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„General Attitude towards Complementary and
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Tom Kevin Jeitz, BSc

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Abstract

This study aimed at creating a new scale assessing attitudes towards complementary and alternative medicine (CAM) in the general public. In doing so, a German-speaking sample was recruited to participate in this study. Explorative factor analysis, *Corrected Item-Total Correlation*, and *Cronbach's α if Item Deleted* suggest a factorial structure of one factor, which accounts for 54.4% of variance ($\lambda=16.32$). As an additional validation process, it was also tested if the new scale could detect attitude changes induced by the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013). If it is designed to assess attitudes towards CAM, it should also be able to assess changes in such attitudes. In order to do so, participants were randomly selected to one of three informational conditions (neutral, negative, or positive towards CAM) and asked to complete the new questionnaire once more (post-test). The results of the 3 x 2 mixed analysis of variance show a change in attitude scores towards CAM, while depending on which informational condition was present, attitude change was affected differently. This suggests that the new scale was also able to detect changes in attitudes. It was also tested if personality, beliefs in conspiracy theories (CTs), and anti-scientific beliefs (ASB) interact with attitude change towards CAM. The results of beliefs in CTs and ASB were consistent with literature, which can be seen as a contribution towards convergent validity. Whereas Openness to Experience appeared to be less affected by the *unimodal of persuasion*.

Introduction

Complementary and Alternative medicine

Establishing a definition for complementary and alternative medicine (CAM) is an ambitious endeavor, mainly because its term is relational in nature (Teichfischer & Münstedt, 2011). CAM describes methodologies and healing approaches not part of conventional medicine (Littlewood & Vanable, 2014). This terminology creates a large and heterogeneous field of approaches and methods, which makes it hard to classify, define and categorize what CAM is (Guillaud et al., 2019). In addition, within CAM is another degree of separation, *alternative medicine* is a direct competitor to conventional medicine, and *complementary medicine* exists in symbiosis with conventional medicine. On the same note, reaching consent on the efficacy of CAM appears to be even more fruitless. Regardless of scientific research efforts, the phenomenon of CAM remains a controversial and complicated topic (Ernst, 2000; Teichfischer & Münstedt, 2011).

From an evidence-based medicine approach, treatment efficacy must be established and demonstrated in a controlled research setting, where confounding factors can be ruled out (Chambless & Hollon, 1998). Treatment validity must be ensured via scientific quality standards, and primary health providers must also be trained as scientists (American Psychological Association, 2006). Most research on CAM employs research designs that are not capable of detecting a specific effect of CAM while ruling out non-specific effects (Swan et al., 2015), and therefore most effects of CAM scrutinized by evidence-based medicine end up being inconclusive (Barić et al., 2018). Furthermore, CAM's mechanism of action is not well understood (Wu, 2010). Insofar as psychologists identify themselves as evidence-based healthcare providers, CAM shouldn't be used in their practices (Swan et al., 2015).

Despite the claims and demands for evidence-based medicine, many still believe in the potential CAM might provide. There are ongoing efforts to overcome these limitations regarding the evidence on CAM efficacy, even calling it a possible future approach for health providers and therefore demanding it be integrated into their practices (Barnett & Shale, 2012). While some try tackling this dilemma scientifically to achieve approval and acceptance of conventional medicine, others see this dilemma as something that cannot be achieved empirically.

CAM may not be compatible with evidence-based medicine since CAM defines healing and sickness within the context of individuals only and, therefore, cannot be investigated via population-based studies (Tonelli & Callahan, 2001). Those individualistic

effects may not be generalizable at the population level and have no real mechanism of action but might have more favorable effects for some patients (Friesen, 2019).

On that train of thought, the effects of CAM are outlined as non-specific and variable to the degree that it is only observable on the individualistic level. Some might conclude that those effects are the same as the effects of placebos. Indeed, this comparison has been made quite frequently (Beedie et al., 2018; Bassman & Uellendahl, 2003). Placebos and their effect are not only an intervention without a specific mechanism of action but also an administration of sensory and social stimuli that communicate to the recipient that a helpful intervention is taking place. In that sense, Placebos and their effects can be described as a therapeutic ritual of treating a patient. This takes place whether the treatment is efficient or not. For the recipient, this can increase positive expectations, decrease anxiety, and activate neuronal reward systems. This can, in return, positively impact health and recovery. Nevertheless, this therapeutic ritual and its effects are potentially always happening regardless of the efficacy of the treatment. Therefore, for a treatment to be regarded as efficient, it needs to have a specific effect in addition to the effect of the therapeutic ritual. That all being said, conventional medicine knows of the placebo's usefulness as a treatment and its applications (Benedetti, 2014; Colloca & Benedetti, 2016).

In irritable bowel syndrome, placebos are used frequently as a treatment and are helpful on average for 40% of patients (Dorn et al., 2007). Meanwhile, to achieve satisfactory pain reduction in postoperative pain treatment, patients who were administered openly analgesics, required only half the dose compared to the patients who were administered analgesics covertly. So merely knowing that one receives analgesics appears to have reduced the pain (Amanzio et al., 2001). So, the effects of CAM might be useful after all, but there are several problems CAM might entail, which cannot be ignored. First, CAM, against common belief, has side effects indeed. Substances used in some CAM approaches are unregulated and potentially dangerous. Acupuncture can cause infections within the skin if hygiene is not upheld. Damages to the spine can result from chiropractic interventions. Second, CAM has opportunity costs. When focusing on CAM and specific conventional treatment is in dire need, delaying or ignoring helpful treatment can even be life-threatening in the worst-case scenario. Third, practitioners should be aware of CAM's implications and be mindful of those. Promoting CAM actively instead of some treatment with specific effects can damage professional integrity (Swan et al., 2015). In return, this could damage the reputation of clinical psychology (Lilienfeld, 2012), or one might act unethically by deceiving patients (Beedie et al., 2018). In conclusion, the line that distinguishes CAM's effects as useful or

dangerous is blurry, and efforts to draw this line are philosophical in nature (Tonelli & Callahan, 2001).

Meanwhile, regardless of the proposed efficacy of CAM, many patients, often even with chronic diseases (Guillaud et al., 2019) or psychological disorders (White, 2009), are using CAM to combat their ailments. When treatment is difficult, patients might seek unconventional ways (Spanier et al., 2003), and CAM, as a phenomenon of the patient agency, is largely ignored. In that regard, mostly no efforts have been made to create questionnaires to investigate attitudes toward CAM in the public (except see McFadden et al., 2010). Most questionnaires focus on primary health-care providers to investigate their attitudes toward CAM and whether they prescribe CAM to their patients (McFadden et al., 2010). Therefore, to combat this lack of questionnaires and to bring back patients into the center of focus when it comes to CAM, the present study created a General Attitudes towards CAM Scale (GACAMS). While validating this new scale, relationships between attitudes on CAM and personality, anti-scientific beliefs (ASB), and beliefs in conspiracy theories (CTs) have been investigated. Furthermore, those relationships between personality, ASB, and beliefs in CTs with attitudes toward CAM can be seen as an additional process to validate the new questionnaire. This can be seen as a contribution towards convergent validity.

Belief in conspiracy theories and science denial.

Science is a complex endeavor involving complicated tools and analyzing a dizzying array of data, like graphs and statistics (Miller, 2020). In 2019, the National Assessment of Educational Progress (NAEP) conducted a survey revealing that 41% of twelfth-grade students were below basic scientific literacy (The National Assessment of Educational Progress, 2019). Science literacy and education, to that extent, are about increasing knowledge and gaining cognitive tools to understand our surroundings and overcoming biases, such as the tendency to believe in easy solutions for complex problems (Van Prooijen, 2017). Nevertheless, human beings are, in essence, naïve scientists with an urge to understand reality (Heider, 1958, as cited in Jylhä et al., 2022), but with a limiting understanding of research methodologies and principles, most must trust science as an epistemic authority on grasping and defining reality. In doing so, rendering oneself dependent on the expertise and knowledge of scientific experts. Therefore, in science, trust is of fundamental importance (Hendriks et al., 2016). Any alienation upon this dependency of the public with such an epistemic authority might be detrimental to the relationship (Harris, 2023). Such alienation can occur by losing trust (Hendriks et al., 2016) because science's

abilities, benevolence, and integrity are perceived as lacking (Mayer et al., 1995). Mere exposure to health-related CTs appears to decrease trust in health authorities and decrease intentions to seek help from such authorities. CTs imply a powerful network of actors working secretly for their mischievous goals to the detriment of the public good (Natoli & Marques, 2020).

Alienation can also occur when laypeople feel like their experiences and knowledge are delegitimized by the epistemic authority and don't want to be patronized by it (Harambam & Aupers, 2014). In this instance, the urge to reject such an epistemic authority might be high, for epistemic autonomy wants to be achieved (Harris, 2023). Indeed, reactance, a motivational state to restore freedom (Rosenberg & Siegel, 2018), appears to be linked with lower trust in doctors, negative attitudes towards vaccines, and a higher likelihood to use CAM (Soveri et al., 2020). Thus, some may adopt beliefs in CTs to facilitate the reassertion of epistemic autonomy (Harris, 2023). This was observable during the COVID-19 pandemic, where belief in CTs was related to positive attitudes toward alternative treatments that lack scientific evidence (Bierwiazzonek et al., 2022).

Personality and CAM

Over the last two decades, scientific interest in personality and CAM attitudes appear to have dried out. In the early 21st century, some investigations have been conducted regarding personality, while of the Big -Five Personality dimensions (Costa & McCrae, 2008), only Openness to Experience and Agreeableness appeared to link with CAM attitudes, while Extroversion appears to have a negative correlation with CAM use (Honda & Jacobson, 2005; Sirois & Purc-Stephenson, 2008). A recent study on this matter using the HEXACO model (Ashton & Lee, 2009) found links of CAM attitudes and Agreeableness (Aßmann & Betsch, 2023).

Meanwhile, research on personality and placebo response suggests a link between psychological traits and endogenous opioids (Colloca & Benedetti, 2016). Specific facets of Agreeableness and neuroticism of the NEO Personality Inventory-Revised (Costa & McCrae, 2008) appear to predict 25% placebo responsiveness to pain and 27% of the nucleus accumbens (NAc) μ -opioid system activation during placebo administration (Peciña et al., 2013).

Present study

The present study uses a German-speaking sample to create a general attitude toward CAM scale (GACAMS). This new scale will be used later to test the influences of personality, belief in CTs, and ASB on such attitude changes toward CAM. This new scale will be validated via two procedures. First, this new scale will be analyzed on its factorial structure via explorative factor analysis (EFA). As an additional validation process, the new scale will also be tested to see if it can detect changes in attitude towards CAM. Based on the *unimodal of persuasion*, when the information is kept short, and therefore less processing effort is required, attitude change can occur. If the new scale can measure attitudes toward CAM, it should also be able to detect a change in such attitudes toward CAM induced by the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013). Participants will be shown neutral, negative, or positive information about CAM to induce such attitude changes while using the new GACAMS to capture it. Therefore, hypothesizing a significant change in within-subject GACAMS scores before and after manipulation, a significant difference in between-subject GACAMS scores of informational conditions, and a significant interaction of manipulation and information group conditions.

Furthermore, it will also be investigated if certain constructs may influence changes in attitudes toward CAM during this manipulation. The constructs which will be investigated are beliefs in CTs, ASB, and personality. The following hypotheses are therefore formulated. For personality, this means each Subscale of the HEXACO-PI-R (Ashton & Lee, 2009; Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, Openness to Experience) will have an influence on CAM attitude changes, meaning its interaction will be significant. In the same way, the belief in CTs and ASB each will have an influence on CAM attitude change, also meaning each of their interactions will be significant on their own.

Methods

Participants

The survey was held online, using ScoSci Survey (Leiner, 2019) to create it. Initially, a required sample size of $n = 782$ was calculated and pre-registered. This sample size was calculated via G*Power (Faul et al., 2009) with a two-tailed correlation with a small effect size of $r = .10$ (Cohen, 1988), an alpha error probability of .05, and a power of .80 in mind. This was done to guarantee a sample size big enough to validate the new scale.

Ultimately, the recruitment was halted after three months because of low return rates. The survey reached 1279 clicks, with only 231 finished questionnaires. In the end, a total of 231 German-speaking participants were recruited via convenience sampling over a timeframe of December 2022 until February 2023. Recruitment occurred via Facebook, SurveyCircle (SurveyCircle, 2023), and emailing friends and acquaintances. For Facebook, the survey was posted in groups twice, with at least two weeks between the first and second post. The post invited the participants to participate in a survey on attitudes and opinions toward CAM. While some of the groups on which the survey was posted focused on health, spirituality, and CAM, overall, the groups contacted were diverse regarding their focus. Friends and acquaintances were called first via phone. They were given the same information about the survey as was written in the Facebook posts. Then if they mentioned interest in participating, they were sent an email containing a link to the survey. SurveyCircle is a website where surveys can be posted to recruit participants. By participating in other studies, points can be acquired, increasing the visibility of one's own survey. On the first page, explanations regarding the modalities, background, and anonymity of the survey and their participation were given, and people had to give their consent to continue. At the end of the survey, participants were thanked for participating. During the survey, the participants were given information about CAM. Therefore, in the end, for debriefing purposes, it was also disclosed that the medical information presented in each group shouldn't be taken seriously since no medical authority was involved in generating the information provided. No compensation for participation was given besides the opportunity to check for their results in comparison with the results of the other participants after the study was concluded (in a manner that anonymity is still guaranteed). The survey took about 30 minutes to complete. As pre-registered, participants under the age of 18 were excluded, which were none in the sample, and participants with a relative speed index of ≥ 2 , i.e., responding twice as fast as the average participant (Leiner, 2019), were also excluded ($n = 13$). Ultimately, the sample consisted of $N = 218$ (70% female; age: $M = 40.47$ years, $SD = 15.09$, range: 19 – 71). $N = 130$ Participants indicated German as their native language. Participants were from Austria ($n = 32$), Germany ($n = 88$), Swiss ($n = 4$), or Luxemburg ($n = 79$), while 15 participants were from other countries which were not represented as an option in the survey (i.e., Italy, Hungary, Poland, or France). Sample characteristics are summarized in Table 1.

In addition to the pre-registered exclusion criteria, participants with 20% or more missing data will be excluded for the respective scale only. Therefore, for hypotheses testing (mixed analysis of variance and mixed analysis of covariance), additional $N = 6$ participants

were excluded. $N = 212$ participants were randomly assigned to one of three informational conditions: Pro-CAM ($n = 71$), Contra-CAM ($n = 73$), and control ($n = 68$).

Table 1.

Sociodemographic Sample Characteristics

Characteristics	<i>N</i>	%
Sex		
Female	153	70.2%
Male	62	28.4%
Divers	3	1.4%
Nationality		
Austria	32	14.7%
Germany	88	40.4%
Swiss	4	1.8%
Luxemburg	79	36.2%
Other	15	6.9%
German native speaker		
Yes	130	59.6%
No	88	40.4%
Relationship status		
Single	53	24.3%
In a relationship	85	39.0%
Married	70	32.1%
Separated/Divorced	5	2.3%
Widowed	5	2.3%
Highest education		

Compulsory school	3	1.4%
Apprenticeship diploma	19	8.7%
Secondary vocational school	11	5.0%
Matura/Abitur	52	23.9%
Master craftsman's diploma	5	2.3%
Bachelor's degree	73	33.5%
Master's or equivalent	41	18.8%
PhD/Doctorate	3	1.4%
Other	11	5.0%

Note. n = number of participants.

2.2. Materials

This study was pre-registered before the collection of any data. The pre-registration protocol, deviations from pre-registration, supplementary materials, and the data file and SPSS syntax for these analyses are available at <https://osf.io/uhzxd/>. The following self-report scales and materials described below were used in the present study.

Creating the general attitude on complementary and alternative medicine scale.

Problems arise quickly when formulating Items for a questionnaire to assess attitudes toward CAM. Given its vast and heterogeneous field, depending on how CAM is operationalized and defined, what counts as CAM and the prevalence of CAM consumption might differ significantly from study to study (Guillaud et al., 2019). This ambiguity might confuse future participants, making them unsure of what exactly they are being asked for.

To reduce ambiguity, an effort has been made to formulate a pool of items and materials which emphasize the more esoteric categories of CAM while also allowing the participants to project other categories of CAM within the questions asked if they so desire. Creating items assessing the "essence of CAM" – to engage consciously with methodologies and interventions not part of conventional medicine.

An overview of the literature regarding CAM has been established to achieve the insight needed to create a pool of potential items. Two particular papers were expedient in

establishing a framework to formulate such items. On the one hand, the attempt to define CAM by Teichfischer and Münstedt (2011) and a qualitative interview study on CAM consumption by Odegard et al. (2022). Five aspects regarding the appeal or criticism of CAM within the general discourse were extracted.

First is the aspect of experiences, which means positive personal experiences with CAM, with a high appraisal, valuing such experiences more than any results from conventional medicine and modern science. While also experiences in a historical context have relevance. Many approaches of CAM have a long tradition and have been used over centuries. It is then argued that the experiences of those past generations, which lead to transferring such practices from generation to generation, must indicate their usefulness. Experience is also relevant because past unpleasant experiences with conventional medicine may contribute to their attitude toward conventional medicine and CAM, respectively (McFadden et al., 2010).

Secondly, the aspect of nature is essential in general CAM discourse. Nature is defined as a vital force that can be harnessed through energy, herbs, or other tinctures, enabling the body to heal from within.

The third aspect is the perceived lack of side effects of CAM. In the general discourse, it is believed that CAM is not harmful to the body, while conventional medicine's chemical compounds can be devastating for the body.

The fourth aspect of CAM discourse is about conventional medicine being an institution. Institutions hold power over others, which can elicit deep distrust and belief in CTs (Van Prooijen et al., 2022). Compared to CAM, conventional medicine is centralized within academics and governing institutions. Meanwhile, representatives of CAM are mostly denied membership in those institutions.

The last aspect within the general discourse on CAM is the lack of scientific evidence for the efficacy of CAM. If people are against CAM, it is because of distrust towards pseudoscience and esoteric approaches while holding science and medicine to a higher standard. These five aspects were used as guidelines in creating the pool of items and additional material for this study to assess the "essence of CAM". In the end, 30 items, on a seven-point Likert-scale (1 = *completely disagree*, to 7 = *completely agree*), were created, whereas higher scores indicate favorable attitudes towards CAM ($\alpha = 0.971$).

Creating the Definitions

Before the survey began, participants were shown short definitions for CAM, conventional medicine, and placebo(-effect) to reduce confusion regarding the topics at hand. It was essential to formulate short and clear material not to overwhelm laypersons. Therefore, research was done in literature and internet sites to aggregate relevant information. The material will be described and presented here as in Swami et al. (2013). The survey was held in German with a German-speaking sample. The materials were originally presented in German but were translated into English for this thesis.

Definition of conventional medicine: Besides formulating a detailed definition of CAM, Teichfischer and Münstedt, (2011), also gave a short definition of conventional medicine. Their definition was restated to be used here as a definition for conventional medicine.

Conventional medicine is subject to a rationalized and evidence-based procedure. In conventional medicine, the efficiency of interventions must be tested and proven using the standards of modern science. Family doctors and physicians in clinics will then use those interventions.

Definition for CAM: Bullet points of Teichfischer and Münstedt, (2011) were used to create a definition that could be used for this study. Additionally, a list with multiple examples and explanations of CAM was created. In doing so, it was important to phrase it as much matter of fact as possible not to influence participants while also phrasing it as lay persons might encounter it by researching on their own. Therefore, information was extracted from websites advocating CAM for most examples created, as listed below.

Regarding homeopathy, a flyer was used, which was created to inform people about the pseudoscientific aspects and dangers of homeopathy. Even though this flyer was critical of homeopathy, the definition used here is the same as postulated by enthusiasts of homeopathy (Gesellschaft zur wissenschaftlichen Untersuchung von Parawissenschaften e. V., 2014). For singing bowls, advertisements of such practices were consulted to explain it (e.g., Asia Buddhist Tours & Treks, 2021). For traditional Chinese medicine (TCM), a general website about CAM was consulted in extracting pieces of information (Tschech, 2017). Regarding naturopathy, several naturopathy clinics appeared to use the same definition, which then was used here (e.g., ATOS MVZ Meviva Berlin, 2021).

Complementary and alternative medicine (CAM) describes itself as an approach to healing that prefers tradition and self-experience over scientific results. CAM has

many methodologies with diverse mechanisms of action, which aren't compatible with conventional medicine and modern science. Therefore, CAM is labeled complementary and alternative.

Prominent approaches of CAM and their mechanism of action are listed below:

- *Homeopathy – "like cures like": Substances that trigger symptoms similar to those of a specific illness should be used highly diluted as a cure for said illness.*
- *Singing bowls – At specific frequencies and vibrations, sound waves generated by singing bowls activate the human energy system, which can treat ailments of the body and soul.*
- *Traditional Chinese medicine – Chinese pharmaceuticals, acupuncture, acupressure massage.*
- *Naturopathy – A way of life as nature intended is highly valued, which should activate the inherent abilities of the body to heal on its own from within. Herbs are used in this endeavor while avoiding technologies and modern pharmaceuticals.*

Definition of placebo(-effects): As above, layperson-friendly information was consulted to state the definition of placebo(-effects) to be used in this study (Allgemeine Ortskrankenkasse, 2022).

Placebos are dummy drugs without any inherent effect. The placebo effect emerges when consumed only because of positive expectations, the person in question experiences improved well-being.

Creating the Stimuli

Participants were randomly selected into one of three informational groups regarding CAM. The first group was presented with neutral information about CAM. In contrast, the second group had to read negative information about CAM, and the last group was presented with positive information supporting CAM.

Neutral Information stimulus: This stimulus only mentions the existence of CAM exists.

Some people use complementary and alternative medicine (CAM) to treat their ailments and illnesses.

Negative Information stimulus: Information used here to formulate the negative information condition was mainly taken from a flyer created to warn people of homeopathy and its ways homeopathy (Gesellschaft zur wissenschaftlichen Untersuchung von Parawissenschaften e. V., 2014) while also consulting a site about acupuncture (Warren, 2016).

Representatives of complementary and alternative medicine (CAM) state having the knowledge and skills to channel healing energies within our bodies to heal every ailment and illness. Those practices emerged from esoteric theories.

Homeopathy states, "like cures like". In practice, for example, to treat a bee sting, one should grind down a bee and apply it to the wound. Meanwhile, acupuncture postulates the existence of chakra (energy), which can be activated and laid bare by puncturing specific places on the body with needles.

Nevertheless, neither CAM's postulated mechanism of action nor efficacy could be proven scientifically. Any improvements in well-being can scientifically be traced back to the placebo effect.

Furthermore, contrary to common beliefs, CAM does indeed possess side effects. Many of the employed Preparations (toadstool, snake venom, saliva of rabid dogs, head lice, cockroaches, dog poop, pus, cancer- and leprosy cells, arsenic, mercury, and plutonium) and practices can be hazardous to health and therefore can lead to injuries and poisoning.

Additionally, such healers of CAM undermine conventional medicine and ignore the actual underlying illnesses. They believe it to be more efficient than conventional medicine and therefore advise against treatment from conventional medicine physicians.

Positive Information stimulus: To formulate the positive information stimulus, information from Teichfischer and Münstedt, (2011) and Dorn et al. (2007) was used. A high quantity of papers about acupuncture in cancer research was observed during the literature research. This circumstance was framed to give the impression that modern science has more interest in CAM than most might believe. At last, at a lecture about medicine ethics, a physician with 17 years of experience working in the oncology department was questioned about CAM

treatment and expressed positive effects of CAM on his patients, which was also used to formulate this stimulus.

Conventional medicine is increasingly accepting of Complementary and alternative medicine (CAM). The number of professorships given to representatives of CAM in universities increases overall, and CAM practices get increasingly included in the curriculums of medical students. Currently, acupuncture is increasingly used in cancer research. Even though the postulated esoteric theories of CAM aren't compatible with modern science, many CAM practices promote a balanced and healthy lifestyle.

Increasingly more physicians and patients report success using CAM, reducing symptoms of illnesses and side effects of conventional medicine. Independently from CAM, the positive effects of placebos were already known and successfully used in conventional medicine.

Therefore, such practices can be used complementary to conventional medicine and increase the success rates of treatments. That's why more and more alternative medical practices have become complementary, accepted by, and used to complement conventional medicine.

Personality

For personality, the HEXACO Personality Inventory–Revised 60 Item – German–Version was used (Ashton & Lee, 2009). This personality self-report assessment inventory has six different Subscales, each assessing a specific personality dimension.

Honesty-Humility: This is a 10-item subscale. Participants who score high on this Subscale tend to avoid breaking the rules and to manipulate others for personal gains. High scores also indicate a lack of interest in lavish wealth and luxuries, with no motivation to elevate social status. Items are on a five-point Likert-scale (1 = *strongly disagree*, to 5 = *strongly agree*). "I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed" is an example of an item from this Subscale. Higher Scores indicate higher honesty and humility ($\alpha = 0.719$).

Emotionality: This is a 10-item subscale. Participants who score high on this Subscale tend to experience fear of physical dangers and anxiety in response to life's stresses. Meanwhile also needing emotional support and empathetic and sentimental attachments with others. Items are

on a five-point Likert-scale (1 = *strongly disagree*, to 5 = *strongly agree*). "I sometimes can't help worrying about little things" is an example of an item from this Subscale. Higher Scores indicate higher emotionality ($\alpha = 0.795$).

eXtraversion: This is a 10-item subscale. Participants who score high on this Subscale feel confident about themselves when leading or addressing groups of people. Experience positive feelings of enthusiasm and energy during social gatherings and interactions. Items are on a five-point Likert-scale (1 = *strongly disagree*, to 5 = *strongly agree*). "In social situations, I'm usually the one who makes the first move" is an example of an item from this Subscale. Higher Scores indicate higher extraversion ($\alpha = 0.824$).

Agreeableness (versus Anger): This is a 10-item subscale. Participants who score high on this Subscale can easily control their temper and are lenient to others while forgiving the wrongs they suffered. Participants with high scores are willing to compromise and cooperate with others. Items are on a five-point Likert-scale (1 = *strongly disagree*, to 5 = *strongly agree*). "I rarely hold a grudge, even against people who have badly wronged me" is an example of an item from this Subscale. Higher Scores indicate higher Agreeableness ($\alpha = 0.747$).

Conscientiousness: This is a 10-item subscale. Participants who score high on this Subscale organize their time and physical surroundings while working disciplined towards their goals. Participants with high Conscientiousness strive for accuracy and perfection in their tasks, and when making decisions, they think deliberately and carefully. Items are on a five-point Likert-scale (1 = *strongly disagree*, to 5 = *strongly agree*). "I plan and organize things to avoid scrambling at the last minute" is an example of an item from this Subscale. Higher Scores indicate higher Conscientiousness ($\alpha = 0.764$).

Openness to Experience: This is a 10-item subscale. Participants who score high on this Subscale become absorbed in the beauty of art and nature and are interested in various knowledge domains. They are interested in unusual ideas or people, and it is natural to use their imagination often and freely. Items are on a five-point Likert-scale (1 = *strongly disagree*, to 5 = *strongly agree*). "I would enjoy creating a work of art, such as a novel, a song, or a painting" is an example of an item from this Subscale. Higher Scores indicate higher Openness to Experience ($\alpha = 0.697$).

Believe in general CTs.

To assess belief in general conspiracy, participants had to fill out the German version of the Belief in Conspiracy Theories Inventory (BCTI; Swami et al., 2010; German: Swami et al., 2011). This inventory includes 15 items on a nine-point Likert-scale (1 = *completely false*, to 9 = *completely true*), whereas every item involves a specific well-known conspiracy theory. Higher Scores indicate higher belief in CTs ($\alpha = 0.933$).

ASB

The German version of the Anti-Scientific-Subscale (Swami et al., 2012) of the New Age Beliefs Scale (Yates & Chandler, 2000) was used for ASB. This Subscale includes eight items on a seven-point Likert-scale (1 = *totally unbelievable*, to 7 = *totally believable*).

"Overall, the impact of science on modern civilization has been more for the negative than the good" is an example of an item of this Subscale. Higher Scores indicate higher ASB ($\alpha = 0.783$).

Procedure

Participants were recruited via convenience sampling. Participants got access to the online survey via a link that was provided to them. This online survey was hosted via SociSurvey, and participants completed it at their discretion. At first, Participants were informed about the purpose of this study (investigation of attitudes on CAM) and then had to give their consent before they were able to participate. Right after that, participants had to fill out the sociodemographic questionnaire. Then the participants were provided with the definitions to decrease ambiguity on the topic at hand. After reading the definitions, GACAMS was presented to be filled out, then the HEXACO PI-R had to be completed, and at last, BCTI and ASB had to be completed as well. Afterwards to induce attitude change toward CAM proposed by the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013), participants were presented with one of three Information regarding CAM. SO participants were randomly assigned to one of the three predetermined blocks using a random number generator of the web application (Leiner, 2019). The first group was provided with neutral information about CAM. The second group was provided with negative information about CAM, while the third group had to read positive information about CAM. After reading the information stimulus, participants were again provided GACAMS as a post-test. When

completed, participants were thanked for their participation and debriefed. It was stated that the information presented was not created by a medical authority but was extracted from the internet and should not be taken seriously. Therefore, no information given should be referred to for future health and medical decisions.

Analysis

First of all, Participants, according to the following criteria, were excluded. Participants under the age of 18 and a relative speed index ≥ 2 , i.e., responding was twice as fast as the average participant (Leiner, 2019), were excluded. None of the participants were under the age of 18, but $N = 13$ were excluded because they showed a response time twice as fast as the average participant. In addition, Participants with 20% or higher missing data were excluded as well but for the respective scale only. Therefore, another $N = 6$ participants were excluded only for hypothesis testing. When participants didn't answer a specific item, that missing value was then replaced with the average score of every participant on that item.

Before further analyses were conducted, GACMAS was first tested on its suitability for further factorial analysis. To do so Kaiser-Meyer-Olkin's measure of sampling adequacy and Bartlett's test of sphericity were performed (Tabachnick & Fidell, 2007). Then, to analyze the factorial structure of GACAMS, an EFA using varimax rotation was conducted. It was pre-registered to interpret factors with an eigenvalue of 1.0 as a relevant factor while also consulting the scree-plot (Cattell, 1966). Additionally, Cronbach α was analyzed. The pre-registered procedure described above ended up inconclusive. Therefore, a one-factor structure was forced while *Cronbach alpha if Item Deleted* and *Corrected Item-Total Correlation* was conducted and consulted as a sensitivity analysis.

For the hypothesis testing, first, a manipulation check was done. The time spent on the stimuli page was used to conduct a one-way analysis of variance to check if participants appeared to have read the stimuli. Before further analysis, the total scores of every scale in question were averaged per person for hypothesis testing. Then, for the first three hypotheses, to test for within-subject, between-subject, and interaction of the information condition (neutral information, negative information, and positive information) induced attitude changes, a mixed 3x2 analysis of variance was conducted. For the remaining hypothesis, if the HEXACO subscales believe in CTs and ASB interact with attitude changes induced by the information condition, a mixed 3x2 analysis of covariance was conducted. At last, multicollinearity was screened by analyzing variance inflation factors (VIFs) of all predictors.

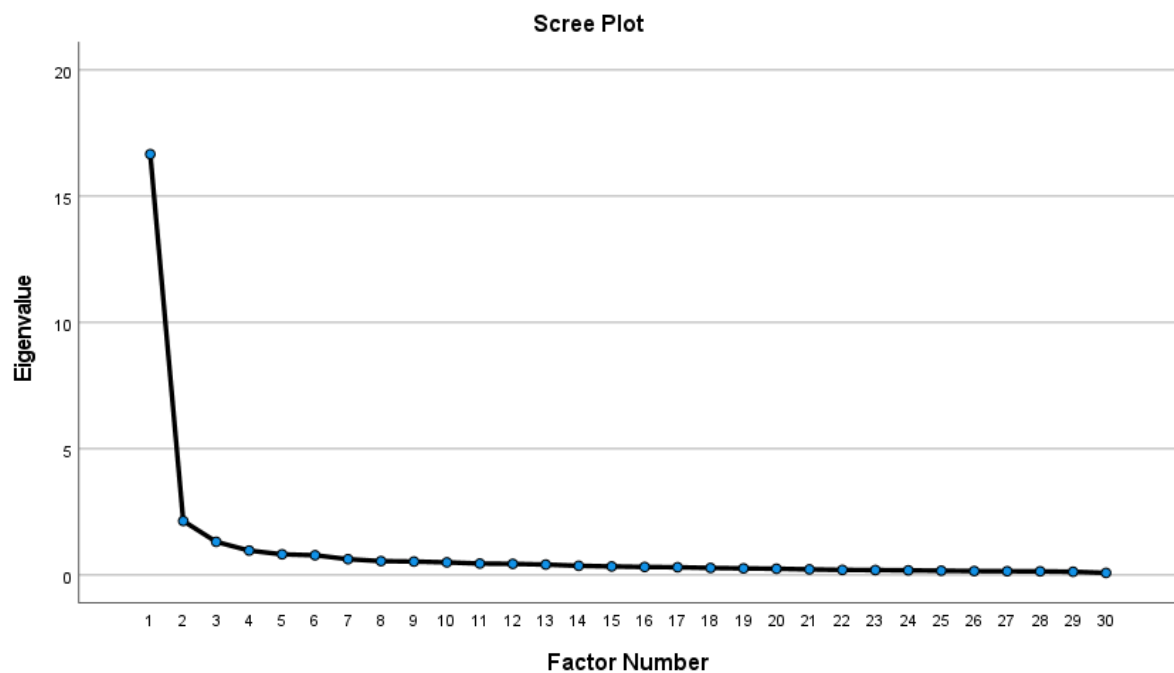
For all statistical tests, significance was set to $p < .05$, and η_p^2 exceeding absolute

values of .01, .06, and .14 were interpreted as small, medium, and large effects, respectively (Norouzian & Plonsky, 2018). All statistical analyses were conducted using IBM SPSS version 28.

Results

Factorial Structure of GACAMS

First, the factor structure of GACAMS needs to be determined. To do so, an EFA with varimax rotation was conducted using the pre-test data. Kaiser-Meyer-Olkin measure of sampling adequacy .96 and Bartlett's test of sphericity $X^2(435) = 5815,386, p < .001$ suggest that the items have enough variance in common to be fit for an EFA (Tabachnick & Fidell, 2007). It was pre-registered to identify factors when eigenvalues (λ) exceed 1.0 while considering the scree-plot (Cattell, 1966). EFA extracted three factors with eigenvalues (λ) higher than 1.0. The first factor explained 25.9% of the variance ($\lambda=7.78$), while the second factor accounted for 21.4% of the variance ($\lambda=6.41$), and the last factor explained 16.1% variance ($\lambda=4.82$). Scree-plot, on the other hand, indicated only one factor, contrasting the number of factors extracted via eigenvalues (λ) (see Figure 1). Under the assumption of three factors, item loadings appear overall low, while many items display loadings of 0.30 (Kline, 1986) or higher across two or all three factors (see Table 2). It was then decided to contrast the loadings of the three factors structure with the loadings of the one-factor structure. Therefore, a second EFA was computed. This time forcing only one factor, as the scree-plot suggested. This one forced factor accounts now for 54.4% of variance ($\lambda=16.32$). Under the assumption of one single factor, all item loadings were over 0.30 (Kline, 1986; see Table 3). Additionally, a sensitivity analysis was done to investigate the one-factor structure. The *Corrected Item-Total Correlation* of each item was satisfactorily high, meaning over 0.30 (Field, 2017). For each item, if deleted, it would have decreased Cronbach's α of the whole scale or remained the same, except for one. Item # 12, if deleted, would increase Cronbach's α , but not by much (for Item-Total Statistics, see Table 4). Nevertheless, based on the additional analysis and findings, it was decided to use all 30 items for this scale, assuming a one-factor structure (Cronbach's $\alpha = .971$).

Figure 1.*Scree-Plot*

Note. Contrary to the number of factors extracted via eigenvalues (λ), the elbow appears already at the second factor. Therefore, the scree-plot implies a one-factor structure.

Table 2.*Rotated Factor Matrix with three extracted Factors*

	Factor		
	1	2	3
16. Mediziner*innen welche KAM verordnen, kann ich nicht ernst nehmen (R).	.810		
11. KAM ist in meinen Augen nur ein esoterischer Irrglaube (R).	.801		
13. KAM bewirkt nur einen Placebo-Effekt (R).	.738		
17. Wer sich auf KAM verlässt, kann mit ernstesten Konsequenzen hinsichtlich der eigenen Gesundheit rechnen (R).	.720		
18. KAM hat eine lange Tradition und hat sich über die Zeit immer wieder als nützlich erwiesen.	.689		.364

1. Komplementäre und alternative Medizin (KAM) ist mindestens genauso effektiv beim Behandeln von Beschwerden und Krankheiten wie die konventionelle Medizin.	.626	.410	.322
30. Damit ich KAM ernst nehmen kann, bräuchte es mehr Beweise für deren Wirksamkeit (z.B. In Form von wissenschaftlichen Studien) (R).	.587	.346	
5. KAM hat weniger Nebenwirkungen als die konventionelle Medizin und ist dabei trotzdem effektiv.	.585	.528	
3. Konventionelle Medizin ist nicht in der Lage die KAM richtig zu verstehen und verunglimpft somit die Erfolge der KAM.	.565	.402	.319
26. Nur weil die konventionelle Medizin ihren Sitz an den Universitäten hat, müssen deren Praktiken nicht unbedingt besser als die der KAM sein.	.565	.480	.366
24. KAM ist Teil meines Lebensstils und ich nutze es regelmäßig, um meine Gesundheit zu fördern.	.548	.407	.484
9. KAM schont meinen Körper im Gegensatz zur konventionellen Medizin.	.534	.435	.444
12. KAM wirkt als Ergänzung zur konventionellen Medizin.	.530		.363
6. Es gibt heilende Kräfte, welche die moderne Wissenschaft nicht erfassen und verstehen kann.	.526		.467
8. Bevor ich zum/zur Ärzt*in gehe, versuche ich es erstmal mich selbst mit KAM zu behandeln.	.515	.447	.377
19. In Sachen Heilung ist die Natur immer noch am effektivsten.	.488	.443	.460
10. Ich traue der konventionellen Medizin nicht.		.803	
4. Durch KAM könnte die konventionelle Medizin überflüssig werden.		.731	
15. Ich habe Angst, dass die Chemie der konventionellen Medizin mehr Schaden an meinem Körper verursacht als es hilft.		.696	.368
25. Ich habe schlechte Erfahrungen mit der konventionellen Medizin gemacht und nutze deswegen vermehrt die KAM.		.651	.315
7. Ich bevorzuge KAM gegenüber der konventionellen Medizin	.593	.626	.314
29. Ärzt*innen sind mir in ihrem Umgang zu kalt und distanziert, da bevorzuge ich die Unterstützung einer/eines Heilpraktiker*in der KAM.		.625	.469
2. KAM kann auch zur Behandlung von schweren Erkrankungen erfolgreich eingesetzt werden (z.B. Krebs).	.458	.561	

20. Das Wissen über Krankheiten und Gesundheit, welches von Generation zu Generation übermittelt und verfeinert wurde schätze ich mehr als solches das kürzlich in einem Labor ermittelt wurde.	.460	.481	.389
23. Ich fühle mich von Mediziner*innen bei meinen Anliegen nicht ernst genommen.		.455	.381
27. Mir ist es für meine Gesundheit wichtig ein Leben im Einklang mit der Natur und meiner Spiritualität zu führen.			.675
22. Der spirituelle Aspekt meines Wohlbefindens und meiner Gesundheit wird von der konventionellen Medizin nicht berücksichtigt.			.673
21. Mein Körper ist Teil der Natur also brauche ich bei Problemen auch Unterstützung aus der Natur.	.420	.318	.650
28. Ich als Individuum habe deswegen auch individuelle Bedürfnisse hinsichtlich meiner Gesundheit und die konventionelle Medizin bietet mir nur Behandlungen an, welche für die Massen konzipiert wurde.	.308	.529	.559
14. Harmonie, Gleichgewicht und Nähe zur Natur würden schon die Krankheiten der meisten Menschen heilen können.	.357	.366	.555

Note. Items indicated with (R) are reversed. Convergence was achieved after eight rotations.

Table 3.

One-Factor forced-entry Factor Matrix

	Factor
	1
7. Ich bevorzuge KAM gegenüber der konventionellen Medizin	.901
24. KAM ist Teil meines Lebensstils und ich nutze es regelmäßig, um meine Gesundheit zu fördern.	.833
26. Nur weil die konventionelle Medizin ihren Sitz an den Universitäten hat, müssen deren Praktiken nicht unbedingt besser als die der KAM sein.	.827
9. KAM schont meinen Körper im Gegensatz zur konventionellen Medizin.	.820
5. KAM hat weniger Nebenwirkungen als die konventionelle Medizin und ist dabei trotzdem effektiv.	.813
1. Komplementäre und alternative Medizin (KAM) ist mindestens genauso effektiv beim Behandeln von Beschwerden und Krankheiten wie die konventionelle Medizin.	.803

19. In Sachen Heilung ist die Natur immer noch am effektivsten.	.803
18. KAM hat eine lange Tradition und hat sich über die Zeit immer wieder als nützlich ,erwiesen.	.796
28. Ich als Individuum habe deswegen auch individuelle Bedürfnisse hinsichtlich meiner Gesundheit und die konventionelle Medizin bietet mir nur Behandlungen an, welche für die Massen konzipiert wurde.	.782
8. Bevor ich zum/zur Ärzt*in gehe, versuche ich es erstmal mich selbst mit KAM zu behandeln.	.781
21. Mein Körper ist Teil der Natur also brauche ich bei Problemen auch Unterstützung aus der Natur.	.778
11. KAM ist in meinen Augen nur ein esoterischer Irrglaube (R).	.774
15. Ich habe Angst, dass die Chemie der konventionellen Medizin mehr Schaden an meinem Körper verursacht als es hilft.	.772
20. Das Wissen über Krankheiten und Gesundheit, welches von Generation zu Generation übermittelt und verfeinert wurde schätze ich mehr als solches das kürzlich in einem Labor ermittelt wurde.	.771
3. Konventionelle Medizin ist nicht in der Lage die KAM richtig zu verstehen und verunglimpft somit die Erfolge der KAM.	.758
2. KAM kann auch zur Behandlung von schweren Erkrankungen erfolgreich eingesetzt werden (z.B. Krebs).	.745
29. Ärzt*innen sind mir in ihrem Umgang zu kalt und distanziert, da bevorzuge ich die Unterstützung einer/eines Heilpraktiker*in der KAM.	.739
13. KAM bewirkt nur einen Placebo-Effekt (R).	.728
6. Es gibt heilende Kräfte, welche die moderne Wissenschaft nicht erfassen und verstehen kann.	.728
14. Harmonie, Gleichgewicht und Nähe zur Natur würden schon die Krankheiten der meisten Menschen heilen können.	.719
16. Mediziner*innen welche KAM verordnen, kann ich nicht ernst nehmen (R).	.707
27. Mir ist es für meine Gesundheit wichtig ein Leben im Einklang mit der Natur und meiner Spiritualität zu führen.	.683
25. Ich habe schlechte Erfahrungen mit der konventionellen Medizin gemacht und nutze deswegen vermehrt die KAM.	.678
10. Ich traue der konventionellen Medizin nicht.	.672

17. Wer sich auf KAM verlässt, kann mit ernsten Konsequenzen hinsichtlich der eigenen Gesundheit rechnen (R).	.670
22. Der spirituelle Aspekt meines Wohlbefindens und meiner Gesundheit wird von der konventionellen Medizin nicht berücksichtigt.	.635
30. Damit ich KAM ernst nehmen kann, bräuchte es mehr Beweise für deren Wirksamkeit (z.B. In Form von wissenschaftlichen Studien) (R).	.634
4. Durch KAM könnte die konventionelle Medizin überflüssig werden.	.608
23. Ich fühle mich von Mediziner*innen bei meinen Anliegen nicht ernst genommen.	.527
12. KAM wirkt als Ergänzung zur konventionellen Medizin.	.386

Note. Items indicated with (R) are reversed. Three iterations were required.

Table 4.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. Komplementäre und alternative Medizin (KAM) ist mindestens genauso effektiv beim Behandeln von Beschwerden und Krankheiten wie die konventionelle Medizin.	103.523	1665.368	.791	.970
2. KAM kann auch zur Behandlung von schweren Erkrankungen erfolgreich eingesetzt werden (z.B. Krebs).	104.257	1666.848	.730	.970
3. Konventionelle Medizin ist nicht in der Lage die KAM richtig zu verstehen und verunglimpft somit die Erfolge der KAM.	103.441	1666.139	.749	.970
4. Durch KAM könnte die konventionelle Medizin überflüssig werden.	105.046	1708.220	.589	.971
5. KAM hat weniger Nebenwirkungen als die konventionelle Medizin und ist dabei trotzdem effektiv.	103.400	1662.722	.798	.970
6. Es gibt heilende Kräfte, welche die moderne Wissenschaft nicht erfassen und verstehen kann.	102.895	1651.932	.721	.970

7. Ich bevorzuge KAM gegenüber der konventionellen Medizin	103.959	1647.968	.884	.969
8. Bevor ich zum/zur Ärzt*in gehe, versuche ich es erstmal mich selbst mit KAM zu behandeln.	103.657	1646.633	.764	.970
9. KAM schont meinen Körper im Gegensatz zur konventionellen Medizin.	102.968	1645.959	.809	.970
10. Ich traue der konventionellen Medizin nicht.	104.780	1691.667	.655	.971
11. KAM ist in meinen Augen nur ein esoterischer Irrglaube (R).	102.225	1651.901	.769	.970
12. KAM wirkt als Ergänzung zur konventionellen Medizin.	101.968	1719.840	.386	.972
13. KAM bewirkt nur einen Placebo-Effekt (R).	102.345	1664.429	.721	.970
14. Harmonie, Gleichgewicht und Nähe zur Natur würden schon die Krankheiten der meisten Menschen heilen können.	103.377	1671.621	.709	.970
15. Ich habe Angst, dass die Chemie der konventionellen Medizin mehr Schaden an meinem Körper verursacht als es hilft.	103.748	1659.003	.755	.970
16. Mediziner*innen welche KAM verordnen, kann ich nicht ernst nehmen (R).	102.023	1662.026	.704	.970
17. Wer sich auf KAM verlässt, kann mit ernstesten Konsequenzen hinsichtlich der eigenen Gesundheit rechnen (R).	102.712	1670.828	.665	.971
18. KAM hat eine lange Tradition und hat sich über die Zeit immer wieder als nützlich erwiesen.	102.565	1658.923	.789	.970
19. In Sachen Heilung ist die Natur immer noch am effektivsten.	103.248	1670.992	.789	.970
20. Das Wissen über Krankheiten und Gesundheit, welches von Generation zu Generation übermittelt und verfeinert wurde schätze ich mehr als solches das kürzlich in einem Labor ermittelt wurde.	103.762	1673.862	.756	.970

21. Mein Körper ist Teil der Natur also brauche ich bei Problemen auch Unterstützung aus der Natur.	103.253	1666.743	.768	.970
22. Der spirituelle Aspekt meines Wohlbefindens und meiner Gesundheit wird von der konventionellen Medizin nicht berücksichtigt.	102.803	1677.099	.630	.971
23. Ich fühle mich von Mediziner*innen bei meinen Anliegen nicht ernst genommen.	103.629	1701.675	.519	.971
24. KAM ist Teil meines Lebensstils und ich nutze es regelmäßig, um meine Gesundheit zu fördern.	103.675	1637.310	.821	.970
25. Ich habe schlechte Erfahrungen mit der konventionellen Medizin gemacht und nutze deswegen vermehrt die KAM.	104.716	1687.754	.663	.971
26. Nur weil die konventionelle Medizin ihren Sitz an den Universitäten hat, müssen deren Praktiken nicht unbedingt besser als die der KAM sein.	103.514	1644.050	.816	.970
27. Mir ist es für meine Gesundheit wichtig ein Leben im Einklang mit der Natur und meiner Spiritualität zu führen.	103.111	1671.455	.674	.971
28. Ich als Individuum habe deswegen auch individuelle Bedürfnisse hinsichtlich meiner Gesundheit und die konventionelle Medizin bietet mir nur Behandlungen an, welche für die Massen konzipiert wurde.	103.606	1657.450	.771	.970
29. Ärzt*innen sind mir in ihrem Umgang zu kalt und distanziert, da bevorzuge ich die Unterstützung einer/eines Heilpraktiker*in der KAM.	104.276	1670.515	.726	.970
30. Damit ich KAM ernst nehmen kann, bräuchte es mehr Beweise für deren Wirksamkeit (z.B. In Form von wissenschaftlichen Studien) (R).	103.868	1677.012	.625	.971

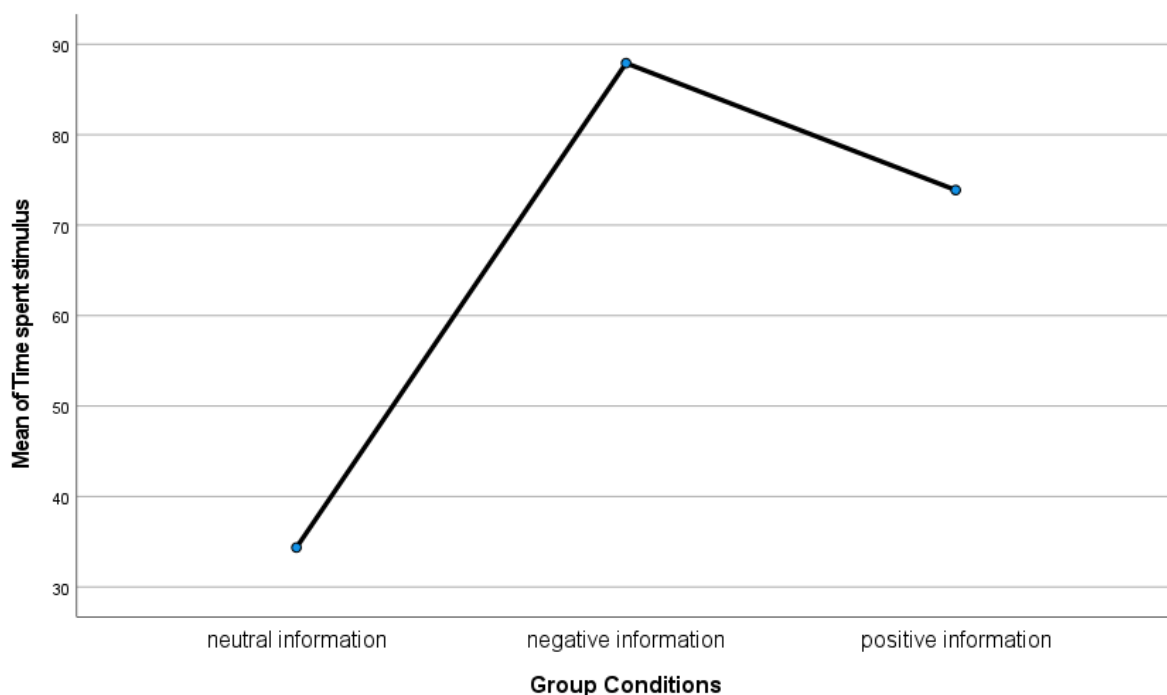
Note. Items indicated with (R) are reversed.

Manipulation check

Time spent on the page, which displayed the information stimulus, was recorded. A one-way analysis of variance was conducted to see if the three groups differed on time spent on this page (neutral: $M = 34.37$, $SD = 69.75$; negative: $M = 87.92$, $SD = 144.84$; positive: $M = 73.89$, $SD = 122.63$), $F(2, 209) = 3.89$ $p = .022$, $\eta_p^2 = .035$. This doesn't imply that participants read the information stimulus. Still, the mean differences of the time spent between groups reflect the length differences of the information given to be read (see Figure 2).

Figure 2.

Mean Plot of Time Spent on the Stimulus Page



Note. The means of time spent on the page of stimuli reflect exactly the length of text of each informational condition.

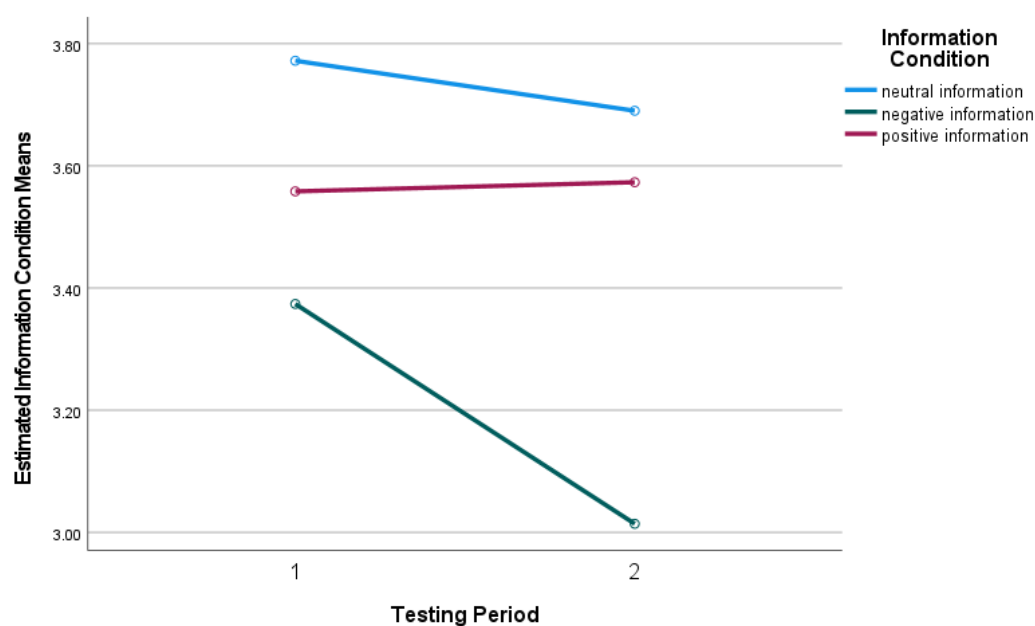
Attitude change

To test if informational framing was detected by the new GACAMS, a 3 x 2 mixed analysis of variance was conducted while using the group conditions (neutral versus negative versus positive) as between-subject factors and the testing period (pre-test versus post-test) as the within-subject factor. The group conditions showed no significant between-subject main

effect $F(2, 209) = 2.64, p = .074, \eta_p^2 = .025$. On the other hand, within-subject main effect of testing period $F(1, 209) = 27.14, p = < .001, \eta_p^2 = .115$, and the interaction between group conditions and testing period $F(2, 209) = 17.28, p = < .001, \eta_p^2 = .142$ ended up significant. Differences between-subject appear to be of small effect size. Differences in the testing period reached a moderate effect size, while the interaction between the testing period and group conditions reached a large effect size. This implies that the informational manipulation caused a change in attitudes towards CAM in the post-test while depending on which informational condition was present, attitude change was affected differently. This indicates that GACMAS was able to detect attitude changes as hypothesized. For Mean Differences in GACAMS scores, see Figure 3.

Figure 3.

Mean Differences in GACAMS Scores



Note. Differences in Pre-and Post-GACAMS-Scores appear to be only within the negative information condition.

Interactions (Personality, Belief in CTs, and ASB) on attitude change.

To test the hypothesized interaction of personality with attitude change, a 3x2 mixed analysis of covariance was conducted. Honesty-Humility appears to have no significant interaction with the attitude changes within all three groups, while also having no effect $F(1,$

206) = .016, $p = .899$, $\eta_p^2 = .000$. Honestly-humility appears not to have influenced attitude changes produced by the informational conditions. The same pattern arose for Emotionality ($F(1, 206) = .287$, $p = .592$, $\eta_p^2 = .001$), eXtraversion ($F(1, 206) = .555$, $p = .457$, $\eta_p^2 = .003$), Conscientiousness ($F(1, 206) = .335$, $p = .564$, $\eta_p^2 = .002$) and Agreeableness ($F(1, 206) = .065$, $p = .800$, $\eta_p^2 = .000$).

On the other hand, Openness to Experience ended up having a significant interaction on attitude change while having a small effect ($F(1, 206) = 4.573$, $p = .034$, $\eta_p^2 = .022$).

Meaning depending on which informational condition was occurring, Openness to Experience had a different influence on GACAMS scores.

Besides the pre-registered hypothesis testing, exploratory analyses of personality influence on GACAMS scores were conducted. Honesty-Humility ($F(1, 206) = 5.072$, $p = .025$, $\eta_p^2 = .024$) and Agreeableness ($F(1, 206) = 4.302$, $p = .039$, $\eta_p^2 = .020$) appear to have a significant small effect on attitudes towards CAM. Participants with higher Honesty-Humility and Agreeableness scores tend to have higher GACAMS scores. This appears to be not the case for the remaining HEXACO Personality traits. No significant link of Conscientiousness ($F(1, 206) = .008$, $p = .927$, $\eta_p^2 = .000$) and Openness to Experience ($F(1, 206) = .269$, $p = .604$, $\eta_p^2 = .001$) with GACMAS could be found. Meanwhile, Emotionality ($F(1, 206) = 2.006$, $p = .158$, $\eta_p^2 = .010$) and eXtraversion ($F(1, 206) = 2.288$, $p = .132$, $\eta_p^2 = .011$) were also not significant, but displayed a small effect.

Exactly as for personality, to test the hypothesized interactions of belief in CTs and ASB beliefs with attitude changes, a 3x2 mixed analysis of covariance was conducted. Believe in CTs ($F(1, 206) = 4.615$, $p = .033$, $\eta_p^2 = .022$) and ASB ($F(1, 206) = 5.558$, $p = .019$, $\eta_p^2 = .026$) ended up significant, while also displaying a small effect. Therefore, both appear to have each a different influence on GAGCAMS scores, depending on which informational condition was active. Exploratory analysis was conducted here on the influences of belief in CTs and ASB beliefs on GACAMS scores as well. Both believe in CTs ($F(1, 206) = 119.655$, $p < .001$, $\eta_p^2 = .367$) and ASB ($F(1, 206) = 217.756$, $p < .001$, $\eta_p^2 = .514$) were significant, while having a large effect. Participants with higher beliefs in CTs and higher ASB each ended up having higher GACAMS scores.

All VIFs were below three, which indicates that no relevant multicollinearity was present within the used predictors.

Discussion

This study aimed to create a new scale to assess attitudes towards CAM. Then it was tested if the new scale can detect attitude changes induced by the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013) using three different information conditions (neutral, negative, and positive) regarding CAM. Furthermore, it was then tested if changes in attitudes towards CAM are influenced by personality, belief in CTs, and ASB. While CTs and ASB were also used here as a process to check for convergent validity. In the end, this endeavor resulted in the creation of GACAMS. During its creation, it was attempted to identify and consider every aspect relevant to attitudes towards CAM according to literature. Therefore, in theory, this scale assesses general attitude towards CAM by asking all those relevant topics. This was tested statistically via EFA, which was initially inconclusive. Eigenvalue and scree-plot showed contradicting numbers of extracted factors. According to the eigenvalues, the three-factor structure produced a factor matrix with many cross-loadings while showing mostly lower loadings for each item. This three-factor structure was, therefore, not employable. It was then consulted the scree-plot, which indicated only one factor. A second EFA with a forced one-factor structure revealed a satisfying factor matrix with high loadings on all the items. This alone was not evidence enough for a one-factor structure. Therefore, to be thorough, a sensitivity analysis was conducted. *Cronbach's α if Item Deleted* showed no real increase in Cronbach's α for each item when deleted, except for Item # 12. Meanwhile, *Corrected Item-Total Correlations* also ended up satisfyingly high for each item. Item # 12 might have less information since its statement (CAM can be used complementary to conventional medicine) can be agreed upon by most, except those with extreme attitudes toward CAM. But it was decided to keep this item in GACAMS because its increase of Cronbach's α when deleted was barely noticeable.

The next step to validate GACMAS was to test if it could assess attitude changes induced by the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013). Indeed, GACMAS detected significant within-subject pre-post-test attitude changes while exhibiting a moderate effect, and the interaction of the manipulation and informational conditions ended up as well significant with a large effect. Between-subject effects were not significant but showed a small effect. Therefore, the data suggests that GACAMS can be used to assess attitudes toward CAM as intended. Interesting to point out, is that the pre-post-test score difference of the negative information condition ended up far higher than the difference of the positive informational condition. A possible explanation could be that at baseline, most

people could be neutral towards CAM and might not know much about CAM. They maybe dabble with it and don't mind it existing. Meanwhile, most people also generally trust science and highly value information from scientific sources (Hendriks et al., 2016). The negative information stimuli ridiculed CAM as a pseudoscience. This might have triggered some cognitive dissonance (Festinger, 1957). Participants were harsher with CAM the second time they were asked. The positive information stimuli tried to establish some scientific legitimacy for CAM, which appeared not as impactful, and therefore, positive attitude change was not as pronounced as negative attitude change toward CAM.

Interactions of belief in CTs and ASB on CAM attitudes ended up significant, the same as the link between belief in CTs and ASB with CAM attitudes. This connection is well-established in the literature (Andrade, 2020). Due to CTs, some might oppose and reject the scientific method (Grimes, 2016) and go for alternatives (Bierwiazzonek et al., 2022). So, replicating such interactions with GACAMS can be interpreted as convergent validity.

Personality appears to not influence attitude change towards CAM, except Openness to Experience. This phenomenon might not be exclusive to CAM. High Openness to Experience is described as curious, being inquisitive about various domains of knowledge (Ashton & Lee, 2009), therefore, maybe handling information differently than participants with lower Openness to Experience. The information stimuli had a perhaps different impact in relation to Openness to Experience. Research suggests that individuals with higher Openness to Experience are less susceptible to social proof persuasion. In ambiguous situations, individuals with high Openness to Experience are less likely to conform to the beliefs and behaviors of others (Oyibo & Vassileva, 2019). Participating in this study may have been experienced as an ambiguous situation, and participants with high Openness to Experience were, therefore, less likely to consent to the information stimuli. There are parallels between the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013) deployed here and social proof persuasion. This could explain these findings.

One finding was consistent with the literature regarding links between CAM attitudes and personality. As described in the literature, Agreeableness appears to have a link with CAM attitudes (Aßmann & Betsch, 2023; Sirois & Purc-Stephenson, 2008). While here, the link between Openness to Experience and CAM attitudes ended up insignificant. Openness to Experience, in general, is considered to be linked with CAM attitudes. Still, it appears to be related to the variety of CAM providers people with higher Openness to Experience tend to try out (Sirois & Purc-Stephenson, 2008). The interaction between Openness to Experience and CAM attitudes might be more complex, as described above. People with high Openness

to Experience might be more willing to try CAM but are, in the end, less likely to be convinced by CAM. Further research is needed to investigate such possible interactions in better detail. At last, in contrast to another study using the HEXACO model (Aßmann & Betsch, 2023), this study found a link between Honesty-Humility and CAM attitudes. As a reminder, the analyses on links between personality and CAM attitudes were explorative in nature.

As a limitation of this study, it should be pointed out once again that this study was underpowered, which means the data used possessed less information than required, so any findings here are prone to Type I Errors. Therefore, any effects found here might be due to a random error, which must be considered when interpreting the results (Akobeng, 2016).

In the introduction, it was laid down why CAM is a controversial and complicated topic to tackle. Concerns are mostly because of patient safety (Swan et al., 2015). Therefore, understanding CAM better and how it is perceived by the general public is of the essence. GACMAS might be useful in such research endeavors.

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List of Figures

FIGURE 1. SCREE-PLOT	19
FIGURE 2. MEAN PLOT OF TIME SPENT ON THE STIMULUS PAGE	26
FIGURE 3. MEAN DIFFERENCES IN GACAMS SCORES	27

List of Tables

TABLE 1 SOCIODEMOGRAPHIC SAMPLE CHARACTERISTICS.	8
TABLE 2 ROTATED FACTOR MATRIX WITH THREE EXTRACTED FACTORS.	19
TABLE 3 ONE-FACTOR FORCED - ENTRY FACTOR MATRIX.	21
TABLE 4 ITEM-TOTAL STATISTICS.....	23

Appendix A

Abstracts in English and German

Abstract (English)

This study aimed at creating a new scale assessing attitudes towards complementary and alternative medicine (CAM) in the general public. In doing so, a German-speaking sample was recruited to participate in this study. Explorative factor analysis, *Corrected Item-Total Correlation*, and *Cronbach's α if Item Deleted* suggest a factorial structure of one factor, which accounts for 54.4% of variance ($\lambda=16.32$). As an additional validation process, it was also tested if the new scale could detect attitude changes induced by the *unimodal of persuasion* (Erb et al., 2003; Swami et al., 2013). If it is designed to assess attitudes towards CAM, it should also be able to assess changes in such attitudes. In order to do so, participants were randomly selected to one of three informational conditions (neutral, negative, or positive towards CAM) and asked to complete the new questionnaire once more (post-test). The results of the 3 x 2 mixed analysis of variance show a change in attitude scores towards CAM, while depending on which informational condition was present, attitude change was affected differently. This suggests that the new scale was also able to detect changes in attitudes. It was also tested if personality, beliefs in conspiracy theories (CTs), and anti-scientific beliefs (ASB) interact with attitude change towards CAM. The results of beliefs in CTs and ASB were consistent with literature, which can be seen as a contribution towards convergent validity. Whereas Openness to Experience appeared to be less affected by the *unimodal of persuasion*.

Abstract (German)

Diese Studie versucht eine neue Skala zur Erfassung der Haltung gegenüber der komplementärer und alternativer Medizin (KAM) in der Gesellschaft zu erstellen. Dafür wurde eine deutschsprachige Stichprobe rekrutiert. Die explorative Faktoranalyse, *korrigierte Itemtrennschärfe* und *Cronbachs α wenn Item weggelassen* suggerieren eine faktorielle Struktur von einem Faktor, welcher 54.4% der Varianz erklären soll ($\lambda=16.32$). Als weiterer Validationsprozess wurde auch getestet, ob die neue Skala auch die Änderungen einer solchen Haltung erfassen kann. Diese Änderung sollte mittels dem *Unimodal der Überredung* induziert werden (Erb et al., 2003; Swami et al., 2013). Dafür wurden die Teilnehmer*innen zufällig in einer der drei Versuchsgruppen zugeteilt (neutrale, negative, oder positive Informationen hinsichtlich KAM) und mussten danach nochmals den Fragebogen beantworten (post-Test). Die Ergebnisse der 3 x 2 Varianzanalyse zeigten eine Änderung der Haltung gegenüber KAM, welche auch anders beeinflusst wurde, abhängig davon welche Information gezeigt wurde. Dies deutet darauf hin, dass die neue Skala auch solche Änderungen erfassen kann. Es wurde auch getestet, ob Persönlichkeit, Glaube an Verschwörungstheorien (VT) und anti-wissenschaftliche Ansichten (AWA) mit der Haltungsänderung gegenüber KAM interagiert. Die Ergebnisse von Glauben an VT und AWA stimmen mit der Literatur überein, was als Beitrag zu konvergenter Validität gesehen werden kann. Währenddessen Offenheit für Erfahrung weniger vom *Unimodal der Überredung* beeinflusst zu werden scheint.

Appendix B

Deviations from pre-registration

1. It was pre-registered to recruit a sample of $N = 782$. In the end, a sample size of only $N = 231$ was achieved.
2. As an additional exclusion criterion, it was added that participants with 20% or more missing data would be excluded for the respective scale only. This affected $N = 6$ participants, who were then excluded.
3. Analysis of the Complementary, Alternative, and Conventional Medicine Scale (CACMAS; McFadden et al., 2010) using a German-speaking sample was abandoned. The pre-registration method of EFA was unfit for such a research question.
4. For hypothesis testing, it was pre-registered to utilize a 3x2 mixed analysis of covariance for all hypotheses. The 3x2 mixed analysis of covariance was meant to be used for the interactions of personality, BCTI, and ASB. Ultimately, a mixed analysis of variance was used for the hypotheses of between-subject, with-subject, and their interaction.
5. As inference criteria, it was pre-registered to interpret η^2 exceeding absolute values of .01, .06, and .14 as small, moderate, or large effects while stating those are the guidelines by Norouzian and Plonsky (2018). Ultimately, this was a misunderstanding. The actual guidelines by Norouzian and Plonsky (2018) are that η_p^2 exceeding absolute values of .01, .06, and .14 should be interpreted as small, medium, and large effects, respectively. The latter was used. This is precisely the mistake Norouzian and Plonsky (2018) warn about.

Appendix C

Material: Definitions and Information (German)

Definitions

Konventionelle Medizin:

Die konventionelle Medizin, auch unter Schulmedizin bekannt, unterliegt einem rationalisierten Prozedere. Behandlungsverfahren der konventionellen Medizin müssen evidenzert sein. Dies bedeutet, dass die Wirksamkeit von Behandlungen, anhand der Standards der modernen Wissenschaft, erfasst und nachgewiesen worden sein müssen. Diese Verfahren sind dann solche welche von Hausärzt*innen und in Krankenhäusern angewendet werden.

Komplementäre und alternative Medizin (KAM):

Komplementäre und alternative Medizin (KAM) versteht sich als eine Heilkunde, welche mehr auf Tradition und Selbsterfahrung Wert legt als auf wissenschaftliche Befunde. KAM hat viele verschiedene Ansätze mit unterschiedlichen Wirkmechanismen, solche, die nicht mit der konventionellen Medizin und modernen Wissenschaft kompatibel sind. Deshalb wird KAM als komplementär und alternativ bezeichnet.

Prominente Ansätze und deren Wirkmechanismen sind zum Beispiel:

- Homöopathie – Ähnlichkeitsprinzip: Substanzen, die ähnliche Symptome hervorrufen wie eine bestimmte Krankheit, sollen stark verdünnt als Heilmittel für diese Krankheit fungieren.
- Klangschalen – Durch Klangschalen erzeugte Schallwellen und Vibrationen sollen bei bestimmten Frequenzen das menschliche Energiesystem anregen und somit körperliche wie auch seelische Leiden behandeln.
- Traditionelle chinesische Medizin – chinesische Arzneiheilkunde, Akupunktur und Fingerdruck-Massagen.
- Naturheilkunde – Wert wird auf eine naturgemäße Lebensweise gelegt und versucht die körpereigenen Fähigkeiten zur Selbstheilung zu nutzen. Dabei wird auf

Arzneimittel (mit Ausnahme von Heilpflanzen) und technologische Hilfsmittel verzichtet.

Placebo Effekt:

Placebos sind Scheinmedikamente die an sich keine Wirkung haben. Der Placebo-Effekt entsteht, wenn Jemand ein solches Scheinmedikament einnimmt und schon nur durch deren positiven Erwartungen an dieses Scheinmedikament, diese Person eine Verbesserung des Wohlbefindens wahrnimmt.

Information (German)

Neutrale Information:

Manche Menschen nutzen die komplementäre und alternative Medizin (KAM) um ihre Beschwerden und Krankheiten zu behandeln.

Negative Information:

Vertreter*innen der komplementären und alternativen Medizin (KAM) behaupten, sie hätten das Wissen und die Fähigkeit, die heilende Energie, welche in der Natur und im Geiste innewohnt, zu kanalisieren, um sämtliche Beschwerden und Krankheiten zu heilen. Diese Praktiken werden mit esoterischen Theorien erklärt.

Bei der Homöopathie soll Ähnliches auch Ähnliches heilen können. So sollen zum Beispiel bei einem Bienenstich, zerriebene Bienen auf die Schwellung aufgetragen werden, um diese zu lindern. Bei der Akupunktur werden mit Nadeln auf bestimmte Stellen des Körpers gestochen, um das Chakra (Energie) zu aktivieren oder freizulegen.

Allerdings konnten bis jetzt weder die postulierten Wirkmechanismen noch Behandlungserfolge wissenschaftlich belegt werden. Verbesserung des Wohlbefindens ist wissenschaftlich belegt auf den Placebo-Effekt zurückzuführen.

Gegensätzlich zum allgemeinen Glauben haben viele Anwendungen der KAM Nebenwirkungen. So sind viele der verwendeten Präparate (z.B. Fliegenpilze, Schlangengift, Speichel tollwütiger Hunde, Kopfläuse, Kakerlaken, Hundekot, Eiter, Krebs- und Leprazellen, Arsen, Quecksilber und Plutonium) und Praktiken gesundheitsgefährdend und können zu Verletzungen und Vergiftungen führen. Ein weiteres Risiko ist, dass solche Heiler*innen sich über die konventionelle Medizin stellen und gerne die zugrundeliegenden Erkrankungen ignorieren. Da sie glauben es besser zu wissen, raten sie den Patient*innen davon ab sich von Ärzt*innen behandeln zu lassen.

Positive Information:

Komplementäre und alternative Medizin (KAM) erlangt immer mehr Akzeptanz in der konventionellen Medizin. So kommt es, dass auf Universitäten der Medizin immer mehr Lehrstühle an Vertreter*innen der KAM vergeben werden und Praktiken der KAM ins Curriculum von angehenden Mediziner*innen inkludiert werden. Zum Beispiel, wird zurzeit Akupunktur immer mehr in der Krebsforschung und Behandlung eingesetzt. Auch wenn die postulierten esoterischen Theorien der KAM nicht mit der modernen Wissenschaft kompatibel sind, basieren viele Praktiken darauf ein gesundes ausgeglichenes Leben zu fördern.

Immer mehr Ärzt*innen und Patient*innen berichten von Therapieerfolgen beim Einsatz von KAM, wie zum Beispiel die Linderung der Symptome von Krankheiten und den Nebenwirkungen von konventionellen Behandlungen. So werden auch schon unabhängig von der KAM, Placebo Therapien erfolgreich in der konventionellen Medizin angewendet.

Somit wirken solche Praktiken komplementär zur konventionellen Medizin und erhöhen den Behandlungserfolg. Deswegen wird aus der alternativen Medizin immer mehr eine komplementäre Medizin, welche von der konventionellen Medizin anerkannt und zur Ergänzung angewendet wird.