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**Workplace Health Promotion:
Motivational and Volitional Processes of Seasonal
Influenza Vaccination Behavior in the Workplace**

Dissertation zur Erlangung des akademischen Grades

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*„A healthy, motivated and well-qualified workforce is
fundamental to the future social and economic well-
being of the European Union”*

(Luxembourg Declaration on Workplace Health Promotion in the
European Union, ENWHP, 2007, p. 2).

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Die Danksagung ist in dieser Online-Version der Arbeit
aus Gründen des Datenschutzes nicht enthalten.

Abstract

Workplace health promotion aims at maintaining and promoting employees health and well-being which is fundamental for organizational and societal functioning and success. In *Chapter 2*, it was explored whether health climate, i.e., employees' shared perceptions of organizational health-related efforts, operates as a job resource, supporting employees' affective commitment to the organization. This would underline the importance of workplace health promotion. In this thesis, the focus was on behavioral workplace health promotion and seasonal influenza vaccination behavior in particular. Successful health behavior promotion requires effective and evidence-based health interventions. This premises a profound understanding of underlying motivational and volitional factors and their interplay.

Cross-sectional analyses in *Chapter 3* investigated whether intention formation by outcome expectancies depended on individuals' past behavior. Analyses in *Chapter 4* built on these findings, examining motivational processes longitudinally with regard to subsequent vaccination behavior. Along with, the putative moderating influence of individuals' past behavior on intention formation and future behavior was investigated.

In *Chapter 5*, the prediction of vaccination behavior was analyzed with structural equation modeling, comparing a model derived from the health action process approach to a model adjusted to behavior specifics. The aim was to identify the most suitable composition of social-cognitive variables for behavior prediction.

In *Chapter 6*, health messages promoting vaccination behavior were compared in a randomized trial, along with compensatory health beliefs (CHB). The role of CHB, considered a self-defense strategy, within the intention-behavior relation was examined. Of particular interest was, whether CHB would interfere with health messages.

In *Chapter 7*, theoretical and practical implications of the findings are discussed.

Zusammenfassung

Gesunde, motivierte und zufriedene Mitarbeiter sind fundamental für gesellschaftliches sowie betriebliches Agieren und ihren Erfolg (ENWHP, 2007). Dies wird angesichts der tiefgreifenden sozialen Veränderungen, wie der epidemiologischen Transition und dem demographischen Wandel (Robert-Koch-Institut, 2008; WHO, 2006) immer deutlicher. Um sich für diese Herausforderungen zu rüsten, verstärken Unternehmen ihre Aktivitäten der betrieblichen Gesundheitsförderung (Beyer, 2007; MERCER, 2010) und möchten so die Gesundheit und das Wohlbefinden ihrer Mitarbeiter bestmöglich sichern und fördern.

Betriebliche Gesundheitsförderung wird definiert als die gemeinschaftlichen Anstrengungen von Arbeitnehmer, Arbeitgeber und Gesellschaft zur Förderung von Gesundheit und Wohlbefinden der Mitarbeiter am Arbeitsplatz (ENWHP, 2007, S. 2). Es wird betont, dass mit der Zuschreibung einer unternehmerischen Verantwortung für das Mitarbeiterwohl keineswegs die Verantwortung des Mitarbeiters für den Erhalt und die Förderung der eigenen Gesundheit entfällt. Dabei kann Gesundheitsförderung verhältnis- und verhaltensorientierte (vgl., Ulich & Wülser, 2009) Maßnahmen umfassen.

In diesem Zusammenhang stellt sich die Frage, welche Bedeutung betriebliche Anstrengungen zur Gesundheitsförderung für die Einstellungen von Mitarbeitern zu ihrem Unternehmen haben und inwiefern arbeits- und organisationsbezogene Einstellungen durch betriebliche Gesundheitsförderung beeinflusst werden können. Unter dem Konstrukt Gesundheitsklima wird die von Mitarbeitern geteilte Wahrnehmung des betrieblichen Engagement und der organisationalen Prioritäten und Werte bezüglich der Mitarbeitergesundheit zusammengefasst (Basen-Engquist, Hudmon, Tripp, & Chamberlain, 1998; Mearns, Hope, Ford, & Tetrick, 2010). Im Sinne des „job demands-resources model“ (vgl., Bakker & Demerouti, 2007; Llorens, Bakker, Schaufeli, & Salanova, 2006) könnte das

Gesundheitsklima als arbeitsbezogene Ressource aufgefasst werden, die positiv auf die emotionale Beziehung eines Mitarbeiters zu seinem Unternehmen, d.h. auf sein affektives Commitment (vgl. Meyer & Allen, 1997), wirkt: Die Wahrnehmung, dass ein Unternehmen sich um die Gesundheit des Mitarbeiters kümmert, sollte dessen affektives Commitment an das Unternehmen stärken. In *Kapitel 2* der vorliegenden Arbeit wird dieser Frage vor dem Hintergrund arbeits- und organisationspsychologischer Forschung nachgegangen.

In der vorliegenden Arbeit liegt der Fokus auf der Verhaltensprävention, bei der das individuelle (Gesundheits-)Verhalten im Zentrum der Präventionsarbeit steht (Vgl., Ulich & Wülser, 2009). Unter Gesundheitsverhalten werden hierbei alle Aktivitäten verstanden, die der Vorbeugung von Krankheiten, sowie ihrer rechtzeitigen Entdeckung, dienen und das Ziel verfolgen, Gesundheit und Wohlbefinden zu fördern (Connor, 2001). Dazu zählen bspw. körperliche Aktivität oder eine gesunde Ernährung (Schwarzer, 2008).

In *Kapitel 3-6* wird die Teilnahme an der saisonalen Influenzaimpfung als Gesundheitsverhaltensweise diskutiert. Die zum Teil umfangreichen und dichten Arbeitsbedingungen in einem Betrieb können zu einem erhöhten Infektionsrisiko für Influenza führen. Daher wird die Gripeschutzimpfung als beste präventive Maßnahme empfohlen (CDC, 2010a; Robert-Koch-Institut, 2011; WHO, 2011).

Jedoch sind die Impfquoten niedriger, als von Experten gewünscht (CDC, 2010b; Reuss et al., 2010; Robert-Koch-Institut, 2008). Folglich gilt es zu eruieren, welche psychologischen Faktoren und Mechanismen für den Aufbau einer Impfbereitschaft (Intentionsbildung) sowie der regelmäßigen Impfteilnahme bedeutsam sind. Dabei ist es ferner wichtig zu untersuchen, ob diese motivationalen und volitionalen Prozesse gleichermaßen bei allen Mitarbeitern operieren. Entsprechend wurden in den Untersuchungen, die in *Kapitel 3-6* dargestellt sind, vor dem Hintergrund gesundheitspsychologischer Theorien und Erkenntnisse (Lippke & Ziegelmann, 2008; Schwarzer, 2008), motivationale und volitionale Faktoren und Prozesse des Impfverhaltens untersucht. Diesbezügliche

Erkenntnisse können dazu beitragen, effektive, effiziente und evidenzbasierte Maßnahmen zur Förderung des Impfverhaltens zu entwickeln (Leventhal, Weinman, Leventhal, & Phillips, 2008; Lippke & Ziegelmann, 2008).

Die Forschungsfragen und -ziele, die in *Kapitel 2-6* behandelt werden, sind im Folgenden überblicksartig zusammengefasst.

- a) In der Studie in *Kapitel 2* wurde untersucht, ob Gesundheitsklima eine förderliche Ressource darstellt, die positiv auf das affektive Commitment eines Mitarbeiters zu seinem Unternehmen wirkt oder ob es eher einen umgekehrten, kausalen Zusammenhang gibt. Ziel war es, Evidenz für die Bedeutung des Gesundheitsklimas für arbeitsbezogene Einstellungen der Mitarbeiter aufzuzeigen.
- b) In *Kapitel 3* liegt der Fokus auf psychologischen Faktoren der Impfbereitschaft (Intentionsbildung). Es wurde untersucht, ob Handlungsergebniserwartungen die Beziehung zwischen vergangenen Impfverhalten und Intention erklären können. Eine weitere Forschungsfrage war, ob die Intentionsbildung in Abhängigkeit von dem bisherigen Impfverhalten variiert.
- c) In *Kapitel 4* stehen motivationale Prozesse mit Blick auf das spätere Impfverhalten im Zentrum der Untersuchungen. Risikowahrnehmung und Handlungsergebniserwartungen sollten durch Intention vermittelt das Verhalten vorhersagen. Ferner wurden Befunde aus *Kapitel 3* aufgegriffen und ein moderierender Einfluss des vergangenen Verhaltens auf die Intentionsbildung und Verhaltensvorhersage exploriert.
- d) In der Studie in *Kapitel 5* wurde das sozial-kognitive Prozessmodell gesundheitlichen Handelns (Health Action Process Approach; HAPA, Schwarzer, 2008) als gesundheitspsychologisches Model zur Verhaltensvorhersage angewandt. Es wurde untersucht, ob die Vorhersage des Impfverhaltens durch das HAPA-basierte Modell

sinnvoll durch impfverhaltensspezifische Zusatzannahmen verbessert werden kann (betreffend Risikowahrnehmung, negative Handlungsergebniserwartung).

e) In den Analysen in *Kapitel 6* stehen volitionale Prozesse des Impfverhaltens im Mittelpunkt. Es wurde eine theoriegeleitete Intervention zur Förderung der Impfteilnahme in einer randomisierten kontrollierten Studie evaluiert. Ferner wurden kompensatorische Gesundheitsüberzeugungen (CHB) als vermeintlich hemmender Faktor der Intention-Verhaltens-Beziehung untersucht. Das Hauptziel der Studie stellte die Exploration des Einflusses der Interventionen auf die Intention-CHB-Verhaltens-Beziehung dar.

Im abschließenden *Kapitel 7* werden die Befunde der vorherigen Kapitel diskutiert und Implikationen für Praxis und weitere Forschung dargestellt. Die Forschungsfragen der *Kapitel 2-6* wurden in zwei getrennten Studien in einem deutschen Großunternehmen zwischen 2009 und 2011 untersucht¹. Die Ergebnisse der einzelnen *Kapitel* werden im Folgenden zusammengefasst dargestellt und diskutiert.

Im Rahmen der Analysen in *Kapitel 2* wurde die Beziehung von Gesundheitsklima und affektivem Commitment untersucht. Beide Konstrukte waren quer- und längsschnittlich miteinander assoziiert. Dabei war jedoch der Einfluss von Gesundheitsklima auf das Commitment stärker, als umgekehrt: die affektive Bindung eines Mitarbeiters an sein Unternehmen war umso höher, je positiver er das Gesundheitsklima wahrnahm. Folglich wiesen die Ergebnisse darauf hin, dass das wahrgenommene Gesundheitsklima im Unternehmen im Sinne einer Job Ressource (Bakker & Demerouti, 2007; Llorens, et al., 2006) förderlich auf das affektive Commitment der Mitarbeiter wirken kann.

Nachfolgende Untersuchungen könnten nun den zugrundeliegenden motivationalen Prozess genauer beleuchten und dabei Einflussfaktoren, wie bspw. die wahrgenommene

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Unterstützung durch die Unternehmensleitung oder das Führungsverhalten des Vorgesetzten (Clausen & Borg, 2010; Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002; Randall & Nielson, 2010) mitberücksichtigen. Ferner könnte auch die Wirkung des Gesundheitsklimas auf weitere bedeutsame arbeitsrelevante Konstrukte, wie bspw. Engagement (Schaufeli & Bakker, 2004; Schaufeli, Bakker, & Salanova, 2006), in komplexeren Kreuzkorrelationsanalysen untersucht werden.

Die Ergebnisse sollten Verantwortliche der betrieblichen Gesundheitsförderung anregen, das Gesundheitsklima zu fördern und zu kultivieren, da dessen Effekte offensichtlich über den konkreten gesundheitlichen Nutzen hinaus gehen (Mearns, et al., 2010; Muse, Harris, Giles, & Feild, 2008). Dafür könnten bspw. verhaltens- (z.B. Sportangebote), sowie verhältnisorientierte Präventionsmaßnahmen (z.B. gesundes Kantinenessen) angeboten werden (Basen-Engquist, et al., 1998). Im Kontext der Verhaltensprävention könnten dann gesundheitspsychologische Theorien für eine evidenzbasierte und effektive Interventionsgestaltung und Evaluation herangezogen werden (Leventhal, et al., 2008; Lippke & Ziegelmann, 2008). Der gezeigte Einfluss des Gesundheitsklimas auf affektives Commitment ist zudem deshalb so bedeutsam für Unternehmen, da Commitment von zentraler Bedeutung für gesundheits- wie leistungsbezogene Parameter ist (z.B. Stressempfinden, Jobperformanz, Fluktuationsabsichten, Work-Family-Balance, vgl. Mathieu & Zajac, 1990; Meyer & Allen, 1997; Meyer, Stanley, Herscovitch, & Topolnytsky, 2002).

In *Kapitel 3* wurde in einer querschnittlichen Studie die Intention zur Impfteilnahme untersucht, da die Intention zentraler Prädiktor für späteres Verhalten ist (Ajzen, 1991; Bish, Yardley, Nicoll, & Michie, 2011; Gargano et al., 2011; Harris, Maurer, & Lurie, 2009). Es wurde gezeigt, dass positive und negative Handlungsergebniserwartungen teilweise den Zusammenhang zwischen vergangenem Impfverhalten und der aktuellen Intention erklärten: eine häufigere Impfteilnahme in der Vergangenheit war mit mehr positiven und weniger negativen Handlungserwartungen assoziiert und diese wiederum mit einer stärkeren Intention.

Darüber hinaus zeigten die Ergebnisse, dass der Zusammenhang von Handlungsergebniserwartungen und Impfindention davon abhing, wie häufig sich Personen in der Vergangenheit (letzten fünf Jahre) hatten impfen lassen. Die Intentionsbildung wurde substantiell vom bisherigen Impfverhalten moderiert: bei jährlichen Impfteilnehmern spielten positive und negative Handlungsergebniserwartungen bei der Intentionsbildung keine Rolle (mehr), im Gegensatz zu Personen, die noch nie oder bisher sporadisch an der Impfung teilnahmen.

Auch wenn die querschnittlichen Untersuchungen keine Aussagen über Ursache und Wirkung erlauben, so stehen die Annahmen zur Richtung der Zusammenhänge von vergangenem Verhalten, Handlungsergebniserwartungen und Intention in Einklang mit bisherigen Befunden (Bish, et al., 2011; Hofmann, Ferracin, Marsh, & Dumas, 2006; Nexøe, Kragstrup, & Sjøgaard, 1999; Ouellette & Wood, 1998; Schwarzer, 2008; Verplanken & Melkevik, 2008). Folglich sollten sie in dem dargelegten Sinne interpretierbar sein, auch wenn längsschnittliche Studien für eine Validierung nötig sind.

Unter Vorbehalt des querschnittlichen Designs können daher erste Schlüsse gezogen werden. Die Ergebnisse deuten an, dass die Intentionsbildung vom bisherigen Impfverhalten abhängt: Das bewusste Abwägen von Vor- und Nachteilen der Impfung (positive und negative Handlungsergebniserwartungen) (Bish, et al., 2011; Harrison, Mullen, & Green, 1992; Hofmann, et al., 2006; Nexøe, et al., 1999) scheint mit zunehmender Impfteilnahme von einem eher automatisierten Intentionsbildungsprozess mit habituellen Charakteristika abgelöst zu werden (de Bruijn & Rhodes, 2010; Ouellette & Wood, 1998; Verplanken & Melkevik, 2008). Dieses eher automatisierte Ablaufen bei der Intentionsbildung könnte möglicherweise aus der wiederholten Impfteilnahme in stabiler Umgebung (Werksärztlicher Dienst) resultieren. Besonders hervortretende Schlüsselreize in der Umgebung (z.B. Impftermine auf dem Fragebogen) könnten dann bei häufigen Impfteilnehmern ausgereicht haben, um sie zu einer Impfteilnahme zu motivieren (Ouellette & Wood, 1998; Verplanken &

Melkevik, 2008). Diese Prozesse gilt es aber, in weiteren Studien mit adäquaten Instrumenten (Verplanken & Melkevik, 2008) genauer zu untersuchen.

Für die Gestaltung effektiver und effizienter (hinsichtlich Zeit, Geld oder Anstrengungen) Interventionen zur Förderung der Impfmotivation implizieren die Befunde, die unterschiedlichen Bedürfnisse der Adressaten zu berücksichtigen. Ist es das Ziel, regelmäßige Impfteilnehmer anzusprechen, so scheinen saliente Hinweisreize, wie bspw. ein Poster mit den Impfterminen ausreichend, um sie zur Teilnahme zu motivieren. Hat eine Person hingegen noch nie oder eher sporadisch in der Vergangenheit an der Impfung teilgenommen, so kann die Intention durch das Adressieren positiver und negativer Handlungsergebniserwartungen in Interventionen gesteigert werden. Beispielsweise könnten die Vor- und Nachteile der Impfung und alternativer präventiver Maßnahmen dargestellt werden (Abraham & Michie, 2008; Michie, Johnston, Francis, Hardeman, & Eccles, 2008).

Insgesamt konnte die Studie trotz designbedingter Einschränkungen erste Einblicke in Intentionsbildungsprozesse sowie Anregung zu weiterer Forschung geben. Mechanismen der Gewohnheitsbildung sollten im Verhaltensänderungsprozess (de Bruijn & Rhodes, 2010; Fleig, Lippke, Pomp, & Schwarzer, 2011; Ouellette & Wood, 1998; Verplanken & Melkevik, 2008) und insbesondere im Kontext der Impfung weiter untersucht werden.

In der längsschnittlichen Untersuchung, die in *Kapitel 4* beschrieben wird, wurde an diese Befunde angeknüpft. Ferner wurde nachverfolgt, ob motivierte Personen tatsächlich an der Impfung zu einem späteren Zeitpunkt teilnehmen. Bisherige Forschung zeigte, dass Intention zwar ein zentraler Prädiktor für späteres Verhalten ist, aber nicht garantiert, dass das Vorhaben tatsächlich realisiert wird (Gollwitzer, Sheeran, & Zanna, 2006; Sheeran, 2002). Neben positiven und negativen Handlungsergebniserwartungen wurde Risikowahrnehmung in das Prädiktionsmodell hinzugenommen (Brewer, Weinstein, Cuite, & Herrington, 2004; Weinstein et al., 2007). Die Ergebnisse zeigten, dass alle drei Konstrukte bedeutsam mit Intention assoziiert waren. Risikowahrnehmung und negative Handlungsergebniserwartungen

sagten, vollständig vermittelt über Intention, späteres Verhalten vorher. Der Einfluss von positiven Handlungsergebniserwartungen auf Verhalten wurde teilweise von Intention mediiert, denn positive Handlungsergebniserwartungen sagten über Intention hinaus das Verhalten sieben Monate später direkt vorher. Einerseits wiesen die Ergebnisse darauf hin, dass Risikowahrnehmung und negative Handlungsergebniserwartungen eher distale Prädiktoren für das Impfverhalten darstellen (Parschau et al., 2011; Renner & Schwarzer, 2005; Schwarzer, 2008) und die Basis für anschließende volitionale Prozesse bereitstellen (Renner, Spivak, Kwon, & Schwarzer, 2007; Schwarzer, 2008). Andererseits prädizierten positive Handlungsergebniserwartungen direkt das Verhalten, was Annahmen der Sozialkognitiven Theorie stützt (Bandura, 1997). Nachfolgende Untersuchungen könnten diese unterschiedlichen Befunde hinsichtlich der Handlungsergebniserwartungen näher beleuchten und bspw. den Inhalt der erwarteten Handlungsergebnisse explorieren (Gellert, Ziegelmann, & Schwarzer, 2011; Williams, Anderson, & Winett, 2005).

In den anschließenden Analysen wurde der moderierende Einfluss des vergangenen Verhaltens auf die Intentionsbildung bestätigt (Ernsting, Schwarzer, Lippke, & Schneider, 2011): die soeben beschriebenen motivationalen Mechanismen variierten in Abhängigkeit des bisherigen Impfverhaltens einer Person. Nahm eine Person bisher sporadisch oder noch gar nicht an der saisonalen Schutzimpfung teil, waren die wahrgenommenen Vor- und Nachteile sowie die Risikowahrnehmung bedeutsam mit der Intention assoziiert und sagten indirekt über Intention das Verhalten vorher. Nahm eine Person hingegen jährlich in den vergangenen fünf Jahren an der Impfung teil, so waren Risikowahrnehmung und Handlungsergebniserwartung nicht mehr mit Intention assoziiert und sagten nicht mehr indirekt das Verhalten vorher. Wie zuvor (vgl. *Kapitel 3*) könnte dieses Muster durch Mechanismen, die bei der Gewohnheitsbildung von Bedeutung sind, erklärt werden. Die wiederholte Teilnahme in einem stabilen Setting (Werksärztlicher Dienst) in der Vergangenheit sowie saliente, aktuelle Hinweisreize (z.B. Impftermine auf dem Fragebogen),

könnten als unterstützende Bedingungen für die Automatisierung (bzw. Habituation) des Intentionsbildungsprozesses fungiert und möglicherweise das Überspringen des kognitiven Prozesses (Intentionsbildung) unterstützt haben (Ouellette & Wood, 1998; Verplanken & Melkevik, 2008). Jedoch sind differenziertere Analysen und experimentelle Interventionsstudien nötig, um die Befunde zu bestätigen und, um genauere Einblicke in die Prozesse der Intentionsbildung und eine mögliche Habituation des Impfverhaltens zu bekommen.

Insgesamt sollten diese Ergebnisse ermutigen, da sie zeigen, dass das Impfverhalten habituelle Eigenschaften aufweisen kann, welche die dauerhafte Aufrechterhaltung eines Gesundheitsverhaltens unterstützen (de Bruijn & Rhodes, 2010; Fleig, et al., 2011; Verplanken & Melkevik, 2008). Dies ist bedeutsam, da nur die regelmäßige und dauerhafte Ausübung eines Gesundheitsverhaltens umfassend förderlich für die Gesundheit ist. Folglich sollten Untersuchungen unterstützende Faktoren und Mechanismen explorieren, die diese selbsterhaltenden Muster des Impfverhaltens unterstützen.

Die Empfehlungen zur Interventionsgestaltung knüpfen an die dargestellten Inhalte in *Kapitel 3* an. Maßnahmen sollten die Bedürfnisse der Adressaten berücksichtigen und gezielt mit den relevanten Techniken intervenieren (Abraham & Michie, 2008; Michie, et al., 2008). Darüber hinaus könnte die Perspektive auf soziale Einflussfaktoren geweitet werden, indem bspw. soziale Normen oder sozialer Druck in den Analysen berücksichtigt werden (Bish, et al., 2011; Gargano, et al., 2011; Painter et al., 2010; Rubin, Potts, & Michie, 2011; Schensul, Radda, Coman, & Vazquez, 2009; Updegraff, Emanuel, Gallagher, & Steinman, 2011).

In *Kapitel 5* wurde in der vorliegenden längsschnittlichen Studie das HAPA (Schwarzer, 2008) als gesundheitspsychologisches Modell zur Verhaltensvorhersage angewandt. Die Verhaltensprädiktion sollte jedoch mit einem Modell, das für das Impfverhalten angepasst wurde, verbessert werden.

Die (strukturellen) Annahmen des HAPAs zur Verhaltensvorhersage konnten bestätigt werden (z.B., Chiu, Lynch, Chan, & Berven, 2011; Craciun, Schüz, Lippke, & Schwarzer, 2011; Schwarzer, 2008; Schwarzer & Renner, 2008; Teng & Mak, 2011): Selbstwirksamkeit, Handlungsergebniserwartungen und Risikowahrnehmung prädizierten Intention und vermittelt über Intention indirekt das Verhalten. Planung medierte zwischen Intention und Verhalten. Dies demonstriert die Bedeutung postintentionaler Faktoren für die Umsetzung einer Intention (Gollwitzer, et al., 2006; Milkman, Beshears, Choi, Laibson, & Madrian, 2011; Reuter, Ziegelmann, Wiedemann, & Lippke, 2008) in Verhalten. Jedoch schien die Intentions-Verhaltens-Lücke geringer zu sein, als bei anderen Verhaltensweisen (Schwarzer, 2008; Sheeran, 2002; Snihotta, Scholz, & Schwarzer, 2005). Möglicherweise reduzierten die Rahmenbedingungen der Studie die selbstregulativen Anforderungen. Zum Beispiel war für die Impfung keine Terminvereinbarung nötig.

Der Vergleich mit dem adjustierten Modell zeigte jedoch, dass durch die Zusatzannahmen eine bessere Komposition sozial-kognitiver Variablen zur Verhaltensvorhersage erreicht wurde. Risikowahrnehmung war über die motivationale Funktion hinaus auch für volitionale Prozesse bedeutsam: Risikowahrnehmung war mit Planung assoziiert und sie sagte indirekt (über Planung vermittelt) sowie direkt das spätere Impfverhalten vorher. Damit ergänzte die vorliegende Studie Befunde aus anderen Bereichen des Gesundheitsverhaltens (Craciun, Schüz, Lippke, & Schwarzer, 2010; Duckworth, Frank-Stromborg, Oleckno, Duffy, & Burns, 2002) und unterstrich die zentrale Bedeutung von Risikowahrnehmung für das Impfverhalten (Bish, et al., 2011; Brewer et al., 2007; Capolongo, daCosta DiBonaventura, & Chapman, 2006; Weinstein, et al., 2007).

Die zweite Anpassung des Modells bezog sich auf die negativen Handlungsergebniserwartungen. Die wahrgenommenen Kosten bzw. Nachteile der Impfung (hier: Nebenwirkungen) zeigten den erwarteten direkten Einfluss auf das Verhalten. In Übereinstimmung mit dem "omission bias" (die Wahrnehmung, dass es schlimmer ist, durch

Handlungen Schaden anzurichten, als durch die Unterlassung einer Handlung, Asch et al., 1994; Spranca, Minsk, & Baron, 1991) erwiesen sich die negativen Ergebniserwartungen bis zur Impfteilnahme als bedeutsam, was ferner konform mit den Annahmen der Sozialkognitiven Theorie ist (Bandura, 1997).

Die Ergebnisse indizierten, dass die Vorhersage des Impfverhaltens durch das HAPA-basierte Modell durch impfverhaltensspezifische Zusatzannahmen sinnvoll verbessert werden konnte. Diese Annahmen müssen jedoch in experimentellen Studien validiert werden. Es gilt zu prüfen, ob Veränderungen in den entsprechenden Kognitionen zu Veränderungen im Verhalten führen. In Interventionen zur Förderung der Impfteilnahme sollte berücksichtigt werden, wo sich eine Person im Prozess der Verhaltensänderung befindet ("stadienspezifische Intervention", Lippke, Schwarzer, Ziegelmann, Scholz, & Schuz, 2010; Schüz, Sniehotta, & Schwarzer, 2007; Wiedemann et al., 2009). Selbstwirksamkeit könnte bspw. mithilfe von Rollenmodellen gesteigert werden, um Personen zur Impfteilnahme zu motivieren (Bandura, 1997). Personen, die bereits motiviert sind, sollten in der Verhaltensaübung unterstützt werden, indem sie bspw. Planungshilfen erhalten. Risikowahrnehmung erwies sich in beiden Phasen der Verhaltensänderung als bedeutsam und sollte entsprechend adressiert werden (Abraham & Michie, 2008; Michie, et al., 2008). Dabei sollte darauf geachtet werden, das Verständnis für Risikostatistiken sicherzustellen (Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz, & Woloshin, 2007).

Zusammenfassend konnten die Untersuchungsergebnisse bereichernde Einblicke in motivationale und volitionale Prozesse des Impfverhaltens geben und zeigen, dass die Berücksichtigung verhaltensspezifischer Charakteristika in bestehenden theoretischen Modellen, wie dem HAPA, sinnvoll sein kann. Ferner wurde die Bedeutung risikobezogener Kognitionen und postintentionaler Faktoren (Planung) für das Verhalten deutlich.

In den Analysen in *Kapitel 6* standen volitionale Prozesse des Impfverhaltens im Fokus. Es wurde eine HAPA-basierte (Schwarzer, 2008) Interventionsstudie zur Förderung

der Impfteilnahme im Betrieb in einer randomisierten kontrollierten Studie (Willis, 2001) implementiert. Ferner wurden kompensatorische Gesundheitsüberzeugungen (compensatory health beliefs; CHB) als potenziell hemmender Faktor der Intentions-Verhaltens-Beziehung untersucht. Das Hauptziel der Studie war die Untersuchung der Fragestellung, ob eine gesundheitsförderliche selbstregulative Intervention dem vermeintlich negativen Einfluss von kompensatorischen Gesundheitsüberzeugungen auf das Verhalten entgegenwirken kann.

Zunächst konnten kompensatorische Gesundheitsüberzeugungen als Mediator zwischen Intention und Verhalten bestätigt werden. Sie stellen eine gesundheitsbedrohliche selbstregulative Strategie dar, die es gestattet, ein gesundheitsschädigendes Verhalten auszuüben (resp. förderliches Verhalten zu unterlassen), weil die Person annimmt, dass sie dieses durch die Ausübung eines anderen gesundheitsförderlichen Verhaltens kompensieren oder neutralisieren kann (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau, Knäuper, & Miquelon, 2006; Radtke, Scholz, Keller, Knäuper, & Hornung, 2011). Gegeben der Annahme, dass Menschen einen gesunden Lebensstil anstreben, ließen sich Studienteilnehmer bedeutsam seltener impfen, wenn sie der Überzeugung waren, dass sie bereits ein gesundes Leben führen. Eine Impfung erschien folglich unnötig, da sie ihren Lebensstil als ausreichend gesundheitsschützend wahrnahmen. In diesem Fall stellten kompensatorische Gesundheitsüberzeugungen eine gute Ausrede für die Nichtteilnahme dar. Künftige Interventionen sollten folglich diese Gesundheitsüberzeugungen berücksichtigen.

In der Studie erhielten Mitarbeiter zudem zufällig eine von zwei Interventionen zur Förderung der Impfteilnahme: in der Standardintervention wurden motivationale Konstrukte angesprochen; in der Interventionsgruppe erhielten die Teilnehmer zusätzliche Interventionskomponenten, die selbstregulative Kompetenzen fördern sollten (Handlungs- und Bewältigungsplanung, Selbstwirksamkeit). Die Ergebnisse zeigten jedoch keine Überlegenheit der Interventionsgruppe hinsichtlich der Impfteilnahme. Dies lag möglicherweise an dem fehlenden Interventionseffekt auf die Selbstwirksamkeitserwartung

(im Gegensatz zum indizierten Effekt auf Planung). Diese defizitäre Interventionswirkung auf Selbstwirksamkeit könnte darüber hinaus auch auf einem zweiten, indirekten Weg wirkungsmindernd auf Wirksamkeit der Intervention gewirkt haben: in vergangenen Studien wurden synergistische Effekte von Selbstwirksamkeit und Planung demonstriert, die zeigen, dass für die Entwicklung von Plänen bzw. das Umsetzen von Plänen in Verhalten, ein bestimmtes Maß an Selbstwirksamkeit vorhanden sein muss (Lippke, Wiedemann, Ziegelmann, Reuter, & Schwarzer, 2009; Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011; Richert et al., 2010). Trotz des mangelnden Interventionseffekt auf Selbstwirksamkeit wird für weitere Studien empfohlen, an der Strategie, Rollenmodelle zur Steigerung der Selbstwirksamkeit einzusetzen, festzuhalten, da dies eine effektive (Ashford, Edmunds, & French, 2010; Bandura, 1997; Warner, Schütz, Knittle, Ziegelmann, & Wurm, 2011) und im Kontext des Impfverhaltens eine praktikable Strategie darstellt. Jedoch ist es ratsam, das Interventionsmaterial für künftige Studien zu überarbeiten. Gegebenenfalls könnten auch andere Medien zur Vermittlung der Inhalte eingesetzt werden (z.B. Videos). Zudem zeigten die Ergebnisse, dass Selbstwirksamkeit und auch Planung späteres Impfverhalten vorhersagten, was ihre Bedeutung für die Ausübung des Gesundheitsverhaltens unterstreicht.

Bei der Untersuchung der Forschungsfrage, ob eine mögliche Interaktion zwischen der Art der Intervention (Intervention vs. Standardintervention) und der gesundheitsschädigenden Selbstregulationsstrategie (CHB) hinsichtlich der Impfteilnahme vorliegt, konnte ein Gruppeneffekt aufgezeigt werden: Erhielten Teilnehmer mit geringen kompensatorischen Gesundheitsüberzeugungen die Intervention mit zusätzlichen Komponenten zur Förderung der Selbstregulation (Interventionsgruppe; hier: wirksam für Planung), war die Wahrscheinlichkeit zur Teilnahme viermal so hoch wie in der Standardinterventionsgruppe. Die Förderung der selbstregulativen Strategien konnte den negativen Einfluss von kompensatorischen Gesundheitsüberzeugungen auf das Verhalten abfedern. Wurde von

Teilnehmern jedoch ein hohes Maß an kompensatorischen Gesundheitsüberzeugungen berichtet, war in beiden Gruppen die Wahrscheinlichkeit zur Teilnahme gering.

Zusammenfassend konnte die Untersuchung zeigen, dass kompensatorische Gesundheitsüberzeugungen einen hemmenden Faktor für die Impfteilnahme darstellen. Sie könnten als Rechtfertigung herangezogen werden, weshalb Menschen nicht an der Impfung teilnehmen. Diese Überzeugungen sollten daher in künftigen Interventionen explizit berücksichtigt werden, z.B., indem gesundheitsförderliche Selbstregulationsstrategien gefördert werden. Diesbezüglich sollte ihr Zusammenwirken mit anderen selbstregulativen Strategien weiter näher beleuchtet werden.

In *Kapitel 7* werden die Ergebnisse der einzelnen Kapitel diskutiert und hinsichtlich ihrer Stärken und Schwächen, sowie Implikationen für Theorie und Praxis, näher beleuchtet.

Referenzen

- Abraham, C., & Michie, S. (2008). A taxonomy of behavior change techniques used in interventions. *Health Psychology, 27*(3), 379-387. doi: 10.1037/0278-6133.27.3.379
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.
- Asch, D. A., Baron, J., Hershey, J. C., Kunreuther, H., Meszaros, J., Ritov, I., & Spranca, M. (1994). Omission bias and pertussis vaccination. *Medical Decision Making, 14*(2), 118-123.
- Ashford, S., Edmunds, J., & French, D. P. (2010). What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. *British Journal Of Health Psychology, 15*(2), 265-288.
- Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology, 22*(3), 309-328.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Basen-Engquist, K., Hudmon, K. S., Tripp, M., & Chamberlain, R. (1998). Worksite health and safety climate: scale development and effects of a health promotion intervention. *Preventive Medicine, 27*(1), 111-119.
- Beyer, U. (2007). Fitness für Ältere. *Wirtschaftspsychologie aktuell, 3*, 24-25.
- Bish, A., Yardley, L., Nicoll, A., & Michie, S. (2011). Factors associated with uptake of vaccination against pandemic influenza: A systematic review. *Vaccine, 29*(38), 6472-6484.
- Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., & Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: The example of vaccination. *Health Psychology 26*(2), 136-145.

- Brewer, N. T., Weinstein, N. D., Cuite, C. L., & Herrington, J. E. (2004). Risk perceptions and their relation to risk behavior. *Annals of Behavioral Medicine*, 27(2), 125-130.
- Capolongo, M. J., daCosta DiBonaventura, M., & Chapman, G. B. (2006). Physician Vaccinate Thyself: Why Influenza Vaccination Rates Are Higher Among Clinicians Than Among Nonclinicians. *Annals of Behavioral Medicine*, 31(3), 288-296.
- CDC. (2010a). Prevention & Control of Influenza with Vaccines - Recommendations of the Advisory Committee on Immunization Practices (ACIP) *MMWR; Morbidity and Mortality Weekly Report* 59, 1-62.
- CDC. (2010b). Seasonal influenza (Flu) – Influenza Vaccination coverage Levels Retrieved 11/10, 2010, from <http://www.cdc.gov/flu/professionals/acip/coveragelevels.htm>
- Chiu, C.-Y., Lynch, R. T., Chan, F., & Berven, N. L. (2011). The Health Action Process Approach as a motivational model for physical activity self-management for people with multiple sclerosis: A path analysis. *Rehabilitation Psychology*, 56(3), 171-181.
- Clausen, T., & Borg, V. (2010). Psychosocial Work Characteristics as Predictors of Affective Organisational Commitment: A Longitudinal Multi-Level Analysis of Occupational Well-Being. *Applied Psychology: Health and Well-Being*, 2(2), 182-203. doi: 10.1111/j.1758-0854.2010.01031.x
- Connor, M. (2001). Health behaviors. In P. B. Baltes & N. J. Smelser (Eds.), *The International Encyclopedia of the Social & Behavioral Sciences* (Vol. 10, pp. 6506-6512). Oxford, England: Elsevier Science.
- Craciun, C., Schüz, N., Lippke, S., & Schwarzer, R. (2010). Risk perception moderates how intentions are translated into sunscreen use. *Journal of Behavioral Medicine*, 33(5), 392-398. doi: 10.1007/s10865-010-9269-5
- Craciun, C., Schüz, N., Lippke, S., & Schwarzer, R. (2011). A Mediator Model of Sunscreen Use: A Longitudinal Analysis of Social-Cognitive Predictors and Mediators. *International Journal of Behavioral Medicine*

- de Bruijn, G. J., & Rhodes, R. E. (2010). Exploring exercise behavior, intention and habit strength relationships. *Scandinavian Journal Of Medicine & Science In Sports*, 21(3), 482-491.
- Duckworth, L. T., Frank-Stromborg, M., Oleckno, W. A., Duffy, P., & Burns, K. (2002). Relationship of Perception of Radon as a Health Risk and Willingness to Engage in Radon Testing and Mitigation. *Oncology Nursing Forum*, 29(7), 1099.
- Eisenberger, R., Stinglhamber, F., Vandenberghe, C., Sucharski, I. L., & Rhoades, L. (2002). Perceived supervisor support: Contributions to perceived organizational support and employee retention. *Journal of Applied Psychology*, 87(3), 565-573. doi: 10.1037/0021-9010.87.3.565
- ENWHP. (2007). Luxembourg Declaration on Workplace Health Promotion in the European Union Retrieved 11/2011, 3, from http://www.enwhp.org/fileadmin/rs-dokumente/dateien/Luxembourg_Declaration.pdf
- Ernsting, A., Schwarzer, R., Lippke, S., & Schneider, M. (2011). Was motiviert Erwerbstätige zur Teilnahme an der saisonalen Influenzaschutzimpfung? Analyse der Impfbereitschaft im betrieblichen Kontext. *Arbeitsmedizin, Sozialmedizin, Umweltmedizin*, 46, 320-325.
- Fleig, L., Lippke, S., Pomp, S., & Schwarzer, R. (2011). Intervention effects of exercise self-regulation on physical exercise and eating fruits and vegetables: a longitudinal study in orthopedic and cardiac rehabilitation. *Preventive Medicine*, 53(3), 182-187.
- Gargano, L., Painter, J., Sales, J., Morfaw, C., Jones, L., Murray, D., . . . Hughes, J. (2011). Seasonal and 2009 H1N1 influenza vaccine uptake, predictors of vaccination, and self-reported barriers to vaccination among secondary school teachers and staff. *Human Vaccines*, 7(1), 89-95.

- Gellert, P., Ziegelmann, J. P., & Schwarzer, R. (2011). Affective and health-related outcome expectancies for physical activity in older adults. *Psychology & Health, Advance online publication*. doi: 10.1080/08870446.2011.607236
- Gigerenzer, G., Gaissmaier, W., Kurz-Milcke, E., Schwartz, L. M., & Woloshin, S. (2007). Helping Doctors and Patients Make Sense of Health Statistics. *Psychological Science, 8*(2), 53-96.
- Gollwitzer, P. M., Sheeran, P., & Zanna, M. P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology, 38*, 69-119.
- Harris, K. M., Maurer, J., & Lurie, N. (2009). Do people who intend to get a flu shot actually get one? *Journal of General Internal Medicine, 24*(12), 1311-1313.
- Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the Health Belief Model with adults. *Health Education Research, 7*(1), 107-116.
- Hofmann, F., Ferracin, C., Marsh, G., & Dumas, R. (2006). Influenza vaccination of health care workers: A literature review of attitudes and beliefs. *Infection 34*, 142–147.
- Knäuper, B., Rabiau, M., Cohen, O., & Patriciu, N. (2004). Compensatory Health Beliefs: Scale Development and Psychometric Properties *Psychology & Health, 19*(5), 607-624.
- Leventhal, H., Weinman, J., Leventhal, E. A., & Phillips, L. A. (2008). Health psychology: The search for pathways between behavior and health. *Annual Review of Psychology, 59*, 477-505.
- Lippke, S., Schwarzer, R., Ziegelmann, J. P., Scholz, U., & Schuz, B. (2010). Testing Stage-Specific Effects of a Stage-Matched Intervention: A Randomized Controlled Trial Targeting Physical Exercise and Its Predictors. *Health Education and Behavior, 37*(4), 533-546.

- Lippke, S., Wiedemann, A. U., Ziegelmann, J. P., Reuter, T., & Schwarzer, R. (2009). Self-efficacy Moderates the Mediation of Intentions Into Behavior via Plans. *American Journal of Health Behavior, 33*(5), 521-529.
- Lippke, S., & Ziegelmann, J. P. (2008). Theory-Based Health Behavior Change: Developing, Testing, and Applying Theories for Evidence-Based Interventions. *Applied Psychology: An International Review, 57*(4), 698-716.
- Llorens, S., Bakker, A. B., Schaufeli, W., & Salanova, M. (2006). Testing the robustness of the job demands-resources model. *International Journal of Stress Management, 13*(3), 378-391. doi: 10.1037/1072-5245.13.3.378
- Luszczynska, A., Schwarzer, R., Lippke, S., & Mazurkiewicz, M. (2011). Self-efficacy as a moderator of the planning-behaviour relationship in interventions designed to promote physical activity. *Psychology & Health, 26*(2), 151-166.
- Mathieu, J. E., & Zajac, D. M. (1990). A review and meta-analysis of the antecedents, correlates, and consequences of organizational commitment. *Psychological Bulletin, 108*(2), 171-194. doi: 10.1037/0033-2909.108.2.171
- Mearns, K., Hope, L., Ford, M. T., & Tetrick, L. E. (2010). Investment in workforce health: Exploring the implications for workforce safety climate and commitment. *Accident Analysis and Prevention, 42*(5), 1445-1454.
- MERCER. (2010). Gesamteuropäische Mercer-Studie zu Fragen betrieblicher Gesundheitsleistungen 2010. Executive Summary [European Mercer-Study on Occupational Health Investments in 2010: Executive Summary], from http://www.healthatwork-online.de/fileadmin/downloads/europaeische_studie_gesundheitl2011.pdf
- Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: Theory, research, and application*. Thousand Oaks, CA US: Sage Publications, Inc.

- Meyer, J. P., Stanley, D. J., Herscovitch, L., & Topolnytsky, L. (2002). Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences. *Journal of Vocational Behavior, 61*(1), 20-52.
- Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Applied Psychology: An International Review 57*(4), 660-680. doi: 10.1111/j.1464-0597.2008.00341.x
- Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. *Proceedings of the National Academy of Sciences of the United States of America, 108*(26), 10415-10420.
- Muse, L., Harris, S. G., Giles, W. F., & Feild, H. S. (2008). Work-life benefits and positive organizational behavior: Is there a connection? *Journal of Organizational Behavior, 29*(2), 171-192.
- Nexøe, J. r., Kragstrup, J., & Søgaaard, J. (1999). Decision on influenza vaccination among the elderly: A questionnaire study based on the Health Belief Model and the Multidimensional Locus of Control Theory. *Scandinavian Journal of Primary Health Care, 17*(2), 105-110.
- Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124*(1), 54-74.
- Painter, J. E., Sales, J. M., Pazol, K., Wingood, G. M., Windle, M., Orenstein, W. A., & Diclemente, R. J. (2010). Psychosocial Correlates of Intention to Receive an Influenza Vaccination among Rural Adolescents. *Health Education Research, 25*(5), 853-864.

- Parschau, L., Richert, J., Koring, M., Ernsting, A., Lippke, S., & Schwarzer, R. (2011). Changes in social-cognitive variables are associated with stage transitions in physical activity. *Health Education Research, Advance online publication*. doi: 10.1093/her/cyr085.
- Rabiau, M., Knäuper, B., & Miquelon, P. (2006). The eternal quest for optimal balance between maximizing pleasure and minimizing harm: The compensatory health beliefs model. *British Journal of Health Psychology, 11*(1), 139-153.
- Radtke, T., Scholz, U., Keller, R., Knäuper, B., & Hornung, R. (2011). Smoking-specific compensatory health beliefs and the readiness to stop smoking in adolescents. *British Journal of Health Psychology, 16*(3), 610-625. doi: 10.1348/2044-8287.002001
- Randall, R., & Nielson, K. (2010). Interventions to Promote Well-Being at Work. In S. Leka & J. Houdmont (Eds.), *Occupational Health Psychology* (1 ed.): Wiley-Blackwell.
- Renner, B., & Schwarzer, R. (2005). The motivation to eat a healthy diet: How intenders and nonintenders differ in terms of risk perception, outcome expectancies, self-efficacy, and nutrition behavior. *Polish Psychological Bulletin, 36*(1), 7-15.
- Renner, B., Spivak, Y., Kwon, S., & Schwarzer, R. (2007). Does Age Make a Difference? Predicting Physical Activity of South Koreans. *Psychology and Aging, 22*(3), 482-493.
- Reuss, A. M., Walter, D., Feig, M., Kappelmayer, L., Buchholz, U., Eckmanns, T., & Poggensee, G. (2010). Influenzaimpfquoten der Saisons 2004/05, 2005/06 und 2006/07: Eine Sekundärdatenanalyse von Abrechnungsdaten der Kassenärztlichen Vereinigungen. *Deutsches Ärzteblatt, 107*(48), 845-850. doi: 10.3238/arztebl.2010.0845
- Reuter, T., Ziegelmann, J. P., Wiedemann, A. U., & Lippke, S. (2008). Dietary planning as a mediator of the intention-behavior relation: An experimental-causal-chain design. *Applied Psychology: An International Review, 57*, 194-207.

- Richert, J., Reuter, T., Wiedemann, A. U., Lippke, S., Ziegelmann, J., & Schwarzer, R. (2010). Differential effects of planning and self-efficacy on fruit and vegetable consumption. *Appetite*, *54*(3), 611-614. doi: 10.1016/j.appet.2010.03.006
- Robert-Koch-Institut. (2008). *Federal Health Reporting: Health in Germany*. Berlin: Oktoberdruck AG.
- Robert-Koch-Institut. (2011). Empfehlungen der Ständigen Impfkommission (STIKO) am RKI [Recommendation of the Standing Vaccination Commission (STIKO) of the RKI]. *Epidemiologisches Bulletin*, *30*.
- Rubin, G. J., Potts, H. W. W., & Michie, S. (2011). Likely uptake of swine and seasonal flu vaccines among healthcare workers. A cross-sectional analysis of UK telephone survey data. *Vaccine*, *29*(13), 2421-2428.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, *25*(3), 293-315. doi: 10.1002/job.248
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The Measurement of Work Engagement with a Short Questionnaire: A Cross-National Study. *Educational and Psychological Measurement*, *66*(4), 701-716.
- Schensul, J. J., Radda, K., Coman, E., & Vazquez, E. (2009). Multi-level intervention to prevent influenza infections in older low income and minority adults. *American Journal of Community Psychology*, *43*(3-4), 313-329.
- Schüz, B., Sniehotta, F., & Schwarzer, R. (2007). Stage-specific effects of an action control intervention on dental flossing. *Health Education Research*, *22*(3), 332-341.
- Schwarzer, R. (2008). Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors. *Applied Psychology*, *57*(1), 1-29.
- Schwarzer, R., & Renner, B. (2008). Social-cognitive predictors of health behavior: Action self-efficacy and coping self-efficacy. *Health Psychology*, *19*(5), 487-495.

- Sheeran, P. (2002). Intention-behaviour relations: A conceptual and empirical review. In W. Ströbe & M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 12, pp. 1-36). London: WileyM.
- Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology & Health, 20*(2), 143-160.
- Spranca, M., Minsk, E., & Baron, J. (1991). Omission and commission in judgment and choice. *Journal of Experimental Social Psychology, 27*(1), 76-105.
- Teng, Y., & Mak, W. (2011). The role of planning and self-efficacy in condom use among men who have sex with men: An application of the Health Action Process Approach model. *Health Psychology, 30*, 119-128.
- Ulich, E., & Wülser, M. (2009). *Gesundheitsmanagement in Unternehmen: Arbeitspsychologische Perspektiven*: Gabler.
- Updegraff, J. A., Emanuel, A. S., Gallagher, K. M., & Steinman, C. T. (2011). Framing flu prevention -An experimental field test of signs promoting hand hygiene during the 2009-2010 H1N1 pandemic. *Health Psychology, 30*(3), 295-299.
- Verplanken, B., & Melkevik, O. (2008). Predicting habit: The case of physical exercise. *Psychology of Sport and Exercise, 9*(1), 15-26.
- Warner, L. M., Schüz, B., Knittle, K., Ziegelmann, J. P., & Wurm, S. (2011). Sources of perceived self-efficacy as predictors of physical activity in older adults. *Applied Psychology: Health and Well-Being, 3*, 172-192. doi: 10.1111/j.1758-0854.2011.01050.x
- Weinstein, N. D., Kwitel, A., McCaul, K. D., Magnan, R. E., Gerrard, M., & Gibbons, F. X. (2007). Risk perceptions: Assessment and relationship to influenza vaccination. *Health Psychology, 26*(2), 146-151.

- WHO. (2006). World Health Report Retrieved 09/12, 2012, from <http://www.who.int/whr/2006/overview/en/#>
- WHO. (2011). Influenza (seasonal). *Media Centre* Retrieved 11/11, 2011, from <http://www.who.int/mediacentre/factsheets/fs211/en/index.html>
- Wiedemann, A. U., Lippke, S., Reuter, T., Schüz, B., Ziegelmann, J. P., & Schwarzer, R. (2009). Prediction of stage transitions in fruit and vegetable intake. *Health Education Research, 24*(4), 596-607.
- Williams, D. M., Anderson, E. S., & Winett, R. A. (2005). A Review of the Outcome Expectancy Construct in Physical Activity Research. *Annals of Behavioral Medicine, 29*(1), 70-79.
- Willis, S. L. (2001). Methodology in behavioral intervention research. In J. E. Birrenm & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 78-108). San Diego, CA: Academic Press.

1

Introduction

Healthy employees are essential for organizational and societal functioning and success. Due to grave societal changes such as epidemiological transitions, demographic changes, and the aging workforce (WHO, 2006), organizations aim to equip themselves to face these challenges and intensify their health-related activities (MERCER, 2010); accordingly, the promotion and maintenance of employees' health and health behaviors are becoming more and more important.

Workplace health promotion is defined as “the combined efforts of employers, employees and society to improve the health and well-being of people at work” (ENWHP, 2007, p. 2), comprising relational (structural) and behavioral prevention (cf., Ulich & Wülser, 2009). Consequently, one major question arises: how should workplace health promotion be designed to support effectively and efficiently employees to engage in a healthy lifestyle? Furthermore, how does this health-related effort of a company affect work-related attitudes of employees?

In the following *Chapter 2*, the relevance of a positive health climate in organizations for employees' affective commitment to their workplace is discussed.

In *Chapter 3-6* the focus is on behavioral workplace health promotion (cf., Ulich & Wülser, 2009), and seasonal influenza vaccination behavior in the workplace in particular. The studies in *Chapter 3-5* investigate the underlying motivational and volitional factors and mechanisms related to influenza vaccination behavior as it represents an important prerequisite for the development of effective and efficient influenza vaccination programs. The final *Chapter 6* introduces a theory-based intervention study to promote influenza vaccination at the workplace. The intervention was evaluated in a randomized-controlled trial striving to provide a template for designing evidence-based workplace health promotion programs.

Chapter 2: Workplace Health Promotion, Health Climate and Affective Commitment

Building on the definition of workplace health promotion (ENWHP, 2007), workplace health interventions can be considered as a tool, aiming to improve employees' health and health behaviors. Beyond that, research has indicated an influence of workplace health promotion programs on work-related concepts such as health climate (Basen-Engquist, Hudmon, Tripp, & Chamberlain, 1998) or commitment (Muse, Harris, Giles, & Feild, 2008).

Health climate describes employees' "shared perceptions of an organization's priorities and practices regarding employee health" (Mearns, Hope, Ford, & Tetrick, 2010, p. 1,447), reflecting a specific aspect of organizational climate that in turn constitutes an important factor for organizational functioning (cf., James et al., 2008; Schneider, Ehrhart, & Macey, 2011). The second construct, *affective commitment*, describes the attitude of involvement, identification, and emotional attachment of an employee with the company and their goals (Meyer & Allen, 1997). Numerous studies have demonstrated strong association of affective commitment and work-related outcomes, such as job performance or organizational citizenship behavior (Mathieu & Zajac, 1990; Meyer & Allen, 1997; Meyer, Stanley, Herscovitch, & Topolnytsky, 2002). As both concepts reflect important targets for human resource management, workplace health promotion efforts seem to extend its primary benefits by supporting these second-order goals.

Previous research reveals associations between these two important concepts (Mearns, et al., 2010). Accordingly, the question arises how health climate and affective commitment are interrelated. From the perspective of the job demands-resources model (Llorens, Bakker, Schaufeli, & Salanova, 2006; Schaufeli & Bakker, 2004) health climate may operate as a valued job resource, supporting employees' affective commitment. However, affective commitment has repeatedly been shown to be positively associated with health-related outcomes, such as perceived stress or work-family conflicts (Mathieu & Zajac, 1990; Meyer, et al., 2002), therefore, potentially having an indirect effect on health climate.

Thus, the study presented in *Chapter 2* explored the longitudinal relationships between health climate and affective commitment, shedding light on the strength of effects on each other. Inspired by the job demands-resources model, analyses should provide results indicating that health climate has a predominant effect on affective commitment, rather than vice versa: the perception that an organization cares about employees' well-being should positively influence employees' affective commitment to the organization. Thus, analyses should point to the beneficial role of a positive health climate for organizational functioning and employees' well-being.

Health Behaviors

Behavioral health promotion programs target the promotion of health behaviors, that is, the adoption and maintenance of any activity that is pursued “for the purpose of preventing or detecting disease or for improving health and well being” (Connor, 2001). Physical activity and a healthy nutrition are two such health behaviors, and benefit one's physical, psychological, and social health (WHO, 2006). Moreover, the definition also includes the giving-up of health risk behaviors, such as smoking, that are likely to be unfavorable to one's health (Scholz & Schwarzer, 2005).

Seasonal Influenza Vaccination Behavior

Crowding conditions in the workplace may lead to an increased risk of seasonal influenza infection (Robert-Koch-Institut, 2011). Accordingly, the annual influenza vaccination represents an important health behavior in the workplace as it provides the best possible prevention of influenza onset and its complications (CDC, 2010a; Gilman, Bonito, & Eicheldinger, 2007; WHO, 2011). However, vaccination rates are lower than desired (CDC, 2010b; Robert-Koch-Institut, 2008). This raises the question of which factors and mechanisms are involved in vaccination motivation and behavior. Understanding these mechanisms will be helpful in the development of effective and evidence-based intervention programs (Leventhal,

Weinman, Leventhal, & Phillips, 2008). These questions were investigated in the following chapters in the context of health behavior theories that identify constructs and mechanisms that predict and explain health behavior and health behavior change (for a discussion and comparison of models, see Lippke & Ziegelmann, 2008).

Chapter 3: Past Vaccination Behavior and the Intention to Receive a Flu Shot

The first step on the way to higher vaccination rates is an increase in vaccination intentions. It has repeatedly been shown that intentions to receive a flu shot are predominantly driven by past behavior (e.g. Chapman & Coups, 1999; Hofmann, Ferracin, Marsh, & Dumas, 2006). Thus, it is crucial to identify potential factors that mediate between past behavior and individuals' intention, and which explain how and why this association occurs. The cross-sectional study in *Chapter 3* investigated outcome expectancies as potential mediators as they constitute a central construct in widely used social cognitive models of health behavior (e.g., Social-Cognitive Theory, Bandura, 1997; Health Action Process Approach, HAPA, Schwarzer, 2008). Outcome expectancies were found to be influential predictors of vaccination intentions (Bish, Yardley, Nicoll, & Michie, 2011; Harrison, Mullen, & Green, 1992; Hofmann, et al., 2006; Nexøe, Kragstrup, & Søggaard, 1999).

The Moderating Role of Past Behavior

Beyond the classical role of past behavior as a key predictor of subsequent intentions (and behavior), studies reveal the influence of past behavior on cognitive processes concerning the initiation, execution or control of behavior (Norman, Conner, & Bell, 2000; Ouellette & Wood, 1998): these studies indicate that if a behavior is carried out frequently in a stable context, cognitive processes, such as the process of intention formation, could be superseded and responses would be performed rather automatically. Drawing on these ideas, *Chapter 3* aimed at investigating whether the formation of vaccination intention, that is, the motivational importance of outcome expectancies for intention, varied according to

individuals' past vaccination behavior. It was expected that the mediation effect of past behavior via outcome expectancies on intention should be the weaker the more frequent an employee received a flu shot in the past. Hence, frequent recipients of influenza vaccination should develop their intentions automatically rather than deliberately balancing the pros (positive outcome expectancies) and cons (negative outcome expectancies) of vaccination.

In *Chapter 3*, results of the cross-sectional analyses provide first impressions of the process of intention formation and suggest starting points for subsequent longitudinal examinations as well as for intervention development, targeting vaccination intentions.

Chapter 4: Past Behavior Moderates the Prediction of Vaccination Adherence

Although intention is largely recognized as a key predictor of subsequent behavior (Ajzen, 1991), it is not sure whether good vaccination intentions are translated into behavior (Harris, Maurer, & Lurie, 2009). Thus, *Chapter 4* pursued this question in a longitudinal study (cf. Figure 1). As an additional important social-cognitive predictor of vaccination intentions, risk perception (Bish, et al., 2011; Brewer et al., 2007; Weinstein et al., 2007) was included along with positive and negative outcome expectancies. Furthermore, longitudinal analyses built on cross-sectional findings in *Chapter 3*, and aimed at illuminating the putative moderating influence of past behavior on the process of intention formation (Norman, et al., 2000; Ouellette & Wood, 1998). It was hypothesized that the less an employee participated in the past, the stronger would be the associations of motivational variables with intention, and consequently, the stronger their indirect effects via intention on behavior would be.

In conclusion, *Chapter 4* aimed at investigating the intention formation process of vaccination behavior along with past behavior. Second, whether employees realize their intentions was examined. Findings contribute to the discussion of automaticity of intention formation, as well as to tailoring health behavior interventions to individuals' needs.

Chapter 5: Searching For an Optimal Composition of Social-Cognitive Predictors of Vaccination Behavior

In the previous study, the focus was on the process of intention formation. However, individuals often fail to translate good intentions into behavior because of distractions, forgetting, or procrastination (i.e., the "intention-behavior gap", Gollwitzer, Sheeran, & Zanna, 2006; Schwarzer, 2008; Sheeran, 2002). The likelihood of successful health behavior change could be improved by taking a closer look at postintentional processes, and by exploring self-regulatory competencies. Postintentional self-regulatory strategies are more proximal predictors on the pathway from intentions to behaviors, and should therefore help to bridge this gap and make goal attainment more likely (Schwarzer, 2008; Sniehotta, Scholz, & Schwarzer, 2005). For example, action planning (or "implementation intentions", Gollwitzer, et al., 2006), action control, or self-efficacy are such important proximal factors (Chapman, Armitage, & Norman, 2009; Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011; Milkman, Beshears, Choi, Laibson, & Madrian, 2011; Pomp, Lippke, Fleig, & Schwarzer, 2010; Sniehotta, Nagy, Scholz, & Schwarzer, 2006).

Theoretical Framework: The Health Action Process Approach

The HAPA (Schwarzer, 2008) is a social-cognitive health behavior theory that explicitly distinguishes between a motivational process, in which a person forms an intention (e.g., to get a flu shot), and a postintentional volition phase, in which the target behavior is carried out. In each phase, different patterns of social-cognitive predictors are specified to operate. Accordingly, in *Chapter 5*, a theory-guided mediator model derived from the HAPA was defined to predict vaccination intention and behavior (Model 1): in the motivational process, outcome expectancies, risk perception, and self-efficacy should predict intention, and in the volitional phase, intention and planning should predict vaccination behavior; planning should mediate between intention and subsequent behavior.

Numerous studies on health behaviors, such as physical activity, sun screen use, condom use, dental flossing, and dietary behaviors (e.g., Chiu, Lynch, Chan, & Berven, 2011; Craciun, Schüz, Lippke, & Schwarzer, 2011; Schwarzer, 2008; Schwarzer & Renner, 2008; Teng & Mak, 2011), demonstrate that the HAPA is a valuable framework for the understanding and prediction of health behaviors. Moreover, the HAPA is designed to be generic, parsimonious, and predictive of the target health behavior (Schwarzer, 2008). However, vaccination behavior is a single-event health behavior that implies behavior characteristics that may require theoretical adjustment. As a single-event behavior, a one-time decision and one-time behavioral act is required when vaccine is available. As a result, fewer barriers may impede the execution of this behavior compared to other health behaviors that require a regular performance (Brewer, et al., 2007; Sniehotta, et al., 2005). Hence, decision processes might be of particular importance and motivational variables should play a predominant role in the adoption of vaccination behavior. Consequently, the theory-guided mediator model (Model 1) was adjusted for this specific behavior (Model 2), should therefore be superior to the original model in predicting vaccination behavior.

Behavior Specific Adjustments to the Health Action Process Approach

Most studies on vaccination behavior identify *risk perception* as the key variable for developing an intention, as well as for the performance of vaccination behavior (Bish, et al., 2011; Brewer, et al., 2007; Capolongo, daCosta DiBonaventura, & Chapman, 2006; Weinstein, et al., 2007). Accordingly, risk perception was hypothesized to be associated with intention, but it was also assumed to affect the execution of the target behavior directly over and above intention. Additionally, research on other health behaviors, such as sunscreen use and radon testing (Craciun, Schüz, Lippke, & Schwarzer, 2010; Duckworth, Frank-Stromborg, Oleckno, Duffy, & Burns, 2002) reveal an influence of risk perception on volitional processes such as planning. Drawing on these findings, risk perception should also

influence planning to participate in a vaccination program. Second, receiving an influenza shot implies the prevention of the risk of falling ill, but also implies the risk of suffering from side effects due to the vaccine. Consequently, fears of potential side-effects or negative outcome expectancies (“If I get a flu shot, I will probably have unpleasant physical side-effects”) are widely considered as influential factors that influence intentions and vaccination behavior (Bish, et al., 2011; Ehrenstein et al., 2010; Harrison, et al., 1992). Preferential attention to concerns about potential side effects, as opposed to concerns about the infectious disease, is a well-known phenomenon (Poland & Jacobson, 2011) which may be explained by the so-called omission bias (Asch et al., 1994; Spranca, Minsk, & Baron, 1991): this bias describes the perception that it would be more acceptable to cause harm through inaction (e.g., no influenza shot) than through action (e.g., getting an influenza shot). Accordingly, these fears should be maintained until the shot is obtained. Consequently, negative outcome expectancies should show direct effects on vaccination behavior.

In sum, *Chapter 5* aimed to illuminate whether the prediction of vaccination behavior by a model derived from the HAPA could be significantly improved when adjusted for specific features of vaccination behavior. The question was whether the adjusted model represents a better composition of social-cognitive predictors for vaccination behavior.

Chapter 6: Theory-guided Intervention to Promote Influenza Vaccination Behavior at the Workplace

Theories constitute a prerequisite for understanding, predicting and changing the target health behavior (e.g., Social-Cognitive Theory, Bandura, 1997; HAPA, Schwarzer, 2008). Thus, they operate as templates for the development of interventions as they specify which factors drive behavior change (Leventhal, et al., 2008; Lippke & Ziegelmann, 2008). In the present study, the intervention to promote participation in a worksite influenza vaccination program was based on the HAPA (Schwarzer, 2008). Validated behavior change techniques

were applied to change the target cognitions and behavior, and to assure that the defined components were addressed correctly (Abraham & Michie, 2008; Michie, Johnston, Francis, Hardeman, & Eccles, 2008).

In *Chapter 6*, employees were randomly chosen to receive one of two health messages via email. Health message 1 (standard intervention) aimed at motivating employees and targeted specified motivational constructs (outcome expectancies, risk perception) with relevant behavior change techniques (Abraham & Michie, 2008; Bandura, 1997; Michie, et al., 2008). For example, risk perception was addressed by providing information on the severity and prevalence of seasonal influenza. Health message 2 prompted additionally self-regulation strategies (action planning: when, where; coping planning: back-up plan; self-efficacy: role modeling promoting the flu shot) to facilitate the translation of intentions into behavior (Schwarzer, 2008). The two messages were compared in a randomized controlled trial with a component control design (Willis, 2001). It was hypothesized that the intervention group would be superior to the standard intervention, yielding an *additional intervention effect* (Aim 1 of Chapter 6).

Intention-Behavior Discrepancies: Compensatory Health Beliefs

The promotion of additional self-regulation strategies should make vaccination adherence more likely (health message 2). However, a challenge of adopting and maintaining health behaviors is that they often require a trade-off between less attractive short-term consequences (e.g., no flu shot) and attractive long-term consequences (e.g., good health). This can lead to situations in which an “initial reluctance” (Gollwitzer, et al., 2006, p. 76) to initiate the health behavior needs to be overcome. In case individuals do not overcome this reluctance, even though they are aware of their intentions (e.g., to lead a healthy life) as well as of an opportunity to attain their goals (e.g., get a flu shot), individuals often start to create excuses or justifications for not carrying out their initial intentions and implement an

alternative (presumably health-detrimental) behavior (with short-term consequences). Accordingly, this health-detrimental self-regulation strategy contributes to the intention-behavior gap; moreover, it can be regarded as a concurrent self-regulation strategy that may compete against health-enhancing strategies, such as planning or self-efficacy.

Chapter 6 introduced compensatory health beliefs (CHB, Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau, Knäuper, & Miquelon, 2006) as such a justification or self-defense strategy that allows individuals not to engage in healthy behaviors or to engage in an unhealthy behavior, such as smoking: individuals believe that they can compensate (Radtke, Scholz, Keller, Knäuper, & Hornung, 2011) or neutralize (Knäuper, et al., 2004; Rabiau, et al., 2006) the negative consequences of unhealthy behaviors by engaging in other, healthy, behaviors (“I live a healthy life and, therefore, I don’t need a flu shot”). Given the premise that individuals hold the overall goal of leading a healthy life, it was hypothesized that participants with low intentions would be more likely to engage in CHB that render adherence unnecessary, whereas those with high intentions were expected to hold lower levels of CHB and were more likely to go for a flu shot (*Aim 2 of Chapter 6*).

Interaction of Health-Enhancing and Health-Detrimental Self-Regulation Strategies

As previously mentioned, CHB can be assumed to operate as a self-regulation strategy that competes against health-enhancing strategies, such as planning or self-efficacy, when it comes to the translation of intentions into behavior. Thus, the main question of this study was, whether CHB would interfere with health messages that promote planning and self-efficacy to assist self-regulation. Investigated was the question of whether health messages, promoting self-regulation strategies (intervention group) would counteract the negative effect of CHB, and consequently, make vaccination adherence more likely compared to the standard intervention (only motivational) (*Aim 3 of Chapter 6*).

To sum up, in *Chapter 6* a theory-based intervention to promote seasonal influenza vaccination at the workplace was evaluated (*Aim 1*). It was examined whether CHB operate as a negative mediator in the intention-behavior relation (*Aim 2*), and finally whether health messages, promoting health-enhancing self-regulation strategies, would counteract CHB. Thus, insights into volitional processes in vaccination behavior should be enriched.

Study Designs and Samples

The research questions in *Chapter 2 to 6* were investigated in two separate studies that were run in a large German company between 2009 and 2011². The company's work committee approved the investigation's data privacy and ethical standards, and studies were conducted in line with the ethical guidelines of the German Psychological Society. Figure 1 provides an overview of the study designs, timelines of measurement points, and illustrates the framework of the different chapters.

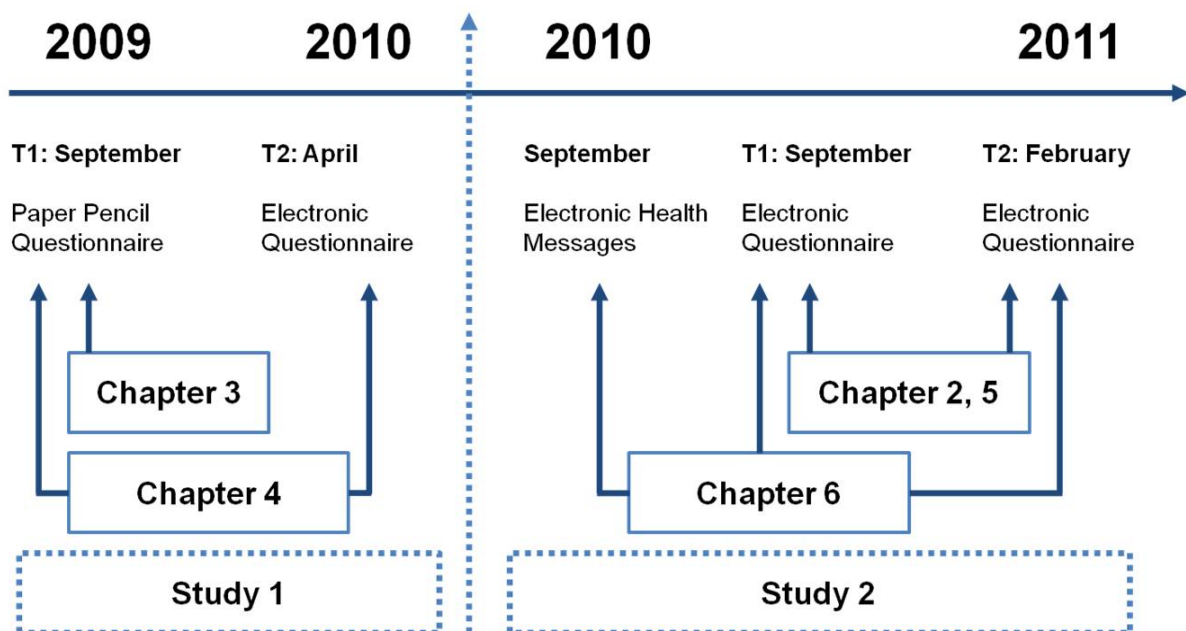


Figure 1. Study designs, timelines of measurement points, and allocation of the different chapters.

² Anna Ernsting was funded under a dissertation grant by Boehringer Ingelheim Pharma GmbH & Co.KG. The studies in this thesis were conducted in this company.

Study 1: Chapter 3, 4

Participants of the questionnaire study were recruited individually. Data at *Time 1* were collected before vaccination was offered by the occupational health service (September 2009) during four days in front of the cafeteria. Additional participants were recruited while the campaign was running at the occupational health services, but before individuals received their flu shot. The follow-up questionnaire at *Time 2* was distributed seven months later via email, when influenza season was over (April 2010). Only those individuals who had given consent at Time 1 were contacted. Completion of each form took approximately 10 minutes.

Study 2: Chapter 2, 5, 6

Participants were recruited via email shortly before influenza vaccination was available (September 2010). Employees were randomized to one of two groups, receiving different health messages (see above) on seasonal influenza, and were then forwarded to an online questionnaire (Time 1). Shortly after Time 1, the occupational health services provided influenza vaccination free of charge to all employees. Five months later (Time 2; February 2011), employees received a link to the follow-up questionnaire. At Time 1 and Time 2, respondents were asked to provide a personal code to match the data from both measurement points in time anonymously. Completion of the forms took approximately 10 minutes.

Research Aims and Questions of the Thesis

To summarize, the thesis investigated the following research aims and questions:

- a) In *Chapter 2*, it was explored whether health climate operates as a beneficial job resource, supporting employees' affective commitment. Investigations should shed light on the relevance of health climate for organizations.
- b) In *Chapter 3*, the focus was on intention formation. Outcome expectancies were investigated as mediators between past behavior and vaccination intention. Moreover, the study illuminated whether intention formation depended on individuals' past behavior.

- c) In *Chapter 4*, the study examined the predictive value of social-cognitive factors for vaccination behavior. The putative moderating influence of individuals' past behavior on motivational processes was investigated. Research findings should add to the discussion on tailoring health behavior interventions to individual's needs.
- d) *Chapter 5*: Health behavior theory was applied to vaccination as a single-event health behavior. The aim was to illuminate whether the prediction of vaccination behavior by a model derived from the HAPA could be improved when adjusted for specific features of vaccination behavior. From this, recommendations for the design of evidence-based preventive programs, and implications for theory-development, should be generated.
- e) In *Chapter 6*, the effectiveness of a theory-based intervention (health messages) to promote seasonal influenza vaccination was examined, while exploring potential impeding factors (compensatory health beliefs) of the intention-behavior relation and their possible interference with health messages. The investigations aimed to acquire insights into volitional processes in vaccination behavior.

In the general discussion in *Chapter 7*, the findings of the previous Chapters are discussed and implications for further research and praxis with regard to vaccination behavior are described.

References

- Abraham, C., & Michie, S. (2008). A taxonomy of behavior change techniques used in interventions. *Health Psychology, 27*(3), 379-387. doi: 10.1037/0278-6133.27.3.379
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.
- Asch, D. A., Baron, J., Hershey, J. C., Kunreuther, H., Meszaros, J., Ritov, I., & Spranca, M. (1994). Omission bias and pertussis vaccination. *Medical Decision Making, 14*(2), 118-123.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Basen-Engquist, K., Hudmon, K. S., Tripp, M., & Chamberlain, R. (1998). Worksite health and safety climate: scale development and effects of a health promotion intervention. *Preventive Medicine, 27*(1), 111-119.
- Bish, A., Yardley, L., Nicoll, A., & Michie, S. (2011). Factors associated with uptake of vaccination against pandemic influenza: A systematic review. *Vaccine, 29*(38), 6472-6484.
- Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., & Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: The example of vaccination. *Health Psychology 26*(2), 136-145.
- Capolongo, M. J., daCosta DiBonaventura, M., & Chapman, G. B. (2006). Physician Vaccinate Thyself: Why Influenza Vaccination Rates Are Higher Among Clinicians Than Among Nonclinicians. *Annals of Behavioral Medicine, 31*(3), 288-296.
- CDC. (2010a). Prevention & Control of Influenza with Vaccines - Recommendations of the Advisory Committee on Immunization Practices (ACIP) *MMWR; Morbidity and Mortality Weekly Report 59*, 1-62.

- CDC. (2010b). Seasonal influenza (Flu) – Influenza Vaccination coverage Levels Retrieved 11/10, 2010, from <http://www.cdc.gov/flu/professionals/acip/coveragelevels.htm>
- Chapman, Armitage, C. J., & Norman, P. (2009). Comparing implementation intention interventions in relation to young adults' intake of fruit and vegetables. *Psychology & Health, 24*(3), 317-332.
- Chapman, G. B., & Coups, E. J. (1999). Predictors of influenza vaccine acceptance among healthy adults. *Preventive Medicine, 29*(4), 249-262.
- Chiu, C.-Y., Lynch, R. T., Chan, F., & Berven, N. L. (2011). The Health Action Process Approach as a motivational model for physical activity self-management for people with multiple sclerosis: A path analysis. *Rehabilitation Psychology, 56*(3), 171-181.
- Connor, M. (2001). Health behaviors. In P. B. Baltes & N. J. Smelser (Eds.), *The International Encyclopedia of the Social & Behavioral Sciences* (Vol. 10, pp. 6506-6512). Oxford, England: Elsevier Science. .
- Craciun, C., Schüz, N., Lippke, S., & Schwarzer, R. (2010). Risk perception moderates how intentions are translated into sunscreen use. *Journal of Behavioral Medicine, 33*(5), 392-398. doi: 10.1007/s10865-010-9269-5
- Craciun, C., Schüz, N., Lippke, S., & Schwarzer, R. (2011). A Mediator Model of Sunscreen Use: A Longitudinal Analysis of Social-Cognitive Predictors and Mediators. *International Journal of Behavioral Medicine*
- Duckworth, L. T., Frank-Stromborg, M., Oleckno, W. A., Duffy, P., & Burns, K. (2002). Relationship of Perception of Radon as a Health Risk and Willingness to Engage in Radon Testing and Mitigation. *Oncology Nursing Forum, 29*(7), 1099.
- Ehrenstein, B. P., Hanses, F., Blaas, S., Mandraka, F., Audebert, F., & Salzberger, B. (2010). Perceived risks of adverse effects and influenza vaccination: A survey of hospital employees. *European Journal of Public Health, 20*(5), 495-499.

- ENWHP. (2007). Luxembourg Declaration on Workplace Health Promotion in the European Union Retrieved 11/2011, 3, from http://www.enwhp.org/fileadmin/rs-dokumente/dateien/Luxembourg_Declaration.pdf
- Gilman, B. H., Bonito, A. J., & Eicheldinger, C. (2007). Impact of Influenza Immunization on Medical Expenditures Among Medicare Elderly, 1999-2003. *American Journal of Preventive Medicine*, 32(2), 107-115.
- Gollwitzer, P. M., Sheeran, P., & Zanna, M. P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, 38, 69-119.
- Harris, K. M., Maurer, J., & Lurie, N. (2009). Do people who intend to get a flu shot actually get one? *Journal of General Internal Medicine*, 24(12), 1311-1313.
- Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the Health Belief Model with adults. *Health Education Research*, 7(1), 107-116.
- Hofmann, F., Ferracin, C., Marsh, G., & Dumas, R. (2006). Influenza vaccination of health care workers: A literature review of attitudes and beliefs. *Infection* 34, 142-147.
- James, L. R., Choi, C. C., Ko, C.-H. E., McNeil, P. K., Minton, M. K., Wright, M. A., & Kim, K.-i. (2008). Organizational and psychological climate: A review of theory and research. *European Journal of Work and Organizational Psychology*, 17(1), 5-32. doi: 10.1080/13594320701662550
- Knäuper, B., Rabiau, M., Cohen, O., & Patriciu, N. (2004). Compensatory Health Beliefs: Scale Development and Psychometric Properties *Psychology & Health*, 19(5), 607-624.
- Leventhal, H., Weinman, J., Leventhal, E. A., & Phillips, L. A. (2008). Health psychology: The search for pathways between behavior and health. *Annual Review of Psychology*, 59, 477-505.

- Lippke, S., & Ziegelmann, J. P. (2008). Theory-Based Health Behavior Change: Developing, Testing, and Applying Theories for Evidence-Based Interventions. *Applied Psychology: An International Review*, 57(4), 698-716.
- Llorens, S., Bakker, A. B., Schaufeli, W., & Salanova, M. (2006). Testing the robustness of the job demands-resources model. *International Journal of Stress Management*, 13(3), 378-391. doi: 10.1037/1072-5245.13.3.378
- Luszczynska, A., Schwarzer, R., Lippke, S., & Mazurkiewicz, M. (2011). Self-efficacy as a moderator of the planning-behaviour relationship in interventions designed to promote physical activity. *Psychology & Health*, 26(2), 151-166. doi: 10.1080/08870446.2011.531571
- Mathieu, J. E., & Zajac, D. M. (1990). A review and meta-analysis of the antecedents, correlates, and consequences of organizational commitment. *Psychological Bulletin*, 108(2), 171-194. doi: 10.1037/0033-2909.108.2.171
- Mearns, K., Hope, L., Ford, M. T., & Tetrick, L. E. (2010). Investment in workforce health: Exploring the implications for workforce safety climate and commitment. *Accident Analysis and Prevention*, 42(5), 1445-1454.
- MERCER. (2010). Gesamteuropäische Mercer-Studie zu Fragen betrieblicher Gesundheitsleistungen 2010. Executive Summary [European Mercer-Study on Occupational Health Investments in 2010: Executive Summary], from http://www.healthatwork-online.de/fileadmin/downloads/europaeische_studie_gesundheitl2011.pdf
- Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: Theory, research, and application*. Thousand Oaks, CA US: Sage Publications, Inc.
- Meyer, J. P., Stanley, D. J., Herscovitch, L., & Topolnytsky, L. (2002). Affective, continuance, and normative commitment to the organization: A meta-analysis of

- antecedents, correlates, and consequences. *Journal of Vocational Behavior*, 61(1), 20-52.
- Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Applied Psychology: An International Review* 57(4), 660-680. doi: 10.1111/j.1464-0597.2008.00341.x
- Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. *Proceedings of the National Academy of Sciences of the United States of America*, 108(26), 10415-10420.
- Muse, L., Harris, S. G., Giles, W. F., & Feild, H. S. (2008). Work-life benefits and positive organizational behavior: Is there a connection? *Journal of Organizational Behavior*, 29(2), 171-192.
- Nexøe, J. r., Kragstrup, J., & Søgaaard, J. (1999). Decision on influenza vaccination among the elderly: A questionnaire study based on the Health Belief Model and the Multidimensional Locus of Control Theory. *Scandinavian Journal of Primary Health Care*, 17(2), 105-110.
- Norman, P., Conner, M., & Bell, R. (2000). The theory of planned behaviour and exercise: Evidence for the moderating role of past behaviour. *British Journal of Health Psychology* 5(Part3), 249-261.
- Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124(1), 54-74.
- Poland, G. A., & Jacobson, R. M. (2011). The age-old struggle against the antivaccinationists. *New England Journal Of Medicine*, 364(2), 97-99.

- Pomp, S., Lippke, S., Fleig, L., & Schwarzer, R. (2010). Synergistic effects of intention and depression on action control: Longitudinal predictors of exercise after rehabilitation. *Mental Health and Physical Activity*, 3(2), 78-84.
- Rabiau, M., Knäuper, B., & Miquelon, P. (2006). The eternal quest for optimal balance between maximizing pleasure and minimizing harm: The compensatory health beliefs model. *British Journal of Health Psychology*, 11(1), 139-153.
- Radtke, T., Scholz, U., Keller, R., Knäuper, B., & Hornung, R. (2011). Smoking-specific compensatory health beliefs and the readiness to stop smoking in adolescents. *British Journal of Health Psychology*, 16(3), 610-625. doi: 10.1348/2044-8287.002001
- Robert-Koch-Institut. (2008). *Federal Health Reporting: Health in Germany*. Berlin: Oktoberdruck AG.
- Robert-Koch-Institut. (2011). Empfehlungen der Ständigen Impfkommission (STIKO) am RKI [Recommendation of the Standing Vaccination Commission (STIKO) of the RKI]. *Epidemiologisches Bulletin*, 30.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25(3), 293-315. doi: 10.1002/job.248
- Schneider, B., Ehrhart, M. G., & Macey, W. H. (2011). Perspectives on organizational climate and culture. In S. Zedeck (Ed.), *APA handbook of industrial and organizational psychology, Vol 1: Building and developing the organization*. (pp. 373-414). Washington, DC US: American Psychological Association.
- Scholz, U., & Schwarzer, R. (2005). Modelle der Gesundheitsverhaltensänderung. In R. Schwarzer (Ed.), *Gesundheitspsychologie* (pp. 389-405). Göttingen: Hogrefe.
- Schwarzer, R. (2008). Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors. *Applied Psychology*, 57(1), 1-29.

- Schwarzer, R., & Renner, B. (2008). Social-cognitive predictors of health behavior: Action self-efficacy and coping self-efficacy. *Health Psychology, 19*(5), 487-495.
- Sheeran, P. (2002). Intention-behaviour relations: A conceptual and empirical review. In W. Ströbe & M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 12, pp. 1-36). London: WileyM.
- Sniehotta, F. F., Nagy, G., Scholz, U., & Schwarzer, R. (2006). The role of action control in implementing intentions during the first weeks of behaviour change. *British Journal of Social Psychology, 45*(1), 87-106.
- Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology & Health, 20*(2), 143-160.
- Spranca, M., Minsk, E., & Baron, J. (1991). Omission and commission in judgment and choice. *Journal of Experimental Social Psychology, 27*(1), 76-105.
- Teng, Y., & Mak, W. (2011). The role of planning and self-efficacy in condom use among men who have sex with men: An application of the Health Action Process Approach model. *Health Psychology, 30*, 119-128.
- Ulich, E., & Wülser, M. (2009). *Gesundheitsmanagement in Unternehmen: Arbeitspsychologische Perspektiven*: Gabler.
- Weinstein, N. D., Kvitel, A., McCaul, K. D., Magnan, R. E., Gerrard, M., & Gibbons, F. X. (2007). Risk perceptions: Assessment and relationship to influenza vaccination. *Health Psychology, 26*(2), 146-151.
- WHO. (2006). World Health Report Retrieved 09/12, 2012, from <http://www.who.int/whr/2006/overview/en/#>
- WHO. (2011). Influenza (seasonal). *Media Centre* Retrieved 11/11, 2011, from <http://www.who.int/mediacentre/factsheets/fs211/en/index.html>

Willis, S. L. (2001). Methodology in behavioral intervention research. In J. E. Birrenm & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 78-108). San Diego, CA: Academic Press.

2

Your Health Matters to Us - The Relationship Between Health Climate and Affective Commitment in the Workplace

Ernsting, A., Schneider, M., Lippke, S. & Schwarzer, R. (2011). Your Health Matters to Us -
The Relationship Between Health Climate and Affective Commitment at the
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3

Was motiviert Erwerbstätige zur Teilnahme an der saisonalen Influenzaschutzimpfung? Analyse der Impfbereitschaft im betrieblichen Kontext

Ernsting, A. Schwarzer R., Lippke, S., & Schneider, M. (2011). Was motiviert Erwerbstätige zur Teilnahme an der saisonalen Influenzaschutzimpfung? Analyse der Impfbereitschaft im betrieblichen Kontext. *Arbeitsmed Sozialmed Umweltmed*, 46:320-325.

4

Who Participates In Seasonal Influenza Vaccination? Past Behavior Moderates The Prediction of Adherence

Ernsting, A., Lippke, S., Schwarzer, R., & Schneider, M. Who Participates in Seasonal Influenza Vaccination? Past Behavior Moderates the Prediction of Adherence. *Advances In Preventive Medicine*, 2011, 148934-148934. doi: 10.4061/2011/148934.

5

To Be or Not to Be at Risk: Social-Cognitive Predictors of Flu Vaccination Adherence at the Workplace

Ernsting, A., Gellert P., Lippke, S., Schneider M. & Schwarzer, R.(2011). To Be or Not to Be at Risk: Social-Cognitive Predictors of Flu Vaccination Adherence at the Workplace. Manuscript submitted for publication.

6

I Don't Need a Flu Shot Because I Live a Healthy Life: Compensatory Health Beliefs Make Vaccination Less Likely

Ernsting, A., Schwarzer, R., Lippke, S. & Schneider M. (2011). I Don't Need a Flu Shot Because I Live a Healthy Lifestyle: Compensatory Health Beliefs Make Vaccination Less Likely. Manuscript submitted for publication.

7

General Discussion

In the previous chapters, the pathway from analyzing a health behavior to developing and evaluating an intervention to promote seasonal influenza vaccination at the workplace was presented. Along with these studies, the implications of employees' perception of organizational health-related efforts for their affective commitment to an organization were elucidated. In the following, each chapter is briefly reiterated and discussed. In a general discussion, the main findings are then integrated and discussed with regard to their implications for practice and future research. Table 1 summarizes the main research aims, findings and implications of this thesis.

Chapter 2: Health Climate Predominantly Predicts Affective Commitment

As an introduction to this thesis, a link between the research setting and seasonal influenza vaccination behavior, as the target health behavior in this thesis, was made by taking a closer look at what health-related efforts of a company may mean to their employees.

In *Chapter 2*, the aim was to study the relations of the two work-related concepts, health climate and affective commitment, over a five-month period. A cross-lagged panel analysis was conducted, to compare the strength of effect the two constructs had on each other: the correlation between health climate at Time 1 and affective commitment at Time 2 as compared to the correlation between affective commitment at Time 1 and health climate at Time 2 was examined (Kenny & Harackiewicz, 1979). The aim was to provide indications of health climate having a predominant influence on affective commitment. This should support the idea that health climate operates as a beneficial job resource, supporting employees' affective commitment to the organization.

Preliminary repeated measures analysis of variance revealed both constructs to be fairly stable and general reactions to the organization (Weinert, 1998): there was no significant change over time in health climate, controlled for age; for affective commitment, no significant change over time emerged, controlled for age and sex.

Table 1. Summary of dissertation aims, findings, and conclusions.

Aims	Findings	Conclusions
<i>Chapter 2:</i> Examination in a longitudinal study whether health climate (health-related efforts of an organization perceived by their employees) operates as a beneficial job resource, supporting employees' affective commitment to the organization.	Cross-lagged panel analysis indicated a predominant effect of health climate on affective commitment as compared to the opposite direction: those who perceived their company as caring about their well-being at Time 1 showed higher levels of affective commitment five month later.	Health climate had a stronger effect on affective commitment than vice versa, indicating that it may operate as a valuable job resource with the potential to support employees' commitment. This indicated the importance of creating and cultivating a positive health climate (e.g., by workplace health interventions).
<i>Chapter 3:</i> In a cross-sectional study on influenza vaccination in the workplace the focus was on intention formation. It was investigated whether outcome expectancies link the relationship of past behavior and intentions, and whether intention formation is moderated by past behavior.	Mediation analyses showed positive and negative outcome expectancies to be mediators between past behavior and vaccination intention. Past behavior moderated this relation (shown in moderated mediation analyses): indirect effects were only valid for individuals who did not undergo the annual immunization.	Outcome expectancies showed how and why past behavior was linked to intention, emerging as potential targets in interventions to enhance intentions. Past behavior moderated intention formation; in annual participants, intentions were no longer associated with balancing pros and cons of vaccination. Results imply the need to consider individual's needs in interventions, but longitudinal studies are required for validation.
<i>Chapter 4:</i> A longitudinal study pursued investigating whether intentions to receive a vaccination were translated into behavior. Second, it was examined whether intention formation by risk perception and outcome expectancies was moderated by past vaccination behavior.	Mediation analyses showed that intention mediated the effects of risk perception, and of positive and negative outcome expectancies, on behavior five months later. Past behavior moderated this indirect relationship: there was no mediation effect for risk perception or outcome expectancies for individuals who participated annually (moderated mediation analyses).	Past behavior moderated indirect effects of risk perception and outcome expectancies via intentions on behavior: the motivational value of the social-cognitive predictors vanished when people went annually for vaccination. These results suggested that this rather infrequent behavior could develop habitual characteristics. But whether it could be labeled as a habit, needs investigations. Overall, varying needs should be accounted for in interventions.
<i>Chapter 5:</i> Health behavior theory was applied to vaccination behavior to explore longitudinally if the prediction by a model derived from the Health Action Process Approach (1) could be improved by a model (2) that accounts for vaccination behavior specifics related to the role of risk perception and negative outcome expectancies for volitional processes.	Model 1: Risk perception, outcome expectancies, and self-efficacy predicted intention; intention and planning predicted behavior; planning partially mediated between intention and behavior. The adjusted model (2) revealed a better fit: direct effects on behavior by risk perception and negative outcome expectancies were confirmed, as well as a direct effect of risk perception on planning, and an indirect effect of risk perception on behavior via planning.	The HAPA was confirmed as an adequate framework to predict vaccination behavior, but the adjusted model was superior: risk perception was relevant for motivational and volitional processes, and so were negative outcome expectancies. This self-protective behavior seemed to be driven by risk-related perceptions. The adjusted model improved the arrangement of social-cognitive variables to predict vaccination behavior, and provided enriched implications for health education on vaccination behavior.
<i>Chapter 6:</i> The study examined the role of compensatory health beliefs (CHB), considered as a self-defense strategy, in a theory-based intervention to promote the flu shot. Employees randomly received one of two health messages; additional self-regulation components (2) were hypothesized to make vaccination more likely compared to motivational messages (1). Whether self-regulation messages (2) would counteract CHB was explored.	CHB mediated negatively between intention and behavior. There was no main treatment effect between the groups: only planning emerged as a mediator between condition and behavior. However, self-efficacy also predicted behavior. Health messages, though, supported vaccination adherence as they moderated the influence of CHB on subsequent behavior: those with low levels of CHB receiving self-regulation messages showed higher likelihood of receiving vaccination compared to the motivational group.	CHB emerged as a health detrimental strategy, providing an excuse for non-adherence. Although health messages with additional self-regulatory strategies were not superior overall to motivational messages, the moderated mediation effect revealed that promoting self-regulatory strategies (planning) made vaccination adherence more likely by buffering CHB to some degree. Hence, CHB should be considered in interventions along with efficient techniques to influence self-efficacy as it represents, along with planning, an influential volitional factor for vaccination adherence.

In contrast, a small time-by-sex interaction was found for health climate, and an increase over time in the perception of health climate was found for women. This may pose questions about possible gender differences in the appraisal of health climate. It is a well known phenomenon that women have higher interest in health-related topics, that they engage in more health-related behaviors, and take part in fewer risk behaviors than men (Lee, 2010; Rabenberg & Mensink, 2011; Sieverding, 2000). Accordingly, women may be more susceptible to health-related changes in their (health) environment and react more immediately. However, further research is needed to elaborate how and why the appraisal of health climate in women and men differ (e.g., by including social norms or health behaviors as mediators). In addition to this specific perspective, it is even more important to gain further insights into the overall concept of health climate, and to elaborate underlying processes such as the influence of workplace health promotion programs (Basen-Engquist, Hudmon, Tripp, & Chamberlain, 1998), social norms, or perceived benefits of health interventions in the workplace (Muse, Harris, Giles, & Feild, 2008).

However, the main question was whether health climate or affective commitment was the stronger predictor of the other construct, potentially operating as a beneficial job resource. Findings of the cross-lagged analysis revealed that both concepts were cross-sectionally and longitudinally related. Referring to the analyses on the strength of effects, health climate emerged as the greater cause of affective commitment, rather than vice versa, accounting for direct and indirect effects (Kenny & Harackiewicz, 1979). Health climate at Time 1 predominantly predicted affective commitment at Time 2: those who perceived their company as caring about their well-being showed higher levels of affective commitment five months later.

Due to the fact that the influence of the two concepts on each other was not equally strong, these findings gave first indications for the causal relation of the two concepts. Results illustrated that health climate was the predominant predictor in this relation. Consequently,

health climate can be considered a valuable job resource (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004) with the potential to change employees' affective commitment. This is a very important finding because affective commitment represents a key factor for organizational functioning and employees' well-being (Mathieu & Zajac, 1990; Meyer & Allen, 1997; Meyer, Stanley, Herscovitch, & Topolnysky, 2002).

Experimental intervention studies (randomized controlled trials) are needed to consolidate these causal assumptions and to investigate underlying motivational processes (Bakker & Demerouti, 2007): workplace health promotion programs could be implemented in an intervention group to evoke changes in health climate (Basen-Engquist, et al., 1998; Muse, et al., 2008). In turn, changes in health climate should then elicit changes in affective commitment. Along this line, investigations of the influence of workplace health promotion on health climate should be conducted in connection with other potentially influential factors such as the commitment and support of senior management on health issues (Randall & Nielson, 2010; "perceived organizational support", Rhoades & Eisenberger, 2002).

In addition, it would be advisable to investigate the influence of health climate on affective commitment in conjunction with other relevant factors such as leadership behavior (Clausen & Borg, 2010; Meyer, et al., 2002) and/ or with regard to effects on other work-related constructs (e.g., engagement; Schaufeli & Bakker, 2004; Schaufeli, Bakker, & Salanova, 2006). Thus, more complex cross-lagged analyses might be performed (e.g., see Luszczynska, Mazurkiewicz, Ziegelmann, & Schwarzer, 2007).

Although questions are left unanswered, the present thesis added valuable insights into the relation between employees' perceptions of an organization's health climate and their affective commitment to the organization. Organizations should be encouraged to create and cultivate a positive health climate, for example, by implementing and intensifying organizational health-related activities (Basen-Engquist, et al., 1998) such as provision of healthy food in the canteen (structural prevention) or offering sports activities (behavioral

prevention). In the context of behavioral health promotion, health behavior theories should be applied to develop effective and evidence-based behavioral health interventions (Leventhal, Weinman, Leventhal, & Phillips, 2008; Lippke & Ziegelmann, 2008).

Seasonal Influenza Vaccination Behavior

In large companies, crowding working conditions may increase the risk of suffering from seasonal influenza (Robert-Koch-Institut, 2011). Due to the fact that the flu annually leads to major individual and economic problems (e.g., absenteeism) (Gilman, Bonito, & Eicheldinger, 2007; Nicholson, Wood, & Zambon, 2003; Nowalk et al., 2008; Robert-Koch-Institut, 2008), seasonal influenza vaccination is of particular importance for organizational functioning. However, vaccination rates are lower than desired (Blank, Freiburghaus, Ruf, Schwenkglens, & Szucs, 2008; CDC, 2010; Robert-Koch-Institut, 2008) and strategies are needed to promote this health behavior.

As preliminary steps, the studies in *Chapter 3*, *4* and *5* examined the underlying motivational and volitional mechanisms of psychological factors involved in vaccination behavior so as to develop a better understanding of the target behavior and to identify starting points for developing effective interventions (Leventhal, et al., 2008; Lippke & Ziegelmann, 2008). This was built on in *Chapter 6* which presented an intervention to promote influenza vaccination.

Chapter 3: Past Vaccination Behavior and the Intention to Receive a Flu Shot

In vaccination behavior research, intention has repeatedly been identified as a key predictor of subsequent behavior (Bish, Yardley, Nicoll, & Michie, 2011; Gargano et al., 2011; Harrison, Mullen, & Green, 1992). These findings illustrate how important it is to have an accurate understanding about the process of intention formation as a precondition for developing effective interventions to promote influenza immunization. In *Chapter 3*, outcome expectancies were evaluated as possible mediators that could explain the association between

past behavior and intentions as they are considered influential predictors of behavioral intentions.

Furthermore, past behavior was hypothesized to operate not only as an independent variable in this motivational process, but also as a moderator in the intention formation process. Previous research showed an influence of past behavior on cognitive processes concerning the initiation and execution or control of behavior (Norman, Conner, & Bell, 2000; Ouellette & Wood, 1998). Previous findings also indicated that with repetitive performance in a stable context (Ouellette & Wood, 1998), the targeted cognitive processes may develop habitual characteristics (Verplanken & Melkevik, 2008). Hence, the research aim of *Chapter 3* was to shed light on the question of whether intention formation might be influenced by individuals' past vaccination behavior.

Preliminary correlational analyses of the cross-sectional study replicated the tight relationship between past behavior and intentions: the more a person participated in the past, the higher was their intention to participate in the current year. Subsequent multiple mediation analyses revealed a partial mediation effect for positive and negative outcome expectancies for the relationship between past behavior and intention: the more frequent a person received a flu shot in the past, the more positive outcome expectancies and the less negative outcome expectancies were reported, and the higher were the intentions to participate in seasonal influenza vaccination this year.

However, the main focus in *Chapter 3* was on the assumed interaction of past behavior and intention formation. Results of the moderated mediation analyses revealed past behavior as a substantial moderator of intention formation: in those who received annually influenza vaccination in the past five years, outcome expectancies were no longer associated with intention. In contrast, indirect effects remained in those who never or sporadically went for immunization.

Looking at these results, cross-sectional data cannot provide information on causes or consequences of the variables as the temporal sequence is missing. Accordingly, the direction of assumed direction of associations between past behavior, outcome expectancies and intention, could also be in the opposite direction. However, this would be very unlikely as the findings presented are in line with previous research (Bish, et al., 2011; Harrison, et al., 1992; Hofmann, Ferracin, Marsh, & Dumas, 2006; Nexøe, Kragstrup, & Søgaaard, 1999; Schwarzer, 2008). Nevertheless, results require longitudinal validation.

With conditional acceptance due to the cross-sectional study design, first indications for theoretical development could be discussed. Results suggested that the cognitive process of intention formation may vary according to individuals' past behavior. With increasing number of flu shots in the past, the reflective balancing of perceived benefits and costs of vaccination adherence (Harrison, et al., 1992; Hofmann, et al., 2006; Nexøe, et al., 1999) may transfer into or may be superseded by a rather automatic intention formation process with habitual characteristics (Ouellette & Wood, 1998; Verplanken & Melkevik, 2008). This may have been supported by the repetitive behavioral performance in the stable setting (i.e., occupational health services); salient environmental cues (e.g., vaccination dates on the questionnaire) may then have been sufficient to motivate frequent vaccination recipients (Ouellette & Wood, 1998; Verplanken & Melkevik, 2008). However, these putative mechanisms require further investigations in future studies with adequate measurement (Verplanken & Melkevik, 2008).

Nevertheless, potential starting points for interventions could be outlined. First, interventions should account for the different needs of their employees in order to efficiently (regarding effort, time or money) and effectively promote vaccination intentions. On the one hand, salient environmental cues, such as posters with vaccination dates, should be sufficient to motivate annual recipients. On the other hand, if someone never or only sporadically participated in seasonal influenza vaccination this procedure would be deficient. In this case,

outcome expectancies might be targeted (Abraham & Michie, 2008; Michie, Johnston, Francis, Hardeman, & Eccles, 2008) to evoke changes in intentions.

In conclusion, cross-sectional analyses provided a first insight into the nature of vaccination intentions. For a deeper discussion of processes of habituation in the context of vaccination behavior (change) further research is needed (de Bruijn & Rhodes, 2010; Fleig, Lippke, Pomp, & Schwarzer, 2011; Ouellette & Wood, 1998; Verplanken & Melkevik, 2008). Moreover, results of *Chapter 4* should be considered to follow-up whether intentions are really translated into behavior (Harris, Maurer, & Lurie, 2009). In addition, experimental studies are required to validate intervention recommendation and theoretical findings. When doing so, it may also be advisable to explore this in connection with other motivational factors, such as risk perception, social norms or the influence of medical staff attitudes' on vaccination (Bish, et al., 2011; Gargano, et al., 2011; Painter et al., 2010; Rubin, Potts, & Michie, 2011; Updegraff, Emanuel, Gallagher, & Steinman, 2011; Weinstein et al., 2007).

Chapter 4: Past Behavior Moderates the Prediction of Vaccination Adherence

Intention is a key predictor of subsequent behavior (Ajzen, 1991) and should therefore be explicitly targeted as a major component of interventions that promote vaccination participation; However, intentions do not guarantee the realization of the behavior (Gollwitzer, Sheeran, & Zanna, 2006; Sheeran, 2002). Thus, the methods in *Chapter 4* longitudinally investigated (cf. Figure 1) whether employees translated their vaccination intention into behavior. Furthermore, investigations in *Chapter 4* aimed to shed further light on the question of whether the underlying mechanism of intention formation would vary according to employees' past vaccination behavior. It was hypothesized that the less an employee participated in the past, the more important outcome expectancies and risk perception would be for intention formation, thus, the higher the indirect predictive value of

the motivational variables via intention would be on behavior (Ernsting, Schwarzer, Lippke, & Schneider, 2011; Ouellette & Wood, 1998).

In the multiple mediation analyses, the parsimonious model presented in *Chapter 3* was extended, with risk perception as a crucial motivational variable for the prediction of vaccination intentions and behavior (Brewer, Weinstein, Cuite, & Herrington, 2004; Weinstein, et al., 2007). Analyses supported this approach as all three social-cognitive variables revealed indirect effects via intention on behavior seven months later. The prediction of vaccination behavior by risk perception and negative outcome expectancies was completely mediated by intentions. This finding underlined their significant but bounded influence on the intention formation process (Parschau et al., 2011; Renner & Schwarzer, 2005). These social-cognitive variables seemed to operate as rather distal predictors for vaccination behavior, and set the stage for the reflection on the subsequent behavioral act (Schwarzer, 2008). In contrast, there was a partial mediation effect for positive outcome expectancies; the perceived benefits of a flu shot were associated with forming an intention, and predicted subsequent behavior indirectly through intention. Furthermore, positive outcome expectancies had a direct influence on vaccination behavior. This dual function of outcome expectancies regarding the initiation (goal setting) and the performance of a health behavior supports the Social Cognitive Theory (Bandura, 1997). However, the different results for positive and negative outcome expectancies should be further explored, for example, by elaborating differences in outcome content (Gellert, Ziegelmann, & Schwarzer, 2011; Williams, Anderson, & Winett, 2005).

These findings have to be considered in light of the results of the moderated mediation analyses. As suggested in the cross-sectional analyses in *Chapter 3*, past behavior emerged as a substantial moderator of intention formation in the longitudinal study. The indirect effects of the motivational variables depended on individuals' past behavior within the past five years: for all those who received no or only sporadic immunization in the past five years, risk

perception, negative outcome expectancies, and positive outcome expectancies were important for the formation of an intention; that is, they influenced vaccination behavior indirectly through intention. In contrast, for employees who went annually for vaccination (and for positive outcome expectancies: “three times and more in the past five years”), the social-cognitive variables were no longer related to vaccination intention, and did not operate as indirect predictors of vaccination behavior via intentions.

As described before (cf. *Chapter 3*), this pattern may be explained by mechanisms relevant in habituation (Ouellette & Wood, 1998; Verplanken & Melkevik, 2008): the repetitive performance of this health behavior in a stable setting (occupational health services) and salient environmental stimuli (e.g., vaccination dates on the questionnaire) may have supported that the cognitive process of intention formation, based upon a rational, deliberative process considering risk perception and outcome expectancies, changed to a rather automatic process. This suggests that vaccination behavior may develop habitual characteristics (Ouellette & Wood, 1998; Verplanken & Melkevik, 2008). However, future studies should investigate these assumptions and gain deeper insights into putative habitual processes.

In conclusion, these findings should be encouraging as health behaviors are only thoroughly beneficial when they are performed continuously. The present findings indicated that vaccination behavior could presumably adopt “habitual” characteristics which strongly support the maintenance of this health behavior (de Bruijn, Kremers, Singh, van den Putte, & van Mechelen, 2009; Fleig, et al., 2011; Verplanken & Melkevik, 2008). Thus, future research should take a closer look at factors and mechanisms that support this self-sustaining pattern in vaccination behavior. This also implies the value of a more elaborate investigation of the concept of “habit” with adequate measurement (de Bruijn & Rhodes, 2010; Verplanken & Melkevik, 2008) in the context of influenza immunization.

Implications and recommendations of the findings in *Chapter 4* built on the conclusions from the cross-sectional study in *Chapter 3*. Health interventions should attend to

employees' varying needs in order to be maximally effective and efficient in enhancing vaccination behavior. Addressing risk perception and outcome expectancies with appropriate behavior change techniques (Abraham & Michie, 2008; Michie, et al., 2008) should enhance intention in those, who never or sporadically participated in vaccination in the past. In turn, intention should make vaccination participation more likely. For frequent participants, salient environmental cues-to-action, such as posters or leaflets with vaccination dates, should be a sufficient and efficient strategy (regarding time, money etc.) to promote vaccination behavior. Additionally, interventions targeting habit strengths may be recommended to strengthen automatic responses across situations (de Bruijn, et al., 2009; de Bruijn & Rhodes, 2010; Fleig, et al., 2011). Furthermore, these recommendations need to be tested in experimental intervention studies to analyze whether changes in the preceding health cognitions lead to changes in vaccination behavior. When doing so, analysis of the moderating effect of past behavior is recommended.

The research findings in *Chapter 4* added valuable contributions to the discussion of tailoring health behavior interventions to individuals' needs in order to efficiently and effectively promote influenza vaccination adherence in the workplace. Furthermore, results added interesting indications for differences in cognitive processing according to individuals' past behavior and suggested further research on mechanisms of the development of habits in influenza vaccination. Additionally, it may be worth widening the perspective from the individual to the social context for seasonal influenza vaccination behavior in future research, and account for social influences such social norms or medical staff attitudes about vaccination (Bish, et al., 2011; Gargano, et al., 2011; Painter, et al., 2010; Rubin, et al., 2011; Schensul, Radda, Coman, & Vazquez, 2009; Updegraff, et al., 2011).

Chapter 5: Searching For an Optimal Composition of Social-Cognitive Predictors of Vaccination Behavior

In the preceding *Chapters 3 and 4*, the focus was on motivational processes because intention is a key construct for vaccination behavior (e.g., Bish, et al., 2011; Gargano, et al., 2011; Harris, et al., 2009). However, missing good opportunities or forgetting may hinder the translation of good intentions into behavior. Thus, it is important to look at postintentional processes and study self-regulatory competencies that may help to bridge the gap (Gollwitzer, et al., 2006; Luszczynska, Scholz, & Sutton, 2007; Pomp, Lippke, Fleig, & Schwarzer, 2010; Reuter et al., 2010; Sheeran, 2002; Sniehotta, Scholz, & Schwarzer, 2005).

Theoretical Framework: The Health Action Process Approach

Accordingly, in the longitudinal study (compare Figure 1) in *Chapter 5*, a theory-guided mediator model derived from the Health Action Process Approach (HAPA, Schwarzer, 2008) was hypothesized to predict vaccination behavior. The HAPA was chosen as a useful theoretical framework as it explicitly includes postintentional factors and was successfully applied to the prediction of various health behaviors (e.g., Chiu, Lynch, Chan, & Berven, 2011; Craciun, Schüz, Lippke, & Schwarzer, 2011; Schwarzer, 2008; Schwarzer & Renner, 2008; Teng & Mak, 2011). Thus, in the motivational phase, outcome expectancies, risk perception, and self-efficacy were chosen as predictors of intention. In the volitional phase, intention and planning were hypothesized to predict vaccination behavior and planning should mediate between intention and behavior (Model 1).

Behavior Specific Adjustments to the Health Action Process Approach

Despite the successful application of the HAPA, an elaborated model (Model 2) was developed that was adjusted for specific features of vaccination behavior. The model accounted for distinct influences of risk perception and negative outcome expectancies on volitional processes in vaccination behavior (Bish, et al., 2011; Brewer, et al., 2004; Craciun,

Schüz, Lippke, & Schwarzer, 2010; Duckworth, Frank-Stromborg, Oleckno, Duffy, & Burns, 2002; Weinstein, et al., 2007). The aim was to create a better composition of social-cognitive variables to improve prediction of vaccination behavior. Thus, the main question in *Chapter 5* was whether the prediction of behavior by a model derived from the HAPA (Model 1) could be improved by a model that further accounts for vaccination behavior specifics (Model 2).

Results demonstrated the effectiveness of central components of the HAPA (Model 1) for predicting behavior, and underlined the importance of postintentional factors (Milkman, Beshears, Choi, Laibson, & Madrian, 2011). All motivational variables predicted intention. In turn, intention and planning predicted behavior five month later. Planning emerged as a partial mediator between intention and behavior, but a strong direct effect of intention remained. The intention-behavior gap in vaccination behavior appeared to be smaller than in other behaviors (Schwarzer, 2008; Sheeran, 2002; Sniehotta, et al., 2005). Probably, the study's setting (e.g., no appointments for vaccination were required at a walk-in clinic) may have reduced self-regulation requirements.

However, the adjusted model (Model 2) revealed a significantly better fit. Risk perception went beyond its classical role in the HAPA, and affected motivational and volitional processes: risk perception (“Without a flu shot, I would feel that I’m going to get the flu this year”) was directly related to planning, and predicted behavior via planning. This added evidence to the hypothesis that risk perception influences volitional processes, such as planning (Craciun, et al., 2010; Duckworth, et al., 2002), to the context of seasonal influenza vaccination. Moreover, risk perception operated not as a negligible, distal predictor of behavior, as it was often found in other health behaviors, such as physical activity or dietary behavior (Luszczynska & Schwarzer, 2003; Renner, Spivak, Kwon, & Schwarzer, 2007; Schwarzer, 2008), but directly affected the target behavior. This underlines the importance of risk perception for vaccination behavior (Bish, et al., 2011; Brewer et al., 2007; Capolongo, daCosta DiBonaventura, & Chapman, 2006; Weinstein, et al., 2007). Second, results

confirmed the relevance of negative outcome expectancies (“If I get a flu shot, I will probably get unpleasant physical side-effects”) for motivational and volitional processes because their direct effect on behavior was shown. In accordance with the omission bias (Asch et al., 1994; Spranca, Minsk, & Baron, 1991), negative outcome expectancies remained influential until behavior execution, as fears of side-effects could obviously only vanish when the shot was received. Thus, this result also supports the Social-cognitive theory (Bandura, 1997).

Drawing on these research findings, pre- and postintentional factors were identified which could be targeted in interventions, depending on an individual’s position within the process of health behavior change (“stage-specific interventions” e.g., Lippke, Schwarzer, Ziegelmann, Scholz, & Schuz, 2010; Schüz, Sniehotta, & Schwarzer, 2007; Wiedemann et al., 2009): those without intention to receive a vaccination (motivational phase) could be motivated by enhancing self-efficacy beliefs (Bandura, 1997), risk perception, and outcome expectancies with relevant behavior change techniques (Abraham & Michie, 2008; Michie, et al., 2008). In risk communication, particular attention should be paid to assure the understanding of health statistics, for example, by providing frequency statements instead of single-event probabilities (Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz, & Woloshin, 2007). Individuals in the volitional phase could be prompted to plan action and coping, e.g., with electronic calendars, to support the translation of intention into behavior. Moreover, risk perception and negative outcome expectancies should be addressed because these risk-related health cognitions still matter for the execution of behavior even in highly motivated individuals. In particular, vaccination programs should consider the possibility of the “omission bias” in medical decision making (Asch, et al., 1994; Spranca, et al., 1991) and tackle negative expectations, e.g., by discussing preventive and curative options regarding seasonal influenza (immunization vs. no immunization), in direct conjunction with their consequences.

However, experimental studies are needed to validate whether changes in the proposed cognitions lead to changes in intention and in behavior. On recent study applied the HAPA (equivalent to Model 1) to the prediction of vaccination behavior change (Payaprom, Bennett, Alabaster, & Tantipong, 2011). Changes in motivational variables predicted changes in intention, but the significance of planning for vaccination performance was not confirmed. One explanation may relate to the rather small sample size which had only the power to detect “between group differences in vaccination rates of 22% (between the previous year’s vaccination rate of 38% and a predicted rate of 60%)” (Payaprom, et al., 2011, p. 493) which is a fairly large effect in light of average vaccination rates, even for target groups, (Blank, Schwenkglens, & Szucs, 2009; CDC, 2010; Robert-Koch-Institut, 2008). Moreover, the planning intervention addressed only “where, when and how they would obtain the vaccination” (Payaprom, et al., 2011, p. 494), whereas the planning items in the present study also accounted for planning a back-up plan (“I already have a definite back-up plan for when to get vaccinated if something prevents me from executing my original plan”). Hence, interventions should also prompt coping planning (Araújo-Soares, McIntyre, & Sniehotta, 2009; Koring et al., 2011; Wiedemann, Lippke, Reuter, Ziegelmann, & Schwarzer, 2011). Further research is required to validate the current findings, to provide support for this study’s recommendations, and to improve understanding of vaccination behavior and behavior change.

Concluding, research findings of *Chapter 5* indicated that the adjustment of the model grounded in the HAPA was a meaningful and enriching approach. Results augmented insights into underlying pre- and postintentional factors and mechanisms of vaccination behavior, and illustrated the applicability of health behavior theory. Henceforward, it may be worthwhile studying these rather individualistic cognitions in relation with social influences, such as injunctive or descriptive social norms, social support, social pressure, or medical staffs’ vaccination attitudes, as research has shown their relevance for vaccination behavior (Bish, et

al., 2011; Gargano, et al., 2011; Painter, et al., 2010; Rubin, et al., 2011; Schensul, et al., 2009; SuMi, HyunSoo, OkKyung, Moon-Hyun, & WhaSook, 2010; Updegraff, et al., 2011). Furthermore, comparisons to other samples are necessary to cross-validate the findings, and comparisons with other health behavior theories (e.g., Social-cognitive Theory, Bandura, 1997) are recommended (Weinstein, 2007).

Chapter 6: Compensatory Health Beliefs and a Theory-based Intervention Study to Promote Influenza Vaccination Behavior

In *Chapter 6*, compensatory health beliefs (CHB), considered as a self-defense strategy, were examined in a theory-guided intervention that aimed at promoting influenza vaccination in the workplace. In a randomized controlled trial with a component control design (Willis, 2001) two treatments were compared to evaluate *additional intervention effects*. The intervention group received health messages, targeting motivational factors and self-regulatory strategies (self-efficacy, planning). The addition of self-regulation strategies was hypothesized to make vaccination adherence more likely as they facilitate the translation of intentions into behavior ("intention-behavior gap", Gollwitzer, et al., 2006; Schwarzer, 2008) compared to health messages (standard intervention) that address only motivational factors (*Aim 1*). Moreover, the focus in *Chapter 6* was on CHB as they were expected to operate as an excuse for non-adherence, impeding the intention-behavior relation (*Aim 2*). However, it was of main interest to examine whether CHB would interfere with self-regulation strategies, that is, whether the promotion of health-enhancing self-regulation strategies could counteract CHB (*Aim 3*).

Health Messages

Mediation analyses indicated that there was no main effect for type of health message. The results of the mediation analyses revealed that only planning emerged as a mediator between condition and vaccination behavior at Time 2. Results affirmed planning as an

effective intervention component, making vaccination adherence more likely (Gargano, et al., 2011; Milkman, et al., 2011). Moreover, results indicated that the behavior change technique applied operated as expected (Abraham & Michie, 2008; Michie, et al., 2008). Contrary to expectation, self-efficacy was not affected by the intervention, indicating that the technique chosen did not operate as predicted (Bandura, 1997). Maybe, the paper-and-pencil role models were not convincing, or participants did not identify with them. Moreover, this limited effect on self-efficacy may have affected the overall effectiveness of the intervention in a second, indirect way: previous research revealed synergistic effects of planning and self-efficacy, demonstrating that those who lack in self-efficacy benefited less from planning (Lippke, Wiedemann, Ziegelmann, Reuter, & Schwarzer, 2009; Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011; Richert et al., 2010). Thus, limited self-efficacy may have constrained intervention effects directly and indirectly via its putative moderator function. Research on potential moderator effects in the context of vaccination behavior could shed light on this assumption.

However, role modeling (vicarious experience) was repeatedly shown to be an effective strategy to promote self-efficacy beliefs as it enables the observer to copy and adopt strategies or techniques to achieve the goal (behavior) (Ashford, Edmunds, & French, 2010; Bandura, 1997; Warner, Schüz, Knittle, Ziegelmann, & Wurm, 2011). Mastery experience, verbal persuasion, and somatic and affective states are defined as the other three sources of self-efficacy (Bandura, 1997). Due to the fact that verbal persuasion was often found to be of limited effectiveness and not enduring (Ashford, et al., 2010; Bandura, 1997), and mastery experience or somatic and affective states seem to be rather inappropriately invasive strategies in the context of vaccination, role modeling could be considered the most feasible and effective strategy. Thus, it would be advisable to revise and edit the material of the present study to improve its effectiveness (e.g., no fictitious role models) or different media (e.g., video clips) could be applied. Adding to this, research findings highlighted the importance of

self-efficacy together with planning for vaccination behavior, increasing the likelihood of vaccination adherence. Of course, experimental studies are needed which take these recommendations into account and clarify the present findings.

Intention-Behavior Discrepancies: Compensatory Health Beliefs

CHB (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau, Knäuper, & Miquelon, 2006) were described as self-defense strategy, and mediation analyses confirmed that CHB impeded the translation of intentions into behavior. Given the overall goal of leading a healthy life, when individuals believed that they already led a healthy lifestyle, they were less likely to obtain a flu shot; vaccination seemed to be considered as a rather unnecessary health behavior as individuals perceived their lifestyle sufficiently protective. Thus, individuals with low intentions conjured up CHB, providing an excuse for non-adherence, and making vaccination less likely. In contrast, individuals with high intentions were less prone to conjure up CHB, and with less CHB it became more likely to act according to one's intentions and receive vaccination.

Consequently, vaccination interventions should explicitly focus on CHB to reduce their detrimental effect on the execution of health behaviors (for more information see below) and research should further study CHB to gain better insights in their underlying processes.

Interaction between Compensatory Health Beliefs and Health Messages

In *Chapter 6*, the main focus was on the particular interplay of CHB and health messages (*Aim 3*). Because CHB operated as a health-detrimental self-regulation strategy, the promotion of health-enhancing strategies should have the potential to buffer this negative effect of CHB on behavior. Moderated mediation analyses supported this assumption, revealing that the intervention group, which received planning and self-efficacy components to assist self-regulation, buffered the negative effect of CHB to some degree: individuals with low CHB in the intervention group were less vulnerable to CHB and more likely to receive

vaccination than those in the motivational group (standard intervention). However, beyond a certain level of CHB, health messages had an overall low potential to counter CHB. Apparently, targeting health-enhancing self-regulatory strategies (here: only effective for planning) to support vaccination behavior could oppose CHB only to a certain degree. Eventually, the buffering effect would have been even stronger if the intervention had affected self-efficacy successfully.

Results underline the need to consider CHB explicitly in future health messages, as well as to focus on mechanisms that may operate when competing health promoting self-regulation strategies come into play. For instance, false CHB need to be uncovered to expose an inaccurate sense of invulnerability; a false belief could be the assumption that being young and healthy is a sufficient protection against influenza infection. Moreover, the issue of inconsistent and/or incorrect adherence to effective compensatory behaviors such as personal hygiene (e.g., hand washing), should be discussed, as an intention does not guarantee the correct and/or consistent implementation (Rabiau, et al., 2006; Radtke, Scholz, Keller, Knäuper, & Hornung, 2011). However, further research on CHB is needed in the context of vaccination, for instance, by developing an entire scale to assess CHB (e.g., in the context of smoking, Radtke, et al., 2011), extending the present assessment of CHB as a general tendency for regulating health behaviors (Knäuper, et al., 2004). The picture of CHB could be further extended by examining the kind and amount of potential compensatory behaviors for not taking a flu shot (e.g., Bish & Michie, 2010). This could enlarge the focus of the present study which considered CHB as a suitable self-regulatory strategy (excuse) to avoid vaccination without suffering from health-detrimental effects; thus, these beliefs did not necessarily need to have a valid basis. Accordingly, as CHB could represent a mere excuse without any intention to perform compensatory behaviors, health promoting self-regulation strategies, such as planning and self-efficacy, should always be strengthened in interventions. Messages might help to reduce the activation of CHB as well as inaccurate and/or inconsistent

compensatory behaviors, and strengthen health-promoting self-beliefs. Thus, participation in vaccination programs should be enhanced and potential health-impeding effects due to CHB or incorrect and/or inconsistent compensatory behaviors could be diminished. However, intervention studies are needed for validation.

In conclusion, results in *Chapter 6* provided evidence that CHB may operate as a mediator between intentions and vaccination behavior, explaining why some people do not follow the call for flu shots (*Aim 2*). In contrast, research findings could not confirm the superiority of self-regulation messages over mere motivational messages in improving participation in a vaccination program in the workplace (*Aim 1*). However, results indicated that the promotion of self-regulation strategies might be a useful component in health messages to counteract CHB (*Aim 3*).

Strength and Limitations

Several recommendations can be derived from the strength and limitations of this thesis to improve future research.

Sample

In both studies, the attrition rates from Time 1 assessment to Time 2 (study 1: 53,7%; study 2: 58,1%) were slightly above average rates in longitudinal studies (Cook, Heath, & Thompson, 2000). This reflects a well-known problem in longitudinal web-based research (here: the company intranet) that needs further investigation to identify feasible remedies, such as addressing participants personally, for example, with serial letters. However, in study 1 this problem of attrition was probably exacerbated by external reasons, as assessment took place during Easter holidays and many employees were unavailable. Furthermore, participation in both surveys was voluntary, but took place during working hours. Hence, the attrition may have been not only a motivational problem of the individual but also due to organizational obligations and constraints. Thus, this may point out to another issue, namely

organizational health climate. The perceived priorities and values set by the company concerning health issues (by employees) may also affect participation in surveys on health issues. Taking a closer look at the results in *Chapter 2*, a mean value of 3.3 (3=“neither agree nor disagree”) on a scale from 1 to 5 was revealed for health climate, indicating a rather moderately positive health climate in this organization (Basen-Engquist, et al., 1998). Hence, in addition to the application of strategies targeting individuals’ motivation to increase participation, further effort should be put into communicating the importance of participating in longitudinal surveys on workplace health promotion and thereby support a positive health climate. Only when information on health attitudes and health behaviors of employees can be gathered, will employees receive the best possible support to engage in a healthy lifestyle. Electronic surveys and interventions seem to be very feasible in an organizational setting because they reach a large number of employees.

A particular strength of the samples was their large sizes. This made it possible to detect even rather small effects and reveal valuable insights into underlying mechanisms. Examples are the interaction effect of gender and health climate over time (cf. *Chapter 2*), and the moderator effect of self-regulation health messages on the CHB-behavior relation (cf. *Chapter 6*).

Study design

Investigations that were presented in *Chapter 3* based on *cross-sectional analyses* that focused on associations between past vaccination behavior and health cognitions. Research results gave first impressions of potential starting points for subsequent investigations and interventions. However, cross-sectional analyses do not allow drawing conclusion about causes or consequences of the associations because of the lacking temporal sequence. Hence, subsequent longitudinal analyses aimed to overcome this.

The longitudinal analyses conducted in *Chapter 5* focused on constructs involved in vaccination behavior and their best possible arrangement for the prediction of the health behavior. Thus, *prospective associations* between health cognitions measured at a first point in time, and vaccination behavior assessed at a later point in time were examined. Starting points were identified for the development of interventions in the workplace and further research on vaccination behavior and the application of health behavior theory was suggested.

In *Chapters 4* and *6*, the focus of the studies was on *behavioral changes*, and in *Chapter 2* on *changes in employees' attitudes*, exploring causal relations of the constructs involved. Thus, the longitudinal models were adjusted for baseline behavior, and findings provided indications of what caused changes in vaccination behavior (*Chapter 4, 6*) and work-related attitudes (*Chapter 2*). That is, potential factors and mechanisms were identified for how vaccination behavior (or commitment) can be adopted and maintained. This “*semidynamic perspective*” (page 2, Renner, Hankonen, Ghisletta, & Absetz, 2011) revealed valuable insights into the change process and went beyond the rather static perspective that was described before.

A future step of importance would be to conduct randomized controlled trials to validate the conclusions. For example, an intervention group could receive a treatment which maximally enhances the cognitions that are assumed to cause changes in the outcome, with these effects compared to those of a control group. Subsequent analyses with change models could investigate whether changes in the preceding psychological cognitions occur, and whether these changes are followed by changes in the target behavior (Lippke & Plotnikoff, 2006; Parschau, et al., 2011; Payaprom, et al., 2011; Renner, et al., 2011; Schüz, et al., 2007). This would further improve and consolidate the understanding of underlying mechanisms in vaccination behavior change. However, the semidynamic perspective was the first step that future studies can build on. Overall, the findings of the present studies contribute valuable insights to vaccination behavior research.

Intervention Study

In *Chapter 6*, an intervention study to promote vaccination adherence in a worksite flu program was presented. The study aimed to provide evidence for the significance of self-regulation strategies (postintentional factors) over and above motivational treatment components (risk perception, outcome expectancies) for participating in an influenza vaccination program at the workplace. A randomized controlled trial with a component control design (Willis, 2001) was conducted to examine the putative *additional intervention effect*. This between-group design implemented separate well-defined components of the intervention that were addressed with established behavior change techniques (Abraham & Michie, 2008; Michie, et al., 2008): one group was provided with the entire intervention (motivational and self-regulation components) representing the intervention group; the other group received only selected components (motivational components) and was considered as the standard intervention group. By comparing the two groups, this study examined whether the additional self-regulation components (planning, volitional self-efficacy) led to superiority in changing vaccination behavior.

From a theoretical, practical, and ethical point of view, this approach has several advantages: the randomization to different treatment groups controlled confounding variables, such as potential differences in individuals (see randomization check in *Chapter 6*), which allowed conducting dependency analyses and drawing conclusions about causal relations (Hager, 1987). Moreover, both groups received intervention components which were supposed to be effective (risk perception, outcome expectancies), which enhanced the credibility of the intervention, and which may also have led to similar expectations among both groups (Willis, 2001). Nevertheless, the comparison of the intervention groups to a passive control group could have added theoretical findings on the motivational components. However, this was not the focus of the present study and presumably the approach presented was more feasible for applied research in the workplace.

Methods of Analyses

The main aim, investigated in the study described in *Chapter 2*, was to illuminate the effects of health climate and affective commitment on each other in order to gain indications for a predominant influence of health climate on affective commitment. Therefore, a *cross-lagged panel analysis* was conducted (Kenny & Harackiewicz, 1979). Results identified health climate as having a greater effect on affective commitment, rather than vice versa, accounting for direct and indirect effects (Kenny & Harackiewicz, 1979). Experimental intervention studies (randomized controlled trials) are needed to consolidate such causal assumptions, and more complex models could account for other potential causes or consequences (e.g., see Luszczynska, Mazurkiewicz, et al., 2007). Although this was not of primary interest, subsequently, mediation and moderated mediation analyses could be applied to yield more differentiated insights into underlying mechanisms of the causal relations. Overall, cross-lagged panel analyses are a productive approach to enhance theoretical and practical development alike.

In the present thesis, *mediation analyses* were applied to investigate *how* and *why* an effect occurred, or whether an association was present (MacKinnon & Fairchild, 2009). In *Chapter 3*, the study focus was on motivational processes involved in vaccination behavior and how past behavior was associated with intention (cf. *Chapter 3*). In *Chapter 4*, the indirect influence of motivational variables on vaccination behavior was examined. In *Chapter 6*, the target of the study was to examine how and why intervention conditions may affect the target behavior and whether CHB impede the intention-behavior relation. Mediation analyses provided valuable insights into underlying mechanisms of the relationship or the effect, such as the working components of the intervention (cf. *Chapter 6*). Furthermore, results allowed for the identification of potential starting points for future interventions to change the target outcome and deficiencies alike (cf. *Chapter 3, 4, 6*). Thus, this approach is appealing for both practical and theoretical development.

Additionally, the strength or the form of a mediation effect can be moderated by a third (moderator) variable. Therefore, *moderated mediation analyses* were applied to investigate whether the putative *indirect effects hold true for all participants*, that is, at all values of the moderator variable (Preacher, Rucker, & Hayes, 2007). In *Chapter 3* and *4*, the present research investigated whether the process of intention formation was the same for all participants, independent of their past vaccination behavior. The examination in *Chapter 6* dealt with the question of whether the health-detrimental effect of CHB on vaccination behavior was influenced by the different kind of health messages individuals received.

Moderated mediation analyses provided a more differentiated picture of the underlying mechanisms of associations or effects. For example, such analyses add to the discussion on tailoring health education depending on individuals past behavior (cf. *Chapter 3, 4*) or the effects of health interventions (cf. *Chapter 6*). Again, this is very appealing for practical and theoretical development at the same time, as it illuminates whether mechanisms operate in general or vary according to specific characteristics (moderator variables).

Measurement

Apart from the assessment of outcome expectancies and planning, measurement (related to influenza vaccination) relied on single-item measures in both studies (risk perception, self-efficacy, CHB, behavior, intention). This was done for usability and economic reasons, and also because vaccination behavior represents a very specific behavior. Therefore, an assessment with a content-valid single items can be assumed to measure the target construct just as well as a multi-item scale (Schwarzer & Luszczynska, 2007). Nonetheless, future studies could develop entire scales, for example, for CHB in the context of vaccination. However, in the present study the focus was not on the content of CHB, but rather on capturing CHB as a general tendency for regulating health behaviors.

Assessment of health climate (adapted from Basen-Engquist, et al., 1998) and affective commitment (validated German version of the questionnaire by Allen and Porter, Schmidt, Hollmann, & Sodenkamp, 1998) were adapted from validated scales and replicated good psychometric properties (affective commitment, seven items: T1: $\alpha=.71$; T2: $\alpha=.79$; health climate, four items: T1: $\alpha=.68$; T2: $\alpha=.68$).

Overall, findings based on self-reports that may reduce validity, but research on other health behaviors diminish this assumption (e.g., Glanz et al., 2009). Moreover, vaccination behavior is a very concrete, single-event health behavior. Thus, recall errors should be minimized, reducing one potential source of invalidity. Objective measures, such as medical reports of vaccination, were not available in the two studies of the thesis due to organizational circumstances, but should be used in future studies.

Integrated Discussion: Future Directions and Implications for Research

Workplace health promotion programs should be designed to provide the best possible support to employees, so that they are empowered to effectively and efficiently lead a healthy lifestyle, that is, to adopt and maintain health behaviors. But beyond very concrete effects on individuals' health behaviors, analyses in *Chapter 2* identified health climate (Basen-Engquist, et al., 1998; Mearns, Hope, Ford, & Tetrick, 2010) as a beneficial job resource, predicting employees' affective commitment to the organization. Findings indicated the importance of a positive health climate for individuals' well-being in the workplace and this should encourage practitioners to implement and cultivate organizational health-related activities such as workplace health promotion programs (e.g., Basen-Engquist, et al., 1998). Further research needs to explore more detailed the causal relations of the two work-related concepts, and it would be advisable to do this in conjunction with health promotion programs to illuminate their contribution to employees' attitudes, organizational functioning, and potential organizational bottlenecks.

In the present thesis, seasonal influenza vaccination was the focus of health behavior at the workplace. Underlying motivational and volitional factors and mechanisms involved in this health behavior were examined (*Chapter 3-6*) as this represents a precondition for developing evidence-based interventions (Leventhal, et al., 2008; Lippke & Ziegelmann, 2008).

Research findings in *Chapter 3* and *Chapter 4* added valuable insights into underlying mechanisms of the intention formation process. Results indicated that automatic or “habitual” characteristics may operate in intention formation (Ouellette & Wood, 1998), and further research should illuminate whether vaccination behavior could (correctly) be labeled as a habit (de Bruijn, et al., 2009; de Bruijn & Rhodes, 2010; Fleig, et al., 2011; Verplanken & Melkevik, 2008). Moreover, starting points for the development of health interventions promoting influenza vaccination were identified, and findings emphasized to account for individual’s needs (according to past behavior).

In *Chapter 5*, the HAPA (Schwarzer, 2008) was confirmed as a valuable framework for predicting behavior, highlighting the role of planning as a postintentional factor. However, the adjustments to the model for vaccination behavior characteristics improved the composition of social-cognitive variables to predict vaccination behavior: research findings emphasized the role of risk perception and negative outcome expectancies for volitional and motivational processes. Recommendations for health education were given, and research findings suggested that social-cognitive models could be meaningfully extended.

In *Chapter 6*, compensatory health beliefs (CHB, Knäuper, et al., 2004; Rabiau, et al., 2006) were investigated within a theory-based intervention to promote seasonal influenza vaccination in the workplace. Although there was no main effect for condition, self-regulation messages made vaccination adherence more likely in individuals with low CHB compared to the motivational group: self-regulation messages buffered the negative effect of CHB on behavior to some degree. Future intervention should explicitly approach this health-

detrimental self-regulation strategy (CHB) that impedes the intention-behavior relation and provides an excuse for non-adherence. Hence, research results gathered valuable insights into volitional processes in vaccination behavior that subsequent studies should follow-up.

In sum, the present thesis traced a pathway from analyzing the target health behavior to implementing an intervention to promote vaccination behavior in the workplace. Differentiated insights into underlying motivational (*Chapter 3, 4*) and volitional (*Chapter 5, 6*) processes were gained, and discussed with regard to practical as well as theoretical implications, with recommendations for research opportunities. In *Chapter 2*, the overall importance of health-related efforts of organizations was presented, providing a framework for the research on vaccination behavior in *Chapter 3-6*. Results indicate that workplace health promotion is not just “nice to have” but may contribute fundamentally to employees’ affective commitment and thus, to individual, organizational (Mathieu & Zajac, 1990; Meyer & Allen, 1997; Meyer, et al., 2002) and societal well-being and success.

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References

- Abraham, C., & Michie, S. (2008). A taxonomy of behavior change techniques used in interventions. *Health Psychology, 27*(3), 379-387. doi: 10.1037/0278-6133.27.3.379
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.
- Araújo-Soares, V., McIntyre, T., & Sniehotta, F. (2009). Predicting changes in physical activity among adolescents: the role of self-efficacy, intention, action planning and coping planning. *Health Education Research, 24*(1), 128-139.
- Asch, D. A., Baron, J., Hershey, J. C., Kunreuther, H., Meszaros, J., Ritov, I., & Spranca, M. (1994). Omission bias and pertussis vaccination. *Medical Decision Making, 14*(2), 118-123.
- Ashford, S., Edmunds, J., & French, D. P. (2010). What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. *British Journal Of Health Psychology, 15*(2), 265-288.
- Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology, 22*(3), 309-328.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Basen-Engquist, K., Hudmon, K. S., Tripp, M., & Chamberlain, R. (1998). Worksite health and safety climate: scale development and effects of a health promotion intervention. *Preventive Medicine, 27*(1), 111-119.
- Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology, 15*(4), 797-824.

- Bish, A., Yardley, L., Nicoll, A., & Michie, S. (2011). Factors associated with uptake of vaccination against pandemic influenza: A systematic review. *Vaccine, 29*(38), 6472-6484.
- Blank, P. R., Freiburghaus, A. U., Ruf, B. R., Schwenkglenks, M. M., & Szucs, T. D. (2008). Trends in influenza vaccination coverage rates in Germany over six seasons from 2001/02 to 2006/07. *Medizinische Klinik, 103*(11), 761-768.
- Blank, P. R., Schwenkglenks, M., & Szucs, T. D. (2009). Disparities in influenza vaccination coverage rates by target group in five European countries: trends over seven consecutive seasons. *Infection, 37*(5), 390-400.
- Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., & Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: The example of vaccination. *Health Psychology 26*(2), 136-145.
- Brewer, N. T., Weinstein, N. D., Cuite, C. L., & Herrington, J. E. (2004). Risk perceptions and their relation to risk behavior. *Annals of Behavioral Medicine, 27*(2), 125-130.
- Capolongo, M. J., daCosta DiBonaventura, M., & Chapman, G. B. (2006). Physician Vaccinate Thyself: Why Influenza Vaccination Rates Are Higher Among Clinicians Than Among Nonclinicians. *Annals of Behavioral Medicine, 31*(3), 288-296.
- CDC. (2010). Seasonal influenza (Flu) – Influenza Vaccination coverage Levels Retrieved 11/10, 2010, from <http://www.cdc.gov/flu/professionals/acip/coveragelevels.htm>
- Chiu, C.-Y., Lynch, R. T., Chan, F., & Berven, N. L. (2011). The Health Action Process Approach as a motivational model for physical activity self-management for people with multiple sclerosis: A path analysis. *Rehabilitation Psychology, 56*(3), 171-181.
- Clausen, T., & Borg, V. (2010). Psychosocial Work Characteristics as Predictors of Affective Organisational Commitment: A Longitudinal Multi-Level Analysis of Occupational Well-Being. *Applied Psychology: Health and Well-Being, 2*(2), 182-203. doi: 10.1111/j.1758-0854.2010.01031.x

- Cook, C., Heath, F., & Thompson, R. (2000). A Meta-Analysis Of Response Rates In Web-Or Internet-Based Surveys. *Educational & Psychological Measurement, 60*(6), 821.
- Craciun, C., Schüz, N., Lippke, S., & Schwarzer, R. (2010). Risk perception moderates how intentions are translated into sunscreen use. *Journal of Behavioral Medicine, 33*(5), 392-398. doi: 10.1007/s10865-010-9269-5
- Craciun, C., Schüz, N., Lippke, S., & Schwarzer, R. (2011). A Mediator Model of Sunscreen Use: A Longitudinal Analysis of Social-Cognitive Predictors and Mediators. *International Journal of Behavioral Medicine*
- de Bruijn, G.-J., Kremers, S. P. J., Singh, A., van den Putte, B., & van Mechelen, W. (2009). Adult Active Transportation: Adding Habit Strength to the Theory of Planned Behavior. *American Journal of Preventive Medicine, 36*(3), 189-194.
- de Bruijn, G. J., & Rhodes, R. E. (2010). Exploring exercise behavior, intention and habit strength relationships. *Scandinavian Journal Of Medicine & Science In Sports, 21*(3), 482-491.
- Duckworth, L. T., Frank-Stromborg, M., Oleckno, W. A., Duffy, P., & Burns, K. (2002). Relationship of Perception of Radon as a Health Risk and Willingness to Engage in Radon Testing and Mitigation. *Oncology Nursing Forum, 29*(7), 1099.
- Ernsting, A., Schwarzer, R., Lippke, S., & Schneider, M. (2011). Was motiviert Erwerbstätige zur Teilnahme an der saisonalen Influenzaschutzimpfung? Analyse der Impfbereitschaft im betrieblichen Kontext. *Arbeitsmedizin, Sozialmedizin, Umweltmedizin, 46*, 320-325.
- Fleig, L., Lippke, S., Pomp, S., & Schwarzer, R. (2011). Intervention effects of exercise self-regulation on physical exercise and eating fruits and vegetables: a longitudinal study in orthopedic and cardiac rehabilitation. *Preventive Medicine, 53*(3), 182-187.
- Gargano, L., Painter, J., Sales, J., Morfaw, C., Jones, L., Murray, D., . . . Hughes, J. (2011). Seasonal and 2009 H1N1 influenza vaccine uptake, predictors of vaccination, and self-

- reported barriers to vaccination among secondary school teachers and staff. *Human Vaccines*, 7(1), 89-95.
- Gellert, P., Ziegelmann, J. P., & Schwarzer, R. (2011). Affective and health-related outcome expectancies for physical activity in older adults. *Psychology & Health*, Advance online publication. doi: 10.1080/08870446.2011.607236
- Gigerenzer, G., Gaissmaier, W., Kurz-Milcke, E., Schwartz, L. M., & Woloshin, S. (2007). Helping Doctors and Patients Make Sense of Health Statistics. *Psychological Science*, 8(2), 53-96.
- Gilman, B. H., Bonito, A. J., & Eicheldinger, C. (2007). Impact of Influenza Immunization on Medical Expenditures Among Medicare Elderly, 1999-2003. *American Journal of Preventive Medicine*, 32(2), 107-115.
- Glanz, K., McCarty, F., Nehl, E. J., O'Riordan, D. L., Gies, P., Bundy, L., . . . Hall, D. M. (2009). Validity of self-reported sunscreen use by parents, children, and lifeguards. *American Journal of Preventive Medicine*, 36(1), 63-69.
- Gollwitzer, P. M., Sheeran, P., & Zanna, M. P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, 38, 69-119.
- Hager, W. (1987). Grundlagen einer Versuchsplanung zur Prüfung empirischer Hypothesen in der Psychologie. In G. Lüer (Ed.), *Allgemeine Experimentelle Psychologie*. Stuttgart: Fischer Verlag.
- Harris, K. M., Maurer, J., & Lurie, N. (2009). Do people who intend to get a flu shot actually get one? *Journal of General Internal Medicine*, 24(12), 1311-1313.
- Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the Health Belief Model with adults. *Health Education Research*, 7(1), 107-116.
- Hofmann, F., Ferracin, C., Marsh, G., & Dumas, R. (2006). Influenza vaccination of health care workers: A literature review of attitudes and beliefs. *Infection* 34, 142-147.

- Kenny, D. A., & Harackiewicz, J. M. (1979). Cross-Lagged Panel Correlation: Practice and Promise. *Journal of Applied Psychology, 64*(4), 372-379.
- Knäuper, B., Rabiau, M., Cohen, O., & Patriciu, N. (2004). Compensatory Health Beliefs: Scale Development and Psychometric Properties *Psychology & Health, 19*(5), 607-624.
- Koring, M., Richert, J., Parschau, L., Ernsting, A., Lippke, S., & Schwarzer, R. (2011). A combined planning and self-efficacy intervention to promote physical activity: A multiple mediation analysis. *Psychology, Health & Medicine, Advance online publication*. doi: 10.1080/13548506.2011.608809
- Lee, C. (2010). Gender, health, and health behaviors. In J. C. Chrisler & D. R. McCreary (Eds.), *Handbook of gender research in psychology, Vol 2: Gender research in social and applied psychology*. (pp. 471-493). New York: Springer.
- Leventhal, H., Weinman, J., Leventhal, E. A., & Phillips, L. A. (2008). Health psychology: The search for pathways between behavior and health. *Annual Review of Psychology, 59*, 477-505.
- Lippke, S., & Plotnikoff, R. C. (2006). *Stages of Change in Physical Exercise: A Test of Stage Discrimination and Nonlinearity*: PNG Publications.
- Lippke, S., Schwarzer, R., Ziegelmann, J. P., Scholz, U., & Schuz, B. (2010). Testing Stage-Specific Effects of a Stage-Matched Intervention: A Randomized Controlled Trial Targeting Physical Exercise and Its Predictors. *Health Education and Behavior, 37*(4), 533-546.
- Lippke, S., Wiedemann, A. U., Ziegelmann, J. P., Reuter, T., & Schwarzer, R. (2009). Self-efficacy Moderates the Mediation of Intentions Into Behavior via Plans. *American Journal of Health Behavior, 33*(5), 521-529.

- Lippke, S., & Ziegelmann, J. P. (2008). Theory-Based Health Behavior Change: Developing, Testing, and Applying Theories for Evidence-Based Interventions. *Applied Psychology: An International Review*, 57(4), 698-716.
- Luszczynska, A., Mazurkiewicz, M., Ziegelmann, J. P., & Schwarzer, R. (2007). Recovery self-efficacy and intention as predictors of running or jogging behavior: A cross-lagged panel analysis over a two-year period. *Psychology of Sport and Exercise*, 8(2), 247-260. doi: 10.1016/j.psychsport.2006.03.010
- Luszczynska, A., Scholz, U., & Sutton, S. (2007). Planning to change diet: A controlled trial of an implementation intentions training intervention to reduce saturated fat intake among patients after myocardial infarction. *Journal of Psychosomatic Research*, 63(5), 491-497.
- Luszczynska, A., & Schwarzer, R. (2003). Planning and Self-Efficacy in the Adoption and Maintenance of Breast Self-Examination: A Longitudinal Study on Self-Regulatory Cognitions. *Psychology & Health*, 18(1), 93-108.
- Luszczynska, A., Schwarzer, R., Lippke, S., & Mazurkiewicz, M. (2011). Self-efficacy as a moderator of the planning-behaviour relationship in interventions designed to promote physical activity. *Psychology & Health*, 26(2), 151-166.
- MacKinnon, D. P., & Fairchild, A. J. (2009). Current Directions in Mediation Analysis. *Current Directions in Psychological Science*, 18(1), 16-20.
- Mathieu, J. E., & Zajac, D. M. (1990). A review and meta-analysis of the antecedents, correlates, and consequences of organizational commitment. *Psychological Bulletin*, 108(2), 171-194. doi: 10.1037/0033-2909.108.2.171
- Mearns, K., Hope, L., Ford, M. T., & Tetrick, L. E. (2010). Investment in workforce health: Exploring the implications for workforce safety climate and commitment. *Accident Analysis and Prevention*, 42(5), 1445-1454.

- Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: Theory, research, and application*. Thousand Oaks, CA US: Sage Publications, Inc.
- Meyer, J. P., Stanley, D. J., Herscovitch, L., & Topolnytsky, L. (2002). Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences. *Journal of Vocational Behavior*, *61*(1), 20-52.
- Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Applied Psychology: An International Review* *57*(4), 660-680. doi: 10.1111/j.1464-0597.2008.00341.x
- Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. *Proceedings of the National Academy of Sciences of the United States of America*, *108*(26), 10415-10420.
- Muse, L., Harris, S. G., Giles, W. F., & Feild, H. S. (2008). Work-life benefits and positive organizational behavior: Is there a connection? *Journal of Organizational Behavior*, *29*(2), 171-192.
- Nexøe, J. r., Kragstrup, J., & Søggaard, J. (1999). Decision on influenza vaccination among the elderly: A questionnaire study based on the Health Belief Model and the Multidimensional Locus of Control Theory. *Scandinavian Journal of Primary Health Care*, *17*(2), 105-110.
- Nicholson, K. G., Wood, J. M., & Zambon, M. (2003). Influenza. *Lancet*, *362*(9397), 1733-1745.
- Norman, P., Conner, M., & Bell, R. (2000). The theory of planned behaviour and exercise: Evidence for the moderating role of past behaviour. *British Journal of Health Psychology* *5*(Part3), 249-261.

- Nowalk, M. P., Zimmerman, R. K., Lin, C. J., Raymund, M., Tabbarah, M., Wilson, S. A., . . . Ricci, E. M. (2008). Raising Adult Vaccination Rates over 4 Years Among Racially Diverse Patients at Inner-City Health Centers. *Journal of the American Geriatrics Society, 56*(7), 1177-1182.
- Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124*(1), 54-74.
- Painter, J. E., Sales, J. M., Pazol, K., Wingood, G. M., Windle, M., Orenstein, W. A., & Diclemente, R. J. (2010). Psychosocial Correlates of Intention to Receive an Influenza Vaccination among Rural Adolescents. *Health Education Research, 25*(5), 853-864.
- Parschau, L., Richert, J., Koring, M., Ernsting, A., Lippke, S., & Schwarzer, R. (2011). Changes in social-cognitive variables are associated with stage transitions in physical activity. *Health Education Research, Advance online publication*. doi: 10.1093/her/cyr085.
- Payaprom, Y., Bennett, P., Alabaster, E., & Tantipong, H. (2011). Using the Health Action Process Approach and Implementation Intentions to Increase Flu Vaccine Uptake in High Risk Thai Individuals: A Controlled Before-After Trial. *Health Psychology, 30*(11). doi: 10.1037/a0023580
- Pomp, S., Lippke, S., Fleig, L., & Schwarzer, R. (2010). Synergistic effects of intention and depression on action control: Longitudinal predictors of exercise after rehabilitation. *Mental Health and Physical Activity, 3*(2), 78-84.
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions. *Multivariate Behavioral Research, 42*(1), 185-227.
- Rabenberg, M., & Mensink. (2011). Obst- und Gemüsekonsum heute. *BGE kompakt 2* (6). from www.rki.de/gbe-kompakt

- Rabiau, M., Knäuper, B., & Miquelon, P. (2006). The eternal quest for optimal balance between maximizing pleasure and minimizing harm: The compensatory health beliefs model. *British Journal of Health Psychology, 11*(1), 139-153.
- Radtke, T., Scholz, U., Keller, R., Knäuper, B., & Hornung, R. (2011). Smoking-specific compensatory health beliefs and the readiness to stop smoking in adolescents. *British Journal of Health Psychology, 16*(3), 610-625. doi: 10.1348/2044-8287.002001
- Randall, R., & Nielson, K. (2010). Interventions to Promote Well-Being at Work. In S. Leka & J. Houdmont (Eds.), *Occupational Health Psychology* (1 ed.): Wiley-Blackwell.
- Renner, B., Hankonen, N., Ghisletta, P., & Absetz, P. (2011). Dynamic psychological and behavioral changes in the adoption and maintenance of exercise. *Health Psychology*. doi: 10.1037/a0025302
- Renner, B., & Schwarzer, R. (2005). The motivation to eat a healthy diet: How intenders and nonintenders differ in terms of risk perception, outcome expectancies, self-efficacy, and nutrition behavior. *Polish Psychological Bulletin, 36*(1), 7-15.
- Renner, B., Spivak, Y., Kwon, S., & Schwarzer, R. (2007). Does Age Make a Difference? Predicting Physical Activity of South Koreans. *Psychology and Aging, 22*(3), 482-493.
- Reuter, T., Ziegelmann, J. P., Wiedemann, A. U., Lippke, S., Schüz, B., & Aiken, L. S. (2010). Planning bridges the intention-behaviour gap: Age makes a difference and strategy use explains why. *Psychology & Health, 25*(7), 873-887. doi: 10.1080/08870440902939857
- Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. *Journal of Applied Psychology, 87*(4), 698-714.
- Richert, J., Reuter, T., Wiedemann, A. U., Lippke, S., Ziegelmann, J., & Schwarzer, R. (2010). Differential effects of planning and self-efficacy on fruit and vegetable consumption. *Appetite, 54*(3), 611-614. doi: 10.1016/j.appet.2010.03.006

- Robert-Koch-Institut. (2008). *Federal Health Reporting: Health in Germany*. Berlin: Oktoberdruck AG.
- Robert-Koch-Institut. (2011). Empfehlungen der Ständigen Impfkommission (STIKO) am RKI [Recommendation of the Standing Vaccination Commission (STIKO) of the RKI]. *Epidemiologisches Bulletin*, 30.
- Rubin, G. J., Potts, H. W. W., & Michie, S. (2011). Likely uptake of swine and seasonal flu vaccines among healthcare workers. A cross-sectional analysis of UK telephone survey data. *Vaccine*, 29(13), 2421-2428.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25(3), 293-315. doi: 10.1002/job.248
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The Measurement of Work Engagement with a Short Questionnaire: A Cross-National Study. *Educational and Psychological Measurement*, 66(4), 701-716.
- Schensul, J. J., Radda, K., Coman, E., & Vazquez, E. (2009). Multi-level intervention to prevent influenza infections in older low income and minority adults. *American Journal of Community Psychology*, 43(3-4), 313-329.
- Schmidt, K.-H., Hollmann, S., & Sodenkamp, D. (1998). Psychometrische Eigenschaften und Validität einer deutschen Fassung des 'Commitment'-Fragebogens von Allen und Meyer (1990). *Zeitschrift für Differentielle und Diagnostische Psychologie*, 19(2), 93-106.
- Schüz, B., Sniehotta, F., & Schwarzer, R. (2007). Stage-specific effects of an action control intervention on dental flossing. *Health Education Research*, 22(3), 332-341.
- Schwarzer, R. (2008). Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors. *Applied Psychology*, 57(1), 1-29.

- Schwarzer, R., & Luszczynska, A. (2007). Self-efficacy. In M. Gerrard & K. D. McCaul (Eds.), *Health behavior constructs: Theory, measurement, and research* (pp. retrieved June 20, 2011 from <http://dccps.cancer.gov/brp/constructs/self-efficacy/index.html>): National Cancer Institute Website.
- Schwarzer, R., & Renner, B. (2008). Social-cognitive predictors of health behavior: Action self-efficacy and coping self-efficacy. *Health Psychology, 19*(5), 487-495.
- Sheeran, P. (2002). Intention-behaviour relations: A conceptual and empirical review. In W. Ströbe & M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 12, pp. 1-36). London: WileyM.
- Sieverding, M. (2000). Risikoverhalten und präventives Verhalten im Geschlechtervergleich: Ein Überblick. *Zeitschrift für Medizinische Psychologie, 9*(1), 7-16.
- Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology & Health, 20*(2), 143-160.
- Spranca, M., Minsk, E., & Baron, J. (1991). Omission and commission in judgment and choice. *Journal of Experimental Social Psychology, 27*(1), 76-105.
- SuMi, K., HyunSoo, O., OkKyung, H., Moon-Hyun, C., & WhaSook, S. (2010). Susceptibility and Factors of Pertussis Vaccination Adherence in Korean Health Care Workers. [Article]. *American Journal of Health Behavior, 34*(1), 45-53.
- Teng, Y., & Mak, W. (2011). The role of planning and self-efficacy in condom use among men who have sex with men: An application of the Health Action Process Approach model. *Health Psychology, 30*, 119-128.
- Updegraff, J. A., Emanuel, A. S., Gallagher, K. M., & Steinman, C. T. (2011). Framing flu prevention -An experimental field test of signs promoting hand hygiene during the 2009-2010 H1N1 pandemic. *Health Psychology, 30*(3), 295-299.

- Verplanken, B., & Melkevik, O. (2008). Predicting habit: The case of physical exercise. *Psychology of Sport and Exercise, 9*(1), 15-26.
- Warner, L. M., Schüz, B., Knittle, K., Ziegelmann, J. P., & Wurm, S. (2011). Sources of perceived self-efficacy as predictors of physical activity in older adults. *Applied Psychology: Health and Well-Being, 3*, 172-192. doi: 10.1111/j.1758-0854.2011.01050.x
- Weinert. (1998). *Organisationspsychologie: Ein Lehrbuch* (4 ed.). Weinheim: Beltz.
- Weinstein, N. D. (2007). Misleading Tests of Health Behavior Theories. *Annals of Behavioral Medicine, 33*(1), 1-10.
- Weinstein, N. D., Kwitel, A., McCaul, K. D., Magnan, R. E., Gerrard, M., & Gibbons, F. X. (2007). Risk perceptions: Assessment and relationship to influenza vaccination. *Health Psychology, 26*(2), 146-151.
- Wiedemann, A. U., Lippke, S., Reuter, T., Schüz, B., Ziegelmann, J. P., & Schwarzer, R. (2009). Prediction of stage transitions in fruit and vegetable intake. *Health Education Research, 24*(4), 596-607.
- Wiedemann, A. U., Lippke, S., Reuter, T., Ziegelmann, J. P., & Schwarzer, R. (2011). How planning facilitates behaviour change: Additive and interactive effects of a randomized controlled trial. *European Journal of Social Psychology, 41*(1), 42-51. doi: 10.1002/ejsp.724
- Williams, D. M., Anderson, E. S., & Winett, R. A. (2005). A Review of the Outcome Expectancy Construct in Physical Activity Research. *Annals of Behavioral Medicine, 29*(1), 70-79.
- Willis, S. L. (2001). Methodology in behavioral intervention research. In J. E. Birrenm & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 78-108). San Diego, CA: Academic Press.

Curriculum Vitae

Anna Ernsting

Der Lebenslauf ist in dieser Online-Version der Arbeit
aus Gründen des Datenschutzes nicht enthalten.

List of publications

ARTICLES IN PEER-REVIEWED JOURNALS (*indicates those that are part of the thesis)

In press

Lippke, S., Ernsting, A., Richert, J., Parschau, L., Koring, M., & Schwarzer, R. (in press).

Nicht- lineare Zusammenhänge zwischen Intention und Handeln: Eine Längsschnittstudie zu körperlicher Aktivität und sozial-kognitiven Prädiktoren. *Zeitschrift für Gesundheitspsychologie*.

Koring, M., Richert, J., Parschau, L., Ernsting, A., Lippke, S., & Schwarzer, R. (in press). A

Combined Planning and Self-Efficacy Intervention to Promote Physical Activity: Effectiveness and Working Mechanisms? *Psychology, Health & Medicine*.

Parschau, L., Richert, J., Koring, M., Ernsting, A., Lippke, S., & Schwarzer, R. (in press).

Stages of Change in Physical Activity are Associated with Changes in Self-Efficacy, Outcome Expectancies, and Planning. *Health Education Research*.

2009-2011

*Ernsting, A., Lippke, S., Schwarzer, R. & Schneider, M. (2011). Who participates in

seasonal influenza vaccination? Past behavior Moderates the Prediction of Adherence. *Advances in Preventive Medicine*. Article ID 148934, 6 pages. doi: 10.4061/2011/148934

*Ernsting, A. T., Schwarzer, R., Lippke, S., & Schneider, M. (2011). Was motiviert

Erwerbstätige zur Teilnahme an der saisonalen Influenzaschutzimpfung? Analyse der Impfbereitschaft im betrieblichen Kontext [How are Employees Motivated to get Their

Seasonal Influenza Vaccination? Analysis of vaccination motivation in the workplace]. *Arbeitsmedizin Sozialmedizin Umweltmedizin*.

Schneider, M. & Ernsting, A. & Antoni, C.H. (2009). FIT IM LEBEN – FIT IM JOB: Eine effektive Maßnahme zur nachhaltigen Veränderung des Gesundheitsverhaltens. [FIT FOR LIFE – FIT FOR WORK: An Effective Preventive Intervention Program for Developing a Health-Promoting Lifestyle]. *Arbeitsmedizin Sozialmedizin Umweltmedizin*.

Under Review in Peer Reviewed Journals

*Ernsting, A., Schwarzer, R., Lippke, S. & Schneider, M. (2011). I don't need a flu shot because I live a healthy life: Compensatory Health Beliefs Make Vaccination Less Likely. Manuscript submitted for publication.

*Ernsting, A., Gellert, P., Lippke, S., Schneider, M. & Schwarzer, R. (2011). To Be or Not to Be at Risk: Social-Cognitive Predictors of Flu Vaccination Adherence at the Workplace. Manuscript submitted for publication.

*Ernsting, A., Schneider, M., Lippke, S. & Schwarzer, R. (2011). Your Health Matters to Us - The Relationship Between Health Climate and Affective Commitment at the Workplace. Manuscript submitted for publication.

PUBLISHED ABSTRACTS (first authorships only)

- Ernsting, A., Schwarzer, R., Lippke, S. & Schneider, M. (2011). A social-cognitive intervention to increase participation in seasonal influenza vaccination in the workplace – effects and psychological mechanisms. 15th Conference of the European Association of Work and Organizational Psychology, Maastricht, Netherlands.
- Ernsting, A., Schwarzer, R., Lippke, S. & Schneider, M. (2011). A Theory-based Randomized Trial to Increase Participation in Influenza Vaccination in the Workplace. 25th Annual Conference of the European Health Psychology Society, Crete, Greece.
- Ernsting, A., Schwarzer, R., Lippke, S. & Schneider, M. (2011). Zusammenhang des wahrgenommenen Partnerverhaltens mit der Motivation zur Teilnahme an einer saisonalen Influenzaschutzimpfung. [The Interplay of Seasonal Influenza Uptake and the Partners' Vaccination Behavior]. 10th Conference of the Division of Health Psychology of the German Psychological Society, Berlin, Germany.
- Ernsting, A., Schwarzer, R., Schneider, M. & Lippke, S. (2010). Understanding Influenza Vaccination Behavior: How well can the Health Action Process Approach be Applied? 24th Annual Conference of the European Health Psychology Society, Cluj-Napoca, Romania.
- Ernsting, A., Schwarzer, R., Lippke, S. & Schneider, M. (2010). Wird die Teilnahme an der Schutzimpfung gegen die saisonale Influenza ähnlich motiviert wie andere Gesundheitsverhaltensweisen? [Can the Mechanism of Health Behavior Change be Applied to Vaccination Behavior?]. 47th Conference of the German Psychological Society, Bremen, Germany.

Ernsting, A., Schneider, M. & Antoni, C. (2009). FIT IM LEBEN - FIT IM JOB - Motivationssteigerung und Veränderung des Gesundheitsverhaltens durch das betriebliche Präventionsprogramm von Boehringer Ingelheim. [FIT FOR LIFE – FIT FOR WORK: Increasing Motivation to Adopt a Healthy Lifestyle and Health Behavior Change in a Workplace Setting]. 9th Conference of the Division of Health Psychology of the German Psychological Society, Zurich, Switzerland³.

MISCELLANEOUS

- Ernsting, A. (2010). Online Gesundheitsberatung BI Vit & BI Aktiv - Neue Wege zu einem gesunden Lebensstil. *Boehringer Ingelheim Zeitung, Deutschland*.
- Ernsting, A. (2010). Und jährlich grüßt die Gripeschutzimpfung – eine wissenschaftliche Studie zur saisonalen Influenzaschutzimpfung. *Boehringer Ingelheim Zeitung, Deutschland*.
- Ernsting, A. (2010). Book Review: Poppelreuter & Mierke (2008). Psychische Belastungen am Arbeitsplatz. Ursachen – Auswirkungen- Handlungsmöglichkeiten (3. Auflage). *Zeitschrift für Gesundheitspsychologie, 2*.

INVITED TALKS 2010-2011

- Invited guest talk “Betriebliches Gesundheitsmanagement im Krankenhaus“, Berliner Krankenhaus-Seminar; 2010.
- Invited expert for the ”Dresdner Gespräch Gesundheit und Arbeit 2011“, Initiative Gesundheit & Arbeit; 2011.

³ Poster Award of the Health Psychology Division of the German Psychological Society.

Erklärung

Hiermit versichere ich, dass ich die vorgelegte Arbeit selbständig verfasst habe. Andere als die angegebenen Hilfsmittel habe ich nicht verwendet. Die Arbeit ist in keinem früheren Promotionsverfahren angenommen oder abgelehnt worden.

Berlin, Dezember 2011

Anna Ernsting