, and feedback. The authors consider digital interventions as an age-appropriate way to reach adolescents and offer unprecedented capabilities. The mentioned health behavior change techniques were observed in several other reviews that focused on smartphone behavior change apps and rated as effective [41–44]. Other authors advocate the use of tailored coaching messages [45] and

personalized, supportive mobile app interventions [46] Tracking also proved to be a good and straightforward behavior change technique. Even meta-analyses that only analyzed tracking interventions were able to identify a substantial change in physical activity [46,47]. A specific scale (ABACUS) to measure the potential behavior change of smartphone apps was developed [48]. It points out which categories are relevant for successful behavior change supported by smartphone apps. Based on their analyses, the authors concluded that the measurement tool should address the areas of knowledge and information, goals and planning, feedback and monitoring, and actions to assess the potential. It points out which categories are relevant for successful behavior change supported by smartphone apps.

4.4. Long-Term Maintenance

One aspect which inevitably ties in with the topic of behavior change is the aspect of long-term maintenance. To promote maintenance (at least six months post-intervention) of smoking cessation, weight loss, and physical activity, interventions based on the transtheoretical model or interventions focused on autonomy and intrinsic motivation were the most effective [49]. Maintenance motives, self-regulation, resources, habits, and contextual influences have been identified as essential factors to maintain changed behavior [50]. The stable establishment of changed behavior provides sufficient material for a stand-alone project but should not be disregarded.

4.5. Core Statement

From the discussed literature it can be concluded that efforts to change health related behavior are widespread and varied. Yet, there are major differences in effectiveness and application that should be considered in order to successfully bring about change.

As far as effectiveness is concerned, the current state of literature supports the assumption that theory- and evidence-based techniques are particularly advisable. When these techniques are integrated appropriately, effects can be observed regardless of whether the intervention was conducted digitally or in person. In cases where the experiments applied theories, the most commonly used theoretical constructs were self-efficacy and the process of change. A specific technique that plays an essential role in changing health behavior was feedback in different forms. Feedback took place, for example, in the form of assessment of tasks, support, feedback on progress, and biofeedback. Notwithstanding the general tendencies of effective techniques, research on behavior change shows that not all groups should be treated equally. In most cases, participants have different levels of readiness to change, and they must be addressed accordingly. The individual stage depends on the degree to which the problematic health behavior is already internalized and the participant's willingness to change this behavior [51].

5. Climate Friendly Behavior—Selected Examples from the Existing Literature

The state of research of climate-friendly behavior is similar to that outlined concerning healthy behavior above. Intentions for change are often in place, yet implementation remains difficult [52]. The most straightforward reason not to act is lack of knowledge [25]. Additionally, people might not act because they feel that their behavior is not relevant enough [53]. Other hypotheses are that social norms are much more effective for behavior change than, for example, knowledge [54].

5.1. Current Research of Climate Friendly Behavior

Previous research with adolescents has shown that certainty about the existence of climate change is influenced by social relationships with friends and family [55]. However, the certainty of climate change was linked to an inverse effect on behavior: increased confidence was associated with decreased behavior. Possibly, this is due to the "drop in the ocean" effect [56] which describes the phenomenon that the magnitude of one's behavior is considered so small that a more climate-friendly behavior is deemed to be futile. How to

induce climate-friendly behavior is still underdetermined. Some of the various approaches presenting factors that impact climate-relevant actions are explained in more detail below.

First, there is the knowledge factor. This has already been extensively researched and is essential of course. However, it is crucial to acknowledge that this alone is seldom sufficient for climate-friendly action. The importance of knowledge has been investigated in a study with Taiwanese students. It showed that higher levels of knowledge enable young people to assess climate change threats better. Thereby, they are more likely to engage in pro-climate behaviors [56]. An Australian study demonstrated that psychological proximity to climate change is connected to a more significant commitment to climate-friendly behaviors [57]. The potential influence of education on students' individual carbon emissions was examined with Californian students who took an intensive university course on climate change. Results from the study suggest that the course itself had an impact on the participants' climate-smart behaviors many years later [58]. Culture plays an essential role for adopting climate-friendly behavior as well and additionally knowledge is not always transmitted in the same way, it depends also on the intervention. All in all, knowledge alone is not enough to trigger lasting climate-friendly behaviors, other factors are necessary, too.

Muroi and Bertone [59] examined some of those factors on pro-environmental behaviors of Chinese and Australian students. The Chinese participants were more environmentally friendly, which can be attributed to education and climate policies. In addition, participants with higher educational degrees and older and better-paid participants were more likely to show pro-environmental behaviors.

Another essential factor for climate action is self-efficacy. A study of Australians showed that participants with high self-efficacy had higher levels of more remarkable persistence toward physical tasks than those with low self-efficacy. Similarly, when people believe that they can engage in pro-environmental behaviors, it can foster a related sense of self-efficacy toward pro-environmental behaviors [60]. Middle and high school students within a large urban area of the western United States [54] felt somewhat efficacious about their personal ability to reduce climate change. They attributed most efficacy to groups. This finding is described by the term collective efficacy by Bandura [61], as climate change is a common environmental problem that requires collective action.

The main findings of a Malaysian study [62] showed that attitudes, subjective norms, and perceived behavioral control positively influence behavioral intention to adapt to or mitigate climate change. Groups that are less affected by climate change tend to care less about climate change than lower-status groups that are more likely to be harmed by climate change [63]. Another literature review summarized communication and intervention studies that underline how positive and negative emotions can promote sustainable behavior [64]. Swedish researchers explored how people sometimes harm the environment despite trying to do good. The equilibrium heuristic leads them to believe that environmentally friendly behavior can compensate for climate-damaging behavior [65].

5.2. Core Statement

From the discussed literature, it can be concluded that the following factors matter when trying to induce pro-environmental behavior: knowledge, self-efficacy, group efficacy, attitudes, subjective norms, perceived behavioral control, social norms, concern, and emotions. However, there is no all-encompassing explanation. Keyworth et al. [36] point out that efforts to change behavior must always consider the circumstances, abilities, and conditions of the target group or individual in order to achieve changes.

6. Differences and Similarities in Pro-Environmental and Healthy Behavior

Climate change and health problems related to unhealthy lifestyles are critical challenges for societies. The fact that the way we behave influences our lives and our environment is indisputable. The two areas causes and effects are strongly interconnected and often mutually dependent. What should be emphasized regarding both is that behavior change

is necessary for individuals and societies as a whole. Moreover, it is broadly acknowledged that knowledge alone is not enough to achieve the desired behavior changes. There are many factors involved in this process; one of them being self-efficacy.

There are numerous differences (Table 2) and parallels (Table 3) between health-friendly and climate-friendly behavior. Comparing these two areas and working out both differences and similarities enables a profound understanding of the action factors to be gained. An understanding that is significant for the attempt to transfer and apply models.

6.1. Differences

There are several distinct differences between healthy and climate-friendly behavior summarized in Table 2: (1) The degree to which individuals are concerned is not the same. In the case of unhealthy or health-friendly actions, it is primarily the person her/himself who is suffering or benefitting. In contrast, with climate-damaging activities, it is more likely that subsequent generations of people from other parts of the world will be worst affected. Even climate-friendly behavior does not always benefit the person who performs this behavior. (2) On the other hand, effects of harmful behavior to health are not always directly noticeable but the effect may be delayed. For example, a smoker does not get lung cancer without warnings but first probably only develops specific lung problems such as shortness of breath. Since behavior can be changed more efficiently if the effects are apparent or noticeable; this is a significant difficulty with climate change and its impacts. In addition, in the case of behavior harmful to health, the burden is primarily (depending on national regulations) on the state health system. In the case of behavior that is harmful to the climate, the quality of life of future generations is burdened and state funds for mitigation and adaptation must be allocated. (3) Another difference lies in the knowledge average people have regarding possible behavioral changes. Health behaviors are often relatively unambiguous; for example, most people know that exercise is essential, and that fruits and vegetables are healthier than fast food. For climate-friendly behaviors, this is usually a bit more complex. Even for experts in the field, it is often difficult to assess whether, for example, a plastic bag is better than a paper bag or in which areas climate-friendly behavior has the greatest impact on CO_2 emissions.

Table 2. Differences of healthy behavior and climate friendly behavior.

	Factor	Healthy Behavior	Climate Friendly Behavior
(1)	Consternation	Concerns mainly the person her/himself.	Concerns mainly the planet, society, and future generations.
(2)	Implications	Effects are necessarily noticeable (not always directly but after a period). State health care system is burdened.	Effects are not necessarily noticeable (especially in European countries). Quality of life of future and current generations and state funds are burdened.
(3)	Knowledge	Healthy behavior is often clear.	Climate-friendly action and its concrete implementation into daily life is often unclear and difficult.

6.2. Similarities

As already described, behavioral risk factors increase the chance of health difficulties like premature mortality and morbidity [51]. Environmental challenges are also caused by human behavior [66]. Despite the mentioned differences, there are also numerous similarities between behavioral changes in the two areas (Table 3). (1) Adopting new behaviors is often challenging and demanding. (2) Another key aspect is that both healthy and climate-friendly behavior change cannot be achieved through knowledge alone but require a variety of factors. (3) A habituation effect with deterrent images is also a common feature; for example, warning pictures on cigarette packets or [67] pictures of starving polar bears become less terrifying to look at or are overlooked over time [67]. (4) In addition,

the biggest problem in both areas is that people are not prepared to take action, which makes it extremely difficult to accompany and support people acting in ways that are harmful to themselves or others. (5) Even when people try to behave climate friendly, they often harm the climate instead [55]. People justify harming the climate because they behaved, for example, climate-friendly before or in another area. Because of a balancing heuristic, there seems to be a solidified assumption that specific climate friendly behaviors can compensate for other unsustainable actions. Similar insights were found regarding compensation effects on health behavior [68,69]. (6) The most significant commonality is that self-efficacy is a very important determinant to achieve behavior change in both areas. For health behaviors, self-efficacy is arguably easier to achieve since many feel more directly responsible for their own body, and actions have an influence on one's own physical sensations. However, as the impact of one's actions is often difficult to perceive, this is often a barrier for people to become climate-friendly actors. It is, therefore, crucial to strengthen self-efficacy with the help of interventions, although this might be more difficult in the climate-friendly field.

Table 3. Similarities of healthy and climate friendly behavior.

	Factor	Healthy Behavior and Climate Friendly Behavior
(1)	Implementation	Implementation of the respective behavior is often difficult.
(2)	Knowledge	Knowledge alone is not sufficient to achieve a change in behavior.
(3)	Blunting	In the case of deterrent images and themes there is a habituation effect.
(4)	Willingness	The biggest problem is people with no willingness to act.
(5)	Compensation	A compensatory heuristic is often used to justify misconduct.
(6)	Self-efficacy	Self-efficacy is one of the most important determinants to change behavior.

7. Conclusions and Future Directions

Changing behavior that is harmful to health or the climate is a significant and essential task. It seems important to also devote attention on how to maintain behavioral changes once they have been accomplished. To achieve a far-reaching effect on climate and health, it is by no means sufficient to change harmful behavior for a short time. Consolidation is crucial. So, in the context of stimulating and adopting new behaviors, health and climate change are strongly interlinked. The two fields and related disciplines should work more closely together, benefit from each other's findings and tackle future challenges together.

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