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DISSERTATION

Selbstwirksamkeitserwartung, internale Kontrollüberzeugung und komplementärmedizinische Behandlungsmethoden

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Zusammenfassung

Abstract

Hintergrund/Zielstellung. Wie überzeugt jemand davon ist, die eigene Gesundheit erhalten oder wiedererlangen zu können und wie die eigenen Einflussmöglichkeiten diesbezüglich eingeschätzt werden, kann individuell sehr unterschiedlich sein. Als drei Aspekte gesundheitsbezogener Überzeugungen wurden in dieser Arbeit internale gesundheitsbezogene Kontrollüberzeugung, Körper-Selbstwirksamkeitserwartung und Angst vor Krankheit/Verletzung untersucht und in einen Zusammenhang mit der Nutzung und Bewertung komplementärer und alternativer medizinischer Behandlungsverfahren (CAM) gebracht. Im Einzelnen verfolgte die Arbeit drei Ziele: (1) Übersetzung des Illness/Injury Sensitivity Index-Revised (ISI-R) aus dem Englischen ins Deutsche und Validierung der übersetzten Fassung, (2) Entwicklung des Konstruktes Körper-Selbstwirksamkeitserwartung, Entwicklung eines geeigneten Messinstrumentes und dessen Validierung unter Berücksichtigung von Zusammenhängen mit CAM, (3) Untersuchung von Zusammenhängen zwischen internaler gesundheitsbezogener Kontrollüberzeugung und Nutzung und Bewertung von CAM.

Methodik. (1) Der ISI-R wurde übersetzt und in zwei Stichproben per Fragebogen validiert. Gängige Skalenkennwerte sowie Zusammenhänge mit verschiedenen Validierungsinstrumenten wurden berechnet und sowohl eine explorative als auch eine konfirmatorische Faktorenanalyse durchgeführt. (2) Körper-Selbstwirksamkeitserwartung wurde definiert und ein Messinstrument entwickelt. Dieses wurde mittels eines Online-Surveys in einer Studierendenstichprobe validiert. Die Bestimmung der Faktorstruktur erfolgte mittels explorativer Faktorenanalyse; weitere Skalenkennwerte und Korrelationen mit vielfältigen Validierungsinstrumenten wurden berechnet. Im Rahmen der Validierung wurden auch Zusammenhänge mit der Nutzung und Bewertung von CAM evaluiert. (3) Mittels der Daten desselben Online-Surveys erfolgte die Evaluierung von Zusammenhängen zwischen internaler gesundheitsbezogener Kontrollüberzeugung und der Nutzung und Bewertung von CAM. In der gesamten Arbeit erfolgten CAM-bezogene Auswertungen aufgrund der Rolle chronischer Erkrankungen als möglicher Confounder sowohl für die Gesamtstichprobe als auch getrennt für chronisch erkrankte und nichterkrankte Teilnehmende.

Ergebnisse. (1) Die Übersetzung des ISI-R ergab dieselbe Faktorstruktur wie das englische Original und erwies sich als hinreichend reliabel und valide. (2) Aufgrund der Er-

gebnisse der Faktorenanalyse wurde die entwickelte Körper-Selbstwirksamkeits-erwartungs-Skala leicht angepasst. Die angepasste Skala erwies sich als hinreichend reliabel und valide. Personen, welche CAM mehr nutzten und positiv bewerteten, wiesen eine höhere Körper-Selbstwirksamkeitserwartung auf als Personen, welche CAM weniger nutzten oder weniger positiv bewerteten. (3) Personen, welche CAM mehr nutzten und positiv bewerteten, wiesen eine höhere internale gesundheitsbezogene Kontrollüberzeugung auf als Personen, welche CAM weniger nutzten oder weniger positiv bewerteten. Das Vorliegen einer chronischen Erkrankung erwies sich für die CAM-bezogenen Auswertungen als wichtiger Confounder.
Diskussion. Weitere Untersuchungen sowohl zur Rolle von Angst vor Krankheit/ Verletzung im Zusammenhang mit CAM als auch in Längsschnittstudien mit gesunden und klinischen Stichproben wären wünschenswert.

Background/Aim. Beliefs concerning the maintenance of health or the overcoming of illness and one's own role in this regard may vary from person to person. Three aspects of such beliefs – internal health locus of control, body-efficacy expectation, and fear of illness/injury – and their association with complementary and alternative medicine (CAM) were focused on. There were three goals of this thesis: (1) Providing a validated German translation of the Illness/Injury Sensitivity Index-Revised (ISI-R). (2) Defining body-efficacy expectation and developing an instrument for its measurement considering associations with CAM use and appraisal during the validation process. (3) Evaluating associations between internal health locus of control and CAM use and appraisal.
Methods. (1) The ISI-R was translated into German and validated in two different samples using questionnaires. An exploratory and a confirmatory factor analysis were conducted. Scale characteristics and associations between the ISI-R and different validation measures were reported. (2) Body-efficacy expectation was defined. A scale for its measurement was developed and validated via an online student survey. Exploratory factor analysis was conducted; further scale characteristics and associations with different validation measures as well as associations between body-efficacy expectation and the use and appraisal of CAM were reported. (3) Using data of the same online survey, associations between internal health locus of control and use and appraisal of CAM were evaluated. All CAM-related analyses were conducted for the

total sample as well as for chronically ill and healthy participants separately as chronic conditions might be a confounder.

Results. (1) The German ISI-R showed the same factor structure as the original and proved reliable and valid. (2) The scale to measure body-efficacy expectation was altered slightly taking into account the results of the exploratory factor analysis. The altered scale was reliable and valid. Participants using CAM more often and showing higher appraisal of CAM reported higher body-efficacy expectation than participants with less CAM use or appraisal. (3) Participants using CAM more often and showing higher appraisal of CAM reported higher internal health locus of control than participants with less CAM use or appraisal. Chronic conditions were an important confounder in all CAM-related analyses.

Discussion. Further research considering the relation of CAM with fear of illness/injury as well as longitudinal studies with healthy and clinical samples is necessary.

1 Einführung

„Ich habe den Tod gespürt, er saß in mir. Ich habe gekämpft. Es werden wahrscheinlich noch einige Kämpfe folgen. Das werden wir sehen. Ich glaube, ich habe Kraft."

(Christoph Schlingensief)

Wie überzeugt Menschen davon sind, dass sie gesund bleiben oder werden und dass sie ihre Gesundheit selbst beeinflussen können, kann individuell sehr unterschiedlich sein und ist von verschiedenen Faktoren abhängig. Unter anderem tragen der tatsächliche Gesundheitszustand, aber auch von anderen (z. B. Akteuren des Gesundheitssystems) vermittelte Ansichten über Erhalt oder Wiedererlangung von Gesundheit zu diesbezüglichen Überzeugungen bei. Die vorliegende Arbeit befasst sich mit drei Aspekten gesundheitsbezogener Überzeugungen – internale Kontrollüberzeugung, Körper-Selbstwirksamkeitserwartung und Angst vor Krankheit/Verletzung – und betrachtet diese vor dem Hintergrund alternativer und komplementärer Behandlungsverfahren (Complementary and Alternative Medicine, CAM) als einem Teilgebiet des Gesundheitssystems.

Internale gesundheitsbezogene Kontrollüberzeugung (Internal Health Locus of Control, IHLOC) beschreibt, inwieweit ein Mensch davon überzeugt ist, seine Gesundheit durch sein Verhalten selbst beeinflussen zu können; sie stellt neben sozial externalen und fatalistisch externalen Überzeugungen eine Dimension der gesundheitsbezogenen Kontrollüberzeugungen dar.[1,2]

Körper-Selbstwirksamkeitserwartung wird in der vorliegenden Arbeit neu eingeführt. Sie wird definiert als die Erwartung, dass der Körper in der Lage ist, mit pathogenen und anderen gesundheitsbedrohenden Faktoren umzugehen und somit für sich selbst und seine Heilung bzw. Gesunderhaltung zu sorgen. Angelehnt ist das Konstrukt an Banduras Selbstwirksamkeits-Theorie[3] sowie an die daraus abgeleiteten domänenspezifischen Selbstwirksamkeitserwartungen (für einen Überblick bezogen auf den Gesundheitsbereich, s. z. B. [4–6]). Generell sind Selbstwirksamkeitserwartungen definiert als Erwartungen, ein bestimmtes Verhalten ausführen zu können. Die hier eingeführte Körper-Selbstwirksamkeitserwartung entfernt sich insofern vom Ursprungskonstrukt bzw. erweitert es, als dass sie nicht auf aktiv ausführbares Verhalten, sondern auf „Verhalten" des Körpers (z. B. seine Immunreaktion) abzielt.

Angst vor Krankheit/Verletzung wird neben Angstsensitivität und Angst vor negativer Bewertung als eine der drei fundamentalen Ängste angesehen[7,8].

Abbildung 1 zeigt die drei im Fokus stehenden Konstrukte und ihr postuliertes Zusammenspiel mit der Nutzung und Bewertung von CAM sowie mit dem Gesundheitszustand.

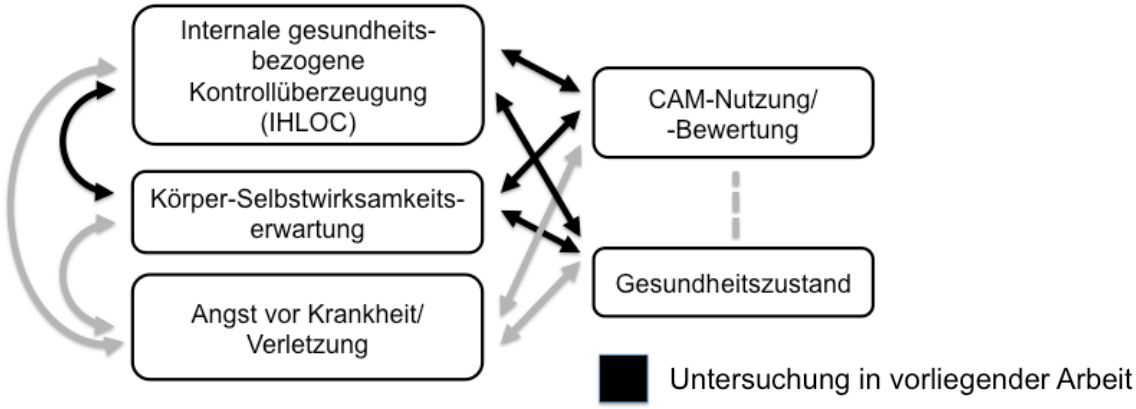

Abbildung 1: Gesundheitsgezogene Überzeugungen, Gesundheitszustand und alternativ-/komplementärmedizinische Behandlungsverfahren

1.1 Gesundheitsbezogene Überzeugungen und CAM-Nutzung/-Bewertung

Auf theoretischer Ebene ergeben sich Zusammenhänge zwischen der Nutzung bzw. Bewertung von CAM und IHLOC dadurch, dass viele CAM-Verfahren eine Eigenverantwortung der Patienten postulieren[9] und Verhaltensänderungen beinhalten (z.B. Atemübungen, Yogaübungen, Ernährungsumstellung). Ob Nutzer von CAM tatsächlich einen höheren IHLOC aufweisen als Nicht-Nutzer, ist Fragestellung vieler Studien[10–16], die Ergebnisse sind jedoch heterogen. Ein systematischer Review fand unter 13 Studien nur in dreien Zusammenhänge zwischen IHLOC und der Nutzung von CAM.[10]

Allerdings variierte die Erfassung der CAM-Nutzung von Studie zu Studie und die Mehrzahl verwendete ein umstrittenes Instrument zur IHLOC-Erfassung.[17,18] Andere, teils neuere Studien fanden positive Zusammenhänge zwischen IHLOC und der Nutzung von CAM.[12–16] Aufgrund dieser widersprüchlichen Forschungslage sollen die Zusammenhänge in der vorliegenden Arbeit weiter beleuchtet werden (Publikation 3). Zusammenhänge zwischen Körper-Selbstwirksamkeitserwartung und CAM-Nutzung werden angenommen und in Publikation 2 untersucht, weil viele CAM-Verfahren für sich beanspruchen, die selbstregulatorischen Fähigkeiten des Organismus zu stimulieren.[9,19,20] Zusammenhänge zwischen Angst vor Krankheit/Verletzung und CAM-Nutzung werden in der vorliegenden Arbeit nicht untersucht.

Wie aus Abbildung 1 ersichtlich, können die Richtungen der postulierten Zusammenhänge beidseitig sein. So wurden in einer (unkontrollierten) Studie Steigerungen von IHLOC während einer stationären integrativen Behandlung beobachtet.[21] Qualitative Studien beschreiben, wie Patient/innen während einer CAM-Behandlung deren Konzepte übernehmen.[22] Andererseits wird angenommen, dass Personen sich vor allem dann für eine CAM-Behandlung entscheiden, wenn diese sich mit ihren ohnehin bereits vorhandenen Ansichten deckt.[10,23]

1.2 Zusammenhänge gesundheitsbezogener Überzeugungen untereinander

Assoziationen zwischen Körper-Selbstwirksamkeitserwartung und IHLOC sind ein Untersuchungsgegenstand von Publikation 2. Studien zu anderen domänenspezifischen Selbstwirksamkeitserwartungen und IHLOC haben unterschiedliche Resultate ergeben.[24–26] Zusammenhänge zwischen Angst vor Krankheit/Verletzung und den anderen beiden Konstrukten werden zwar angenommen (je weniger die eigene Gesundheit beeinflussbar scheint bzw. je weniger dem eigenen Körper zugetraut wird, desto größer sollte die Angst vor Krankheit/Verletzung sein), eine Überprüfung ist jedoch nicht Bestandteil dieser Arbeit.

1.3 Die Rolle des Gesundheitszustands

Wie gesundheitsbezogene Überzeugungen und der Gesundheitszustand zusammenhängen, ist zwar nicht primäre Fragestellung der vorliegenden Arbeit, jedoch ist der Gesundheitszustand im Rahmen der unter 1.1 beschriebenen Zusammenhänge eine wichtige Größe. Zusammenhänge zwischen IHLOC und Gesundheitszustand[27,28] bzw. auch gesundheitsbezogener Lebensqualität[29,30] wurden nachgewiesen und werden auch in

der vorliegenden Arbeit beleuchtet (Publikation 3). Auch für Körper-Selbstwirksamkeitserwartung und Gesundheitszustand postuliert die vorliegende Arbeit einen Zusammenhang (Publikation 2). Die Placebo-Forschung hat gezeigt, dass Erwartungen generell eine große Rolle bei Gesundungsprozessen spielen, so werden sie z. B. als das Kernelement des Placebo-Effektes angesehen[31] (interessanterweise wird dieser von Bootzin und Caspi in enge Verbindung mit (Selbst-)Heilung gebracht[32], auf welche ja Erwartung im Sinne von Körper-Selbstwirksamkeitserwartung fokussiert). Zusammenhänge zwischen Angst vor Krankheit/Verletzung und dem Gesundheitszustand werden zwar angenommen, jedoch in der vorliegenden Arbeit nicht untersucht. Die Rolle von Angst vor Krankheit/Verletzung bei der Entwicklung von chronischen Schmerzen wurde jedoch bereits thematisiert.[33–35]

Erneut können die (postulierten) Zusammenhänge beidseitig sein. Selbstwirksamkeitserwartungen verändern sich unter anderem durch entsprechende Erfahrungen[3], dies sollte also auch für Körper-Selbstwirksamkeitserwartung der Fall sein. So könnte ein guter Gesundheitszustand zu hoher Körper-Selbstwirksamkeitserwartung beitragen. Andersherum kann aber auch angenommen werden, dass Körper-Selbstwirksamkeitserwartung den Gesundheitszustand im Sinne eines placeboartigen Effekts beeinflusst. Einflüsse von Selbstwirksamkeit auf körperliche Stressreaktionen wurden bereits nachgewiesen.[6] Auch für IHLOC bzw. Angst vor Krankheit/Verletzung und Gesundheitszustand sind analoge gegenseitige Beeinflussungsmöglichkeiten denkbar.

Zu berücksichtigen ist der Gesundheitszustand in der vorliegenden Arbeit auch in seiner Rolle als möglicher Confounder bei den CAM-bezogenen Fragestellungen, da Forschungsergebnisse zeigen, dass neben den oben aufgeführten Zusammenhängen zwischen Gesundheitszustand und IHLOC[27,28] ein schlechter Gesundheitszustand einer der Prädiktoren für CAM-Nutzung ist[36] (gestrichelte Linie in Abbildung 1).

2 Zielstellung

Ziel der Arbeit ist es, die drei Konstrukte IHLOC, Körper-Selbstwirksamkeitserwartung und Angst vor Krankheit/Verletzung genauer zu untersuchen bzw. messbar zu machen und Zusammenhänge mit der Nutzung von CAM zu evaluieren. Genauer:

(1) Der Illness/Injury Sensitivity Index-Revised (ISI-R[33,37]), eine englischsprachige Skala zur Erfassung von Angst vor Krankheit/Verletzung, soll ins Deutsche übersetzt und die Übersetzung einer ersten Validierung unterzogen werden (Publikation 1).

(2) Eine Skala zur Erfassung von Körper-Selbstwirksamkeitserwartung soll entwickelt und validiert werden. Im Rahmen der Validierung sollen neben möglichen Zusammenhängen von Körper-Selbstwirksamkeitserwartung mit IHLOC und mit dem Gesundheitszustand auch Zusammenhänge zwischen Körper-Selbstwirksamkeitserwartung und der Nutzung von CAM untersucht werden (Publikation 2).
(3) Zusammenhänge zwischen IHLOC und CAM-Nutzung sollen, u. a. unter Berücksichtigung des Gesundheitszustands, speziell dem Vorliegen chronischer Erkrankungen, untersucht werden (Publikation 3).

3 Methodik

3.1 Publikation 1: The Illness/Injury Sensitivity Index: Validation of a German version of the ISI-R

Der ISI-R[33,37] wurde in einem mehrstufigen Verfahren ins Deutsche übersetzt. Anschließend wurden zwei Studien zur Validierung dieser deutschen Fassung durchgeführt. Teilnehmende der ersten Studie waren Studierende, die zwei Fragebögen ausfüllten. Der erste enthielt Fragen zur Soziodemografie, den ISI-R sowie eine visuelle Analogskala (VAS) zur Erfassung von Angst vor Krankheiten. Der zweite Bogen, der zwei Tage später ausgefüllt werden sollte, enthielt den ISI-R. Die ISI-R-Daten des ersten Fragebogens wurden zur Analyse der Faktorstruktur, für Itemanalysen sowie zur Korrelation mit der VAS genutzt. Die ISI-R-Daten des zweiten Fragebogens dienten zur Berechnung der Test-Retest-Reliabilität. Es wurde eine explorative Faktorenanalyse (EFA) zur Ermittlung der Faktorstruktur durchgeführt. Die Faktoren wurden mittels Hauptfaktoranalyse extrahiert, als Rotationsverfahren wurde Promax gewählt.[38] Eigenwerte >1 sowie Cattells Scree-Test dienten als Entscheidungskriterien für die Bestimmung der Faktoranzahl. Als Maß für die interne Konsistenz diente Cronbachs α, zur Trennschärfebestimmung wurde die korrigierte Item-Subskalen-Korrelation berechnet. Die Test-Retest-Reliabilität wurde durch Korrelation der ISI-R-Werte des ersten und zweiten Fragebogens bestimmt. Eine erste Einschätzung der Validität erfolgte durch Korrelation der ISI-R-Werte mit der VAS.

Die zweite Studie basierte auf einer Gelegenheitsstichprobe. Die Teilnehmenden füllten ebenfalls zwei Fragebögen im Abstand von zwei Tagen aus. Der erste Fragebogen enthielt Fragen zur Soziodemografie, den ISI-R sowie eine VAS zur Erfassung von Angst vor Krankheiten, der zweite enthielt den übersetzten ISI-R sowie die deutsche Fassung

des Whiteley Index'[39], ein Messinstrument zur Erfassung von Hypochondrie. Für die Erfassung der Faktorstruktur, für Itemanalysen und die Korrelation mit den Validierungsinstrumenten wurden die ISI-R-Daten des ersten Fragebogens verwendet. Es wurde eine konfirmatorische Faktorenanalyse (CFA) zur Überprüfung der in Studie 1 gefundenen Faktorstruktur durchgeführt. Folgende Fit-Indizes wurden zur Bewertung des Modells herangezogen: Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Residual (SRMR)[a]. Inter-Item-Korrelationen, interne Konsistenz und Trennschärfe wurden sowohl für die Gesamtskala als auch für die Subskalen berechnet. Zur Validierung wurden die Korrelationen mit der VAS und dem Whiteley Index berechnet. Zur Erfassung der Test-Retest-Reliabilität wurden die ISI-R-Daten des ersten mit denen des zweiten Fragebogens korreliert.

3.2 Publikation 2: Body-Efficacy Expectation: Assessment of beliefs concerning bodily coping capabilities with a five-item scale

Basierend auf Empfehlungen zur Entwicklung anderer domänenspezifischer Selbstwirksamkeitsskalen[41] und der Diskussion mit einer Expertin für Selbstwirksamkeit wurde eine Skala zur Messung von Körper-Selbstwirksamkeitserwartung entwickelt. Der Validierungsprozess erfolgte mittels eines Online-Surveys für Studierende. Neben Soziodemografie und der Körper-Selbstwirksamkeitserwartungs-Skala umfasste der Survey folgende Instrumente: Skala zur Erfassung der allgemeinen Selbstwirksamkeitserwartung[42], Subskala IHLOC des Fragebogens „Kontrollüberzeugungen zu Krankheit und Gesundheit"[43,44], Subskalen „Gesundheit/körperliches Befinden", „Pflege des Äußeren und der körperlichen Funktionsfähigkeit" sowie „Körperliche Effizienz" der Frankfurter Körperkonzeptskalen[45], Fragen des SF-36 Health Surveys[46] zum allgemeinen und derzeitigen Gesundheitszustand sowie Fragen zu vorliegenden Erkrankungen, aufgrund derer eine Einteilung der Befragten in chronisch erkrankte und nichterkrankte vorgenommen werden konnte. Des Weiteren wurden Erfahrungen mit verschiedenen CAM-Verfahren abgefragt und aus den Antworten ein CAM-Bewertungs-Score gebildet, anhand dessen die Teilnehmenden in eine Gruppe mit niedriger und eine mit hoher CAM-Bewertung eingeteilt wurden. Außerdem wurden der Medikamentengebrauch sowie Besuche bei verschiedenen Fachgruppen des Gesundheitssystems im vergangenen halben Jahr erfragt. Dies diente einer Einteilung der Befragten in verschiedene Grup-

[a] CFI-Werte sollten nahe 0,95 oder größer sein, RMSEA-Werte sollten <0,08 sein, SRMR-Werte sollten <0,08 sein[40].

pen, zum einen nach dem Medikamentenprofil (vier Gruppen: 1. nur CAM-Medikamente genutzt, 2. nur konventionelle Medikamente genutzt, 3. beides genutzt, 4. keine Medikamente genutzt), zum anderen nach einem Behandlungsprofil (vier Gruppen: 1. nur CAM-Behandelnde aufgesucht, 2. nur konventionelle Behandelnde aufgesucht, 3. beides aufgesucht, 4. keine Behandlung aufgesucht).

Das Ausmaß fehlender Körper-Selbstwirksamkeitserwartungs-Items wurde ermittelt. Im Falle von > 5 % fehlender Werte auf einem Item wurde Littles MCAR-Test durchgeführt und im Falle eines nicht-signifikanten Testergebnisses wurden die Werte mittels Expectation Maximation (EM)-Methode ersetzt.

Für die Körper-Selbstwirksamkeitserwartungs-Items wurde eine EFA durchgeführt (Extraktionsverfahren Hauptfaktoranalyse, Rotationsverfahren Promax[38]). Zur Bestimmung der Anzahl der Faktoren wurde Horns Parallelanalyse anhand von Hayton, Allen und Scarpellos Anleitung[47] durchgeführt. Die EFA wurde anschließend mit fixierter Faktoranzahl wiederholt. Items wurden aufgrund der Kriterien von Costello und Osborne[38] bewertet und gegebenenfalls ausgeschlossen. Im Falle von ausgeschlossenen Items wurden die genannten Schritte (EFA, Parallelanalyse und EFA mit fixierter Faktorzahl) mit den verbleibenden Items wiederholt. Weitere Maße zur Bewertung der Skala waren Cronbachs α, korrigierte Item-(Sub-)Skalenkorrelation, Item-Mittelwerte und Item-Varianzen.

Die Validitätsbeurteilung erfolgte mittels Produkt-Moment-Korrelation mit den anderen Skalen und Fragen des Surveys. Die Körper-Selbstwirksamkeitserwartungs-Werte von Teilnehmenden mit und ohne chronische Erkrankungen sowie von Personen mit hoher und niedriger CAM-Bewertung wurden mittels t-Tests für unabhängige Stichproben verglichen. Zum Vergleich der Körper-Selbstwirksamkeitserwartungs-Werte anhand des Medikamenten- und Behandlungsprofils wurden einfaktorielle Varianzanalysen (ANOVAs) durchgeführt. Einzelvergleiche wurden anhand vorher definierter orthogonaler linearer Kontraste durchgeführt. Diese verglichen Teilnehmende ohne jegliche Medikamenteneinnahme mit allen anderen sowie Teilnehmende, die nur CAM-Medikamente einnahmen, mit solchen, die entweder nur konventionelle oder sowohl konventionelle als auch CAM-Medikamente einnahmen. Analog wurden Teilnehmende ohne jeglichen Kontakt zu Behandelnden mit allen anderen und Teilnehmende, die nur CAM-Behandelnde aufsuchten, mit denen verglichen, die nur konventionelle oder beide Arten von Behandelnden aufsuchten.

Alle CAM-bezogenen Analysen wurden sowohl für die Gesamtstichprobe als auch für die Subgruppen der Teilnehmenden mit und ohne chronische Erkrankung durchgeführt, da das Vorliegen einer chronischen Erkrankung als möglicher Confounder angesehen wurde. Für alle Analysen wurden neben p-Werten auch Effektgrößen berechnet.

3.3 Publikation 3: Internal health locus of control in users of complementary and alternative medicine: a cross-sectional survey

Die Publikation basierte auf den Daten desselben Online-Surveys, der unter Publikation 2 beschrieben ist. Für die Analyse entscheidend waren die Messinstrumente IHLOC[43,44], die Unterteilung der Teilnehmenden in chronisch erkrankte und nichterkrankte, der CAM-Bewertungs-Score sowie Medikamenten- und Behandlungsprofil. Untersucht wurden IHLOC-Unterschiede zwischen Personen mit hoher und niedriger CAM-Bewertung (t-Test für unabhängige Stichproben) sowie Unterschiede zwischen den vier Medikamentenprofil-Gruppen und Behandlungsprofil-Gruppen (einfaktorielle ANOVAs). Im Rahmen der ANOVAs wurden vorher festgelegte Einzelvergleiche mittels orthogonaler linearer Kontraste durchgeführt: Verglichen wurden Personen ohne jegliche Medikamenteneinnahme mit allen anderen sowie Personen, welche nur CAM-Medikamente einnahmen mit solchen, die nur konventionelle oder sowohl CAM- als auch konventionelle Medikamente einnahmen. Analog wurden Personen ohne jeglichen Kontakt zu Behandelnden mit allen anderen und Personen, welche nur CAM-Behandelnde aufsuchten, mit solchen, welche beide Arten von Behandelnden aufsuchten, verglichen. Im Falle signifikanter IHLOC-Unterschiede zwischen chronisch erkrankten und nichterkrankten Personen (t-Test für unabhängige Stichproben) wurden alle Analysen außer für die Gesamtstichprobe jeweils auch für diese beiden Subgruppen berechnet.

Des Weiteren wurde mittels multivariater linearer Regressionsanalyse evaluiert, welche Variablen den höchsten prädiktiven Wert für IHLOC hatten. In das Modell wurden die Prädiktoren Geschlecht, Alter, chronische Krankheit, CAM-Bewertung sowie das Medikamenten- und Behandlungsprofil einbezogen.

4 Ergebnisse

4.1 Publikation 1: The Illness/Injury Sensitivity Index: Validation of a German version of the ISI-R

An Studie 1 nahmen 97 Studierende teil (Alter MW = 32,5 (SD = 8,7) Jahre; 85 % Frauen). Die EFA ergab eine zweifaktorielle Struktur, wobei die Faktoren 64 % der Gesamt-

varianz aufklärten. Nach Promax-Rotation repräsentierten die Faktoren deutlich die beiden Subskalen „Angst vor Krankheit“ und „Angst vor Verletzung“ (Tabelle 1). Ein Item wich mit einer Faktorladung von 0,43 leicht von Costello und Osbornes Kriterien[38] ab. Die internen Konsistenzen der Gesamtskala (α = 0,91) sowie der Subskalen „Angst vor Krankheit“ (α = 0,90) und „Angst vor Verletzung“ (α = 0,84) waren hoch und konnten durch Eliminierung einzelner Items nicht weiter erhöht werden. Die Test-Retest-Korrelationen waren ebenfalls hoch (für die Gesamtskala r = 0,92). Die übersetzte ISI-R-Gesamtskala sowie die Subskala „Angst vor Krankheit“ korrelierten hoch mit der VAS (r = 0,61 bzw. r = 0,66), was auf konvergente Validität des ISI-R hinwies.

Tabelle 1. Faktorstruktur und Itemparameter des deutschen ISI-R

	Study 1: EFA				**Study 2: CFA**		
	MW (SD)	Faktoren[a]		CITC	MW (SD)	CITC	Pfad-koeffi-zienten[b]
		I	II				
Subskala „Angst vor Krankheit”	6,46 (4,85)				6,12 (4,21)		
Ich mache mir Sorgen, dass ich krank werden könnte	1,16 (1,01)	**0,94**	-0,09	0,82	1,06 (1,03)	0,72	0,82
Der Gedanke an körperliche Erkrankungen macht mir Angst	1,44 (1,23)	**0,63**	0,29	0,76	1,45 (1,13)	0,68	0,73
Ich mache mir Sorgen, dass ich später einmal eine körperliche Erkrankung bekommen könnte	1,58 (1,27)	**0,77**	-0,03	0,73	1,59 (1,19)	0,62	0,70
Ich mache mir Sorgen um meine körperliche Gesundheit	1,30 (1,09)	**0,69**	0,15	0,75	1,19 (1,00)	0,70	0,78
Ich bekomme Angst, wenn ich das Gefühl habe, dass ich eine Krankheit ausbrüte	0,98 (1,12)	**0,81**	-0,03	0,72	0,83 (1,06)	0,50	0,54
Subskala „Angst vor Verletzung”	3,46 (3,14)				3,02 (3,44)		
Ich habe Angst davor, dass ich mir eine Verletzung zuziehen könnte	1,10 (0,93)	-0,10	**0,85**	0,68	0,96 (1,20)	0,70	0,84
Es versetzt mich in Schrecken, an Verletzungen zu denken	0,99 (1,09)	0,13	**0,62**	0,65	0,93 (1,13)	0,60	0,59
Ich mache mir Sorgen, dass ich mir eine Verletzung zuziehen könnte	0,87 (0,93)	-0,03	**0,95**	0,79	0,71 (0,97)	0,80	0,95
Ich kann den Gedanken nicht ertragen, dass ich mir eine Verletzung zuziehen könnte	0,51 (0,86)	0,29	**0,43**	0,60	0,42 (0,89)	0,58	0,62

Abkürzungen: EFA (Explorative Faktorenanalyse), CFA (Konfirmatorische Faktorenanalyse) CITC (Korrigierte Item-Subskala-Korrelation), MW (Mittelwert), SD (Standardabweichung)
[a] Mustermatrix nach Hauptfaktoranalyse mit Promax-Rotation und Kaiser-Normalisation
[b] Pfadkoeffizienten repräsentieren Einflüsse der latenten Variable „Angst vor Krankheit“ auf die Items der (angenommenen) Subskala bzw. der latenten Variable „Angst vor Verletzung“ auf die Items der (angenommenen) Subskala

An Studie 2 nahmen 117 Personen teil (Alter MW = 38,6 (SD = 17,1) Jahre; 78 % Frauen). Für das sich aus Studie 1 ergebende zweifaktorielle Modell wurde in der CFA ein zufriedenstellende Passung erreicht (CFI = 0,94, RMSEA = 0,11, SRMR = 0,078;

Pfadkoeffizienten s. Tabelle 1). Die internen Konsistenzen der Gesamtskala (α = 0,86) sowie der Subskalen „Angst vor Krankheit“ (α = 0,84) und „Angst vor Verletzung“ (α = 0,83) waren hoch und konnten durch Eliminierung von Items nicht erhöht werden. Gesamt- und Subskalen wiesen hohe Test-Retest-Korrelationen auf (Gesamtskala r = 0,87). Die Korrelationen der ISI-R-Gesamtskala und der Subskala „Angst vor Krankheit“ mit dem WI und mit der VAS wiesen auf konvergente Validität hin (für die Gesamtskala r = 0,64 und r = 0,58).

4.2 Publikation 2: Body-Efficacy Expectation: Assessment of beliefs concerning bodily coping capabilities with a five-item scale

Es nahmen 1054 Studierende an der Studie teil (Alter MW = 32,7 (SD = 9,3) Jahre, 80 % Frauen, 35 % mit chronischer Krankheit). Fehlende Körper-Selbstwirksamkeitserwartungs-Werte wurden mittels EM-Methode ersetzt. Im Rahmen des Prozesses der Itembewertung wurde ein Item („ ... auch wenn ich keine besonderen Vorsichtsmaßnahmen treffe (z. B. häufiges Händewaschen, Mundschutz, Vermeidung ansteckender Personen, Grippeimpfung, Einnahme von Nahrungsergänzungsmitteln)“) aufgrund niedriger Kommunalität, geringer Item-Skala-Korrelation und großer Item-Standardabweichung eliminiert. Die endgültige, einfaktorielle Faktorlösung erklärte 52 % der Gesamtvarianz. Die Faktorladungen waren hoch, drei Items hatten jedoch Kommunalitäten < 0,40 (Tabelle 2). Cronbachs α betrug 0,77, die Eliminierung weiterer Items trug nicht zu einer Erhöhung von α bei. Tabelle 3 zeigt die Korrelationen mit den Validierungsinstrumenten, wobei die höchsten Korrelationen zwischen Körper-Selbstwirksamkeitserwartung und dem allgemeinen Gesundheitszustand (sowohl gemessen mit der Skala „Gesundheit/körperliches Befinden“ als auch mit dem entsprechenden Item des SF-36) bestanden.

Tabelle 2. Items und Faktorstruktur der Körper-Selbstwirksamkeitserwartungs-Skala

	Item MW (SD)	Faktorladung	CITC	Kommunalität
Ich bin mir sicher, dass mein Körper gut gegen Krankheiten gewappnet ist…				
…auch wenn ich ihm manchmal viel zumute.	2,91 (0,74)	0,68	0,59	0,47
…auch wenn ich in der Öffentlichkeit vielen Krankheitserregern ausgesetzt bin.	2,98 (0,78)	0,57	0,49	0,32
…auch wenn ich gestresst bin.	2,58 (0,76)	0,61	0,52	0,37
Ich bin mir sicher, dass mein Körper Krankheiten gut aus eigener Kraft bewältigen kann…				
…auch wenn ich eine Krankheit habe, wegen der ich im Bett bleiben muss.	3,01 (0,71)	0,68	0,57	0,46
…auch wenn ich eine länger andauernde Krankheit habe.	2,65 (0,74)	0,62	0,51	0,38

Abkürzungen: MW (Mittelwert), SD (Standardabweichung), CITC (korrigierte Item-Subskala-Korrelation)

Tabelle 3. Interkorrelationen von Körper-Selbstwirksamkeitserwartung mit verschiedenen Validierungsmaßen

	BEE	GSE	IHLOC	GKB	PKF	KEF	SF-36-AG	SF-36-DG
BEE Körper-Selbstwirksamkeit	-							
GSE Allgemeine Selbstwirksamkeit	0,35	-						
IHLOC Internale gesundheitsbezogene Kontrollüberzeugung	0,30	0,23	-					
GKB Gesundheit/körperliches Befinden	0,47	0,43	0,29	-				
PKF Pflege d. Äußeren u. der körperlichen Funktionsfähigkeit	0,09	0,21	0,31	0,27	-			
KEF Körperliche Effizienz	0,30	0,34	0,23	0,68	0,42	-		
SF-36-AG Allgemeiner Gesundheitszustand	0,47	0,31	0,28	0,65	0,23	0,45	-	
SF-36-DG Derzeitiger Gesundheitszustand	-0,04	-0,01	0,00	-0,03	-0,03	-0,04	-0,03	-
MW	2,83	2,97	29,34	25,70	35,70	44,04	3,35	3,19
SD	0,54	0,43	4,93	5,30	5,18	8,59	0,81	0,75
Cronbachs α	0,77	0,88	0,84	0,84	0,73	0,87		

Abkürzungen: MW (Mittelwert), SD (Standardabweichung)

Chronisch erkrankte Teilnehmende hatten signifikant niedrigere Körper-Selbstwirksamkeitserwartung als Teilnehmende ohne chronische Erkrankung, und Teilnehmende mit niedriger CAM-Bewertung hatten niedrigere Körper-Selbstwirksamkeitserwartung als solche mit hoher CAM-Bewertung. Letzteres galt auch in den beiden Subgruppen der chronisch Erkrankten und Nichterkrankten. Die den ANOVAs angeschlossenen Einzelvergleiche ergaben signifikant höhere Körper-Selbstwirksamkeitserwartung für Teilnehmende, die keine Medikamente einnahmen, verglichen mit Teilnehmenden, die Medikamente einnahmen. Dies galt sowohl für die Gesamtstichprobe (Differenz $\Delta = 0,41$, $p < 0,001$) als auch für Teilnehmende ohne chronische Erkrankung ($\Delta = 0,27$, $p < 0,05$). Ebenso wiesen Teilnehmende, die nur CAM-Medikamente einnahmen, höhere Körper-Selbstwirksamkeitserwartung auf als Teilnehmende, die nur konventionelle oder sowohl CAM- als auch konventionelle Medikamente einnahmen. Dies galt ebenfalls für die Gesamtstichprobe ($\Delta = 0,43$, $p < 0,001$) und für die nicht chronisch erkrankten Teilnehmenden ($\Delta = 0,37$, $p < 0,01$). Beide Vergleiche waren in der Subgruppe der chronisch Erkrankten nicht signifikant. Die Einzelvergleiche bezüglich der Konsultationsprofile ergaben signifikant höhere Körper-Selbstwirksamkeitserwartung der Teilnehmenden, die keine Behandlung aufsuchten, verglichen mit denen, die eine Behandlung aufsuchten. Dies galt in der Gesamtstichprobe ($\Delta = 0,62$, $p < 0,001$) als auch in der Subgruppe der nicht chronisch Erkrankten ($\Delta = 0,53$, $p < 0,01$). Alle anderen Einzelvergleiche wurden nicht signifikant.

4.3 Publikation 3: Internal health locus of control in users of complementary and alternative medicine: a cross-sectional survey

Teilnehmende waren dieselben wie in Publikation 2. Teilnehmende ohne chronische Erkrankung wiesen signifikant höhere IHLOC-Werte auf als chronisch erkrankte Teilnehmende, somit wurden alle Analysen sowohl für die Gesamtstichprobe als auch getrennt für diese beiden Gruppen durchgeführt. Sowohl in der Gesamtstichprobe als auch in den Subgruppen der Teilnehmenden ohne und mit chronischer Erkrankung zeigte sich ein höherer IHLOC bei den Teilnehmenden mit hoher CAM-Bewertung. Die den ANOVAs nachfolgenden Einzelvergleiche ergaben signifikant höhere IHLOC-Werte bei Personen, welche lediglich CAM-Medikamente einnahmen, verglichen mit denen, welche lediglich konventionelle oder sowohl CAM- als auch konventionelle Medikamente einnahmen. Dies galt für die Gesamtstichprobe ($\Delta = 3,67$, $p < 0,01$) sowie für die Teilnehmenden ohne chronische Erkrankung ($\Delta = 2,74$, $p < 0,05$), nicht aber für chronisch erkrankte Personen. Personen, welche lediglich CAM-Behandelnde konsultiert hatten, wiesen höhere IHLOC-Werte auf als solche, die lediglich konventionelle oder sowohl CAM- als auch konventionelle Behandelnde konsultiert hatten. Dies galt für die Gesamtstichprobe ($\Delta = 7,65$, $p < 0,001$) genauso wie für beide Subgruppen der chronisch Nichterkrankten ($\Delta = 5,04$, $p < 0,05$) und der chronisch Erkrankten ($\Delta = 11,70$, $p < 0,01$). Alle weiteren Einzelvergleiche wurden nicht signifikant.

Im multivariaten linearen Modell erwiesen sich die CAM-Bewertung (standardisierter Regressionskoeffizient $\beta = 0,15$, $p < 0,001$), das Vorliegen einer chronischen Erkrankung ($\beta = -0,11$, $p < 0,001$), das alleinige Aufsuchen von CAM-Behandelnden ($\beta = 0,11$, $p < 0,01$) sowie überhaupt keine Besuche bei Behandelnden ($\beta = 0,17$, $p < 0,001$) als signifikante Prädiktoren für IHLOC, wobei das Vorliegen einer chronischen Erkrankung zu einer Verringerung der IHLOC-Werte führte. Alle Prädiktoren zusammen erklärten jedoch nur 9 % der Gesamtvarianz.

5 Diskussion

In der vorliegenden Arbeit wurden drei Aspekte gesundheitsbezogener Überzeugungen – IHLOC, Körper-Selbstwirksamkeitserwartung und Angst vor Krankheit/Verletzung – untersucht. Dabei wurde besonders auch auf Zusammenhänge mit der Bewertung und der Nutzung von CAM eingegangen. Als Hauptergebnis kann festgehalten werden, dass Personen, die CAM mehr nutzen und schätzen, tendenziell höhere IHLOC-Werte sowie höhere Körper-Selbstwirksamkeitserwartung aufwiesen als Personen mit geringerer

Nutzung oder Bewertung von CAM. Dies war besonders bei Probanden ohne chronische Erkrankung der Fall. Chronisch kranke Personen wiesen per se niedrigere Körper-Selbstwirksamkeit und niedrigere IHLOC-Werte auf und die Zusammenhänge mit der Nutzung von CAM waren weniger ausgeprägt.

Als weiteres Ergebnis der Arbeit können zwei neue deutschsprachige Skalen vorgewiesen werden, zum einen eine Übersetzung des ISI-R, zum anderen eine Skala zur Erfassung von Körper-Selbstwirksamkeitserwartung. Bezüglich der Validierung muss festgehalten werden, dass das ISI-R-Item, welches in der CFA den niedrigsten Pfadkoeffizienten aufwies („Ich bekomme Angst, wenn ich das Gefühl habe, dass ich eine Krankheit ausbrüte“), sich möglicherweise von den anderen Items unterschied, in dem Sinne, dass „Krankheit“ bei diesem Item von den Teilnehmenden als eine gewöhnliche, wenig ernsthafte Krankheit interpretiert wurde. Dies ist ein Unterschied zur Angst vor schwerwiegenderen Erkrankungen, der bereits in früheren Arbeiten diskutiert wurde.[33] Des Weiteren erwies sich eines der Körper-Selbstwirksamkeitserwartungs-Items als problematisch und wurde aus der endgültigen Skala ausgeschlossen. Dies lässt sich inhaltlich insofern rechtfertigen, dass das Item normales Verhalten (kein Mundschutz, kein übermäßiges Händewaschen etc.) als potenzielles Gesundheitsrisiko betrachtet hat.

Besondere Stärken der Arbeit liegen in der Erfassung der CAM-Nutzung bzw. der Wertschätzung von CAM in Publikation 2 und 3 durch verschiedene Variablen. So wurde sowohl die Bewertung von CAM als auch der Medikamentengebrauch und das Aufsuchen verschiedener Praktizierender des Gesundheitssystems untersucht. Des Weiteren wurde der Gesundheitszustand, speziell die Rolle chronischer Erkrankungen, als möglicher Confounder beachtet, indem die Stichproben in Untergruppen chronisch erkrankter und nichterkrankter Personen unterteilt wurden. Dies ist nicht nur durch die in den Daten gefundenen Unterschiede in IHLOC und Körper-Selbstwirksamkeitserwartung zwischen chronisch erkrankten und nichterkrankten Personen zu rechtfertigen, sondern auch durch die bereits aufgeführten Forschungsergebnisse zu Zusammenhängen zwischen Gesundheitszustand mit IHLOC[27,28] und mit CAM-Nutzung[36]. Auch die große Stichprobe, die den Publikationen 2 und 3 zugrunde liegt, ist eine Stärke der Arbeit, besonders bezüglich des Validierungsprozesses der Körper-Selbstwirksamkeits-erwartungs-Skala. Publikation 1 basierte zwar auf wesentlich kleineren Stichproben, konnte aber die Faktorstruktur des englischsprachigen ISI-R bestätigen.

Eine Hauptlimitation der Arbeit liegt im Querschnittsdesign der Studien. Für die Validierung des ISI-R ist das gewählte Design angemessen. Um die Zusammenhänge zwischen IHLOC und Körper-Selbstwirksamkeitserwartung mit CAM-Bewertung und -Nutzung weiter zu evaluieren, wären Längsschnittstudien jedoch wünschenswert. Wie in der Einführung bereits erläutert, ist es sowohl möglich, dass Personen medizinische Behandlungen aufsuchen, die sich mit ihren Überzeugungen decken, als auch, dass sich Überzeugungen durch die Anwendung bestimmter Verfahren ändern. Weiterhin ist denkbar, dass die hier gewählten Konstrukte lediglich Facetten tieferliegender Überzeugungen sind. Eine Studie zu Prädiktoren für CAM-Nutzung kommt zu dem Schluss, dass wichtiger als IHLOC, Gesundheitszustand o. ä. die drei Aspekte intuitives Denken, paranormale Ansichten und ontologische Verwirrungen sind.[48] Weiter sind die Stichproben aller drei Publikationen trotz der oben festgehaltenen Stärken verbesserungswürdig. Publikation 1 basiert auf sehr kleinen und ausgewählten Stichproben. Den Publikationen 2 und 3 liegt dieselbe Stichprobe zugrunde. Diese ist, da sie an der Fernuniversität in Hagen erhoben wurde, zwar heterogener als übliche Studierendenstichproben (kein NC, Altersheterogenität, Arbeitserfahrung und Familie vieler Studierender[49]), kann aber dennoch nicht zwangsläufig als repräsentativ für die Allgemeinbevölkerung angenommen werden. Wünschenswert wären weitere Untersuchungen an repräsentativen und auch an klinischen Stichproben. Letztere würden der Problematik des Selbstauskunftscharakters der Variablen in der vorliegenden Arbeit begegnen. Gerade für die gesundheitsbezogenen Variablen (Gesundheitszustand, chronische Erkrankungen) wäre interessant, ob Studien an Probanden mit bestätigten Diagnosen zu den gleichen Ergebnissen kommen. Durch geeignete Stichprobenwahl könnte auch dem Problem der sehr unterschiedlichen und teilweise sehr kleinen Gruppengrößen in den hier durchgeführten ANOVAs (Publikation 2 und 3) begegnet werden. Eine weitere Schwäche der Arbeit liegt im multiplen Testen. Diesem wird jedoch dadurch Rechnung getragen, dass neben den p-Werten wenn möglich auch Effektstärken berichtet wurden.

Auf lange Sicht wünschenswert wäre die Beleuchtung des in Abbildung 1 dargestellten Gesamtzusammenhangs zwischen den Konstrukten inklusive Beeinflussungsrichtungen. Hierbei muss neben der Einbeziehung von Angst vor Krankheit/Verletzung auch die Art der Beziehung zwischen IHLOC und Gesundheitszustand beachtet werden. So muss ein hoher IHLOC nicht per se zu einem besseren Gesundheitszustand führen, sondern nur, wenn die betreffende Person sich auch in der Lage fühlt, das in Frage ste-

hende Verhalten auszuführen. Hier kämen also domänenspezifische, auf konkrete Verhaltensweisen bezogene Selbstwirksamkeitserwartungen ins Spiel.

Insgesamt bleibt Raum für weitere Forschungsarbeiten mit weiterführenden Methoden, z. B. Längsschnittstudien oder lineare Strukturgleichungsmodelle, um die hier betrachteten Aspekte gesundheitsbezogener Überzeugungen und Gesundheitszustand sowie CAM-Nutzung in einen breiten Zusammenhang zu bringen. Die vorliegende Arbeit stellt einen ersten Schritt auf diesem Weg dar.

Literaturverzeichnis

1. Wallston KA. Conceptualization and operationalization of perceived control. In: Baum AS, Revenson R, Singer JE, eds. *Handbook of Health Psychology*. Vol Mahwah, NJ: Erlbaum; 2001:49-58.
2. Wallston KA, Wallston BS, DeVellis RF. Development of the multidimensional health locus of control (MHLC) scales. *Health Education Monographs*. 1978;6(2):160-170.
3. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. In: Baumeister RF, ed. *The Self in Social Psychology*. Ann Harbor: Psychology Press; 1999:285-298.
4. DeVellis BM, DeVellis RF. Self-efficacy and health. In: Baum AS, Reveson TA, Singer JE, eds. *Handbook of Health Psychology*. Mahwah, NJ: Erlbaum; 2001:235-247.
5. Schwarzer R, Renner B. Health-Specific Self-Efficacy Scales. 2000 (Accessed October 7, 2010, at: *http://userpage.fu-berlin.de/~health/healself.pdf)*.
6. O'Leary A. Self-efficacy and health: Behavioral and stress-physiological mediation. *Cognit Ther Res*. 1992;16:229-245.
7. Reiss S. Expectancy model of fear, anxiety, and panic. *Clin Psychol Rev*. 1991;11(2):141-153.
8. Taylor S. The structure of fundamental fears. *J Behav Ther and Exp Psychiatry*. 1993;24(4):289-299.
9. Barrett B, Marchand L, Scheder J, Appelbaum D, Plane MB, Blustein J, Maberry R, Capperino C. What complementary and alternative medicine practitioners say about health and health care. *Ann Fam Med*. 2004;2(3):253-259.
10. Bishop FL, Yardley L, Lewith GT. A systematic review of beliefs involved in the use of Complementary and Alternative Medicine. *J Health Psychol*. 2007;12(6):851-867.
11. Huber R, Lüdtke R, Beiser I, Koch D. Coping strategies and the request for a

consultation on complementary and alternative medicine – a cross-sectional survey of patients in a psychosomatic and three medical departments of a German university hospital. *Forsch Komplementarmed Klass Naturheilkd*. 2004;11(4):207-211.

12. Henderson JW, Donatelle RJ. The relationship between cancer locus of control and complementary and alternative medicine use by women diagnosed with breast cancer. *Psychooncology*. 2003;12(1):59-67.

13. Davidson R, Geoghegan L, McLaughlin L, Woodward R. Psychological characteristics of cancer patients who use complementary therapies. *Psychooncology*. 2005;14(3):187-195.

14. Ono R, Higashi T, Suzukamo Y, Konno S, Takahashi O, Tokuda Y, Rhaman M, Shimbo T, Endo H, Hinohara S, Fukui T, Fukuhara S. Higher internality of health locus of control is associated with the use of complementary and alternative medicine providers among patients seeking care for acute low-back pain. *Clin J Pain*. 2008;24(8):725-730.

15. McFadden KL, Hernández TD, Ito TA. Attitudes toward Complementary and Alternative Medicine influence its use. *Explore (NY)*. 2010;6(6):380-388.

16. Sasagawa M, Martzen MR, Kelleher WJ, Wenner CA. Positive correlation between the use of complementary and alternative medicine and internal health locus of control. *Explore (NY)*. 2008;4(1):38-41.

17. Marshall GN, Collins BE, Crooks VC. A comparison of two multidimensional health locus of control instruments. *J Pers Assess*. 1990;54(1-2):181-190.

18. Lau RR. Origins of health locus of control beliefs. *J Pers Soc Psychol*. 1982;42(2):322-334.

19. Melzer J, Saller R. Gibt es ein bestimmtes Menschenbild in der Naturheilkunde/ Komplementärmedizin? *Forsch Komplementärmed*. 2006;13(4):210-219.

20. Willich SN, Girke M, Hoppe J-D, Kiene H, Klitzsch W, Matthiessen PF, Meister P, Ollenschläger G, Heimpel H. Schulmedizin und Komplementärmedizin: Verständnis und Zusammenarbeit müssen vertieft werden. *Dtsch Arztebl*. 2004;101(19):A - 1314-1319.

21. Hoffmann B, Moebus S, Michalsen A, Paul A, Spahn G, Dobos GJ, Jöckel KH. Gesundheitsbezogene Kontrollüberzeugung und Lebensqualität bei chronisch Kranken nach stationärer Behandlung mit Integrativer Medizin – eine Beobachtungsstudie. *Forsch Komplementarmed Klass Naturheilkd*. 2004;11(3):159-170.

22. Cartwright T, Torr R. Making sense of illness: The experiences of users of Complementary Medicine. *J Health Psychol*. 2005;10(4):559-572.

23. Owens JE, Taylor AG, Degood D. Complementary and alternative medicine and psychologic factors: toward an individual differences model of complementary and alternative medicine use and outcomes. *J Altern Complement Med*. 1999;5(6):529-541.
24. Edwards R, Telfair J, Cecil H, Lenoci J. Reliability and validity of a self-efficacy instrument specific to sickle cell disease. *Behav Res Ther*. 2000;38(9):951-963.
25. Sallis JF, Pinski RB, Grossman RM, Patterson TL, Nader PR. The development of self-efficacy scales for health-related diet and exercise behaviors. *Health Educ Res*. 1988;3(3):283-292.
26. Luszczynska A, Schwarzer R. Multidimensional Health Locus of Control: Comments on the construct and its measurement. *J Health Psychol*. 2005;10(5):633-642.
27. Selander J, Marnetoft S-U, Asell M. Predictors for successful vocational rehabilitation for clients with back pain problems. *Disabil Rehabil*. 2007;29(3):215-220.
28. Gebhardt WA, Doef MP van der, Paul LB. The Revised Health Hardiness Inventory (RHHI-24): psychometric properties and relationship with self-reported health and health behavior in two Dutch samples. *Health Educ Res*. 2001;16(5):579-592.
29. Pucheu S, Consoli SM, D'Auzac C, Français P, Issad B. Do health causal attributions and coping strategies act as moderators of quality of life in peritoneal dialysis patients? *J Psychosom Res*. 2004;56(3):317-322.
30. Rudolph U, Schweizer J, Thomas A. Kontrollüberzeugungen und subjektive Lebensqualität bei chronischen Erkrankungen. *Präv Gesundheitsf*. 2006;1(3):182-189.
31. Colloca L, Miller FG. How placebo responses are formed: a learning perspective. *Philos Trans R Soc Lond B Biol Sci*. 2011;366(1572):1859-1869.
32. Bootzin RR, Caspi O. Explanatory mechanisms for placebo effects: cognition, personality and social learning. In: Kleinman A, Guess HA, Wilentz JS, eds. *The Science of the Placebo: Toward an Interdisciplinary Research Agenda*. London, UK: BMJ Books; 2002:108-132.
33. Carleton RN, Park I, Asmundson GJG. The Illness/Injury Sensitivity Index: An examination of construct validity. *Depress Anxiety*. 2006;23:340-346.
34. Mounce C, Keogh E, Eccleston C. A principal components analysis of negative affect-related constructs relevant to pain: Evidence for a three component structure. *J Pain*. 2010;11(8):710-717.
35. Vancleef LMG, Peters ML, Roelofs J, Asmundson GJG. Do fundamental fears differentially contribute to pain-related fear and pain catastrophizing? An evaluation of the sensitivity index. *Eur J Pain*. 2006;10(6):527-536.

36. Astin JA. Why patients use alternative medicine. *JAMA*. 1998;279(19):1548-1553.
37. Carleton RN, Asmundson GJG, Taylor S. Fear of physical harm: Factor structure and psychometric properties of the Injury/Illness Sensitivity Index. *J Psychopathol Behav Assess*. 2005;27(4):235-241.
38. Costello AB, Osborne JW. Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*. 2005;10(7):1-9.
39. Hinz A, Rief W, Brähler E. Hypochondrie in der Allgemeinbevölkerung: *Diagnostica*. 2003;49(1):34-42.
40. Schreiber JB, Nora A, Stage FK, Barlow EA, King J. Reporting structural equation modeling and confirmatory factor analysis results: A review. *J Educ Res*. 2006;99(6):323-337.
41. Schwarzer R. Everything you always wanted to know about the self-efficacy scale but were afraid to ask. 2009. (Accessed November 7, 2011, at: http://userpage.fu-berlin.de/~health/faq_gse.pdf).
42. Schwarzer R, Jerusalem M, eds. *Skalen zur Erfassung von Lehrer- und Schülermerkmalen. Dokumentation der psychometrischen Verfahren im Rahmen der wissenschaftlichen Begleitung des Modellversuchs Selbstwirksame Schulen*. Berlin: Freie Universität Berlin; 1999.
43. Lohaus A, Schmitt GM. *Kontrollüberzeugungen zu Krankheit und Gesundheit*. Göttingen: Hogrefe; 1989.
44. Lohaus A, Schmitt GM. Kontrollüberzeugungen zu Krankheit und Gesundheit (KKG): Bericht über die Entwicklung eines Testverfahrens. *Diagnostica*. 1989;35:59-72.
45. Deusinger IM. *Die Frankfurter Körperkonzeptskalen (FKKS)*. Göttingen: Hogrefe; 1998.
46. Bullinger M, Kirchberger I. *SF-36 Health Survey*. Göttingen: Hogrefe; 1998.
47. Hayton JC, Allen DG, Scarpello V. Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organ Res Methods*. 2004;7(2):191-205.
48. Lindeman M. Biases in intuitive reasoning and belief in complementary and alternative medicine. *Psychol Health*. 2011;26(3):371-382.
49. FernUniversität in Hagen. Daten-Zahlen-Fakten - Uni Intern - FernUniversität in Hagen. 2011. (Accessed September 22, 2011, at: http://www.fernuni-hagen.de/arbeiten/statistik/daten/index.shtml).

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Studienplanung, Zusammenstellung der Fragebögen, Datenerhebung, Dateneingabe, Datenauswertung, erste Manuskriptversion, Überarbeitung des Manuskripts

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Research Article

Body-Efficacy Expectation: Assessment of Beliefs concerning Bodily Coping Capabilities with a Five-Item Scale

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Background. Expectancies regarding a treatment play an important role in recovery as has been shown in placebo research. The role of expectations regarding the bodily capability to overcome illness is less investigated although in complementary and alternative medicine (CAM) such capability is the target of interventions. We introduced a new construct, body-efficacy expectation, defined as the conviction that one's body is able to deal with health-threatening factors by itself, and developed and validated a scale for its measurement. *Methods*. The scale was developed following expert recommendations. Using online survey data from 1054 participants an exploratory factor analysis was conducted and psychometric properties of the scale were examined (item characteristics, reliability, and validity). *Results*. The exploratory factor analysis yielded a one-factor solution explaining 51.96% of total variance (Cronbach's $\alpha = 0.77$). One of the originally six items was removed due to poor item characteristics. Correlations with several validation measures were in line with the theoretical background of the construct. Most importantly, participants with better general health showed higher body-efficacy expectation than participants with poorer health status. *Conclusions*. Further studies confirming the factor structure and using clinical samples are recommended. Also, the relations with the appraisal of CAM and CAM use warrant further research.

1. Introduction

Expectations play a crucial role in the maintenance of health and recovery. This has especially been highlighted in placebo research. Expectations can be regarded as the core element of the placebo effect [1] which is also reflected in its NBCI's MeSH term databank definition as "an effect usually, but not necessarily, beneficial that is attributable to an expectation that the regimen will have an effect; that is, the effect is due to the power of suggestion." But not only can one have expectations regarding the effectiveness of a treatment, but also can expectations concern the capability of one's body to overcome an illness, or to maintain health. Such expectancies are especially regarded in complementary and alternative medicine (CAM) since self-regulation is described as one aspect of CAM's anthropology [2]. Most forms of CAM assume a self-regulating force of the body, for example, the Qi in Traditional Chinese Medicine [3]. Illness is understood as an imbalance or weakened state of this force which therefore has to be rebalanced or strengthened by the treatment. In that way, expectancies regarding the effectiveness of a CAM treatment are subsequently also expectancies concerning the self-healing capacities of the body. In case they show effects similar to other placebo/expectancies effects [4, 5], they might be a large part of the effect of CAM treatments.

In order to evaluate the positive influence on treatment outcome that beliefs concerning one's bodily capability might have and their role in CAM, first one needs a clear definition of such beliefs and a reliable and valid measure for their assessment.

In developing both we were guided by scale development processes and research in the field of self-efficacy expectation. Self-efficacy expectation is defined as "the conviction that one can successfully execute the behaviour required to produce the outcomes" [6] and has proven to be an important construct in health psychology. Domain-specific self-efficacy expectations (i.e., convictions concerning narrowly defined behaviors as regularly brushing one's teeth or refraining from drinking) have been shown to be important predictors for changes in health behavior, coping with illness, or

recovery [7–9]. General self-efficacy expectation, that is, the conviction that one is able to cope with demanding and/or novel situations in general [10], has been found to correlate with a variety of measures concerning wellbeing and coping [11–13]. Although the body's performance when restoring or maintaining health differs from such actively executable behaviors that are the subject of self-efficacy expectations we found that both issues resemble each other. We therefore called the beliefs about one's bodily capability *body-efficacy expectation* (BEE) and defined them as the conviction that one's body is able to heal and take care of itself by dealing with pathogens and other health-threatening demands on its own. Since Bandura [6] describes performance accomplishments as the most important source for the manifestation of self-efficacy expectations, one can assume that someone who experiences a "capable body"; that is, someone who is rarely ill or overcomes illness quickly has higher BEE than someone of bad general health. Also, someone who experienced, for example, in CAM treatment, that his/her condition can improve without the use of an "invasive" treatment (e.g., antibiotics) can be assumed to have higher BEE than someone without that experience. In fact, CAM users report about the treatment-induced experience that the body is able to heal itself [14, 15].

Having thus defined BEE, we aimed to develop a reliable and valid measure, investigate its factor structure and reliability, and in the validation process evaluate its relation with other health-related measures, namely, general and current health status (assessed with various measures), physical fitness, general self-efficacy, internal health-locus of control, and body care. In addition, we were interested in relations with CAM and/or conventional medicine usage, that is, appraisal of CAM, medication usage, and kinds of health-care professionals consulted.

2. Methods

2.1. Participants and Setting. The BEE scale as well as all other reported measures were designed in the format of an online survey. Participants were undergraduate psychology students from the FernUniversität in Hagen, a distance-teaching university in Germany, who received course credit for participation. The students were informed about the possibility to participate in the study on the website of the department of psychology's "virtual laboratory". At the time of the study there were more than 10,000 undergraduate psychology students enrolled at the FernUniversität Hagen. However, students are encouraged to get their credits for study participation early in their course of studies. Therefore, only a proportion of students (those at the beginning of their course of studies) might regularly check the website of the "virtual laboratory." Participation was optional and anonymous.

2.2. Measuring Instruments

2.2.1. Body-Efficacy Expectation (BEE). The scale was developed according to suggestions based on previously developed domain-specific self-efficacy scales [16]. The items in the scale were also discussed with an experienced expert for self-efficacy in medical psychology.

The scale consists of six items in the German language. Four items follow the stem sentence "I am sure that my body is well equipped to deal with illness. . .," for example, ". . . even if I sometimes expect too much of it." Two items follow the stem sentence "I am sure that my body is strong enough to overcome an illness by itself. . .," for example, ". . . even if I am so ill that I have to stay in bed." Items are answered on a four-point Likert scale ranging from 1 (not at all true) to 4 (exactly true). This answering format corresponds to the answering format suggested by Schwarzer [16] for domain-specific self-efficacy scales as well as to that of the general self-efficacy scale [10]. The mean of all answers is calculated as the final score.

2.2.2. General Self-Efficacy Expectation. General self-efficacy expectation was assessed with the German version of the general self-efficacy scale [10], a widely used and well-validated instrument. The scale assesses the belief that one can cope with demanding and/or novel situations in general, for example, with the item "I am confident that I could deal efficiently with unexpected events." All ten items are rated on a 4-point-Likert scale ranging from 1 (not at all true) to 4 (exactly true). According to the recommendations by Schwarzer [16] the mean was calculated as the final score if less than 4 items were missing.

2.2.3. Internal Health Locus of Control (IHLOC). IHLOC [17–19] was assessed with the subset of seven items referring to internal locus of control from the German version of the multidimensional health locus of control questionnaire [20]. Items refer to the extent one is convinced that oneself is responsible for one's health, for example, "If I take the right actions, I can stay healthy." They are answered on a 6-point-Likert scale ranging from 1 (strongly agree) to 6 (strongly disagree). Scores are reversed in the process of calculating a final sum score so that a high score represents high internal locus of control.

2.2.4. Frankfurter Body Concept Scales. The Frankfurter Body Concept Scales [21] assess different body-related self-concepts. We chose three subscales for our study: (1) *state of health (SoH)* assessing the evaluation of one's health or physical limits via 6 items, for example, "I often feel weak," (2) *body care and external appearance/body functioning (BC/BF)* assessing actions in order to improve physical functioning or appearance via 8 items, for example, "I make sure that I get enough sleep," and (3) *physical fitness (PF)* assessing evaluations of one's strengths and ductility via 10 items, for example, "I am annoyed by the clumsiness of my movements." All items are answered on a 6-point-Likert scale ranging from 1 (strongly agree) to 6 (strongly disagree). Negative items are reversed so that high final scores represent a high degree of the respective construct.

2.2.5. Health Status and Chronic Conditions. In addition to the SoH scale, health status was assessed using two questions from the German version of the SF-36 health survey [22]. The

item "How would you describe your general health?" assesses general health while the item "How would you describe your present health (compared to last week)?" assesses current health status. The items are answered on a 5-point-Likert scale ranging from "excellent" to "bad" or from "much better than last week" to "much worse than last week," respectively. The coding was then reversed so that the higher values on the scale indicated better health.

In addition, we asked if the participants had a chronic condition (yes or no) and if so what chronic condition they had. We also asked for the following acute conditions in the last six months: common cold/flu, stomach problems, headache, back or neck pain, injury, cystitis, vaginal infection (women), psychological problems, and others. If the participants had any of the acute conditions, they were asked to report the duration in days. If the number of days was >100, the condition was considered as chronic and re-classified as such.

2.2.6. Appraisal of CAM. Participants were asked about their experience with different CAM treatments: homeopathy, TCM, acupuncture, phytotherapy, anthroposophic medicine, body-focused therapies (e.g., yoga, qigong, and taiqi), Bach flowers, essential oils, and up to three other treatments they could specify. They were asked to choose one of the following answer categories: "I have positive experience with this treatment," "I have negative experience with this treatment," "I can imagine this treatment is effective, but have not tried it yet," "I do not think this treatment is effective," or "I do not know this treatment/no opinion." The number of treatments that participants reported either to have positive experience with or regarded them as effective even though they themselves had not tried them was used as a surrogate measure for positive CAM appraisal (appraisal score).

2.2.7. Medication Profile. Participants were asked if they used the following drugs (prescribed or over the counter) during the six months prior to the study: allopathic drugs (e.g., but not limited to pain killers, antibiotics, detumescing nasal spray, beta-blockers, drugs for thyroid dysfunction, and ointments) and psychiatric drugs, together regarded as conventional medicine, phytomedicine, homeopathic drugs, TCM herbs, Bach flowers, and essential oils, together regarded as CAM medicine. They could also use free text to list other medication that afterwards were screened and classified either as conventional or CAM medication. Participants then were assigned to one of the following groups: (1) using only CAM medication, (2) using only conventional medication, (3) using both CAM and conventional medication, and (4) using no medication at all.

2.2.8. Consultation Profile. Participants were asked if they visited the following physicians or health-care practitioners during the six months before the study: general practitioner or specialist (e.g., but not limited to internists, orthopedic specialist, gynecologist, otorhinolaryngologist, eye specialist, etc.), together regarded as conventional consultations, naturopathic MD, homeopathic MD, TCM MD, anthroposophic medicine MD, and non-medical practitioner (German "Heilpraktiker"), together regarded as CAM consultations. They could also use free text to name other practitioners that afterwards were screened and classified either as conventional or CAM consultation. We also asked for psychotherapy; however, this question was not analyzed. Participants were assigned to one of the following groups: (1) only CAM consultations, (2) only conventional consultations, (3) both CAM and conventional consultations, and (4) not visiting any health-care professional at all.

2.3. Statistical Methods and Analyses

2.3.1. Missing BEE Data. BEE items were checked for the amount of missing values. If for one of the items more than 5% of the data were missing, a threshold commonly regarded as crucial [23], Little's MCAR test was conducted in order to check if the data were missing completely at random. If nonsignificant, missing values were imputed using expectation maximization (EM) and imputed values were rounded to integers to reflect the answering format of the scale. All following analyses were conducted with the imputed values.

2.3.2. Factor Structure and Reliability. We used P-P plots for BEE items to check for normality. If the answers were normally distributed, an exploratory factor analysis (EFA) was conducted using principal axis factoring as extraction method and Promax rotation. Following Hayton, Allen, and Scarpello's tutorial [24], Horn's parallel analysis (PA) was conducted based on 50 randomly created data sets in order to decide on the number of factors and the EFA was then run again with the number of factors fixed to the decided number. Items were screened in order to tag items that warrant consideration for removal. Guiding principles were Costello and Osborne's criteria [25] (i.e., items with communalities <0.40, factor loadings <0.50, or cross-loadings ≥ 0.32) and other item characteristics as corrected item-(sub)scale correlations, item means, and item variances. At least half of the items in the factors were required to have loadings ≥ 0.60 to support factor stability [26]. If items were removed, the PA was repeated with the smaller number of items to evaluate if the factor structure still held for the reduced scale. Cronbach's coefficient α was calculated for internal consistency, either for the total scale (if of homogeneous factor structure), or for the subscales.

2.3.3. Validity. The health-related scales and questions served as validation measures. P-P plots were used for checking the distribution of continuous measures. If normally distributed, Bravais-Pearson's correlation coefficient r was calculated for correlations with BEE. Independent samples t-tests were used for comparisons between participants with and without chronic health conditions and between participants with low appraisal and high appraisal of CAM following a split of the sample at the mean of the appraisal score. Regarding the medication profile, a one-factor ANOVA was used to compare BEE between the four groups. Two orthogonal linear contrasts were computed for subgroup analyses in which we compared (1) participants who used no medication at all with all other participants and (2) participants who used

CAM medication only with participants who either used only conventional medication or both conventional and CAM medication. A similar analysis was done for the consultation profile with the linear contrasts comparing (1) participants who went to no practitioner at all with all other participants and (2) participants who had CAM consultations only with those who either had conventional only or both CAM and conventional consultations. All CAM-related analyses were repeated separately for participants with and without chronic condition to control for confounding since poorer health status is a predictor for CAM use [27] and might also be related to lower BEE per se.

All computations were performed using the IBM Statistical Package for the Social Sciences (SPSS), Version 20 for Windows. Since the sample size was large, and therefore statistically significant differences not necessarily are relevant, effect sizes were calculated for t-tests and ANOVAs using the program G*Power 3.1 [28].

3. Results

3.1. Participants. 1054 students participated in the study. The mean age was 32.74 years (SD = 9.32); 80.4% of the sample were women and 17.9% were men (1.7% did not indicate their gender). 34.8% of the participants had a chronic health condition. 77.3% of the participants had tried a least one CAM treatment. The mean CAM appraisal score was 5.32 (SD = 2.40).

3.2. Missing BEE Data. For the item "... even if I am stressed" 8.5% of the answers were missing; for all other items, the amount of missing values was <1.5%. Little's MCAR test was conducted, yielding a nonsignificant result ($X^2(39) = 36.63$, $P = 0.58$) indicating that values were missing completely at random. Missing values then were imputed using the EM algorithm.

3.3. Factor Structure and Reliability. P-P plots suggested that the distributions of answers to the six items were normal. The EFA resulted in a factor solution with two factors having eigenvalues >1.00; however, the PA suggested to just retain the first factor, since it was the only one with an eigenvalue larger than the mean eigenvalue of the EFAs conducted in the 50 random samples (factor 1 : 2.89 versus 1.10; factor 2 : 1.04 versus 1.05). We therefore fixed the number of factors to one and reran the analysis for the interpretation of item parameters. One item—"... even if I do not take many precautions (e.g., wash hands regularly, wear a face mask, prevent contact with people who are contagious, flu vaccine, dietary supplements)"—showed very low communality (<0.30) as well as a much lower corrected item-total correlation and higher standard deviation than the other items. Since it could be justified with regard to the content to drop this item, we decided to run an EFA with the remaining five items instead. Again, the PA suggested to just retain one factor (factor 1: 2.60 versus 1.09; factor 2: 1.02 versus 1.04). The number of factors was thus fixed to one. The resulting solution explained 51.96% of the variance, and the factor loadings were sufficiently high (four items >0.60). However, three items showed communalities <0.40.

Cronbach's alpha for the 5-item scale was $\alpha = 0.77$. Omitting any item from the scale would not lead to an increase in α. The average inter-item-correlation was $r = 0.40$ (0.25–0.66). Table 1 shows item means, factor loadings, corrected item-total correlations, and communalities for all items.

3.4. Validity. The BEE mean score was $M = 2.83$ (SD = 0.54). This is comparable to other domain-specific self-efficacy scales [7] (see Table 2 for descriptive statistics and internal consistency of all validation measures). The P-P plots indicated that the distributions of the validation measures were normal. Table 2 shows the intercorrelations of all scales. Positive correlations were found between BEE and general health (no matter if assessed with the SoH scale or the item of the SF-36), fitness, general self-efficacy expectations, and IHLOC with the highest correlations being those between BEE and the general health measures. No correlations were found between BEE and current health status as well as body care.

Participants suffering from a chronic condition had significantly lower BEE than participants without chronic conditions ($t(1033) = 7.09$; $P < 0.001$; effect size $d = 0.46$), and participants with high appraisal of CAM had higher BEE than those with low appraisal of CAM in the total sample ($t(1052) = 4.04$; $P < 0.0001$; effect size $d = 0.25$) as well as in the subgroups of participants with chronic condition ($t(365) = 3.07$; $P < 0.01$; $d = 0.32$) and no chronic condition ($t(666) = 2.97$; $P < 0.01$; $d = 23$). The results of the ANOVAs are shown in Tables 3 and 4. No significant mean differences were found for the subgroup suffering from a chronic condition, but for both the total sample and the healthy subgroup. The linear contrasts showed that participants who took no medication at all had higher BEE than those who took any medication, and participants who took only CAM medication had higher BEE than those taking either only conventional or both CAM and conventional medication (Table 5). Regarding the consultation profiles, the only significant mean differences were those between participants who consulted no health care professional at all and those who did in both the total sample and the subgroup without chronic condition (Table 6).

4. Discussion

The purpose of this study was to develop and validate a scale to measure BEE, that is, the conviction that one's body is able to deal with pathogens and other health-threatening demands on its own. The development of the scale followed the line of domain-specific self-efficacy research; however, the concept deviates from other specific self-efficacy scales as the behavior of the body is not actively executable.

The process of identifying the factor structure and deciding on the final items proved rather complex. One of the initially six items did not meet several criteria for a satisfactory factor solution. With regards to content, the item was different from the remaining items insofar that "normal"

Table 1: Factor loadings and item parameters of the BEE scale.

	Item mean (SD[a])	Factor loading	Corrected item-total-correlation	Communality
I am sure my body is well prepared for illness...				
... even if I sometimes expect too much of it.	2.91 (0.74)	0.68	0.59	0.47
... even if I am exposed to a lot of pathogens in public.	2.98 (0.78)	0.57	0.49	0.32
... even if I am stressed.	2.58 (0.76)	0.61	0.52	0.37
I am sure my body is strong enough to overcome an illness by itself...				
... even if I am so ill that I have to stay in bed.	3.01 (0.71)	0.68	0.57	0.46
... even if I have an illness over a longer period.	2.65 (0.74)	0.62	0.51	0.38

[a]Standard deviation.
Excluded item: ... even if I do not take many precautions (e.g., wash hands regularly, wear a face mask, prevent contact with people who are contagious, get a flu vaccine, or take dietary supplements).

Table 2: Descriptive statistics, internal consistencies, and intercorrelation of the scales.

	BEE	GSE	IHLOC	SoH	BC/BF	PF	General Health	Present Health
Intercorrelation of the scales								
BEE: body-efficacy expectation	—							
GSE: general self-efficacy	0.35	—						
IHLOC: internal health locus of control	0.30	0.23	—					
SoH: state of health	0.47	0.43	0.29	—				
BC/BF: body care and external appearance/body functioning	0.09	0.21	0.31	0.27	—			
PF: physical fitness	0.30	0.34	0.23	0.68	0.42	—		
General health	0.47	0.31	0.28	0.65	0.23	0.45	—	
Present health	−0.04	−0.01	0.00	−0.03	−0.03	−0.04	−0.03	—
Mean (M)	2.83	2.97	29.34	25.70	35.70	44.04	3.35	3.19
Standard Deviation (SD)	0.54	0.43	4.93	5.30	5.18	8.59	0.81	0.75
Cronbach's α	0.77	0.88	0.84	0.84	0.73	0.87		

Table 3: ANOVAs: body-efficacy expectation compared between different medication profiles.

	Total group		No chronic condition		Chronic condition	
	N	Mean (SD)	n	Mean (SD)	n	Mean (SD)
CAM medication only	100	2.97 (0.48)	77	3.02 (0.47)	23	2.77 (0.48)
Conventional medication only	350	2.79 (0.55)	202	2.89 (0.52)	147	2.67 (0.57)
Both	320	2.71 (0.52)	162	2.79 (0.49)	156	2.63 (0.55)
No medication	284	2.96 (0.51)	227	2.99 (0.50)	41	2.82 (0.49)
Total	1054	2.83 (0.54)	668	2.91 (0.51)	367	2.67 (0.55)
F (df)		14.06 (3,1050)		6.40 (3,664)		1.61 (3,363)
P		<0.001		<0.001		0.19
Effect size f		0.20		0.17		0.11

Table 4: ANOVAs: body efficacy-expectation compared between different consultation profiles.

	Total group		No chronic condition		Chronic condition	
	N	Mean (SD)	n	Mean (SD)	n	Mean (SD)
CAM consultations only	25	2.83 (0.45)	17	2.82 (0.44)	8	2.85 (0.49)
Conventional consultations only	531	2.74 (0.54)	294	2.81 (0.51)	235	2.65 (0.57)
Both	80	2.70 (0.53)	35	2.89 (0.46)	44	2.57 (0.54)
No consultations	418	2.96 (0.51)	322	3.02 (0.50)	80	2.78 (0.48)
Total	1054	2.83 (0.54)	668	2.91 (0.51)	367	2.67 (0.55)
F (df)		16.24 (3,1050)		9.11 (3,664)		1.91 (3,363)
P		<0.001		<0.001		0.13
Effect size f		0.21		0.20		0.13

Table 5: Linear contrasts for comparisons between medication profiles.

	Total group			No chronic condition			Chronic condition		
	Difference in BEE	t (df)	P	Difference in BEE	t (df)	P	Difference in BEE	t (df)	P
No medication versus any medication	0.41	3.52 (1050)	<0.001	0.27	2.12 (664)	<0.05	0.39	1.36 (363)	0.18
CAM medication only versus conventional or both CAM and conventional medication	0.43	3.84 (1050)	<0.001	0.37	2.94 (664)	<0.01	0.26	1.08 (363)	0.28

BEE: body-efficacy expectation.

Table 6: Linear contrasts for comparisons between consultation profiles.

	Total group			No chronic condition			Chronic condition		
	Difference in BEE	t (df)	P	Difference in BEE	t (df)	P	Difference in BEE	t (df)	P
No consultation versus any consultation	0.62	4.30 (1050)	<0.001	0.53	3.10 (664)	<0.01	0.26	0.93 (363)	0.35
CAM consultation only versus conventional or both CAM and conventional consultation	0.23	1.04 (1050)	0.30	−0.05	−0.19 (664)	0.85	0.48	1.21 (363)	0.23

BEE: body-efficacy expectation.

behavior (not wearing a mask, not avoiding ill people, and not washing your hands often) was regarded as a potential health risk. Therefore, a low score for this item might have indicated if someone had tendencies of an illness phobia or obsessive-compulsive disorder with contamination concerns [29, 30] rather than low BEE. For this reason we considered it appropriate to remove the item from the scale and in doing so improve the factor structure and make the scale more straightforward. The results of the EFA with PA suggested a one-factor solution for the remaining five items. However, the communalities did not all reach the threshold of .40, indicating that not all variables are highly related to each other. This reflects the very tight decision for a one-factor solution, with the eigenvalue from the EFA's second factor being just below the mean of eigenvalues of the PA. A two-factor structure reflecting the two different stem sentences of the scale and therefore convictions about the body's capability to stay healthy and to get healthy when already ill, however, would have resulted in one of the factors consisting of only two items. Two-item factors are generally considered weak and unstable while factors with "5 or more strongly loading items (0.50 or better) are desirable and indicate a solid factor" [25]. Since all five items had factor loadings >0.50, and Cronbach's α still was sufficiently high [31] the one-factor solution probably is the best despite the rather low communalities.

The scale's correlations with the validation measures were in line with previous research and most important with those considerations on the formation and possible effect of BEE.

The positive relationship between BEE and IHLOC suggests an overall feeling of empowerment (or, resp., helplessness) regarding one's own health, either through one's own behavior (as is assessed by IHLOC) or through trust in one's body's capability (as is assessed by the BEE scale). This is not in line with Luszczynska and Schwarzer [32] who argue that correlations between health locus of control and specific self-efficacy measures tend to be low because locus of control refers to a broader range of health beliefs than domain-specific self-efficacy scales. BEE, however, also is rather unspecific regarding the health problems it targets which might well explain the positive correlations found in our study. In fact, correlations between domain-specific self-efficacy expectations and IHLOC have been found in other studies as well [33, 34].

Feeling empowered in the health domain furthermore relates to a general trust in one's ability to deal with problems as the correlation between BEE and general self-efficacy suggests. Such moderate correlations between domain-specific and general self-efficacy have been reported for other domain-specific self-efficacy scales as well [10, 12].

Most important, participants with a better general health status (irrespective of whether the assessment was with the SoH scale or with the item from the SF-36) reported higher BEE. Also, participants without chronic condition had higher BEE than those with chronic condition. In the total sample and in the subgroup without chronic condition, those participants who took no medication at all had higher BEE than those who did, and those who did not consult any health care professional had higher BEE than those who did. Therefore, the experience that the body is healthy in general is paired with a certain trust in its abilities. Since the study followed a cross-sectional design, the nature of this relationship cannot be clarified. However, as outlined in the introduction section, influences possibly are bidirectional. Performance accomplishments, in this case being generally of good health, can boost self-efficacy expectations [6]. However, higher BEE might also lead to a better health. This is suggested by the placebo research as well as by studies that

show effects of self-efficacy expectations on immune system parameters such as cortisol levels or numbers of lymphocytes [35].

Present health status, on the other hand, did not correlate with BEE. This is in line with Bandura [6]. Although self-efficacy expectations are modifiable, adjustments are not made quickly (i.e., by experiencing a better or worse health than in the previous week) and changes are reliant on strong new experiences.

Also, no correlation was found between BC/BF and BEE. The BC/BF items deal with concerns as getting enough sleep, keeping up dental care, eating healthy, or with general convictions such as "a healthy mind belongs to a healthy body." It is possible that high expectations regarding one's body's capabilities may actually minimize the importance of such concerns (if someone feels that his/her body is highly capable, it might not even be important to get enough sleep).

Physical fitness, on the other hand, was related to BEE. Fitness in fact correlates with better health and a more positive attitude towards one's body (lower levels of physical activity have been noted in subjects with hypochondria or illness worries [36]); however, in our study the relation might mostly be due to the substantial correlation between physical fitness and state of health.

High appraisal of CAM was associated with higher BEE. Also, higher BEE was found in participants who took only CAM medication compared to those who took only conventional or both CAM and conventional medication, as long as they did not suffer from a chronic condition. Again, the direction of influence cannot be concluded. As outlined in the introduction section, self-healing beliefs can be a result of CAM treatment [15] as patients adopt concepts as "balance," "qi," or "energy," from their practitioner [[14], page 564]. Concerning other kinds of domain-specific self-efficacy expectations, it has indeed been shown that it is possible to enhance them by appropriate interventions [37–42]. However, it is also assumed that people chose CAM because it is in accordance with beliefs that they already hold [43, 44]. In this scenario BEE would not be a result of but reason for CAM use. Possibly both directions of impact play together (resulting in a self-stabilizing or destabilizing system of facilitated/complicated healing and higher/lower BEE). Longitudinal studies and structural equation modelling might be useful to further disentangle the mutual influences in future research.

Several strengths of the study can be highlighted. (1) The sample was large and quite heterogeneous. Participants were students of the only distance-teaching university in Germany who vary considerably in age and in their lifestyle as well as in previous knowledge and experience. Unlike in German on-site universities, there is no grade point enrolment limit for this university. Many of the students have work experience; 80% work during their course of studies [45], and many have children. The proportion of participants with a chronic condition was comparable to the German population [46]. However, the majority of the samples were women who differ from men in their CAM use [47] and also in their health beliefs and behavior [48]. (2) We used a large set of validation measures to embed BEE in a broad context. (3) Regarding the CAM-related variables (appraisal of CAM, medication profile, and consultation profile), we divided the sample in subgroups with and without chronic condition to control for confounding. In fact, most results were not significant in participants suffering from a chronic condition indicating that this in fact is an important confounder.

Several limitations have to be discussed. (1) The scale was developed just by following recommendations and not by starting with a large item pool and reducing it in several steps. However, the recommendations were drawn up by a well-recognized expert in self-efficacy research. (2) Communalities for some items were below the common threshold of .40 indicating a trend towards a heterogeneous factor structure. A clearer factor structure might have been achieved by formulating more items and thereby strengthening a possible second factor or by limiting the scale items to one of the domains indicated by the two stem sentences (staying healthy or getting healthy when already ill). However, as the factor loadings and Cronbach's α are still sufficiently high, the current scale might be an economical measure for the quite broad construct of BEE inclusive of both its aspects. (3) Health status and chronic conditions were only assessed via self-report. Analyzing samples with a confirmed diagnosis, for example, chronic pain, might be worthwhile. (4) The CAM appraisal score might not be the most appropriate measure to assess the appraisal of CAM. Someone who is strongly convinced of one kind of CAM, for example, homeopathy, might stick to that one treatment only and not believe in anything else. Such a person in our study would fall into the low appraisal group while someone who has tried one or the other alternative treatments and found them working alright but might be convinced otherwise in a twinkling would fall into the high appraisal group. The same is true for the medication and consultation profiles that might simplify someone's health-related behavior in a nonrepresentative manner. (5) In the ANOVAs and contrast analyses, the compared groups were of different sample size. The same was true for the subgroups of participants with and without chronic condition. However, this cannot be avoided in observational studies. (6) An alpha of 0.5 was assumed for all statistical tests. Therefore testing was multiple and results should be interpreted with some caution regarding statistical significance. (7) Regarding the CAM-related analyses (BEE's relations with CAM appraisal, medication score, and consultation score) most absolute differences and effects were rather small with effect sizes of about 0.2 that correspond to small effects [49].

5. Conclusion

Since arriving at the final factor structure and items involved rather tight thresholds and various considerations, further demonstrations that the factor structure is reliable are recommended, for example, via confirmatory factor analyses in other large samples. Also, more research on BEE's relation with CAM and directions of influence is needed. However, since the scale substantially correlated with the validation measures in the assumed direction, in the meantime we consider the scale applicable in CAM as well as in health

psychology as it adds a new component to expectancy research that is especially relevant to CAM.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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References

[1] L. Colloca and F. G. Miller, "How placebo responses are formed: a learning perspective," *Philosophical Transactions of the Royal Society B*, vol. 366, no. 1572, pp. 1859–1869, 2011.

[2] J. Melzer and R. Saller, "Gibt es ein bestimmtes Menschenbild in der naturheilkunde/komplementärmedizin?" *Research in Complementary Medicine*, vol. 13, no. 4, pp. 210–219, 2006.

[3] K. A. O. 'Brien and C. C. Xue, "Der theoretische rahmen der traditionellen chinesischen medizin," in *Chinesische Medizin. Alte Heilkunst Und Moderne Wissenschaft*, P. C. Leung, C. C. Xue, and Y. C. Cheng, Eds., pp. 51–88, Urban und Fischer, München, Germany, 2006.

[4] A. Pollo, E. Carlino, and F. Benedetti, "Placebo mechanisms across different conditions: from the clinical setting to physical performance," *Philosophical Transactions of the Royal Society B*, vol. 366, no. 1572, pp. 1790–1798, 2011.

[5] S. Vits, E. Cesko, P. Enck, U. Hillen, D. Schadendorf, and M. Schedlowski, "Behavioural conditioning as the mediator of placebo responses in the immune system," *Philosophical Transactions of the Royal Society B*, vol. 366, no. 1572, pp. 1799–1807, 2011.

[6] A. Bandura, "Self-efficacy: toward a unifying theory of behavioral change," in *The Self in Social Psychology*, R. F. Baumeister, Ed., pp. 285–298, Psychology Press, Ann Harbor, Mich, USA, 1999.

[7] R. Schwarzer and B. Renner, "Health-Specific Self-Efficacy Scales," 2010, http://userpage.fu-berlin.de/~health/healself.pdf.

[8] B. M. DeVellis and R. F. DeVellis, "Self-efficacy and health," in *Handbook of Health Psychology*, A. S. Baum, T. A. Reveson, and J. E. Singer, Eds., pp. 235–247, Erlbaum, Mahwah, NJ, USA, 2001.

[9] R. Schwarzer, "Social-cognitive factors in changing health-related behaviors," *Current Directions in Psychological Science*, vol. 10, no. 2, pp. 47–51, 2001.

[10] R. Schwarzer, M. Jerusalem, and Eds, "Skalen zur erfassung von Lehrer-und schülermerkmalen," Dokumentation der Psychometrischen Verfahren Im Rahmen der Wissenschaftlichen Begleitung des Modellversuchs Selbstwirksame Schulen [Scales For the Assessment of Teacher and Student Characteristics], Freie Universität Berlin, Berlin, Germany, 1999.

[11] A. Luszczynska, B. Gutiérrez-Doña, and R. Schwarzer, "General self-efficacy in various domains of human functioning: evidence from five countries," *International Journal of Psychology*, vol. 40, no. 2, pp. 80–89, 2005.

[12] A. Luszczynska, U. Scholz, and R. Schwarzer, "The general self-efficacy scale: multicultural validation studies," *Journal of Psychology*, vol. 139, no. 5, pp. 439–457, 2005.

[13] R. Schwarzer, "Optimism, vulnerability, and self-beliefs as health related cognitions: a systematic review," *Psychology and Health*, vol. 9, pp. 161–180, 1994.

[14] T. Cartwright and R. Torr, "Making sense of illness: the experiences of users of complementary medicine," *Journal of Health Psychology*, vol. 10, no. 4, pp. 559–572, 2005.

[15] C. Hsu, J. Bluespruce, K. Sherman, and D. Cherkin, "Unanticipated benefits of CAM therapies for back pain: an exploration of patient experiences," *Journal of Alternative and Complementary Medicine*, vol. 16, no. 2, pp. 157–163, 2010.

[16] R. Schwarzer, "Everything you always wanted to know about the self-efficacy scale but were afraid to ask," 2009.

[17] K. A. Wallston, "Conceptualization and operationalization of perceived control," in *Handbook of Health Psychology*, A. S. Baum, R. Revenson, and J. E. Singer, Eds., pp. 49–58, Erlbaum, Mahwah, NJ, USA, 2001.

[18] K. A. Wallston, G. D. Kaplan, and S. A. Maiden, "Development and validation of the health locus of control (HLC) scale," *Journal of Consulting and Clinical Psychology*, vol. 44, no. 4, pp. 580–585, 1976.

[19] K. A. Wallston, B. S. Wallston, and R. DeVellis, "Development of the multidimensional health locus of control (MHLC) scales," *Health education monographs*, vol. 6, no. 2, pp. 160–170, 1978.

[20] A. Lohaus and G. M. Schmitt, *Kontrollüberzeugungen zu Krankheit und Gesundheit (KKG)*, Hogrefe, Göttingen, Germany, 1989.

[21] I. M. Deusinger, *Die Frankfurter Körperkonzeptskalen (FKKS)*, Hogrefe, Göttingen, Germany, 1998.

[22] M. Bullinger and I. Kirchberger, *SF-36 Health Survey*, Hogrefe, Göttingen, Germany, 1998.

[23] B. G. Tabachnick and L. S. Fidell, *Using Multivariate Statistics*, Pearson-Allyn & Bacon, New York, NY, USA, 5th edition, 2007.

[24] J. C. Hayton, D. G. Allen, and V. Scarpello, "Factor retention decisions in exploratory factor analysis: a tutorial on parallel analysis," *Organizational Research Methods*, vol. 7, no. 2, pp. 191–205, 2004.

[25] A. B. Costello and J. W. Osborne, "Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis," *Practical Assessment, Research & Evaluation*, vol. 10, no. 7, pp. 1–9, 2005.

[26] E. Guadagnoli and W. F. Velicer, "Relation of sample size to the stability of component patterns," *Psychological Bulletin*, vol. 103, no. 2, pp. 265–275, 1988.

[27] J. A. Astin, "Why patients use alternative medicine: results of a national study," *Journal of the American Medical Association*, vol. 279, no. 19, pp. 1548–1553, 1998.

[28] F. Faul, E. Erdfelder, A.-G. Lang, and A. Buchner, "G* Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences," *Behavior Research Methods*, vol. 39, no. 2, pp. 175–191, 2007.

[29] R. Noyes Jr., C. P. Carney, and D. R. Langbehn, "Specific phobia of illness: search for a new subtype," *Journal of Anxiety Disorders*, vol. 18, no. 4, pp. 531–545, 2004.

[30] N. Hoffmann and B. Hofmann, "Berührungsängste und waschzwänge," in *Wenn Zwänge das Leben Einengen*, pp. 59–78, Springer, Berlin, Germany, 2011.

[31] M. Tavakol and R. Dennick, "Making sense of Cronbach's alpha," *International Journal of Medical Education*, vol. 2, pp. 53–55, 2011.

[32] A. Luszczynska and R. Schwarzer, "Multidimensional health locus of control: comments on the construct and its measurement," *Journal of Health Psychology*, vol. 10, no. 5, pp. 633–642, 2005.

[33] R. Edwards, J. Telfair, H. Cecil, and J. Lenoci, "Reliability and validity of a self-efficacy instrument specific to sickle cell disease," *Behaviour Research and Therapy*, vol. 38, no. 9, pp. 951–963, 2000.

[34] J. F. Sallis, R. B. Pinski, R. M. Grossman, T. L. Patterson, and P. R. Nader, "The development of self-efficacy scales for health-related diet and exercise behaviors," *Health Education Research*, vol. 3, no. 3, pp. 283–292, 1988.

[35] A. O. 'Leary, "Self-efficacy and health: behavioral and stress-physiological mediation," *Cognitive Therapy and Research*, vol. 16, pp. 229–245, 1992.

[36] A. Martin and F. Jacobi, "Features of hypochondriasis and illness worry in the general population in Germany," *Psychosomatic Medicine*, vol. 68, no. 5, pp. 770–777, 2006.

[37] K. N. Brown, H. J. Wengreen, T. S. Vitale, and J. B. Anderson, "Increased self-efficacy for vegetable preparation following an online, skill-based intervention and in-class tasting experience as a part of a general education college nutrition course," *American Journal of Health Promotion*, vol. 26, no. 1, pp. 14–20, 2011.

[38] E. C. Murru and K. A. Martin Ginis, "Imagining the possibilities: the effects of a possible selves intervention on self-regulatory efficacy and exercise behavior," *Journal of Sport and Exercise Psychology*, vol. 32, no. 4, pp. 537–554, 2010.

[39] S. F. V. Wu, M. C. Lee, S. Y. Liang, Y. Y. Lu, T. J. Wang, and H. H. Tung, "Effectiveness of a self-efficacy program for persons with diabetes: a randomized controlled trial," *Nursing & Health Sciences*, vol. 13, no. 3, pp. 335–343, 2011.

[40] S. L. Williams and D. P. French, "What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour—And are they the same?" *Health Education Research*, vol. 26, no. 2, pp. 308–322, 2011.

[41] S. A. Rigby, E. W. Thornton, and C. A. Young, "A randomized group intervention trial to enhance mood and self-efficacy in people with multiple sclerosis," *British Journal of Health Psychology*, vol. 13, no. 4, pp. 619–631, 2008.

[42] D. L. Coffman, E. A. Smith, A. J. Flisher, and L. L. Caldwell, "Effects of health wise South Africa on condom use self-efficacy," *Prevention Science*, vol. 12, no. 2, pp. 162–172, 2011.

[43] F. L. Bishop, L. Yardley, and G. T. Lewith, "A systematic review of beliefs involved in the use of complementary and alternative medicine," *Journal of Health Psychology*, vol. 12, no. 6, pp. 851–867, 2007.

[44] J. E. Owens, A. G. Taylor, and D. Degood, "Complementary and alternative medicine and psychologic factors: toward an individual differences model of complementary and alternative medicine use and outcomes," *Journal of Alternative and Complementary Medicine*, vol. 5, no. 6, pp. 529–541, 1999.

[45] Fern Universität in Hagen, "Daten-Zahlen-Fakten—Uni Intern —Fern Universität in Hagen," 2011, http://www.fernuni-hagen.de/arbeiten/statistik/daten/index.shtml.

[46] U. Ellert, J. Wirz, and T. Ziese, *Beiträge zur Gesundheitsberichterstattung des Bundes. Telefonischer Gesundheitssurvey des Robert Koch-Instituts (2. Welle). Deskriptiver Ergebnisbericht*, Robert-Koch-Institut, 2006.

[47] U. Härtel and E. Volger, "Use and acceptance of classical natural and alternative medicine in Germany—findings of a representative population-based survey," *Forschende Komplementarmedizin und Klassische Naturheilkunde*, vol. 11, no. 6, pp. 327–334, 2004.

[48] W. H. Courtenay, D. R. McCreary, and J. R. Merighi, "Gender and ethnic differences in health beliefs and behaviors," *Journal of Health Psychology*, vol. 7, no. 3, pp. 219–231, 2002.

[49] J. Cohen, *Statistical Power Analysis for the Behavioral Sciences*, Erlbaum, Hillsdale, NJ, USA, 1988.

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RESEARCH ARTICLE Open Access

Internal health locus of control in users of complementary and alternative medicine: a cross-sectional survey

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Abstract

Background: Complementary and alternative medicine (CAM) is widely used in Germany, with some treatments eligible for health insurance reimbursements. CAM encourages patients to play an active role in their healing process. The belief that a person's own behavior influences health is assessed as the internal health locus of control (IHLOC). Studies on the association between IHLOC and CAM use yield inconsistent results. Using various indicators of CAM use, we evaluated whether there were differences in IHLOC between different groups of CAM users.

Methods: A cross-sectional online survey was conducted. IHLOC was compared between participants with high and low appraisal of CAM, between participants who used different types of medications (none, CAM, conventional, both), and who consulted with different health care professionals (none, CAM, conventional, both). Independent samples t-tests and ANOVAs were conducted for the total group and for subgroups of chronically ill and healthy participants. Post-hoc, we conducted a multivariate linear regression evaluating which indicators of CAM use or other characteristics showed the strongest association with IHLOC.

Results: A total of 1,054 undergraduate students completed the survey. Participants with high CAM appraisal showed higher IHLOC than those with low CAM appraisal, regardless of whether they were chronically ill ($p < .001$). Participants without chronic conditions showed higher IHLOC when only using CAM medications than when using either conventional medications alone or both conventional and CAM medications ($p < .05$). All participants showed higher IHLOC when visiting only CAM practitioners than when visiting either only conventional or both conventional and CAM practitioners ($p < .05$). CAM appraisal was associated the strongest with IHLOC in the linear regression model.

Conclusions: Generally, participants using CAM more or exclusively, and participants with higher appraisal of CAM showed higher IHLOC than those with less CAM use or lower CAM appraisal. Because of the cross-sectional design, it is not possible to determine whether differences in IHLOC are reasons for or consequences of CAM use. Research using a longitudinal design is needed. The sample, though more representative than most student samples, might not represent the general population. Studies evaluating clinical populations might add to the findings.

Keywords: Internal-external control, Complementary therapies, Cross-sectional studies

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Background

Therapies belonging to the spectrum of complementary and alternative medicine (CAM) are widely used in Germany [1,2] and worldwide [3,4]. According to a recent systematic review, [5] herbal medicine and chiropractic care are the most popular CAM treatments in Germany, however, the data differs depending on the definition of CAM and the CAM professionals included (physicians only or also lay practitioners). While in Germany, some CAM treatments, such as acupuncture for chronic low back pain and osteoarthritis of the knee, are generally reimbursed, it is different in other countries where reimbursement depends on the patient's insurance. The association between the use of CAM and its users' characteristics and beliefs has been investigated in numerous studies (e.g., [6-8]). One of the characteristics that has been examined repeatedly is internal health locus of control (IHLOC). IHLOC describes the perception that one can influence one's health (as opposed to health being determined by powerful others, e.g., physicians, or by chance, fate, or God [9,10]). Barrett et al. interviewed CAM practitioners about their views on health and health care, coming to the conclusion that the patients' responsibility for their own health is an important part of CAM [11]. The patient works together with the health care professional to improve his or her health. Often this involves changing aspects of one's lifestyle (e.g., diet or sleeping behavior), or practicing certain techniques (e.g., breathing or meditating). Taking responsibility for their recovery in this way might be one of the reasons patients choose CAM in the first place.

In a systematic review of beliefs of CAM patients, the majority of studies found correlations between the use of CAM and the desire for personal responsibility and health empowerment in general [7]. Qualitative studies come to that conclusion as well [12,13]. However, when looking at IHLOC in the same review, only three studies [14-16] showed positive correlations between internal locus of control and CAM use, and ten showed no relationship [7]. However, this result must be regarded with caution as most of the studies included in the review used a measure for IHLOC [17] that has questionable reliability [18]. Additionally, the assessment of CAM use varies from study to study, including giving the participants a list of CAM modalities and defining everybody as a CAM user who has used at least one of these modalities, and recruiting participants at CAM-based treatment centers and comparing them to participants recruited at GP-based treatment centers. More recent studies, not included in the above review, also come to ambiguous results regarding associations between CAM use and IHLOC. No relationship between internal locus of control and requests for CAM was found in an inpatient sample in Germany [19]. However, positive relationships have been found in cancer patients [20,21], in patients with lower back pain [22], in the healthy population [23], and in a mixed sample [24]. The picture, therefore, remains unclear and warrants further investigation.

The aim of this study was to evaluate differences in IHLOC between participants with high and low appraisal of CAM, with different patterns of medication use (none, only CAM, only conventional, or both), and with different patterns of health-care consultations (none, only CAM practitioners, only conventional practitioners, or both) using a large sample.

Methods

Subjects and Setting

The study was designed as an online survey conducted at a university (FernUniversität in Hagen) that was also used for the validation of a scale to measure body-efficacy expectation (BEE) described in a different publication [25]. In this manuscript, we report the methods relevant to this publication; for overall methods, see Schützler and Witt, 2013 [25].

As an anonymous survey, the study did not require the approval of an ethics committee.

Measurement Instruments

Internal Health Locus of Control (IHLOC)

IHLOC [9,10,26] was assessed with the seven items of the "internal" subscale of the German version of the multidimensional health locus of control questionnaire [27]. Items assess the extent to which people believe that they are responsible for their health, e.g., "If I take the right actions, I can stay healthy". The items are rated on a 6-point Likert scale ranging from 1 (strongly agree) to 6 (strongly disagree). To calculate the total score, the scores are reversed so that higher total scores represent higher IHLOC values. Because the manual for the questionnaire does not contain instructions for dealing with missing values, an IHLOC score was only computed for participants who had no missing values. Cronbach's alpha of the scale in our sample was .84.

Chronic conditions

Participants were asked if they had a chronic condition and, if so, what chronic condition they had. They were also given a list with acute conditions and were asked to check any condition they suffered from in the last six months as well as the duration of the condition. If the duration was >100 days, the condition was considered to be chronic and was reclassified as such [25].

Appraisal of CAM

Participants were presented with a list of CAM treatments (including the option to specify three more CAM

treatments not on the list) and were asked to answer one of the following: "I have positive experience with this treatment", "I have negative experience with this treatment," "I can imagine this treatment is effective, but have not tried it yet", "I do not think this treatment is effective", or "I do not know about this treatment/no opinion". The number of treatments that participants reported having had positive experiences with or regarded as effective even though they had not tried them personally was used as a surrogate measure for positive CAM appraisal (appraisal score, see also [25]).

Medication profile

Participants were given a list of prescription and over-the-counter drugs and reported if they had used them in the six months prior to the study. These included: allopathic drugs (e.g. but not limited to pain killers, antibiotics, detumescing nasal sprays, beta-blockers, drugs for thyroid dysfunction, ointments) and psychiatric drugs, together regarded as conventional medications, phytomedicine, homeopathic drugs, TCM herbs, Bach flowers, and essential oils, regarded as CAM medications. Participants could also list other medications that were then screened and classified as either conventional or CAM medications. We assigned the participants to one of the following groups: (1) uses only CAM medications, (2) uses only conventional medications, (3) uses both CAM and conventional medications, and (4) uses no medications at all [25].

Consultation profile

Participants were given a list of physicians and health practitioners and reported if they had visited them in the six months before the study: general practitioners or specialists (e.g. but not limited to internists, orthopedic specialists, gynecologists, otorhinolaryngologists, eye specialists, etc.), together regarded as conventional consultants, naturopathic MDs, homeopathic MDs, Traditional Chinese Medicine (TCM) MDs, anthroposophic medicine MDs and non-medical practitioners (German "Heilpraktiker"), together regarded as CAM consultants. They could also list other practitioners that were screened and classified as either conventional or CAM consultants. We then assigned the participants to one of the following groups: (1) only sees CAM consultants, (2) only sees conventional consultants, (3) sees both CAM and conventional consultants, and (4) does not consult with any health care professionals [25].

Statistical methods and analyses

The sample was split into two subgroups based on the CAM appraisal score resulting in one subgroup with low appraisal and one with high appraisal of CAM. An independent samples t-test was conducted to compare IHLOC in both subgroups.

One-factor ANOVAs were used to compare IHLOC of the participants according to their medication and consultation profiles (for more details see [25]). Orthogonal linear contrasts were used to compare pre-defined groups: we compared IHLOC of participants without any medication use with all other participants, and participants who only used CAM medications with those who only used conventional, or both CAM and conventional, medications. Accordingly, we compared IHLOC of participants reporting no consultations with any health care professionals with all others, and participants who only visited CAM practitioners with those who only visited conventional, or both CAM and conventional, practitioners.

To check if participants with and without chronic conditions differed in their IHLOC, an independent samples t-test was conducted to compare the two groups. If significant, all analyses were conducted for the subgroups with and without chronic conditions in addition to the analysis of the total sample.

In addition to these analyses, a multivariate linear regression model was built to evaluate which variables contributed the most to high or low IHLOC when considering them all together. The IHLOC score was the outcome and the following variables were added to the model as predictors: sex, age, presence of a chronic condition, appraisal score (as a numerical variable), and medication and consultation profiles. Factors of the latter were dummy-coded, and taking only conventional medication or visiting only conventional practitioners served as the reference category. No selection of predictors was conducted, rather, all predictors were left in the model, regardless of whether they were significant or not. The variance inflation factor was computed for all variables to check for multicollinearity.

All computations were performed using the IBM Statistical Package for the Social Sciences (SPSS), Version 20 for Windows. Because statistically significant differences in a large sample are not necessarily relevant, we computed effect sizes for the t-tests and ANOVAs using the program G*Power 3.1 [28].

Results

A total of 1,054 students (mean age 32.74 years, SD = 9.32) completed the survey; 80.4% of the sample were women, 17.9% were men, and 1.7% did not indicate their gender; 34.8% of the participants reported a chronic health condition; and 77.3% of the participants had tried at least one CAM treatment. With the majority of CAM treatments, the participants had positive experiences, or at least assumed them to be effective (Figure 1). IHLOC scores were missing for 3.2% of the sample. Because this

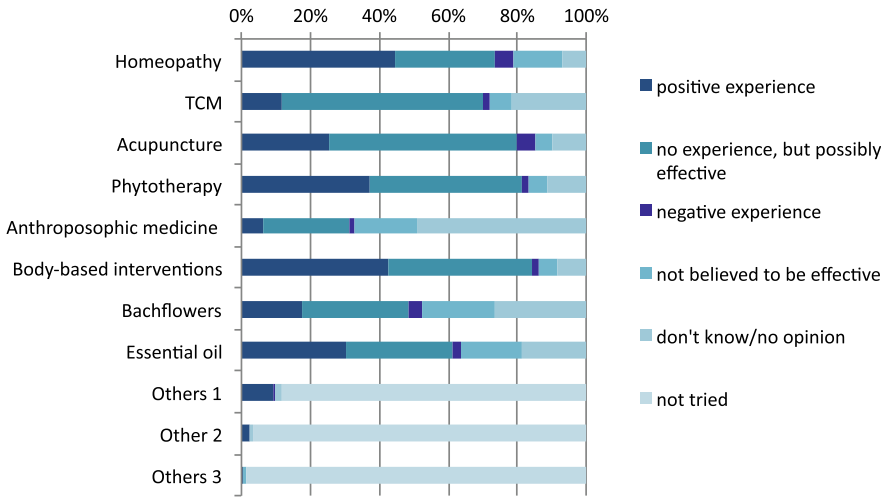

Figure 1 Experience with complementary and alternative medicine.

number is relatively small we decided to not impute missing values.

We used Q-Q plots to check the normality assumptions for the t-tests and ANOVAs. Only slight deviations from normality were found so we decided to conduct parametric tests. T-tests and ANOVAs are relatively robust against violations of normality assumptions as long as the sample size is large enough. Additionally, most studies evaluating IHLOC use comparisons of means which makes comparisons between studies difficult when conducting different analyses.

Participants without chronic conditions had higher IHLOC (M = 29.96, SD = 4.53) than participants suffering from a chronic condition (M = 28.32, SD = 5.46; $p < .001$, effect size d = .33). Therefore, all of the following analyses were computed for the total sample, and separate analyses were performed for participants with and without chronic conditions. Appraisal scores were between 0 and 11 with a mean of 5.32 (SD = 2.40) and a median of 6. The sample was split into one group with low CAM appraisal (scores of 0–5) and one with high CAM appraisal (scores of 6–11). This corresponds to a split where one group has scores below the mean and the other has scores above the mean. A median split, which would have been the normal procedure for planned group comparisons, was not feasible because 159 participants had a score of 6, i.e., the median itself. The low appraisal group had a mean appraisal score of 3.20 (SD = 1.64) and the high appraisal group had a mean appraisal score of 7.21 (SD = 0.96). IHLOC differed significantly in these groups, with higher values observed in participants with a high appraisal of CAM. This was true both for the total sample ($M_{High\ Appraisal} = 30.10$ (SD = 4.80), $M_{Low\ Appraisal} = 28.47$ (SD = 4.92), $p < .001$, d = .34) and for the subgroups with a chronic condition ($M_{High\ Appraisal} = 29.27$ (SD = 5.08), $M_{Low\ Appraisal} = 27.17$ (SD = 5.70), $p < .001$, d = .39) and without a chronic condition ($M_{High\ Appraisal} = 30.59$ (SD = 4.60), $M_{Low\ Appraisal} = 29.24$ (SD = 4.34), $p < .001$, d = .30). According to Cohen's conventions for standard mean differences, effect sizes of .2, .5 and .8 correspond to small, medium and large effects [29]. Therefore, the effects were small to moderate as is reflected in how they correspond to small numerical differences on the IHLOC scale.

Participants who only used CAM medications showed the highest IHLOC results, followed by participants who did not use any medications, those who used both CAM and conventional medications, and lastly those who only used conventional medications. This pattern was found in the total sample as well as in the subgroups of participants with and without chronic conditions. ANOVAs comparing the participants according to their medication use showed significant differences with a small effect size for the total sample, but not for the subgroups of participants with and without chronic conditions (Table 1). The linear contrasts showed that the overall effect was due to significantly higher IHLOC scores in participants who only used CAM medications compared to those who only used conventional or both CAM and conventional medications, while the difference between those who did not use any medications at all and all other participants was not significant (Table 2). This was also true for participants without chronic conditions, but not for those with a chronic condition (Table 2).

Participants who only consulted CAM practitioners showed the highest IHLOC results, followed by those who did not see any practitioners, those who consulted both CAM and conventional practitioners, and lastly, those who consulted only conventional practitioners. This pattern was found in the total sample as well as in the subgroups of participants with and without chronic

Table 1 IHLOC according to medication use in the past six months

	Total group		Chronic condition		No chronic condition	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
CAM medication only	98	30.74 (4.92)	23	29.87 (5.43)	75	31.01 (4.76)
Conventional medication only	341	28.87 (5.03)	143	28.01 (5.55)	197	29.49 (4.54)
Both	313	28.95 (4.64)	151	28.11 (4.99)	160	29.80 (4.13)
No medication	268	29.89 (4.99)	40	29.30 (6.70)	219	30.13 (4.67)
Total	1020	29.34 (4.93)	357*	28.32 (5.46)	651*	29.96 (4.53)
F (df)		5.52 (3,1016)		1.27 (3,353)		2.25 (3,647)
p		<.01		.284		.081
Effect size f		.13		.11		.10

*Sizes of subgroups do not add up to 1020 because of missing data regarding the presence/absence of a chronic condition.

conditions (Table 3). ANOVAs comparing the participants according to the health care professionals they visited yielded significant overall results in the total sample as well as in the subgroups of participants with and without chronic conditions (Table 3). The effects were of moderate size. The subgroup analyses showed that this overall result was due to a significantly higher IHLOC in participants who only visited CAM practitioners compared to those who visited both conventional and CAM practitioners or conventional practitioners only. This was found in the total sample and both subgroups (Table 4).

The variance inflation factors for all variables were approximately 1, and the highest value was 1.6, indicating little multicollinearity. The linear regression model showed that the appraisal score (beta = .15, $p < .001$), the presence of a chronic condition (beta = −.11, $p < .001$), not visiting any health-care professionals (beta = .17, $p < .001$), and visiting only CAM practitioners (beta = .11, $p < .01$) were significant predictors for IHLOC. Suffering from a chronic condition was associated with a lower IHLOC, while the three others were associated with a higher IHLOC. All other predictors were not significant (Table 5). Despite the highly significant predictors, the explained variance in IHLOC was only 9%.

Discussion

We aimed to determine whether IHLOC differed according to CAM appraisal and the use of different medications (only CAM, both conventional and CAM, only conventional, or none) or chosen health care professionals (only CAM, both conventional and CAM, only conventional, or none). Because the study was observational, one must keep in mind that the study population is often heterogeneous, with the CAM group including more patients with chronic illnesses. It has been shown that poor health status is a predictor for CAM use [6]. Additionally, a chronic condition might lead to lower IHLOC results because it has been shown that IHLOC scores are higher in healthier subjects [30]. Indeed, in our sample the participants suffering from chronic conditions showed lower IHLOC than participants without chronic conditions. Therefore, we controlled for possible confounding by conducting subgroup analyses of participants with and without chronic conditions.

The proportion of participants who had used at least one CAM treatment was higher than previously reported for the general German population [2,31]. However, our study population was a student population whose social statuses might be higher than that of the general population. A higher social status has been found to be a predictor of CAM use [1,31]. The proportion of participants with a chronic condition was comparable to that of the general German population [32].

Higher appraisal of CAM was moderately related to higher IHLOC, regardless of whether participants had a chronic condition. Focusing on the medication use of the participants, differences were found between those participants who only used CAM medications and all others; however, not for the chronically ill participants. This indicates that the presence of a chronic condition is a more important predictor of IHLOC than the type of

Table 2 Subgroup comparisons regarding medication

	Total group			Chronic condition			No chronic condition		
	Difference in IHLOC	t (df)	p	Difference in IHLOC	t (df)	p	Difference in IHLOC	t (df)	p
No medication vs. any medication	1.10	1.00 (1016)	.32	1.90	.66 (353)	.51	.08	.07 (647)	.94
CAM medication only vs. CAM and conventional or conventional medications only	3.67	3.46 (1016)	<.01	3.62	1.53 (353)	.13	2.74	2.39 (647)	<.05

Table 3 IHLOC according to health-professionals' consultation during the past six months

	Total group		Chronic condition		No chronic condition	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
CAM consultation only	24	32.58 (4.24)	8	34.00 (4.28)	16	31.88 (4.18)
Conventional consultation only	517	28.44 (4.96)	229	27.47 (5.36)	286	29.23 (4.49)
Both	78	29.08 (4.80)	42	28.83 (5.06)	35	29.49 (4.53)
No consultation	401	30.37 (4.67)	78	29.96 (5.39)	314	30.57 (4.48)
Total	1020	29.34 (4.93)	357*	28.32 (5.46)	651*	29.96 (4.53)
F (df)		15.78 (3,1016)		7.62 (3,353)		5.62 (3,647)
p		<.001		<.001		<.01
Effect size f		.22		.25		.16

*Sizes of subgroups do not add up to 1020 because of missing data regarding the presence/absence of a chronic condition.

medication used. For the type of health care professional the participants consulted, there were differences between the participants who only consulted CAM practitioners and all others. This was even true for the group with a chronic condition. The results seem to support those studies that found IHLOC to be positively related to CAM use [14-16,20-24].

When considering CAM appraisal, medication and consultation profiles, chronic conditions as well as sex and age in one model, we found that CAM appraisal had the strongest association with IHLOC, followed by suffering from a chronic condition (negative association), not visiting any health care professionals or only visiting CAM practitioners. However, all of the variables combined only explained 9% of the variance in IHLOC. This indicates that there are other factors associated with IHLOC that were not included in our model. We only assessed whether participants had a chronic condition; however, how they manage it might be more important regarding IHLOC. This points to self-efficacy expectations [33] as one important factor.

Strengths of our study include the large, heterogeneous sample. As described in the validation publication of the BEE scale [25], this was not an ordinary student sample: the FernUniversität in Hagen is the only distance learning university in Germany. Students vary considerably in age, lifestyles, and previous knowledge and experiences. The university has no grade point enrollment cut-off, and many students have work experience or work during their course of studies (in fact, 80% do so, [34]), and many have children.

CAM use was assessed in several ways: We used an appraisal score that included positive experiences with CAM as well as positive assumptions regarding CAM modalities that have not been tried by the participants themselves. Furthermore, we looked at the types of medications the participants used and the health care professionals they visited for their health problems. Additionally, we took care to account for the role of chronic conditions as a possible confounder by running subgroup analyses for all comparisons. IHLOC was assessed using a widely used and well-validated instrument [9,10].

For non-significant mean differences, the trends also pointed in the assumed directions. The lack of significant differences in the subgroup of participants with a chronic condition is likely due to the smaller sample size (approximately 35% of the total sample).

Several limitations of this study must be discussed. First, because of the cross-sectional study design, there is no way to determine whether a higher IHLOC is a disposition that makes people prone to using CAM, or whether it is a result of positive experiences with CAM treatments. In a study by Hoffmann et al. [35] concerning changes that occur during CAM treatment, an increase in IHLOC was observed during inpatient integrative medicine treatment of patients with chronic conditions. However, the study lacked a control group. In the interview study by Cartwright and Torr [36], the authors describe how the participants adopt concepts from CAM when they refer to "balance", "qi", "energy", etc. (p. 564), i.e., ideas and theories have been communicated

Table 4 Subgroup comparisons regarding health professionals consultations

	Total group			Chronic condition			No chronic condition		
	Difference in IHLOC	t (df)	p	Difference in IHLOC	t (df)	p	Difference in IHLOC	t (df)	p
No consultation vs. any consultation	1.00	.74 (1016)	.46	−.42	−.15 (353)	.88	1.13	.72 (647)	.47
CAM consultation only vs. CAM and conventional or conventional consulations only	7.65	3.73 (1016)	<.001	11.70	3.03 (353)	<.01	5.04	2.12 (647)	<.05

Table 5 Results of the linear regression model predicting internal health locus of control (IHLOC)

Predictor	B (95% CI)	Beta	P
Appraisal score	.32 (.18, .45)	.15	<.001
Chronic condition	−1.18 (−1.84, −.52)	-.11	<.001
Sex: female	-.18 (−.96, .60)	-.01	.65
Medication [Reference: only conventional medication]			
Only CAM	.36 (−.77, 1.49)	.02	.53
Both CAM and conventional	-.01 (−.78, .75)	-.00	.97
None	-.07 (−.91, .77)	-.01	.86
Consultations [Reference: only conventional practitioners]			
Only CAM	3.49 (1.50, 5.48)	.11	<.01
Both CAM and conventional	.40 (−.78, 1.59)	.02	.50
None	1.73 (1.02, 2.43)	.17	<.001
Age	.01 (−.02, .05)	.02	.44

between them and their practitioner. Such results point out the possible change of beliefs and expectations during the course of treatment. However, it is generally assumed that people chose CAM because it is in accordance with beliefs that they already hold [7,37]. It would be worthwhile to investigate IHLOC and CAM in a longitudinal design, i.e., assessing participants' IHLOC before and after a CAM treatment. In that way, one could detect changes in IHLOC as well as possible differences between different CAM treatments (for example, yoga's very active patient role, and homeopathy's more passive patient role).

Second, health statuses and chronic conditions were only assessed through self-reports. Analyzing samples with a confirmed diagnosis might be worthwhile to come to a final conclusion regarding whether health status is a confounder or not. Additionally, the CAM-related variables might not be optimal, as discussed elsewhere [25].

Third, although the sample was more heterogeneous than student samples generally are, whether the results can be generalized to the general population remains up for debate. Also, results may be different in countries with different reimbursement strategies of CAM treatments since the status of CAM might be different in such countries.

Methodologically, using the same sample that was used in the BEE scale validation study makes this study somewhat exploratory. Additionally, in the ANOVAs and contrast analyses, the sample sizes of the compared groups were quite different for some groups, especially for those of participants using only CAM medications or practitioners, which included very few participants. This is a serious problem and should be addressed in further studies by recruiting part of the sample in different settings, e.g., outpatient CAM departments or practices. In addition to that, an alpha of 0.05 was assumed in all statistical tests, resulting in multiple testing. The results should therefore be interpreted with caution regarding statistical significance, the more as only small to moderate effects could be found. Additionally, the proportion of explained variance in IHLOC when using CAM appraisal, medication and consultation profiles as well as other possibly confounding variables, such as chronic conditions, was very low. This is in accordance with the rather small effects found in the t-tests and ANOVAs.

In discussing the results, an important question has recently been posed by Lindeman [38]: are there predictors of CAM use that underlie the factors and beliefs commonly assumed to be related to CAM use? Her study used a regression model with factors that have been investigated with regard to CAM use in numerous studies, e.g., desire for control, health, education, gender, certain world views, etc. In addition to that, intuitive thinking, core knowledge confusions, and paranormal beliefs were added as predictors. Those three predictors explained 34% of the variance in CAM beliefs while all other predictors added no more than 4% of the explained variance.

Therefore, the question is justified as to whether focusing on constructs such as locus of control is worth further pursuit or if more general, underlying constructs should be increasingly taken into account.

While that question remains debatable, our results indicate that there are, in fact, differences in IHLOC when comparing different groups of CAM users.

Conclusion

We found that IHLOC was related to CAM use by looking at several indicators for CAM use. It remains unclear whether people use CAM because it is in accordance with their higher IHLOC or if their IHLOC

changes during CAM treatments. This question will have to be evaluated using longitudinal studies or structural equation modeling. Additionally, the role of possible confounders should be further illuminated.

Abbreviation

CAM: Complementary and alternative medicine; BEE: Body-efficacy expectation; IHLOC: Internal health locus of control; TCM: Traditional Chinese Medicine.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

LS participated in the design of the study, coordinated the study, analyzed the data and drafted the manuscript. CMW participated in the design and coordination of the study and helped draft the manuscript. Both authors read and approved the final manuscript.

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References

1. Härtel U, Volger E: **[Use and acceptance of classical natural and alternative medicine in Germany - Findings of a representative population-based survey].** *Forsch Komplementarmed Klass Naturheilkd* 2004, **11:**327–334.
2. Institut für Demoskopie Allensbach: *Naturheilmittel 2010. Ergebnisse einer bevölkerungsrepräsentativen Befragung.* Allensbach; 2010.
3. Burke A, Upchurch DM, Dye C, Chyu L: **Acupuncture use in the United States: findings from the National Health Interview Survey.** *J Altern Complement Med* 2006, **12:**639–648.
4. Thomas KJ, Nicholl JP, Coleman P: **Use and expenditure on complementary medicine in England: a population based survey.** *Complement Ther Med* 2001, **9:**2–11.
5. Linde K, Alscher A, Friedrichs C, Joos S, Schneider A: **Die Verwendung von Naturheilverfahren, komplementären und alternativen Therapien in Deutschland - eine systematische Übersicht bundesweiter Erhebungen.** *Res Complement Med* 2014, **21:**2–2.
6. Astin JA: **Why patients use alternative medicine.** *JAMA* 1998, **279:**1548–1553.
7. Bishop FL, Yardley L, Lewith GT: **A systematic review of beliefs involved in the use of Complementary and Alternative Medicine.** *J Health Psychol* 2007, **12:**851–867.
8. Honda K, Jacobson JS: **Use of complementary and alternative medicine among United States adults: the influences of personality, coping strategies, and social support.** *Prev Med* 2005, **40:**46–53.
9. Wallston KA, Kaplan GD, Maiden SA: **Development and validation of the health locus of control (HLC) scale.** *J Consult Clin Psychol* 1976, **44:**580–585.
10. Wallston KA, Wallston BS, DeVellis RF: **Development of the multidimensional health locus of control (MHLC) scale.** *Health Educ Monogr* 1978, **6:**160–170.
11. Barrett B, Marchand L, Scheder J, Appelbaum D, Plane MB, Blustein J, Maberry R, Capperino C: **What Complementary and Alternative Medicine Practitioners Say About Health and Health Care.** *Ann Fam Med* 2004, **2:**253–259.
12. Richardson J: **What patients expect from complementary therapy: a qualitative study.** *Am J Public Health* 2004, **94:**1049–1053.
13. Thorne S, Paterson B, Russell C, Schultz A: **Complementary/alternative medicine in chronic illness as informed self-care decision making.** *Int J Nurs Stud* 2002, **39:**671–683.
14. Downer SM, Cody MM, McCluskey P, Wilson PD, Arnott SJ, Lister TA, Slevin ML: **Pursuit and practice of complementary therapies by cancer patients receiving conventional treatment.** *BMJ* 1994, **309:**86–89.
15. Furnham A, Bhagrath R: **A comparison of health beliefs and behaviours of clients of orthodox and complementary medicine.** *Br J Clin Psychol* 1993, **32:**237–246.
16. McGregor KJ, Peay ER: **The choice of alternative therapy for health care: Testing some propositions.** *Soc Sci Med* 1996, **43:**1317–1327.
17. Lau RR: **Origins of health locus of control beliefs.** *J Pers Soc Psychol* 1982, **42:**322–334.
18. Marshall GN, Collins BE, Crooks VC: **A comparison of two multidimensional health locus of control instruments.** *J Pers Assess* 1990, **54:**181–190.
19. Huber R, Lüdtke R, Beiser I, Koch D: **Coping strategies and the request for a consultation on complementary and alternative medicine – a cross-sectional survey of patients in a psychosomatic and three medical departments of a German university hospital.** *Forsch Komplementarmed Klass Naturheilkd* 2004, **11:**207–211.
20. Henderson JW, Donatelle RJ: **The relationship between cancer locus of control and complementary and alternative medicine use by women diagnosed with breast cancer.** *Psychooncology* 2003, **12:**59–67.
21. Davidson R, Geoghegan L, McLaughlin L, Woodward R: **Psychological characteristics of cancer patients who use complementary therapies.** *Psychooncology* 2005, **14:**187–195.
22. Ono R, Higashi T, Suzukamo Y, Konno S, Takahashi O, Tokuda Y, Rhaman M, Shimbo T, Endo H, Hinohara S, others: **Higher internality of health locus of control is associated with the use of complementary and alternative medicine providers among patients seeking care for acute low-back pain.** *Clin J Pain* 2008, **24:**725.
23. McFadden KL, Hernández TD, Ito TA: **Attitudes toward Complementary and Alternative Medicine influence its use.** *Explore: The Journal of Science and Healing* 2010, **6:**380–388.
24. Sasagawa M, Martzen MR, Kelleher WJ, Wenner CA: **Positive correlation between the use of complementary and alternative medicine and internal health locus of control.** *Explore (NY)* 2008, **4:**38–41.
25. Schützler L, Witt L: **Body-Efficacy Expectation: Assessment of Beliefs concerning Bodily Coping Capabilities with a Five-Item Scale.** *Evid base Compl Alternative Med* 2013, **2013**.
26. Wallston KA: **Conceptualization and operationalization of perceived control.** In *Handbook of Health Psychology.* Edited by Baum AS, Revenson R, Singer JE. Mahwah, NJ: Erlbaum; 2001:49–58.
27. Lohaus A, Schmitt GM: *Kontrollüberzeugungen zu Krankheit und Gesundheit (KKG).* Göttingen: Hogrefe; 1989.
28. Faul F, Erdfelder E, Lang A-G, Buchner A: **G*Power 3: flexible statistical power analysis programm for the social, behavioral, and biomedical science.** *Behav Res Methods* 2007, **39:**175–191.
29. Cohen J: *Statistical Power Analysis for the Behavioral Sciences.* Hillsdale, NJ: Erlbaum; 1988.
30. Gebhardt WA, van der Doef MP, Paul LB: **The Revised Health Hardiness Inventory (RHHI-24): psychometric properties and relationship with self-reported health and health behavior in two Dutch samples.** *Health Educ Res* 2001, **16:**579–592.
31. Bücker B, Groenewold M, Schoefer Y, Schäfer T: **The use of complementary alternative medicine (CAM) in 1 001 German adults: results of a population-based telephone survey.** *Gesundheitswesen* 2008, **70:**e29–36.
32. Robert-Koch-Institut (Ed): *Beiträge zur Gesundheitsberichterstattung des Bundes. Telefonischer Gesundheitssurvey des Robert Koch-Instituts (2. Welle).* Berlin: Deskriptiver Ergebnisbericht; 2006.
33. DeVellis BM, DeVellis RF: **Self-efficacy and health.** In *Handbook of Health Psychology.* Edited by Baum AS, Reveson TA, Singer JE. Mahwah, NJ: Erlbaum; 2001:235–247.
34. **Daten-Zahlen-Fakten - Uni Intern - FernUniversität in Hagen.** [http://www.fernuni-hagen.de/arbeiten/statistik/daten/index.shtml]
35. Hoffmann B, Moebus S, Michalsen A, Paul A, Spahn G, Dobos GJ, Jöckel KH: **Gesundheitsbezogene Kontrollüberzeugung und Lebensqualität bei chronisch Kranken nach stationärer Behandlung mit Integrativer Medizin – eine Beobachtungsstudie.** *Forsch Komplementarmed Klass Naturheilkd* 2004, **11:**159–170.

36. Cartwright T, Torr R: **Making sense of illness: The experiences of users of Complementary Medicine.** *J Health Psychol* 2005, **10:**559–572.
37. Owens JE, Taylor AG, Degood D: **Complementary and alternative medicine and psychologic factors: toward an individual differences model of complementary and alternative medicine use and outcomes.** *J Alternative Complement Med* 1999, **5:**529–541.
38. Lindeman M: **Biases in intuitive reasoning and belief in complementary and alternative medicine.** *Psychol Health* 2011, **26:**371–382.

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Lebenslauf

Mein Lebenslauf wird aus datenschutzrechtlichen Gründen in der elektronischen Version meiner Arbeit nicht veröffentlicht.

Publikationsliste

Witt CM, Außerer O, Baier S, Heidegger H, Icke K, Mayr O, Mitterer M, Roll S, Spizzo G, Scherer A, Thuile C, Wieser A, **Schützler L**. Effectiveness of an additional individualized multi-component complementary medicine treatment on health-related quality of life in breast cancer patients: a pragmatic randomized trial. *Breast Cancer Res Treat*. 2015;149(2):449-460.

Schützler L, Witt CM. Internal health locus of control in users of complementary and alternative medicine: a cross-sectional survey. *BMC Complement Altern Med*. 2014;14(1):320.

Martins F, Kaster T, **Schützler L**, Witt CM. Factors influencing further acupuncture usage and a more positive outcome in patients with osteoarthritis of the knee and the hip: a 3-year follow-up of a randomized pragmatic trial. *Clin J Pain*. 2014;30(11):953-959.

Blödt S, **Schützler L**, Huang W, Pach D, Brinkhaus B, Hummelsberger J, Kirschbaum B, Kuhlmann K, Lao L, Liang F, Mietzner A, Mittring N, Müller S, Paul A, Pimpao C, Roll S, Wu H, Zhu J, Witt CM. Effectiveness of additional self-care acupressure for women with menstrual pain compared to usual care alone: using stakeholder engagement to design a pragmatic randomized trial and study protocol. *Trials*. 2013;14(1):99.

Schützler L, Witt L. Body-Efficacy Expectation: Assessment of beliefs concerning bodily coping capabilities with a five-item scale. *Evid Based Complement Alternat Med*. 2013;2013.

Adler UC, Krüger S, Teut M, Lüdtke R, **Schützler L**, Martins F, Willich SN, Linde K, Witt CM. Homeopathy for depression: A randomized, partially double-blind, placebo-controlled, four-armed study (DEP-HOM). *PLoS ONE*. 2013;8(9):e74537.

Schützler L, Carleton RN, Witt CM. The Illness/Injury Sensitivity Index: validation of a German version of the ISI-R. *Cogn Behav Ther*. 2012;41(3):223-229.

Witt CM, Martins F, Willich SN, **Schützler L**. Can I help you? Physicians' expectations as predictor for treatment outcome. *Eur J Pain*. 2012;16(10):1455-1466.

Witt CM, **Schützler L**. The gap between results from sham-controlled trials and trials using other controls in acupuncture research-the influence of context. *Complement Ther Med*. 2013;21(2):112-114.

Witt CM, **Schützler L**, Lüdtke R, Wegscheider K, Willich SN. Patient characteristics and

variation in treatment outcomes: Which patients benefit most from acupuncture for chronic pain? *Clin J Pain*. 2011;27(6):550-555.

Adler UC, Krüger S, Teut M, Lüdtke R, Bartsch I, **Schützler L**, Melcher F, Willich SN, Linde K, Witt CM. Homeopathy for depression--DEP-HOM: study protocol for a randomized, partially double-blind, placebo controlled, four armed study. *Trials*. 2011;12(1):43.

Schützler L, Pröbstel CH. Ganztagsschule in Nordrhein-Westfalen. In: Merkens H, Schründer-Lenzen A, Kuper H, eds. *Ganztagsorganisation im Grundschulbereich*. Münster u.a.: Waxmann; 2009:135-150.

Schützler L, Bischkopf J, Wolff S. „Wenn du zunimmst, mag ich dich so, wie du bist...“. Bedingungslose Wertschätzung und Gewichtskontrolle bei der klientenzentrierten Behandlung von Anorexie-Patientinnen. *Gesprächspsychotherapie und Personzentrierte Beratung*. 2006;1:20-24.

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