Gesundheit am Arbeitsplatz:
Meta-Analysen zum Zusammenhang von Arbeitsmerkmalen und Depression

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Für meine Familie.

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Zusammenfassung

Depressive Störungen führen zum einen zu erheblichen Einschränkungen des täglichen Lebens und zum anderen auch zu hohen betriebs- und volkswirtschaftlichen Kosten. Die Global Burden of Disease Study (WHO, 2008) sagt vorher, dass depressive Störungen im Jahr 2020 an zweiter Stelle (Murray & Lopez, 1997) und im Jahr 2030 an erster Stelle (WHO, 2008) der Erkrankungen stehen werden, die für Morbidität und eine vorzeitige Mortalität verantwortlich sind. Die Betroffenen empfinden oftmals einen hohen Leidensdruck. Betriebs- und volkswirtschaftliche Kosten sind enorm.

Während das Thema Depression am Arbeitsplatz in den letzten zwei Jahrzehnten stärker auf Primärstudienebene untersucht wurde, sind Überblicksarbeiten immer noch rar. Wenige Reviews existieren, die spezifische Merkmale einer Tätigkeit mit Depression in Bezug setzen (Tennant, 2001; Bonde, 2008; Netterstrøm et al., 2008; Siegrist, 2008; van der Doef & Maes, 1999). Eine erste Meta-Analyse untersucht Tätigkeitsmerkmale und deren Zusammenhang zu den breiter angelegten „common-mental disorders“ (Stansfeld & Candy, 2006). Eine umfassende Meta-Analyse, welche Merkmale des Arbeitsplatzes bzw. der Arbeitstätigkeit erfasst und diese in Relation zu Depression auswertet, ist nicht präsent.

In der vorliegenden Arbeit wurde vor dem Hintergrund möglicher Prävention geprüft, ob es Arbeitsmerkmale gibt, die einen Zusammenhang zu Depression am Arbeitsplatz aufweisen und als eventuell begünstigende Faktoren wirken. Hierzu wurden Meta-Analysen erstellt, welche die Zusammenhänge verschiedener Merkmale von Arbeitstätigkeiten und Depression betrachten, indem sie Ergebnisse vorhandener Primärstudien meta-analytisch integrieren. Weiterhin wurden Analysen der untersuchten Konzepte durchgeführt, um so inhaltliche Erkenntnisse zu gewinnen. Zwei Publikationen wurden verfasst.

Als erste Meta-Analyse in diesem Forschungsfeld untersuchte Publikation 1 den Zusammenhang von Rollenstress und Depression. Dabei wurden Rollenkonflikte sowie Rollenambiguität nach Kahn, Woelfe, Quinn, Snoek, and Rosenthal (1964) als interessierende Variablen betrachtet. Die Ergebnisse zeigen einen positiven Zusammenhang von Rollenambiguität und Depression sowie einen etwas höheren positiven Zusammenhang von Rollenkonflikten und Depression. Bei einer Korrektur der Ergebnisse um den Einfluss der anderen Rollenvariable zeigten sich weiterhin Korrelationskoeffizienten in bedeutender Höhe. Zudem wurde die Unabhängigkeit der beiden Rollenvariablen meta-analytisch untersucht. Die Ergebnisse zeigten eine gemeinsame Komponente der Variablen, welche in

dem grundlegenden Konzept begründet sein könnte. Inhaltliche Überlegungen stützen jedoch auch ein Resultieren aus der Arbeitsumgebung. Ein statistisch signifikanter Moderator wurde extrahiert und zeigte erstmals einen moderierenden Einfluss der geographischen Region, in der die Daten erhoben wurden, auf. Diese Ergebnisse gehen einher mit Primärforschung von Hofstede (1994), der sechs Dimensionen identifizierte, die sich in regionalen Kulturgruppen unterscheiden.

Die zweite Publikation unterteilt sich in zwei inhaltlich und methodisch getrennte Fragestellungen.

Zum einen wurde der Zusammenhang der Variablen des Job Demand-Control Modells (Karasek, 1979; Karasek & Theorell, 1990) und Depression meta-analytisch untersucht. Zum anderen stand die Angemessenheit der konzeptionellen Erfassung von job-demands im Vordergrund. Die meta-analytischen Ergebnisse zeigten kleine bis moderate, aber signifikante Zusammenhänge. Den höchsten Zusammenhang fand sich für die Variable iso-strain (hohe Arbeitsanforderungen/wenig Kontrolle/sozial isolierte Arbeitsbedingungen). Detaillierte Analysen zeigten, dass job-strain unter isolierten Arbeitsbedingungen besonders bei Frauen einen hohen Zusammenhang zu Depression zeigt. Moderierende statistische Variablen wurden aufgezeigt.

Die Ergebnisse der zweiten Fragestellung zeigten, dass bisherige Messinstrumente zur adäquaten Erfassung heutiger Arbeitsbedingungen dringend überarbeitet werden sollten und lieferten damit direkt praktische Implikationen. Es wurde deutlich, dass das Antwortverhalten der untersuchten Arbeitnehmer sich in den letzten zwei Jahrzehnten nicht merklich verändert hat. Trotzdem stieg der Zusammenhang zwischen Arbeitsanforderungen und Depression an. Die Ergebnisse legen nahe, dass die bisherigen Messinstrumente die zunehmende Konzentration der Arbeitswelt (z.B. steigende qualitative und quantitative Arbeitsanforderungen, die von einer geringeren Anzahl an Mitarbeitern bewältigt werden müssen) nicht mehr adäquat abbilden.

1. Einleitung

„In der ersten Hälfte unseres Lebens ruinieren wir unsere Gesundheit, um an Geld zu kommen. Und in der zweiten Hälfte geben wir das meiste Geld dafür aus, um unsere Gesundheit wiederzuerlangen.“

(Voltaire, 1694-1778)

Die vorliegende Arbeit befasst sich mit den Zusammenhängen von Tätigkeitsmerkmalen und Depression. Die Relevanz des Themas zeigt sich in der Fülle an Beiträgen in aktuellen Medien. Der Spiegel Wissen (1/2012) hat in seinem Themenheft „PATIENT SEELE – wie die Psyche wieder ins Gleichgewicht kommt“ arbeitsbedingter Depression gleich mehrere Kapitel gewidmet. Darin findet sich folgende Aussage:

„Die Arbeitswelt erwartet heute große Flexibilität und permanenten Einsatz. Grenzen werden überschritten – geographische, zeitliche und menschliche.“ (S. 41).

Diese Aussage verdeutlicht die wachsenden Anforderungen, die heutzutage an Erwerbstätige gestellt werden. Projektgruppen mit Mitgliedern, die sich noch nie persönlich begegnet sind, steigender Termindruck bei der Fertigstellung von Aufträgen, eine Verdichtung der Arbeitswelt, in der weniger Mitarbeiter immer mehr leisten müssen sowie ständige Erreichbarkeit sind nur einige Beispiele, die zu einer höheren Beanspruchung der Arbeitenden führen.

Auch die Süddeutsche Zeitung widmet sich dem Thema in mehreren Artikeln. Die Titel lauten z.B. *„Immer mehr Fehltage wegen psychischer Erkrankungen“* (2012) oder *„Stress lass nach! Psychische Erkrankungen am Arbeitsplatz“* (2011). Weitere Artikel finden sich in FOCUS ONLINE, der Frankfurter Allgemeinen Zeitung oder auch der ZEIT. Die Aktualität der Thematik Arbeit und psychische Gesundheit ist überall sichtbar.

Die vorliegende Arbeit greift diese Aktualität auf und untersucht, inwiefern bestimmte Arbeitsmerkmale einen Zusammenhang mit Depression aufweisen. Dabei geht es einerseits um einen theoretischen Erkenntnisgewinn, andererseits wird ein besonderes Augenmerk auf die Bedeutung der Ergebnisse für die Praxis gelegt.

2. Theoretischer Hintergrund

Im Folgenden wird der theoretische Hintergrund der vorliegenden Arbeit vorgestellt. Dazu wird zuerst ausführlich auf das Störungsbild Depression eingegangen. Folgend wird auf die Bedeutung des Depressionskonzepts für die arbeits- und organisationspsychologische Forschung eingegangen. Anschließend wird die Relevanz des Themas Depression am Arbeitsplatz diskutiert. Das Kapitel schließt mit einer kurzen Darstellung der gängigen Erklärungsmodelle zur Entstehung einer Depression bzw. zur Erläuterung des Zusammenhangs zwischen Tätigkeitsmerkmalen und Depression.

2.1 Depression

2.1.1 Störungsbild der unipolaren Depression

In diesem Abschnitt wird zuerst die depressive Symptomatik vorgestellt. Anschließend werden die diagnostischen Kriterien der Major Depression erläutert. Die Darstellung von Prävalenzraten auf weltweiter, europäischer sowie nationaler Ebene bildet den Abschluss.

2.1.1.1 Depressive Symptomatik

Die depressive Symptomatik äußert sich auf verschiedenen Ebenen. Beesdo-Baum & Wittchen (2011) sprechen hier von „Gesichter(n) der Depression“ (S. 880) und unterscheiden zwischen emotionalen, kognitiven, physiologisch-vegetativen und behavioralen/motorischen Symptomen. Die emotionale Ebene ist beispielsweise durch Traurigkeit, Niedergeschlagenheit, Schuldgefühle, Ängstlichkeit oder auch Schwermut, Reizbarkeit und Gefühllosigkeit gekennzeichnet. Rief, Exner & Martin (2006) nennen zusätzlich den Verlust von Freude und Interesse sowie Hoffnungslosigkeit. Auf der kognitiven Ebene zeigen sich beispielsweise ein intensives Grübeln und Pessimismus, negative Einstellungen gegenüber der eigenen Person, Konzentrations- und Gedächtnisstörungen oder Suizidgedanken. Die physiologisch-vegetative Ebene äußert sich durch Energieverlust, Erschöpfung, Schlafstörungen, innere Unruhe, Appetit- und Gewichtsveränderungen sowie Libidoverlust. Auf der Verhaltensebene sind vor allem ein sozialer Rückzug und eine geringere Aktivitätsrate sowie Probleme bei der Bewältigung alltäglicher Anforderungen zu beobachten (Berking & Radkovsky, in Druck).

2.1.1.2 Diagnostische Kriterien der Major Depression

Depressive Störungen zählen zu den affektiven Störungen und können mit Hilfe des „Diagnostische(n) und Statistische(n) Manual(s) Psychischer Störungen“ (DSM-IV; APA, 1994, 2000) klassifiziert werden. Zu den depressiven Störungen zählen die Diagnosen „Major Depression“, „Dysthyme Störung“ sowie „Nicht näher bezeichnete Depression“. Für die vorliegende Arbeit war neben subklinisch-depressiven Symptomen die Major Depression von Relevanz, weshalb im Folgenden näher auf sie eingegangen wird. Hierbei wird sich auf die Klassifikation nach DSM-IV (APA, 1994, 2000) bezogen, da die zugrunde liegenden Studien sich auf diese beziehen.

Die Episode einer Major Depression nach DSM-IV (APA, 1994, 2000) wird begleitet von einem mindestens zweiwöchigen Auftreten depressiver Verstimmung an fast allen Tagen, für die meiste Zeit des Tages oder ein mindestens zweiwöchiger Verlust an Interesse oder Freude an fast allen Aktivitäten, an fast allen Tagen. Weiterhin müssen mindestens vier der folgenden Symptome auftreten: Deutliche Veränderungen in Appetit und/oder Gewicht, deutliche Veränderungen im Schlafverhalten, Veränderungen in psychomotorischer Aktivität, sowie an jeweils fast allen Tagen Müdigkeit und Energieverlust, Schuldgefühle oder Gefühle der Wertlosigkeit, Konzentrationsprobleme und/oder Entscheidungsprobleme und wiederkehrende Gedanken an den Tod, Suizidvorstellungen, -planung oder -versuch.

Die Symptome dürfen nicht die Kriterien einer gemischten Episode erfüllen und müssen in klinisch bedeutsamer Weise Leiden oder Einschränkungen verursachen. Zudem sollten sie nicht auf direkte körperliche Wirkung von Substanzen oder medizinischen Faktoren zurückgehen und nicht besser durch einfache Trauer erklärbar sein.

Die Major Depression kann nach Schweregrad (leicht, mittel, schwer), nach Verlauf (einzeln, rezidivierend) und dem Vorliegen weiterer Merkmale (z.B. psychotische) unterteilt werden.

2.1.1.3 Prävalenzraten

Nach Angaben der World Health Organization (WHO, 2012) sind weltweit etwa 121 Millionen Menschen von einer unipolaren Depression betroffen. Kalkuliert über Männer und Frauen aller Altersgruppen wird die Depression im Jahr 2030 an erster Stelle der Erkrankungen stehen, die für Morbidität und eine vorzeitige Mortalität verantwortlich sind.

Die Lebenszeitprävalenz für Frauen beträgt ca. 25%, die für Männer ca. 12% (WHO, 2008).

Wittchen & Jacobi (2005) analysierten auf europäischer Ebene Daten von 27 epidemiologischen Studien. Die Studien wurden in 16 europäischen Ländern (Mitgliedsländern der EU, zusätzlich Norwegen, Schweiz sowie Island) durchgeführt und umfassten insgesamt 150.000 Personen. Die geschätzten Ergebnisse besagen, dass insgesamt 27% der erwachsenen Bevölkerung im vergangenen Jahr an einer psychischen Störung litt. An erster Stelle stand die Diagnose Major Depression. Die 12-Monats-Prävalenz betrug 6,9%. In Zahlen ausgedrückt wurde geschätzt, dass von den damals 301,7 Millionen Einwohnern in den betreffenden Staaten 82,7 Millionen in den letzten zwölf Monaten von einer psychischen Störung betroffen waren, davon 18,4 Millionen Menschen von einer Major Depression. Ein Review auf europäischer Ebene stammt von Paykel, Brugha & Fryers (2005). Die Autoren fanden variierende Prävalenzraten in den einbezogenen Studien (0,8%-8,3%) und konkludierten, dass die 12-Monats-Prävalenz, bezogen auf Major Depression, für westeuropäische Länder bei ca. 5% liegt.

Auf nationaler Ebene können Daten des Bundesgesundheitssurvey, welcher vom Robert-Koch-Institut im Auftrag des Bundesgesundheitsministeriums durchgeführt wurde, zur Prävalenzbestimmung herangezogen werden. Nach Jacobi et al. (2004) beträgt die 12-Monats-Prävalenz, bezogen auf die deutsche Allgemeinbevölkerung, 10,7% (Frauen 14,0%, Männer 7,5%) für unipolare Depression. Die Lebenszeit-Prävalenz beträgt 17,1% (Frauen 23,3%, Männer 11,1%). In die Studie flossen Daten von 4.181 Personen ein.

Roesler, Jacobi und Rau (2006) beziehen sich in ihrer Forschung ebenfalls auf Daten des Bundesgesundheitssurveys, werteten die Daten jedoch speziell in Bezug auf die erwerbstätige Bevölkerung (n = 2.329) aus. Es zeigte sich eine 12-Monats-Prävalenzrate von 9,3% für affektive Störungen. Die Prävalenzrate für Major Depression lag bei 6,5% (Frauen 9,2%, Männer 4,9%).

2.1.2 Erklärungsansätze für die Entstehung von depressiven Störungen

Es existieren verschiedene Erklärungsmodelle der klinischen Psychologie zur Entstehung von Depression. Die Überprüfung dieser Modelle war nicht Grundlage der vorliegenden Arbeit. Aus diesem Grund werden die Modelle nur kurz dargestellt. Vorab werden jedoch der Vollständigkeit halber Risikofaktoren für die Entstehung von depressiven Störungen kurz angesprochen.

2.1.2.1 Risikofaktoren

In der vergangenen Forschung wurde übereinstimmend vor allem das Geschlecht zu Ungunsten der Frauen als Risikofaktor gefunden (z.B. Kessler et al., 2003). Weiterhin wurde ein höheres Alter als ein Risikofaktor bestätigt (z.B. Beesdo, Pine, Lieb & Wittchen, 2010). Der Familienstand (getrennt lebend, geschieden oder verwitwet), negative Lebensereignisse (z.B. Paykel et al., 2005) sowie ein niedriger sozioökonomischer Status (z.B. Gilman, Kawachi, Fitzmaurice & Buka, 2003) konnten ebenfalls als Risikofaktoren bestätigt werden.

2.1.2.2 Erklärungsmodelle der klinischen Psychologie

In den Lehrbüchern der klinischen Psychologie finden sich wiederkehrend drei prominente Erklärungsmodelle bzw. -theorien. Zum einen wird die Verstärker-Verlust-Theorie (Lewinsohn, 1974) zur Erklärung des Entstehens von Depression verwendet. Diese besagt, dass Depression als Konsequenz eines Wegfalls positiver Aktivitäten erklärt werden kann. Übertragen auf den Arbeitskontext könnte ein Beispiel für dieses lernpsychologisch-verstärkungstheoretische Modell der Wegfall von sozialen Kontakten und Freizeittätigkeiten aufgrund intensiver Überstundenarbeit sein. Dahingegen wird die Depression im Modell der erlernten Hilflosigkeit von Seligman (1974) als Resultat einer überdauernd wahrgenommenen Hilflosigkeit angesehen. Im Arbeitskontext könnte dies durch zu hoch gesetzte Ziele und damit wiederholten, vergeblichen Verhaltensweisen zur Erreichung dieser Ziele begründet sein. Das Modell der dysfunktionalen Kognitionen und Schemata nach Beck (1970, 1974) erklärt die Depression als eine Art Interaktion von lerngeschichtlich entstandenen Einstellungen und Annahmen mit akuten Lebensereignissen bzw. Stressoren, welche negative Stimmungen und Gedanken nach sich ziehen. Im Rahmen der Depression ist das Denken wiederum gekennzeichnet durch eine negative Sicht auf sich selbst, auf andere sowie auf die Zukunft (kognitive Triade). Ein Beispiel hierfür wären reaktivierte Versagensannahmen am Arbeitsplatz, z.B. durch Arbeitsstrukturen, welche Fehler begünstigen.

2.1.3 Auffassungen zum Depressionskonzept und die Bedeutung für die arbeits- und organisationspsychologische Forschung

Im Verständnis der gegenwärtigen Forschung ist die Depression nicht als ein kategoriales, sondern als ein kontinuierliches Konstrukt zu sehen (Farmer & McGuffin,

1989; Flett, Vredenburg & Krames, 1997). Das Kontinuum erstreckt sich von dem Auftreten depressiver Symptome bis hin zur Diagnose einer depressiven Störung.

Diese Operationalisierung ist für die arbeits- und organisationspsychologische Forschung von besonderer Wichtigkeit. Auch das Erleben subklinischer depressiver Symptome kann gesundheitsbeeinträchtigend sein und zu reduzierter Arbeitsleistung sowie zusätzlichen Krankheitstagen führen. Lexis, Jansen, van Amelsvoort, van den Brandt, und Kant (2009) untersuchten den Einfluss von depressiven Symptomen auf Arbeitszeitfehltage. Die Ergebnisse ihrer 3.339 arbeitende Personen umfassenden Analyse besagten, dass sogar das Erleben schwacher, depressiver Symptome Risikofaktoren für spätere Krankheitstage darstellen. Eine weitere Studie (Cuijpers & Smith, 2004) zeigte, dass Personen, die subklinische depressive Symptome berichteten, vulnerabler für die Entwicklung einer Major Depression sind. Neben dem Leiden der betroffenen Personen bringt dies erhebliche betriebs- und volkswirtschaftliche Kosten mit sich und ist daher auch unter dem Kostenaspekt für Arbeitgeber sowie für die Wirtschaft von äußerster Relevanz.

2.2 Relevanz des Themas Depression am Arbeitsplatz

Die zunehmende Forschung zum Thema Depression am Arbeitsplatz sowie die nachgewiesenen Zusammenhänge von Merkmalen der Arbeitstätigkeit und Depression in einer Vielzahl von Studien bestätigen die Wichtigkeit des Themas. Neben dem oftmals enormen Leidensdruck für die betroffene Person ist es aus weiteren Gründen wichtig, Kenntnisse über dieses Thema zu gewinnen. Die folgenden Abschnitte gehen darauf ein.

2.2.1 Veränderung der Arbeitswelt

Die Arbeitswelt hat sich in den letzten Jahren, bedingt durch Globalisierung und den Einsatz neuer Technologien, erheblich verändert. Arbeitsorganisationen werden unter dem Begriff „change management“ wiederkehrend neu geformt und bringen Unsicherheit, permanente Veränderung und das Erfordernis zur ständigen Anpassungsleistung des Arbeitnehmers mit sich. Nach einem Bericht der Bundesagentur für Arbeit (2010) und Berechnungen des Instituts der deutschen Wirtschaft (IW, BAP-Umfrage Januar 2012) waren im März 2010 ca. 720.000 Menschen in Zeitarbeitsverhältnissen beschäftigt. Im Dezember 2011 lag die Zahl bei ca. 905.000 Menschen. Marktforschungsprognosen gehen von einer Million Menschen aus, die sich Ende 2012 in Zeitarbeitsverhältnissen befinden werden.

Eine weitere, unsicherheitsfördernde Veränderung ist die Verdichtung der Arbeitswelt. Diese kann quantitativ erfolgen, sodass weniger arbeitende Personen, die gleiche oder mehr Leistung erbringen müssen. Überdies findet eine qualitative Anforderungsverdichtung statt. Dies wird begünstigt durch den Wandel von der früheren Produktionsgesellschaft, in der körperliche Arbeit im Vordergrund stand, zu der heute vielfach erwähnten Wissens- und Dienstleistungsgesellschaft, wodurch die Anforderung an kognitive und psychische Prozesse steigt.

2.2.2 Arbeitsunfähigkeitstage

Die im Vorfeld genannten Prävalenzen sowie mehrere Gesundheitsreports großer Krankenkassen machen die prekäre Lage deutlich. Der Gesundheitsreport der Krankenkasse BKK (2010) gibt für die erwerbstätige Bevölkerung an, dass seit 1999 die Arbeitsunfähigkeit aufgrund psychischer Erkrankungen bei Frauen um 83%, bei Männern um 50% zugenommen hat. Im Jahr 2009 war jeder neunte Ausfalltag mit einer psychischen Diagnose begründet. Rau, Gebele, Morling & Rösler (2010) beziehen sich auf einen Report der Techniker-Krankenkasse für das Jahr 2007, welcher zeigt, dass 1,3 Millionen Fehltage durch die Diagnose „Depressive Störung“ verursacht sind.

Ein aktueller Bericht der DAK (2012) verzeichnet einen Anstieg von Arbeitsunfähigkeitstagen aufgrund psychischer Erkrankungen. Im Jahr 2011 waren psychische Erkrankungen für 13,4% des Gesamtkrankenstandes verantwortlich (Frauen 16,3%, Männer 11,0%) und rangieren damit auf Platz vier. Verglichen mit dem Vorjahr zeigte sich eine einheitliche Erhöhung der Arbeitsunfähigkeitstage aufgrund psychischer Erkrankungen bei Männern und Frauen, insgesamt um 16%. Interessant ist hierbei die Tatsache, dass sich die Dauer (in Tagen) einer Erkrankung um nur 6% erhöht hat, während die Fallhäufigkeit um rund 12% gestiegen ist. Bei den Einzeldiagnosen belegt die depressive Episode den dritten Rang unter den 20 wichtigsten Erkrankungen, die zu Arbeitsunfähigkeitstagen führen. Laut dem Bericht gehen 4,3% der Arbeitsunfähigkeitstage (5,3% Frauen, 3,6% Männer) auf depressive Episoden zurück.

2.2.3 Entstehende Kosten

Ein weiterer Aspekt, der für die Wichtigkeit der Erforschung von Depression am Arbeitsplatz spricht, sind die enormen betriebs- und volkswirtschaftlichen Kosten, die durch die Erkrankung entstehen.

Auf betriebswirtschaftlicher Seite stehen der Ausfall von Arbeitskräften und die damit verbundenen Kosten im Vordergrund. So können Engpässe bzw. Verzögerungen bei der Fertigstellung von Produkten und Dienstleistungen entstehen, was wiederum Kosten nach sich zieht. Weiterhin entstehen bei Kompensation des Arbeitspensums Überstunden für die übrigen Beschäftigten, deren Kapitalwert als Rücklage gebildet werden muss. Die zeitweise Neueinstellung von Mitarbeitern zieht andere Kosten, z.B. für Personalsuche oder Einarbeitung mit sich. Nicht zu vergessen sind Krankengeld sowie die erhöhte Belastung durch zusätzliche Sozialabgaben für kompensatorische Mitarbeiter.

Auf volkswirtschaftlicher Seite kann zwischen direkten und indirekten Kosten unterschieden werden. Zu den direkten Kosten zählen zum Beispiel Behandlungskosten durch Ärzte, Therapeuten oder Krankenhäuser, oder auch Arzneimittelkosten, die durch Krankenkassen oder die Patienten getragen werden. Friemel, Bernert, Angermeyer und König (2005) analysierten Daten der „European Study of the Epidemiology of Mental Disorders“ und schätzten so die Kosten depressiver Störungen in Deutschland. Diese betrugen 686 Euro pro Patient/Jahr. Die 12-Monats-Prävalenz lag bei 3,5%. Eine Schätzung auf Bevölkerungsebene ergab, dass für 2,4 Millionen Patienten Kosten in Höhe von 1,64 Milliarden Euro entstehen. Bezogen auf das Bruttoinlandsprodukts nahm die Versorgung der betroffenen Personen 0,08% in Anspruch.

Die Erfassung indirekter Kosten ist weitaus schwieriger. Zu dieser Kostenart zählen Kosten, die durch Fehlzeiten am Arbeitsplatz und damit einhergehendem Produktionsausfall entstehen. Weiterhin werden die Kosten, die durch verminderte Produktivität oder vorzeitigen Tod entstehen, hinzugezählt. Für eine Kostenschätzung müsste zuerst eine Berechnung der Arbeitsleistung bzw. Produktivitätswerte erfolgen. Untersuchungen konnten bestätigen, dass depressive Personen eine niedrigere Arbeitsproduktivität aufwiesen und dadurch indirekte Kosten verursachten (z.B. Wittchen, Müller, Pfister, Winter & Schmidtkunz, 1999; Wang, 2004). Ein weiterer Punkt indirekter Kosten stellt die Belastung, der Angehörige ausgesetzt sind, dar. Ein erster systematischer Review versucht, direkte und indirekte Kosten verschiedener Länder abzubilden und kommt zu einem recht heterogenem Ergebnis (Luppa, Heinrich, Angermeyer, König & Riedel-Heller, 2007).

2.3 Erklärungsmodelle für den Zusammenhang von Arbeitstätigkeiten und Depression

Im folgenden Abschnitt wird ein Modell zur Erklärung des Zusammenhangs von Arbeitsmerkmalen und Depression vorgestellt: Das Job Demand-Control Modell (Karasek, 1979; Karasek & Theorell, 1990). Dieses wurde u.a. in Publikation 2 untersucht. Der Vollständigkeit halber soll an dieser Stelle angemerkt werden, dass ein zweites Modell zur Erklärung dieses Zusammenhangs besteht: Das Efford-Reward-Imbalance-Modell (Siegrist, 1996, 2002). Da dieses Modell jedoch nicht für die Berechnungen in der vorliegenden Arbeit herangezogen wurde, wird es an dieser Stelle nicht näher erläutert, sondern nur an die angegebene Literatur verwiesen.

2.3.1 Das Job Demand-Control Modell

Das Job Demand-Control-Modell (Anforderungs-Kontroll-Modell) wurde 1979 von Karasek entwickelt. Es versucht, die Zusammenhänge von Arbeitsmerkmalen und Gesundheit am Arbeitsplatz mit Hilfe von zwei Dimensionen zu erklären: Arbeitsintensität (job demands) und Tätigkeitsspielraum (decision latitude; oftmals als control bezeichnet).

Die Dimension Arbeitsintensität beschreibt das Ausmaß an Anforderungen, die ein Arbeitnehmer während der Ausführung seiner Tätigkeit zu bewältigen hat (Arbeitstempo, Zeitdruck, sich widersprechende Arbeitsaufträge). Die Dimension Tätigkeitsspielraum wiederum beschreibt das Ausmaß an Kontrolle, die der Arbeitnehmer bei der Ausführung seiner Tätigkeit ausüben kann. Die Dimension besteht aus zwei Unterfaktoren: Decision authority und Skill discretion. Decision authority beschreibt, inwieweit eigene Entscheidungen bezüglich Ablauf und Durchführung der Arbeit getroffen werden können. Skill discretion hingegen beschreibt das Ausmaß, sein Wissen und seine Fertigkeiten bei der Arbeitsausführung einsetzen zu können.

Die Kombination dieser beiden Dimensionen bezeichnen vier Tätigkeitsgruppen, welche in Abbildung 1 dargestellt sind.

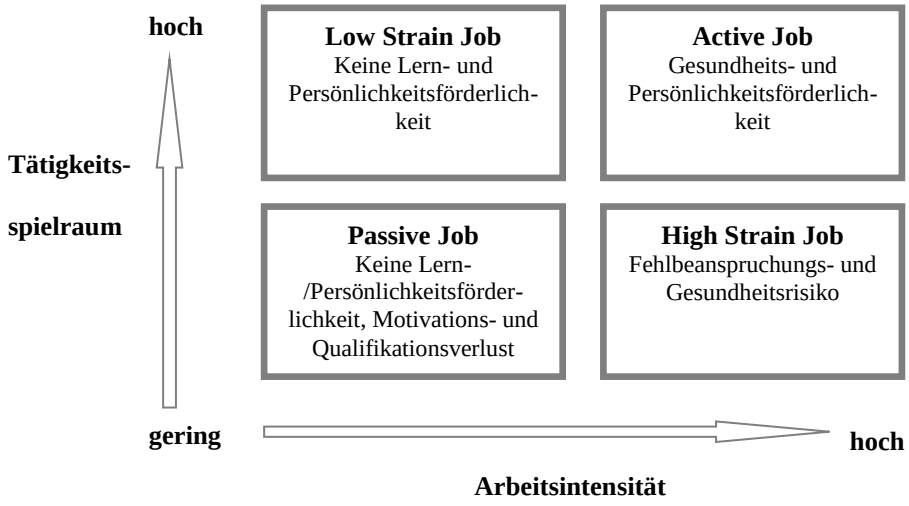

Abbildung 1: Darstellung des Job-Demand-Control Modells nach Karasek (1979)

High Strain Jobs weisen eine hohe Arbeitsintensität und einen geringen Tätigkeitsspielraum auf. Sie sind verbunden mit einem höheren Risiko für psychische Störungen, wie z.B. Depression (Karasek, 1979; Karasek & Theorell, 1990), was in der Forschung als Strain-Hypothese bezeichnet wird. Die negative Wirkung von job-strain wurde in einer Vielzahl von Studien untersucht und nachgewiesen (z.B. Paterniti, Niedhammer, Lang & Consoli, 2002; Pelfrene et al., 2002; Tsutsumi, Kayaba, Theorell & Siegrist, 2001).

Active Jobs hingegen wirken nach Karasek und Theorell (1990) gesundheits-, motivations- und lernförderlich. Personen, die eine solche Tätigkeit ausführen, erleben zwar auch eine hohe Arbeitsintensität, jedoch verbunden mit einem hohen Maß an Kontrolle. Passive Jobs sind dagegen gekennzeichnet durch eine niedrige Arbeitsintensität und einen niedrigen Tätigkeitsspielraum. Für die ausführende Person ergibt sich das Risiko des Verlustes von Fertigkeiten. Low Strain Jobs sind wiederum charakterisiert durch eine niedrige Arbeitsintensität bei gleichzeitig hohen Kontrollmöglichkeiten. Sie wirken nicht lernförderlich auf das Individuum, das gesundheitliche Risiko ist für Personen, die eine solche Tätigkeit ausführen, aber niedrig (Karasek & Theorell, 1990).

Eine Erweiterung des Modells wurde 1988 durch Johnson & Hall vorgenommen. Die Autoren fügten eine dritte Dimension, die der sozialen Unterstützung am Arbeitsplatz, hinzu. Dabei kann soziale Unterstützung instrumentell oder sozioemotional bereitgestellt

werden. Durch die Inklusion von sozialer Unterstützung in das Modell wurde die Iso-Strain-Hypothese formuliert. Iso-strain tritt demnach dann auf, wenn die arbeitende Person hohe Arbeitsanforderungen, niedrige Kontrolle sowie niedrige soziale Unterstützung erlebt. Die gesundheitlichen Effekte für diese Kombination von Merkmalen der Arbeit wurden mehrfach untersucht und nachgewiesen (z.B. Clays, et al., 2007; Johnson & Hall, 1988; Nishikitani, Nakao, Karita, Nomura & Yano, 2005; Sanne, Mykletun, Dahl, Moen & Tell, 2005).

Das Modell und seine Komponenten wurden vielfach untersucht. Ergebnisse bisheriger Reviews werden in Publikation 2 erläutert. Aus Redundanzgründen werden diese hier nicht nochmals aufgeführt.

3. Methoden zur Zusammenfassung von Forschungsergebnissen

Im Folgenden werden Möglichkeiten zur Zusammenfassung von Studienergebnissen bisheriger Forschung vorgestellt. Weiterhin wird der Ablauf einer Meta-Analyse beschrieben. Dabei wird in jedem Schritt Bezug auf die in den Publikationen 1 und 2 verwendeten Methoden genommen. Das Kapitel schließt mit einem kurzen Absatz über bisherige Übersichtsarbeiten.

3.1 Mögliche Formen von Übersichtsartikeln

Es existieren drei Formen von Übersichtsartikeln. Zum einen gibt es den traditionellen, narrativen Review, bei welchem der Autor auf Basis der ihm bekannten Literatur den Stand des Wissens beschreibt. Die unsystematische Literatursuche bringt eine hohe Selektion der Literatur mit sich und ist daher sehr subjektiv. Aus diesem Grund sind narrative Reviews oft von Publikationsverzerrungen begleitet. Weiterhin werden, bedingt durch die ausschließlich qualitative Analyse, Studien gleichgewichtig behandelt, unabhängig von der Anzahl der Probanden, die den Ergebnissen zugrunde liegen. Weiterführende Informationen zur Kritik an narrativen Reviews finden sich bei Rosenthal & DiMatteo (2001) sowie bei Rustenbach (2009).

In systematischen (narrativen oder quantitativen) Reviews werden die einbezogenen Publikationen mit Hilfe einer systematischen Literatursuche gefunden. Auch hier wird der aktuelle Wissensstand zusammengetragen und interpretiert. Somit ist diese Form von Übersichtsartikeln weniger anfällig für Publikationsverzerrungen und Subjektivität. Werden die Ergebnisse der einbezogenen Studien quantitativ ausgewertet, bedienen sie sich häufig der sogenannten „Vote-Counting-Method“ (z.B. Hedges & Olkin, 1979, Hunter & Schmidt, 1990, Bushman &Wang, 2009). Allen vote-counting Ansätzen ist gemeinsam, dass die Anzahl signifikanter und nicht-signifikanter Ergebnisse ausgezählt und miteinander verglichen wird. Diese Methode ist als kritisch einzustufen, da auch hier die Größe der Stichprobe sowie moderierende Faktoren nicht einbezogen werden. Weiterhin werden die Ergebnisse nur in Gruppen (signifikant vs. nicht-signifikant) eingeteilt, um so zu erkennen, welche Gruppe mehr Ergebnisse beinhaltet. Die Bedeutung der unterschiedlichen Gruppengrößen wird meist nicht elaboriert betrachtet. Weiterführende statistische Mängel dieser Methode wurden von Hedges & Olkin (1980) nachgewiesen.

Eine elaboriertere Form der quantitativen Verarbeitung von primären Forschungsergebnissen stellt die Meta-Analyse dar. Dieser Begriff geht auf Glass (1976, 1983) zurück und bezeichnet die statistische Analyse von Primärstudienergebnissen mit dem Ziel einer gemeinsamen statistischen Aggregation und Auswertung. Hierbei werden die Ergebnisse der Primärstudien wie Einzeldaten behandelt. Eine besondere Stärke dieses Analyseverfahrens ist, dass unterschiedliche Stichprobengrößen berücksichtigt und in Berechnungen inkludiert werden. Borenstein (2009) weist darauf hin, dass der Nutzen von Meta-Analysen nicht ausschließlich in der Berechnung eines Gesamteffekts liegt, sondern vielmehr auch Implikationen über die Angemessenheit verschiedener meta-analytischer Methoden je nach Anwendungsgebiet liefert. Somit schließt er, dass es nicht *den* richtigen Weg gibt, eine Meta-Analyse durchzuführen, sondern jeweils individuelle Studienfaktoren berücksichtigt werden müssen.

Ein Problem für die Forschung ist, dass die Begriffe „systematic review“ und „meta-analysis“ in der englischen Schriftsprache oft synonym verwendet werden. Der ursprüngliche Ansatz von Glass (1976) sieht die Meta-Analyse jedoch als eine eigenständige Form von Forschung an, indem er sie gegen Primär- (das Sammeln und Auswerten von Daten) und Sekundärforschung (die Re-Analyse bereits ausgewerteter Daten) abgrenzt. Manchmal finden sich jedoch auch in „systematic reviews“ fundierte meta-analytische Berechnungen. In dieser Handlungsweise wird die Meta-Analyse als eine Auswertungsform systematischer Reviews angesehen. So findet sich im Wörterbuch der Epidemiologie (Last, 2001, zitiert nach O`Rourke, 2006, S. 3) folgende Unterscheidung:

> “*Systematic Review:* The application of strategies that limit bias in the assembly, critical appraisal, and synthesis of all relevant studies on a specific topic. Meta-analysis may be, but not necessarily, used as part of this process.”

> “*Meta-Analysis:* The statistical synthesis of the data from separate but similar, i.e. comparable studies, leading to a quantitative summary of pooled results.”

3.2 Ablauf der (vorliegenden) Meta-Analyse

Beelmann & Bliesener (1994) unterteilen den Ablauf einer Meta-Analyse in sechs aufeinanderfolgende Schritte. An dieser Stelle soll jedoch eine differenzierte Form dargestellt werden, die dem Ablauf der für diese Arbeit durchgeführten Meta-Analysen entspricht.

1. Formulierung der Fragestellung

   Wie in jeder wissenschaftlichen Forschung sollte zu Beginn die Formulierung der Fragestellung stehen. Wird eine Meta-Analyse nicht explorativ durchgeführt, sollten eventuelle Hypothesen formuliert werden. Aus der Fragestellung ergibt sich auch das relevante Effektmaß (in der vorliegenden Arbeit der Korrelationskoeffizient). Abgeleitet von der Fragestellung sollten bereits in diesem Schritt Inklusions- bzw. Exklusionskriterien festgehalten werden. Dies ist wichtig, um Objektivität bei der Studienauswahl zu gewährleisten.

2. Literaturrecherche

   Der „Wert“ von Meta-Analysen steigt mit einer ausführlichen Literaturrecherche. Ein Fehler vieler Meta-Analysen ist das Beschränken auf bestimmte Studien (z.B. jene, die einfach und schnell erhältlich sind). So bilden sie das untersuchte Forschungsgebiet nicht vollständig ab. Publikationsverzerrungen sind die Folge. In der vorliegenden Arbeit wurde deshalb eine intensive Recherche durchgeführt, welche verschiedene, auch fachfremde, Suchmaschinen einbezog. Weiterhin wurden Konferenzbeiträge, wissenschaftlich-einschlägige Journals und publizierte Studien händisch nach weiterer Literatur durchsucht. Um eine sogenannte „Sprachverzerrung“ (Easterbrook, Berlin, Gopalan & Matthews, 1991; Grégoire, Derderian & Le Lorier, 1995) zu vermeiden, wurden fremdsprachige Studien in intensiver Arbeit mit Muttersprachlern übersetzt, um sie so auf Eignung zu überprüfen.

3. Kodierung der Studien

   Studienmerkmale, die für eine sinnvolle Integration benötigt werden, sollten mit einem Kodierbuch erfasst werden. Sinnvollerweise sollten hier allgemeine Studienmerkmale (z.B. Zusammensetzung der Stichprobe, verwendete Messinstrumente) sowie auch die berichteten, verwendbaren Ergebnisse erfasst werden. Dieser zweigeteilte Ansatz wurde in Publikation 1 noch um einen dritten Teil erweitert, der die Qualitätssicherung der einbezogenen Studien verfolgte.

4. Berechnung der Primärstudieneffekte

   Unterschiedliche statistische Parameter können in einer Meta-Analyse ineinander überführt und integriert werden. Formeln zur Berechnung finden sich in vielzähligen Methodenbüchern (z.B. Lipsey & Wilson, 2001). In diesem Schritt ist auch ein gewissenhafter Umgang mit Mehrfachpublikationen wichtig. Um mehrfach analysierte Stichproben gleichwertig zu gewichten, sollte hier entweder eine Auswahl getroffen werden oder es sollte eine Mitteilung der berichteten Ergebnisse vor der Integration per Hand vorgenommen werden. Um Informationsverlust zu vermeiden, wurde in der vorliegenden Arbeit der zweite Ansatz verfolgt. In diesem Schritt ist auch zu klären, ob eine Ausreißeranalyse durchgeführt werden soll. Aufgrund der Beschaffenheit des Studienpools wurde dies mit Hilfe des Ansatzes von Huffcutt & Arthur (1995) verfolgt.

5. Integration der Primärstudien und Berechnung eines Gesamteffekts

   Die Integration der Primärstudien sollte in einem vorher festgelegten Integrationsmodell erfolgen. Eine ausführliche Darstellung der verschiedenen Integrationsmodelle, die je nach Forschungsdesign Anwendung finden sollten, findet sich in Borenstein (2009). In der vorliegenden Arbeit wurde das Modell zufallsvariabler Effekte verwendet. Dies stellt eine konservativere Form der Integration dar und ist aufgrund der unterschiedlichen Studienhintergründe als die Methode der Wahl anzusehen. Zudem erfolgte die Integration unter Verwendung eines meta-analytischen Ansatzes. In der vorliegenden Arbeit wurde der Ansatz von Hedges & Olkin (1985, 1993) verwendet. In Publikation 1 wurden zusätzlich Meta-Analysen unter Verwendung des Ansatzes von Hunter & Schmidt (1990, 2004) berechnet, welcher die Korrektur um Studienartefakte ermöglicht.

6. Homogenitätsanalyse

   Die Homogenitätsanalyse ist ein wichtiger, jedoch oft vernachlässigter Aspekt der Meta-Analyse. Der Homogenitätstest stellt fest, inwieweit die gefundenen Effekte ein homogenes Muster aufweisen. Typischerweise wird die Homogenitätsanalyse mittels des Q-Tests durchgeführt. Neuere Ansätze ergänzen den Q-Wert sinnvoll (z.B. I^2, Higgins, Thompson, Deeks & Altman, 2003).

7. Überprüfung der Validität der Meta-Analyse

   Hier sind zwei validitätseinschränkende Bereiche zu beachten: Die Validität auf Ebene der Primärstudien sowie die Validität auf Ebene der Meta-Analyse.

Validitätseinschränkende Faktoren sollten durch sinnvolle Inklusionskriterien behoben werden. Ferner kann die Studienqualität als ein Gewichtungsfaktor oder als Moderatorvariable herangezogen werden (Beelman & Bliesener, 1994). Auf Ebene der Meta-Analyse sollte ein Publikations- und Sprachbias mit Hilfe von funnel-plots und weiteren Kennwerten (Duval & Tweedie, 2000; Orwin, 1983; Rosenthal, 1979) überprüft werden. Auch die bereits angesprochene Abhängigkeit von Ergebnissen sowie die Integration ausschließlich validierter Messverfahren dienen zur Vermeidung von Validitätsproblemen. Die Validität der Ergebnisse wurde in Publikation 1 sowie Publikation 2 als besonders wichtig angesehen und ausführliche Berechnungen wurden vorgenommen.

8. Weiterführende Moderatoranalysen

   Neben der statistischen Berechnung von Gesamteffekten können mit Hilfe einer Meta-Analyse inhaltliche Erkenntnisse über ein Forschungsgebiet erlangt werden. Ein Weg ist die Berechnung von Moderatoranalysen, um potentielle Einflüsse auf die Höhe eines gefundenen Effekts zu untersuchen. In beiden Publikationen dieser Dissertation wurden mehrere, umfangreiche Moderatoranalysen durchgeführt.

9. Aufbereitung der Ergebnisse

   Durchführung und Ergebnisse der Meta-Analyse sollten sorgfältig und nachvollziehbar dargestellt werden. Zudem gibt es verschiedene Normen bzw. Leitlinien für die Aufbereitung von Forschungsberichten bzw. Publikationen. In der vorliegenden Arbeit wurde die Nachvollziehbarkeit mittels Flow-Charts und schrittweiser Erläuterung sichergestellt. Zusätzlich wurde für Publikation 2 das PRISMA-statement (http://www.prisma-statement.org/) befolgt.

3.3 Bisherige Übersichtsarbeiten, die den Zusammenhang von Arbeit und Depression untersuchen

Es existieren eine Handvoll Überblicksarbeiten, die den Zusammenhang der in der vorliegenden Arbeit untersuchten Tätigkeitsmerkmale und Depression untersuchen. In Publikation 1 wurden die Konstrukte Rollenambiguität und Rollenkonflikte und deren Zusammenhang zu Depression untersucht. Diese Publikation ist die erste Übersichtsarbeit zu diesem Thema. Demnach liegen keine bisherigen Reviews vor. Reviews finden sich vorwiegend zu anderen Merkmalen, wie Arbeitsleistung oder Ängstlichkeit (z.B. Gilboa,

Shirom, Fried & Cooper, 2008; Örtqvist & Wincent, 2006). Die Ergebnisse werden in Publikation 1 vorgestellt, weshalb an dieser Stelle darauf verzichtet wird.

In Publikation 2 wurde der Zusammenhang der Variablen aus dem Job Demand-Control Modell (Karasek, 1979; Karasek & Theorell, 1990) und Depression untersucht. Während eine Meta-Analyse den Zusammenhang des Modells zu allgemeineren psychischen Störungen analysierte (Stansfeld & Candy, 2006), existieren zum Zusammenhang des Modells und Depression ausschließlich systematische Reviews. Deren Ergebnisse sowie die Stärken und Schwächen sind in Publikation 2 dargestellt. Aus Redundanzgründen werden diese hier nicht wiederholt.

4. Die vorliegende Arbeit

Die vorliegende Arbeit beinhaltet zwei Publikationen, die den Zusammenhang von Tätigkeitsmerkmalen am Arbeitsplatz und Depression untersuchen. Jede der beiden Publikationen beinhaltet Meta-Analysen zu bestimmten Tätigkeitsmerkmalen und Depression. Weiterhin wurden die Tätigkeitsmerkmale aufgegriffen und inhaltlich untersucht. So wurde neben einem statistischen Neuheitswert auch ein inhaltlicher Beitrag zur Weiterentwicklung des Forschungsfeldes geleistet. Durch den Einbezug nicht ausschließlich englischsprachiger Literatur konnte ein echter Mehrwert geschaffen werden. So wurden japanische, chinesische, russische, spanische und französische Studien in Kooperation mit Muttersprachlern aufwändig übersetzt und auf die Einschlusskriterien überprüft.

4.1 Darstellung und Erläuterung von Publikation 1

Einleitung

Arbeitnehmer sind in Ihrer Arbeitstätigkeit oftmals mit der Erfüllung unterschiedlicher Rollen konfrontiert. Probleme können entstehen, wenn die Erwartungen an die jeweilige „Rolle“ nicht klar definiert sind und der Arbeitnehmer somit keine eindeutigen Informationen über seine Rolle besitzt. Kahn et al. (1964) führten für diese Situation den Begriff *Rollenambiguität* ein. Ein weiteres Problem liegt vor, wenn Arbeitskollegen, Vorgesetzte, Untergebene, etc. konfliktäre Rollenanforderungen an den Arbeitnehmer stellen. Kahn et al. (1964) sprechen hier von *Rollenkonflikten*. Beide Begriffe zusammenfassend kann man von *Rollenstress* sprechen. Kahn und Byosiere (1992) integrierten die bisherige Theorie in ein Rahmenkonzept und stellten so einen Zusammenhang von psychosozialen Stressoren am Arbeitsplatz (z.B. Rollenambiguität, Rollenstress) und physischen, behavioralen sowie psychologischen Folgen her. Vorhandene Meta-Analysen konzentrieren sich hauptsächlich auf leistungsbezogene Outcomes, wie z.B. „job performance“ (z.B. Gilboa, Shirom, Fried & Cooper, 2008). In Bezug auf gesundheitsbezogene Variablen wurde der Zusammenhang von Rollenstress und Anspannung/Angst meta-analytisch untersucht (Fisher & Gitelson, 1983; Jackson & Schuler, 1985; Örtqvist & Wincent, 2006). Eine Meta-Analyse zum Zusammenhang von Rollenstress und Depression ist in der bisherigen Forschung nicht existent.

Fragestellung und Neuheitswert

Die erstmalige Berechnung einer Meta-Analyse, welche die Zusammenhänge von Rollenambiguität/Rollenkonflikten und Depression untersucht, war das Hauptziel der ersten Publikation. Somit sollte der Frage nachgegangen werden, ob und in welcher Höhe ein Zusammenhang von Rollenstress und Depression besteht. Weiterhin sollten theoretische Erkenntnisse über das Rollenkonzept gewonnen werden, um so das Forschungsgebiet voranzutreiben. Dabei wurde die Frage der Unabhängigkeit der beiden Rollenvariablen meta-analytisch untersucht. Ebenso sollte geklärt werden, ob der Zusammenhang der einen Rollenvariable und Depression sich bei der Korrektur um den Einfluss der anderen Rollenvariable verändert. Unter Berücksichtigung dieses Einflusses stellte sich die Frage, ob sich die Höhe der Zusammenhänge verändert, was durch erneute Meta-Analysen geklärt wurde. Ferner wurden arbeitsplatzbezogene, kulturelle und methodische Faktoren als potentielle Moderatorvariable untersucht.

Zusammenfassung der wesentlichen Ergebnisse

Die Untersuchung konnte zeigen:

- Rollenambiguität und -konflikte am Arbeitsplatz zeigten einen positiven Zusammenhang zu Depression.
- Den höchsten Zusammenhang wiesen Rollenkonflikte und Depression auf.
- Die Konstrukte weisen gemeinsame Komponenten auf, sind jedoch nicht deckungsgleich.
- Der Einbezug der jeweils anderen Variable als beeinflussender Faktor erhöhte den Zusammenhang.
- Die geographische Region, in der die Daten erhoben wurden, wurde als signifikanter Moderator identifiziert.
- Die Literaturrecherche war umfassend; die Kennwerte für den Publikationsbias sind als gut zu anzusehen.

4.2 Darstellung und Erläuterung von Publikation 2

Einleitung

Das Job Demand-Control Modell (Karasek, 1979; Karasek & Theorell, 1990) ist eines der am meisten untersuchten Modelle in der gesundheitsbezogenen Forschung am Arbeitsplatz. Das Modell beinhaltet die Variablen Anforderung und Kontrolle, welche das bereits erwähnte 4-Quadranten-Modell aufspannen. Zusammenhänge wurden primär zu kardiovaskulären Erkrankungen untersucht, für welche (systematische) Reviews (z.B. Eller et al., 2009; Schnall, Landbergis & Baker, 1994) und Meta-Analysen (Kivimäki et al., 2006) verfügbar sind. Auch finden sich viele Primärstudien, die den Zusammenhang der Variablen des Modells zu arbeitsbedingter Depression untersuchen. Eine Meta-Analyse (K=11) untersuchte den Zusammenhang der Variablen zu common-mental-disorders. Während einige systematische Reviews, die spezifisch Depression als interessierende Variable untersuchten, in den letzten Jahren erstellt wurden, fehlt noch immer eine Meta-Analyse, die das Forschungsfeld umfassend abbildet.

Fragestellung und Neuheitswert

Die Fragestellung in diesem Artikel war zweigeteilt. Zum einen sollte der Frage nachgegangen werden, welche Zusammenhänge die Variablen des Modells mit Depression zeigen. Durch eine weitaus umfassendere Literaturrecherche (verglichen mit den bisherigen Reviews) sowie dem erstmaligen Einbezug auch querschnittlicher Studien bringt dieser Artikel neue Inhalte in die meta-analytische Forschung ein. Aufgrund der wirtschaftlichen Veränderungen und den steigenden Arbeitsanforderungen in Unternehmen heutzutage schloss sich zum anderen eine weitere Frage an. Es wurde untersucht, ob das Messinstrument, welches für die Erhebung von Anforderungen am Arbeitsplatz in den Primärstudien eingesetzt wurde, diese zeitgemäß erfasst.

Zusammenfassung der wesentlichen Ergebnisse

Die Untersuchung konnte zeigen:

- Job-demands (Arbeitsanforderungen), job-strain (hohe Anforderungen/wenig Kontrolle) und iso-strain (hohe Arbeitsanforderungen/wenig Kontrolle/sozial isolierte Arbeitsbedingungen) zeigten einen positiven Zusammenhang zu Depression.
- Kontrolle zeigte einen negativen Zusammenhang zu Depression.

- Der höchste Zusammenhang fand sich für iso-strain bei weiblichen Stichproben.
- Methodische und statistische Variablen (Stichprobengröße, statische Auswertung der Primärdaten, Datenanpassung) wurden als Moderatoren identifiziert.
- Die Literaturrecherche war umfassend; für job demands und control existierte kein Publikationsbias.
- Die Mittelwerte für job-demands blieben gleichverteilt über die Erhebungsjahre.
- Der Zusammenhang zwischen job-demands und Depression stieg über die Jahre an.

4.3 Zusammenfassende Diskussion beider Publikationen

Die Ergebnisse beider Publikationen zeigten signifikante und bedeutsame Implikationen für die wissenschaftliche Forschung sowie für die praktische Gestaltung von Organisationsstrukturen und Arbeitsplätzen.

Vom theoretischen Standpunkt her ergibt sich die gemeinsame Komponente der beiden Rollenkonstrukte aus den Umgebungsbedingungen, die zum Vorhandensein von Rollenstress führen. Vom methodischen Standpunkt könnte ein Bias im Antwortverhalten der Arbeitnehmer zur Erklärung herangezogen werden. So erscheint es wahrscheinlich, dass die mentalen Repräsentationen der Konstrukte bei den Studienteilnehmern inhaltlich vermischt waren. Objektive Messverfahren (Stellenbeschreibung, Beobachtung), die die Arbeitstätigkeit untersuchen, könnten dieses Problem lösen. Ein Methodenbias, der durch die Verwendung ausschließlich subjektiver Verfahren entsteht, wurde bei Podsakoff, McKenzie, Lee & Podsakoff (2003) bestätigt. Die Unabhängigkeit der Konstrukte ist unter Berücksichtigung der Verschiedenheit der benötigten Interventionen zur Auflösung von Rollenkonflikten am Arbeitsplatz nachvollziehbar. Verglichen mit bisherigen Meta-Analysen zu Angst und Depression resultierten die Ergebnisse der vorliegenden Publikation in etwas niedrigeren Korrelationskoeffizienten. Eine Erklärung kann sich aus der Literatur ergeben, die zeigt, dass Depression oft auf eine vorhergehende Angst folgt (Jacobi, Vossen & Wittchen, 2009). Auf den Arbeitsplatz direkt anwendbare Erkenntnisse wurden auch in den Moderatoranalysen gefunden. Die geographische Region als ein Parameter für die zugrunde liegenden Kulturen und Normen einer Region zeigte sich als signifikanter Moderator. Für die arbeitsplatzbezogene Forschung bedeutet dies, dass Ergebnisse immer unter der Berücksichtigung der zugrundeliegenden kulturellen Gegebenheiten interpretiert werden sollten. Nach gängiger Klassifikation von Korrelationskoeffizienten (Cohen, 1992) zeigte sich ein moderater Zusammenhang in Publikation 1 und ein kleiner bis moderater

Zusammenhang der vier Variablen und Depression in Publikation 2. Trotzdem gliedern sich die Ergebnisse in gängige Größenordnungen der arbeits- und organisationspsychologischen Forschung ein. Diese sind nicht nur im statistischen, sondern auch im praktischen Sinne relevant (Frese, 1985). Die Heterogenitätstests für die Zusammenhänge der Rollenvariablen mit Depression wurden signifikant (Rollenambiguität: Q = 184,4; df = 26; p = <0,001; Rollenkonflikte: Q = 78,6; df = 19; p = <0,001). Die I^2-Werte zeigten einen hohen Prozentsatz an Variation zwischen den Studien auf, der auf die Heterogenität der Primärstudien zurückzuführen ist (Rollenambiguität: I^2 = 85,9; Rollenkonflikte; I^2 = 75,8). Es ist wahrscheinlich, dass die Heterogenität aufgrund der in den Primärstudien verwendeten Messverfahren zustande gekommen ist. Für Rollenkonflikte existieren viele adaptierte Messverfahren, die auf Rizzo (1970) zurückgehen. Folglich variiert die Definition der Rollenvariablen, was für einen Anstieg der Heterogenität spricht. Die Heterogenitätswerte für die Zusammenhänge der Variablen des Job Demand-Control Modells (Karasek, 1979; Karasek & Theorell, 1990) zeigten ein differenziertes Bild. Da diese in Publikation 2 ausführlich dargestellt und diskutiert werden, wird aus Redundanzgründen an dieser Stelle darauf verzichtet.

Die Ergebnisse bezüglich der Messung von job-demands zeigten die Notwendigkeit der Anpassung von Messverfahren. Arbeitnehmer geben keine höheren Arbeitsanforderungen an als vor 20 Jahren. Trotzdem steigt der Zusammenhang der angegebenen Arbeitsanforderungen und Depression. Dies spricht dafür, dass Arbeitsanforderungen nicht mehr adäquat erfasst werden und die Arbeitswelt nicht mehr angemessen abbilden. Eine Lösung könnte die Veränderung des Messinstrumentes darstellen. Ein größerer Range der angegebenen Werte könnte durch die Erweiterung der 4-stufigen Skala erzielt werden. Darüber hinaus wäre es wichtig, nicht nur zu schauen, ob die Arbeitnehmer hohe Arbeitsanforderungen haben, sondern auch den Grund dafür zu erfragen. Es könnte sein, dass organisationale Veränderungen im Zuge der Verdichtung von Arbeit zu höheren Anforderungen beigetragen haben. Dies wären Veränderungen, die aus dem Arbeitssystem resultieren. Es könnte aber auch sein, dass geistige Anforderungen zugenommen haben und die Bearbeitung gestellter Aufgaben somit mehr Zeit in Anspruch nimmt. Als Folge dessen würden die Arbeitnehmer Fragen wie „Das von mir verlangte Arbeitstempo ist sehr hoch“ (Richter et al., 2000, Item 4) positiv beantworten. Weitere Gründe sind denkbar. Die Ursache des Erlebens von hohen Arbeitsanforderungen sollte mit erfasst werden. Ferner sollte der aufgrund der erhöhten Arbeitsverdichtung veränderte

Bezugsrahmen für die Angemessenheit von Arbeitsanforderungen mit berücksichtigt werden. Durch die Erfassung sozialer intraindividueller Vergleichsprozesse könnte darüber Auskunft gegeben werden, ob die gestellten Anforderungen höher erlebt werden, als dies zu einem bestimmten Zeitraum zuvor der Fall war.

Beide Publikationen liefern anwendbare Implikationen für die Praxis. Sich verändernde und verdichtende Arbeitsorganisationen erfordern eine hohe Anpassungsfähigkeit der Arbeitnehmer. Rollen und Aufgaben sollten präzise definiert werden. Weiterhin sollten sich diese ergänzen und nicht konfliktär aufeinander wirken. Vorgesetzte sollten eine Vermittlerrolle einnehmen, um eventuelle Unklarheiten sofort aufzulösen. Auch und gerade in einer Gesellschaft von Zeitarbeit und Überstunden sollte die Machbarkeit der Erfüllung von Arbeitsanforderungen wiederkehrend überprüft werden. Dies kann mit Hilfe von Projektgruppen, Kummerkästen und (Halb-)Jahresgesprächen passieren. Auch sollte Arbeit nicht unter sozial isolierten Bedingungen erfolgen bzw. falls nötig, für einen Ausgleich gesorgt werden. Insgesamt muss bedacht werden, dass im Sinne einer Gesunderhaltung der Arbeitnehmer die Verhältnisprävention Vorrang vor der Verhaltensprävention haben sollte. Arbeit kann und sollte sinnvoll und gesundheitserhaltend gestaltet werden. Betriebliche Gesundheitsförderung sollte als ein wichtiger, jedoch am besten nur begleitender Teil guter Arbeitsbedingungen angesehen werden.

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6. Publikationen

Die vorliegende Arbeit besteht aus den folgenden Publikationen:

Publikation 1:

Schmidt, S., Roesler, U., Kusserow, T., & Rau, R. (resubmitted, minor revision). Uncertainty in the workplace: examining role ambiguity and role conflict and their link to depression – a meta-analysis. *European Journal of Work and Organizational Psychology*.

Publikation 2:

Schmidt, S., Roesler, U., & Rau, R. (submitted for publication). The Job-demand-control-model and depression: a meta-analytical exploration of the relationships and the test of influencing factors. *Occupational and Environmental Medicine.*

4.1 Publikation 1:

Schmidt, S., Roesler, U., Kusserow, T., & Rau, R. (resubmitted, minor revision). Uncertainty in the workplace: examining role ambiguity and role conflict and their link to depression – a meta-analysis. *European Journal of Work and Organizational Psychology*.

Running head: Uncertainty at work and its link to depression

Uncertainty in the workplace: examining role ambiguity and role conflict, and their link to depression – a meta-analysis

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Abstract

Health-related research on role stress in the workplace focusses mainly on the occurrence of depression and anxiety. Reviews for the latter are available. This meta-analysis relates role ambiguity/role conflict to depression. The initial literature search, part of a more comprehensive search, yielded about 50,000 results. Studies have been published in multiple languages. Thirty-three studies comprising 19,926 research subjects were statistically aggregated. Different meta-analytical approaches were used. The results show a moderate but significant positive relationship for both variables (role ambiguity: $r = 0.279$; role conflict: $r = 0.318$). Further, the distinctness of the role stressors was supported by meta-analytical computations. Moderators were tested and identified. We conclude that role ambiguity and role conflict overlap to some extent, but they should be categorised as distinct concepts for workplace research. Providing clearly defined roles and job objectives can be seen as one factor that can contribute to employee health and help prevent costs arising from workplace absence.

Background

Far-reaching occupational changes have occurred in recent years. Work hours and environments have become more flexible, and organisations have had to overcome numerous transformations, such as restructuring, downsizing and outsourcing. New positions have been created, and employees now must assume a variety of frequently changing tasks associated with new or expanded roles. This requires employees to make physical and psychological adjustments. A number of studies have investigated the various impacts of new situations on the well-being of employees (e.g. Ashford, 1988; Begley & Czajka, 1993; Ferrie, Shipley, Marmot, Stansfeld, & Smith, 1998). Role stressors have been experienced in the workplace for the past several decades. Because of structural transformations in companies, the introduction of new forms of working (e.g. temporary employment), and globalised collaborations of businesses, research has become even more important of late.

There are several views and theories on role theory, stemming from different academic disciplines. In this article, we focus on the constructs of role ambiguity and role conflict as originally introduced by Kahn, Woelfe, Quinn, Snoek, and Rosenthal (1964). According to the authors, role ambiguity results from a lack of information and therefore missing clarity in a specific job position. This leads employees to be uncertain about their role, job objectives and associated responsibilities. Expectations of colleagues and supervisors also may be unclear. Role conflict arises when a person is confronted with two or more conflicting or opposing role expectations and the corresponding role demands of others (Kahn et al., 1964). This leads to a psychological conflict in which the employee will not be capable of fulfilling every expected role at the same time. Role stress can occur in every job position, with or without organisational change. In the 1960s, Kahn et al. (1964) reported that the complexity of organisations, organisational change as well as switching positions were factors that can increase the amount of role ambiguity.

It seems obvious that role ambiguity and role conflict to some extent are associated. Both arise from an individual's environment and may be caused by the same underlying condition. The initial research of Kahn et al. (1964) reported only modest correlations. The authors described some overlap between the concepts but referred to them as "two independent sources of stress" (Kahn et al., 1964, p. 89). Subsequent research found a wider range of intercorrelations between the two concepts. On the one hand, small to moderate coefficients have been reported (e.g. El-Bassel, Guterman, Bargal, & Su, 1998; Keenan & McBain, 1979; Singh, Jayaratne, Siefert, & Chess, 1995). On the other hand, higher coefficients up to $r = 0.67$ ($p < 0.05$) also have been found (Borucki, 1987; Mak & Mueller, 2000; Spector, 1987). More detailed analyses have shown that the intercorrelation of role ambiguity and role conflict varied depending on the subsample (Rizzo, House, & Lirtzman, 1970) or favoured distinct concepts (Gonzalez-Roma & Lloret, 1998; Schuler & Jackson, 1985).

Both concepts contain an objective and a subjective component. Objective role ambiguity refers to certain conditions in the individual's environment, whereas subjective role ambiguity relates to the amount of ambiguity that a person in this environment perceives. The same concept can be applied to role conflict. Objective role conflict results from the environment (e.g. involved persons), whereas subjective role conflict is expressed in the psychological conflict that results from environmental conditions (Kahn et al., 1964). Kahn and Byosiere (1992) displayed a conceptual framework of stress research in organisations. They drew a relationship between stressors in organisational life and an individual's responses to stress. According to the authors, a potential psychosocial stressor (e.g. role ambiguity, role conflict) can lead to physiological, behavioural and psychological responses. The subjective element of role stress might then be seen as a cognitive appraisal process that moderates the relationship between organisational stressors (e.g. unclear organisational job

position) and the responses that follow these stressors (e.g. motivational or health-related). Health-related responses often lead to absence from work and substantial costs to the individual and society. In particular, the linkage of workplace factors to depression has become prominent in recent research.

Depression is one of the most common mental disorders, affecting men and women of all ages. The “Global Burden of Disease Study” by the World Health Organization points out the relevance and severity of depressive disorders. With numbers rising, the data predicts that depressive disorders will be the second-leading cause of disease burden in 2020 (Murray and Lopez, 1997) and the leading cause by 2030 (WHO, 2008).

Considering depression as a continuous construct (Farmer & McGuffin, 1989; Flett, Vredenburg, & Krames, 1997) is important for the occupational context. Even experiencing minor depressive symptoms without meeting clinical diagnosis can lead to impaired health, reduced job performance or absence from work. Lexis, Jansen, van Amelsvoort, van den Brandt, and Kant (2009) investigated the influence of depressive complaints on sickness-related absence at work. After analysing a sample of 3,339 employees, their results showed that even mild depressive complaints were risk factors for sickness-related absence. Furthermore, research has shown that experiencing depressive symptoms increases the vulnerability of developing major depression (Cuijpers & Smith, 2004), which may later lead to additional costs, sickness-related absence and suffering.

Transferring these finding to the workplace setting, the question arises whether there are distinguishable job characteristics (e.g. role ambiguity, role conflict) that may lead to developing depression and thereby to impaired performance. In the long run, this path may lead to an inability to work. Identifying crucial characteristics may be a starting point for workplace and task design.

Aim of the analysis

The objective was to systematically review the findings of published and unpublished quantitative research in order to explore the strength of the relationship between role stressors at work and depression. The number of people suffering from mental disorders is steadily rising, and depression was chosen as a particular form to include in the review. Based on the role theory of Kahn et al. (1964), we interpret role ambiguity and role conflict as two distinct concepts.

The relationship between role ambiguity/role conflict and depression has been studied in a variety of settings, occupation types, countries and samples. Several meta-analyses regarding role stressors at work have been conducted (e.g. Fisher & Gitelson, 1983; Gilboa, Shirom, Fried, & Cooper, 2008; Örtqvist & Wincent, 2006), but none thus far has been linked to depression.

Materials and Methods

Inclusion/exclusion criteria

Studies had to meet content as well as methodological criteria in order to be included in the meta-analysis. First, the relationship between the target variables in the working context had to be reported. Subjects were supposed to be older than 16 and from the working population. To gain the most information, studies could be of longitudinal, cross-sectional or case control design. There was no restriction regarding the country where the data was gathered. Relevant statistics such as correlation coefficients or odds-ratios had to be given or be retrievable from the data or the authors. If the same data with the same target variables was published in multiple articles, only one analysis was used. Sample sizes were evaluated for their adequacy according to a quality criterion validity rating based on Faragher, Cass, and Cooper (2005). To avoid a so-called language bias (Grègoire, Derderian, & Le Lorier, 1995), there was no restriction regarding language.

Search

A systematic search was undertaken to identify all relevant scientific literature. As a first step, we carried out an electronic search using the PsycInfo, Pubmed and Web of Science databases through 1 July 2009. The starting year was 1965, the year following Kahn`s introduction of role theory, and also the year that Arthur Kornhauser (1965) published his book about mental health and the workplace. The search was carried out as part of a more comprehensive search. A list of key words can be found in Table 1. Yielded results were merged and checked for duplicates. Titles and abstracts were screened for relevance. Next, the full article was read to investigate whether specific work characteristics were statistically analysed in relation to depression. To identify publications not found during the electronic search, a manual search involving conference booklets and selected scientific journals was

done; Table 2 lists the journals consulted during the manual search. Reference lists of the eligible primary studies were also checked. As a final step, scientists were contacted by e-mail and asked for findings of their current research. Doctoral dissertations were identified using the ProQuest Dissertations & Theses Full-Text Database.

- Insert table 1 here –

- Insert table 2 here –

Coding

A detailed codebook was written, taking into consideration the recommendations of Rustenbach (2005) and Lipsey and Wilson (2001). To ensure the appropriateness, the structure and components were discussed and revised at certain times. The codebook consisted of three parts: in part 1, the study characteristics were coded; part 2 included statistical analyses and results; and a supplemental third part was drawn up based on Faragher et al. (2005) to assess the quality of the eligible studies. Details of the codebook can be seen in Appendix 1. Three coders were involved in the process, and every study was coded independently by two of them. One of the coders was a graduate student and the others held a degree in psychology. All were specialised in the field of work, organisational and health psychology. To assure high quality the studies were coded independently. No average coding was used ever. Any differences were discussed until an agreement was reached.

Data Extraction

Most studies reported correlation coefficients quantifying the linear relationship between role ambiguity/role conflict and depression. Other statistical parameters were transformed into correlation coefficients by standard formulas (Lipsey & Wilson, 2001). For consistency of results, we chose the coefficient for the entire sample if a study reported

correlations for subgroups beneath the overall sample correlation. If only independent subgroups were reported, we combined their coefficients according to standard formulas (Bortz, 2005). For longitudinal studies, only baseline data was extracted. This was done for two reasons: to harmonise longitudinal and cross-sectional study designs, and because the reason for attrition over the time points was unclear. Non-English studies were translated by native speakers and discussed with the coders. A cooperative time-consuming coding was done to immediately clear up questions that arose. A worksheet that coincided with the codebook was completed to script the key components of the studies.

Statistical Integration

Independence of the constructs

Some data shows remarkably high correlation coefficients between role ambiguity and role conflict, whereas other authors found smaller correlation coefficients between the two constructs (see "Background"). There were two ways to deal with this fact: merging the two variables into one and leaving them separate.

Role conflict and role ambiguity appear in work surroundings that are manifold and supposedly need different interventions to minimise their occurrence. So, it appeared reasonable to value the concepts as two distinct variables and to run two separate analyses. Some studies reported intercorrelations between role ambiguity and role conflict; a meta-analysis was run to calculate the overall correlation between the two constructs. Our theoretical rationale was confirmed by this statistical computation. Thus we treated the two variables separate for further calculations.

Choice of a model for integration

The validity of a meta-analysis relies to a great extent on the quality of the primary studies that were included. Bortz and Doering (2006) state, that the homogeneous operation of the outcome variable is especially important. Because eligible studies could be conducted in different study designs, use different methods, come from various regions and be published in different languages, the authors expected between-study variation and chose the random effects model for integration. In contrast to the fixed effects model, a random effects model assumes variation in the true effects across studies and therefore allows unequal true effect sizes in studies (Borenstein, Hedges, Higgings, & Rothstein, 2009). Therefore it performs a more conservative integration and creates wider confidence intervals.

Meta-analytical approach

Besides the choice of a statistical model, there are different approaches for meta-analytical integration. This meta-analysis was based on the approaches of Hedges and Olkin (1985, 1993) and Hunter and Schmidt (1990). Using multiple approaches provides the opportunity to investigate the data in a more differentiated manner. It also increases certainty when results are similar. The approach of Hedges and Olkin (1985, 1993) is a comprehensive method to integrate data from multiple studies. The approach uses z-standardised correlation coefficients for integration. Besides the actual integration, formulas are given for estimating publication bias. The psychometric approach of Hunter and Schmidt (1990) offers the advantage to correct for attenuating artifacts. In our analyses, we integrated correlation coefficients through a two-step-procedure. First we corrected for sample bias; second, we corrected for unreliability in the criterion. To increase the theoretical contribution of our analysis, we finally calculated the effect for one variable taking the other into account according to the formulas of Hunter and Schmidt (1990).

The Hedges and Olkin approach was run using the Software Comprehensive Meta-Analysis 2 (Borenstein, Hedges, Higgins, & Rothstein, 2005). The integration using the Hunter and Schmidt (1990) approach was conducted with a modified version of a Microsoft Excel spreadsheet.

Treatment of Outliers

Although the random effects model allows variance between studies, it is important to check for extreme deviancies and their causes, and eventually to eliminate them. In research there is no consensus about the appropriateness of outlier detection and treatment in meta-analyses. Huffcutt and Arthur (1995) investigated the treatment of outliers in meta-analyses and concluded that only few of them observed statistical outliers. If so, the consequence was mostly based on subjective estimates. They proposed an elaborated outlier statistic based on the computation of eigenvalues. The advantage over common techniques for primary data is the inclusion of unequal sample sizes. The authors refer to the true variability between studies and argue that the effects resulting from a false rejection of a potential study are much smaller compared to keeping an extreme study that might result in overestimation. We can support the findings of the authors. Sixteen years after Huffcutt and Arthur (1995) we screened an admittedly random selection of meta-analyses published in the recent years. Still, meta-analyses with and without checking or even mentioning outliers were found.

For our analysis, we computed the Sample-Adjusted Meta-Analytic Deviancy (SAMD) statistic according to the formulas given by Huffcutt and Arthur (1995) with a self-developed Microsoft Excel spreadsheet.

Moderators

Results are often influenced by other factors that produce heterogeneity in the data. Because the backgrounds of our data were manifold, we expected heterogeneity in our results and tried to resolve this influence. As an applied research approach we focussed on workplace and methodological variables. Thus, we tested as potential moderators the type of workplace setting, the country where the data was gathered and the year of publication. We therefore conducted subgroup analyses using the most conservative approach by applying a full random-model.

Robustness of the analysis

The robustness of our analysis was assessed in different ways. First we recalculated our analysis by removing one study at a time. Second, cumulative analyses were run to determine the influence of year and sample size. Third, we integrated the studies using a fixed effects model. Finally, the validity of the primary studies was secured by integrating only those with a validity rating of at least five.

Publication bias

Although we performed a widespread literature search to avoid publication bias, additionally we investigated its presence by funnel-plot. Further, we computed Fail-Safe-Ns according to Rosenthal (1979) and Orwin (1983), in which the criterion for a trivial correlation was set to $r = 0.15$, and the mean correlation in missing studies to $r = 0.10$. Publication bias is caused by the fact that studies with small or non-significant effects are less likely to be published. The Trim and Fill procedure (Duval & Tweedie, 2000) was undertaken to assess the shifting of the mean after missing studies were imputed. Therefore, if publication bias existed, we expected missing studies left of the mean.

Results

Descriptives

This search, part of a more expanded search, resulted in about 50,000 hits. The complete flow chart is shown in Figure 1. Twenty-four non-English studies were found, three of which we included in the meta-analysis (Hong, 2004; Iliescu, 2004; Oliver & Tomás, 2005).

- Insert figure 1 here –

Overall we found 33 studies eligible for inclusion, three of which were doctoral dissertations. Thirteen studies measured role ambiguity, five measured role conflict, and 15 measured both variables. Intercorrelations of the variables were reported in 11 studies. The studies included were published between 1976 and 2009 with a total sample size of 19,926 persons (range: 72 to 4,487 persons per study). Study characteristics are shown in Table 3.

The majority of the study population consisted of nurses and other medical staff (e.g. Baba, 1999; Hong, 1994; McLachlan, 1995). The samples of other studies consisted of white-collar workers (e.g. Ganster, 1986; Heinisch & Jex, 1997); blue-collar workers (e.g. Ganster, 1986, Iwata, 1992); and civil servants (Mak & Mueller, 2000). Other studies reported the results for a mixed group of job holders (Wännström, 2009).

Role ambiguity and role conflict are job characteristics that are studied worldwide. Our findings included mainly studies from the U.S., but also from Western Europe (e.g. Wännström, 2009) and Eastern Europe (e.g. Borucki, 1987). Our search also led us to studies conducted in the Asian region (e.g. Sajo, 2007), Australia (Mak & Mueller, 2000), Canada (McLachlan, 1995), Israel (El-Bassel, 1998), and Iran (Naisi, 2009).

The data concerning the two job characteristics were collected with various questionnaires (e.g. Caplan, 1975; Rizzo, 1970). Depression was assessed with different standardised instruments, e.g. “Self-rating depression scale” (Zung, 1965).

- Insert table 3 here –

Outlier analysis

Absolute SAMD values for role ambiguity ranged from 0.04 to 23.76. The scree-plot showed a steep decline leading to a flat slope comprising most of the studies. After further investigation of the SAMD values above the flat slope, Shimazu and Kosugi (2003) was considered to be an outlier and was excluded from the main meta-analytical integration. This lowered the number of included studies to 32. Studies measuring role conflict showed absolute SAMD values from 0.06 to 3.74. The gradually falling slope showed no noteworthy outliers.

Independence of the constructs

Eleven studies comprising 6,858 persons reported the intercorrelation between role ambiguity and role conflict. Table 4 shows the reported numbers and the corresponding sample sizes. It appears that smaller samples show higher intercorrelations than larger samples. This statistical imperfection is reconciled by the meta-analytical approach. Table 5 shows a medium-sized total correlation.

- Insert table 4 here –

- Insert table 5 here –

Meta-Analysis

Role ambiguity

The overall main analysis in the random effects model included 27 studies with a total sample of 13,703 persons. It yielded a point estimate of $r = 0.278$. The forest plot is shown in Figure 2.

- Insert figure 2 here –

A following sensitivity analysis removing one study at a time resulted in 27 point estimates (one for each removal) with point estimates ranging from $r = 0.263$ to $r = 0.287$. It showed no ineligible impact of any study. The cumulative analyses indicated only a small shift by ascending year, and the results did not shift towards a higher effect by smaller sample size. The fixed effects analysis showed a point estimate of $r = 0.253$, which was slightly lower than the random effects analysis. The following integration of the primary studies with a rating of five and higher yielded an effect size of $r = 0.290$.

As described above, we also calculated an overall effect using the Hunter and Schmidt (1990) statistics. The bare-bones analysis resulted in an overall effect of $r = 0.249$ and showed a somewhat smaller coefficient than the random effects analysis by Hedges and Olkin (1985, 1993). After additionally correcting for unreliability in the criterion, the point estimate rose to $r = 0.279$. Details are shown in Table 6.

The Trim and Fill procedure revealed no missing studies left of the mean. Therefore the point estimated remained unchanged. After checking for missing studies to the right, two missing studies were revealed, which shifted the point estimate marginally to $r = 0.293$ (CI: 0.232-0.339). The Classic Fail-Safe-N resulted in 5,773 missing studies, whereas Orwin`s

Fail-Safe-N showed 57 missing studies for the chosen criteria. Figure 3 shows the funnel-plot including imputed studies.

- Insert figure 3 here –

Role conflict

The meta-analytical integration of role conflict included 20 studies with an overall sample size of 10,538 participants. The random effects analysis resulted in a point estimate of $r = 0.287$. Details can be seen in Figure 4.

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Sensitivity analyses were conducted similarly to the analyses for role ambiguity. The one-study-removed analysis resulted in 20 point estimates, ranging from $r = 0.279$ to $r = 0.303$. The stability of results was also assessed by cumulative analyses by year and sample size. No noteworthy shift occurred in either of the alternatives. Analysing the effects under the terms of the fixed effects model showed a point estimate of $r = 0.288$. The integration of primary studies with a validity rating of five or higher resulted in an effect of $r = 0.275$.

Integrating the effects corrected for sample bias resulted in an overall coefficient of $r = 0.286$, thus affirming the quantity of the first-found effect according to the Hedges and Olkin (1985, 1993) approach. Just as in the role ambiguity analysis, the correction for measurement error resulted in a higher coefficient of $r = 0.318$. Table 6 shows the summary of results.

The funnel plot for role conflict is shown in Figure 5. After imputing six studies missing left of the mean, the point estimate shifted to $r = 0.237$ (CI: 0.149-0.284). Rosenthal`s

Fail-Safe N computed 3,620 missing studies to reach statistical insignificance. The Fail-Safe-N analysis based on Orwin (1983) computed 58 missing studies.

- Insert figure 5 here -

- Insert table 6 here –

Results of role ambiguity/role conflict corrected for the influence of the other construct

Fifteen studies comprising 8,202 persons reported correlations for both variables and depression. The correction for the influence of the other role stressor raised the correlation coefficient for both constructs. Correcting the observed variables for this influence as well as unreliability in the criterion raised the correlation coefficient remarkably. Results are shown in Table 7.

- Insert table 7 here –

Moderating Factors

The type of occupational setting, the country of the study, and the year of publication were tested as moderators. Subgroup analyses for the occupational setting and the year of publication resulted in insignificant Q-values. The Q-value resulting from the subgroup analysis for the country of study reached statistical significance and revealed moderating influence. Details can be seen in Table 8.

- Insert table 8 here –

Discussion

Results

The aim of our analysis was to integrate findings regarding the relationship of role ambiguity/role conflict and depression. Although a handful of systematic reviews have targeted role ambiguity/role conflict, as far as could be determined none examines the relationship to depression. For the first time we researched the overall relationship of these important concepts in the working context. The findings were integrated with meta-analytical calculations.

Both role ambiguity and role conflict were moderately but significantly related to depression. We assumed a random effects model because studies came from various research groups using a variety of instruments. Calculating multiple approaches offers additional information about the results. For role ambiguity, the bare-bones analysis revealed that there was some sampling error in the data, resulting in a somewhat smaller coefficient of $r = 0.249$. Additionally, the psychometric meta-analysis corrected for measurement unreliability. This raised the coefficient, and the results were similar to our main analysis. As an advantage, the second approach contains this additional information, which also supported the robustness of the analysis.

Role conflict formed a more homogeneous picture. The bare-bones analysis yielded a similar coefficient to the main analysis. The additional correction for measurement unreliability resulted in a higher coefficient of $r = 0.318$. Although the psychometric meta-analysis approach is often criticised as being an idealistic condition not representing reality, both approaches have their benefits. Detailed elaborations about the superiority and usefulness of both approaches have been published (e.g. Field, 2001; Field, 2005; Hall & Brannick, 2002).

The outlier examination detected one outlier study. We tried to resolve the source for this extreme divergence and contacted the author. The participants of the study were researchers working in a research institute of an automobile company. The reason may lie in the nature of the occupation itself. In the context of the automobile industry, there may be pressure to achieve high productivity levels. Thus, clear goals seem to be extremely important toward fulfilling the targets. Additionally, success may only be apparent over long time periods because work results have to be practically included into the production process. The new research may not be used at all. Lower intrinsic satisfaction may result, causing frustration. In addition to this theoretical explanation, the correlation matrix of the respective study may give further explanation. Also other relationships show remarkably high correlation coefficients. It could be that the relationship between role ambiguity and depression may be inflated by high insufficient authority or moderated by productivity.

Independence of role stressors

The independence of the constructs was assessed in multiple ways. From a theoretical approach, we concluded that role ambiguity and role conflict should be valued as separate variables for meta-analytical purposes. Additionally we conducted a smaller meta-analysis and computed the total intercorrelation of the variables. The results were moderately sized with $r = 0.335$/$r = 0.404$, depending on the assumed model. The sizes of the coefficients imply a common component shared by the constructs, but no congruence. Our findings comply with the proposed theory by Kahn et al. (1964), who assumed only some overlap between the role stressors but refers to them as two distinct constructs.

Meta-analytical results corrected for the influence of the other construct

Further, a meta-analysis investigating the relationship for one role stressor and depression with applied corrections for the influence of the other role stressor was computed. The correction raised the coefficient from $r = 0.251$ to $r = 0.262$ (role ambiguity) respectively from $r = 0.281$ to $r = 0.293$ (role conflict). This change is relatively small but noteworthy. There are some assumptions as an explanation. First, it might indicate a slight suppression effect. One variable strengthens the relationship between the other role variable and depression by suppressing invalid variance in the predictor. This explanation seems unusual. Being uncorrelated with the criterion is often part of a suppressor variable`s definition. Conger (1974) revised this definition and introduced the term “reciprocal suppressors” (p. 42), which share substantial relationships with the criterion. Besides measuring invalid variance in the predictor, they also measure variance in the criterion. Thus, both role variables (role ambiguity and role conflict) may measure an independent part of the criterion and therefore suppress each other mutually.

Another influencing factor may lie in the methodology of the data collection. Data was collected with subjective measures. Subjects had to report the occurrence of role stress in the workplace. It may be that their answers contained some bias. If both role stressors are existent at the same time, it might be that the more prominent stressor is emphasized while filling out the questionnaire. This might result in inflated answers. Additionally the less prominent stressor might be diminished while answering the questionnaire. To investigate this possible factor, research using objective measures (e.g. job description, expert-rated assessment) would be needed.

Moderators

Including studies from so many backgrounds makes the present study more heterogeneous. This may be due to various reasons. We conducted moderator analyses for the type of occupational setting, the country where the data was gathered, and the year of publication. One of the moderators could be identified as statistically significant. We clustered the countries according to their geographic region. This corresponds to certain values that a culture shares and which therefore are present in the workplace. The moderating influence of the country agrees with an interesting study by Peterson et al. (1995). The authors researched role stresses on four macro level-based dimensions proposed by Hofstede (1994). They found that role stress varied the most by country.

The test of the occupational setting as a moderator did not reach statistical significance. Despite that fact it still appeared valuable nonetheless. Categories clustered studies that collected their data in similar work places (e.g. hospitals). The correlation coefficient for the categories varied to some extent (e.g. “hospital” resulted in a much higher correlation coefficient than “office”). A second approach would have been to cluster homogeneous groups according to the specific job types (e.g. “nurses” and “doctors” instead of “hospital”; “managers” and “clerical assistants” instead of “office”). Unfortunately, this approach was not successful because results were often reported for a mixed occupational group. The descriptive examination of our results still supported our assumption that the moderator existed in the structure of the company and the occupation itself. In a steep hierarchy, employees may have less firsthand feedback. More than one supervisor may have expectations regarding an employee’s role. This might lead to the presence of role conflict. A flat hierarchy may offer more room for employees to solve role issues as soon as they arise. Further, we assume that a steep hierarchy, such as we would expect in a hospital, relates to a lower level of role ambiguity. Peterson et al. (1995) found a negative relationship between

power distance and role ambiguity, which agrees with our assumption of hierarchy being a significant factor. Another possible explanation lies in the level of the job position. The higher it is set, the more role stress the employee may experience. Unfortunately, there was not enough information in the primary studies to test this assumption.

Further discussion

As previously noted, role stress has been reviewed and statistically related to health before. These studies focussed mainly on anxiety. A comparison of their findings to our findings results in smaller effect size estimates but larger overall sample sizes for the overall relationship of role stress and depression. Fisher and Gitelson (1983), Jackson and Schuler (1985), and Örtqvist and Wincent (2006) conducted meta-analyses researching the relationship between role stress and tension/anxiety. The first group of authors found relationships of $r = 0.19$ (role ambiguity) and $r = 0.28$ (role conflict). The others found higher numbers of $r = 0.47/r = 0.43$ and $r = 0.35/r = 0.43$, implying a stronger relationship between the variables. All three of the meta-analyses, however, comprised a much smaller sample size.

Co-morbidity between anxiety and depression is often present. People suffering from generalised anxiety disorder are more vulnerable in developing a depressive disorder later on. Their risk is about seven times higher than for people without generalised anxiety disorder (Jacobi, Vossen, & Wittchen, 2009). The authors also reanalysed data from four epidemiological studies focussing on secondary depression following anxiety. In three of these studies “more than 70% of the cases started with an initial anxiety symptomatology” (Jacobi et al., 2009; p. 442).

Cohen (1992) classified correlation coefficients according to their size. These guidelines are often used by clinical psychologists. We believe that they are not identically transferrable to the field of work and organisational psychology, where correlation

coefficients usually are smaller. Compared to other disciplines, the coefficients resulting from our analyses may only range from small to medium in size. For work and organisational psychology, they seem to be of an appreciable size, and they are still important in a practical sense (Frese, 1985).

Strengths

One strength of our work is our extensive literature search using multidisciplinary search engines. Doctoral dissertations and studies in their original languages were included. Authors often publish their significant results in English to provide accessibility to international scientists. In return, insignificant results are often published in the original language or are not published at all. Furthermore, significant results are published in more reputable journals (Easterbrook, Berlin, Gopalan, & Matthews, 1991). The problem of this bias can be reduced by including results published in the authors' original language, as well as by contacting authors and asking for results. Another strength is the sophisticated statistical integration. We verified our results with complementary sensitivity analyses and applied two different forms of integration. Through an extensive calculation, the data sources were tested for outliers. Role stress has been reviewed predominantly in regard to job performance or motivational outcomes. Meta-analyses concerning the relationship between role ambiguity/role conflict and a mental health variable are rare. Usually they are narrower in focus by targeting one mental health variable, mostly anxiety (Fisher & Gitelson, 1983; Jackson & Schuler, 1985; Örtqvist & Wincent, 2006). Comparing our total sample size to the smaller sample sizes of these analyses, we claim to deliver a comprehensive picture of existing research.

Limitations

Like all scientific research, our analysis also faces certain limitations. The results describe relationships between certain variables. This goes along with the meta-analyses on role ambiguity/role conflict mentioned above. It is rather descriptive, and the data does not allow us to claim causality. For a causal interpretation of the relationship, the primary studies would have had to follow a longitudinal design, but only one of them did. Nevertheless, this fact does not diminish our findings or their importance. Scientific research should be valuable for actual occupational settings. The overall finding of a relationship in the workplace – summarising data collected at workplaces – supports our aim of transferable results. An integration of longitudinal primary studies would face other issues, such as controlling for depression at baseline, or ensuring a homogeneous duration between the baseline and the follow-up. Further, other work and personal factors would be involved and have to be controlled for a causal interpretation.

Another limitation is that moderator analyses of organisational factors were difficult to realise. Often, studies did not provide enough information to build subgroups based on occupational variety. It would have been interesting to cluster the samples into different occupational groups. An attempt indicated that there would not have been enough samples per group to conduct a statistically meaningful analysis. Grouping results according to the questionnaires that were used could also reveal a moderator, because the wording of items may produce item bias and can help to explain variance (Harris and Bladen 1994).

Future Research

One issue we experienced during the coding process was the amount of given information regarding the study sample. In order to analyse the data more in-depth, it would have been conducive to have additional information. We recommend that future research

provide statistics about the type of organisation (e.g. private/public), the overall amount of years worked, and separate analyses for different occupational groups within the organisation. A comprehensive description of the study sample would ease future meta-analyses. The information could be used for detailed moderator analyses to reveal variables that influence the results.

Nearly all studies collected their data by using questionnaires. Often, the data of the "independent variable" role stress and the "dependent variable" depression was gathered at one point in time. Both circumstances can produce common method bias variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The separate collection of data could help this methodological problem. Further, we recommend to assess objectively at least one of the variables. We are aware that this approach is more time-consuming and often difficult to arrange. Job descriptions and behavioural monitoring could be a way to prevent this form of bias. If only the use of questionnaires is possible, items could be designed in a two-step response. The first step could be to ask for the "objective" amount of role stress, and the second step could be to ask for the subjective impairment that the person experiences.

Further, we appeal to authors to submit results of non-significant and/or small effects for publication, and to scientific journals to include such results in their publications. Results may be small or non-significant at a statistical level, but they may still be significant for practical purposes.

The flexibility of roles should also be kept in mind when researching their concepts. In an extensive review published by Grant and Hofmann (2011), the authors researched the expansion of roles and concluded that it is rather a result of interpersonal persuasion than self-chosen. Future research should take this finding into account. Developing new questionnaires should include scales that ask for the variability and a previous change in the job-holder's role.

The samples found in the primary studies consisted of employees, and none of them targeted entrepreneurs. This may be due to economic factors in gathering a good sample size. For us, focussing on the work environment of the owners of small- and medium-sized businesses, and self-employed people would represent the ideal sample population. They have to fulfil at least two roles at the same time: owner and staff member. Therefore we assume that conflicting roles arise and that they often have to switch between roles.

Implications

What can we learn from these results? The findings show that role stress is present in the workplace. It appears in separate facets and may affect an employee's health. Nowadays, work environments seem to be unstable. It is becoming more important to clarify roles in the workplace, as well as employees' tasks, responsibilities and goals. Managers should be trained to lead within a clear framework that eases employees' burden to fulfil their job position. The literature search showed that role stress appears throughout the world and is not unique to a certain country. The high prevalence of depression among employees, their suffering and the resulting costs provide additional reasons for companies to promote health in the workplace. Identifying crucial characteristics at work can be a first step toward an occupational health-preserving task design.

Notes

1. Excel spreadsheets of the SAMD-Statistic and the integration calculations are available upon request.

Conflict of interest

No conflict of interest exists.

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* References with an asterisk were included in preparative and meta-analytical techniques.

Appendix 1

- Insert table 9 here –

- Insert table 10 here –

- Insert table 11 here –

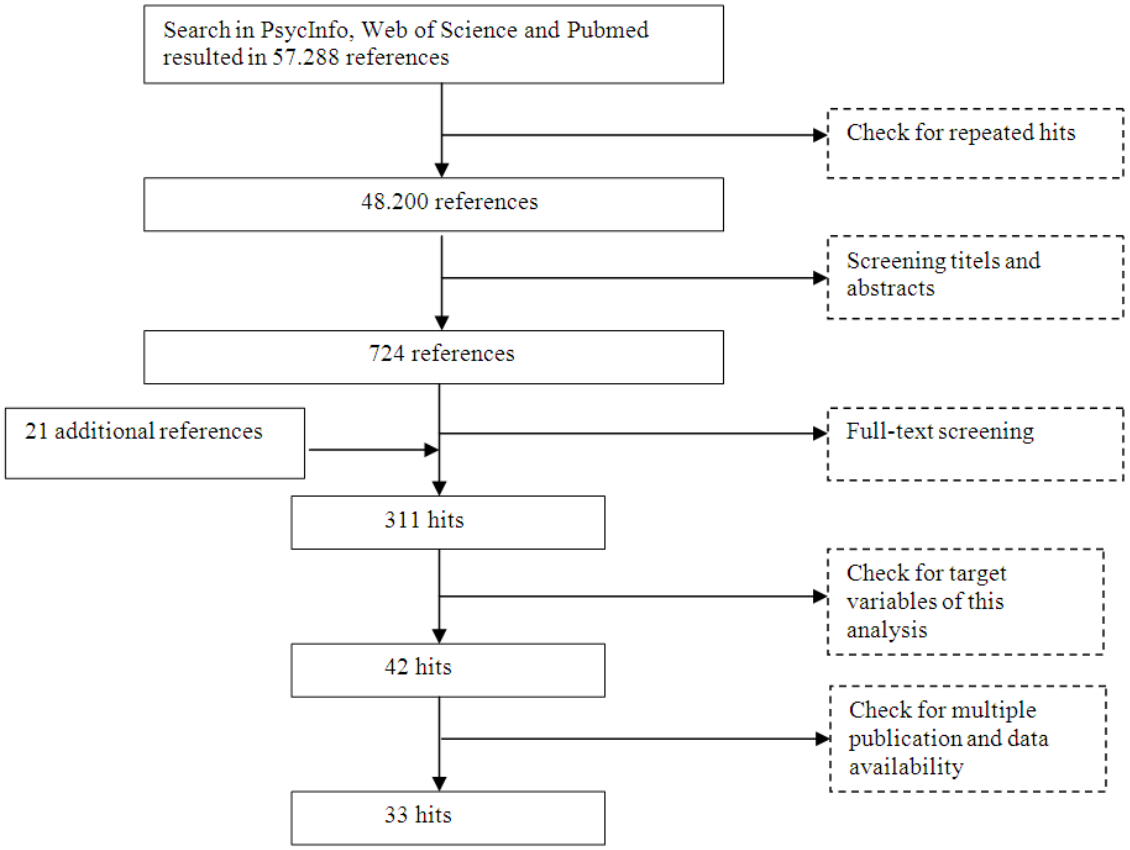

Figure 1. Flow chart of the literature search process.

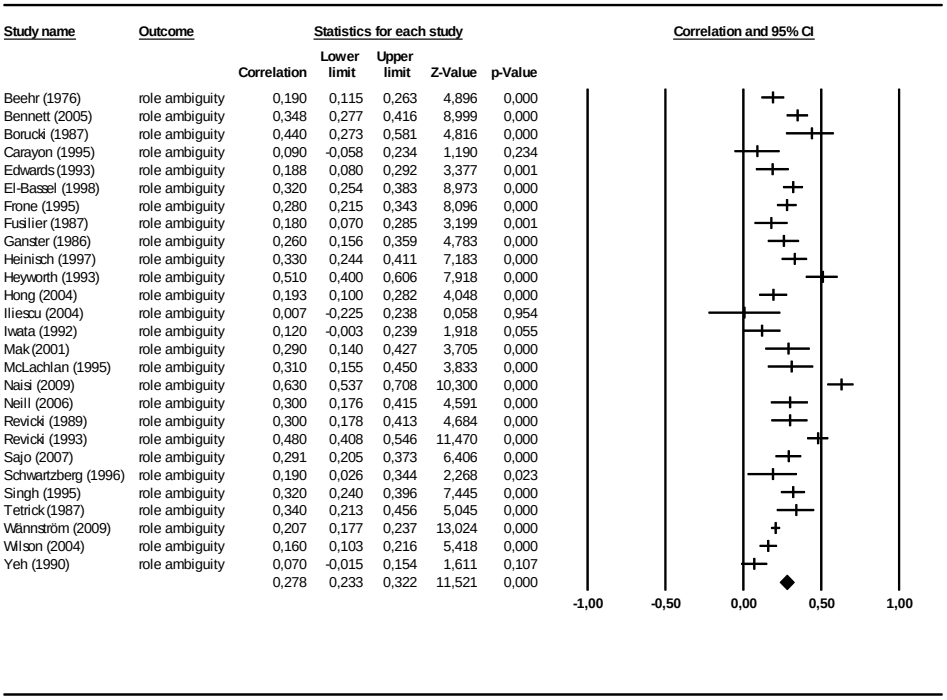

Figure 2. Forest plot of the relationship role ambiguity and depression in the random effects model.

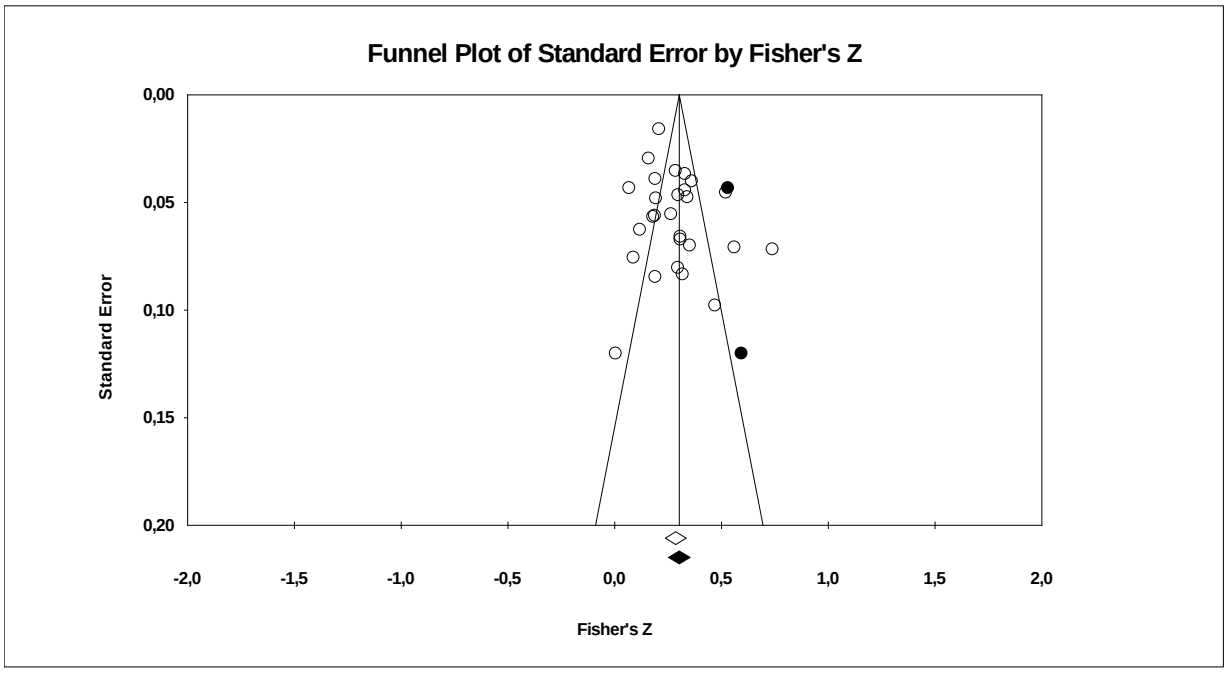

Figure 3. Funnel plot for role ambiguity using the Trim & Fill-technique (Duval & Tweedie, 2000).

Study name	Outcome	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Baba (1999)	role conflict	0,200	0,021	0,367	2,183	0,029
Borucki (1987)	role conflict	0,500	0,343	0,630	5,602	0,000
El-Bassel (1998)	role conflict	0,240	0,171	0,307	6,622	0,000
Fusilier (1987)	role conflict	0,210	0,101	0,314	3,747	0,000
Ganster (1986)	role conflict	0,210	0,104	0,312	3,831	0,000
Heinisch (1997)	role conflict	0,390	0,308	0,466	8,628	0,000
Hong (2004)	role conflict	0,376	0,292	0,454	8,190	0,000
Iliescu (2004)	role conflict	0,320	0,095	0,514	2,755	0,006
Iwata (1992)	role conflict	0,240	0,121	0,352	3,893	0,000
LaRocco (1980)	role conflict	0,288	0,215	0,358	7,439	0,000
Lowe (1988)	role conflict	0,390	0,336	0,442	12,950	0,000
Mak (2001)	role conflict	0,280	0,129	0,418	3,570	0,000
McLachlan (1995)	role conflict	0,330	0,177	0,467	4,100	0,000
Naisi (2009)	role conflict	-0,090	-0,227	0,051	-1,254	0,210
Oliver (2005)	role conflict	0,200	0,100	0,296	3,863	0,000
Pomaki (2007)	role conflict	0,280	0,155	0,396	4,296	0,000
Sajo (2007)	role conflict	0,379	0,298	0,455	8,527	0,000
Singh (1995)	role conflict	0,310	0,229	0,387	7,196	0,000
Tetrick (1987)	role conflict	0,350	0,224	0,464	5,207	0,000
Wännström (2009)	role conflict	0,266	0,236	0,295	16,901	0,000
		0,287	0,246	0,327	12,975	0,000

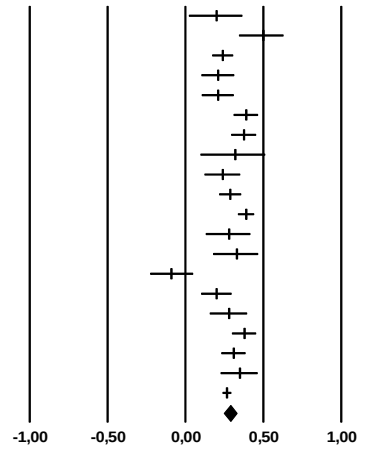

Figure 4. Forest plot of the relationship role conflict and depression in the random effects model.

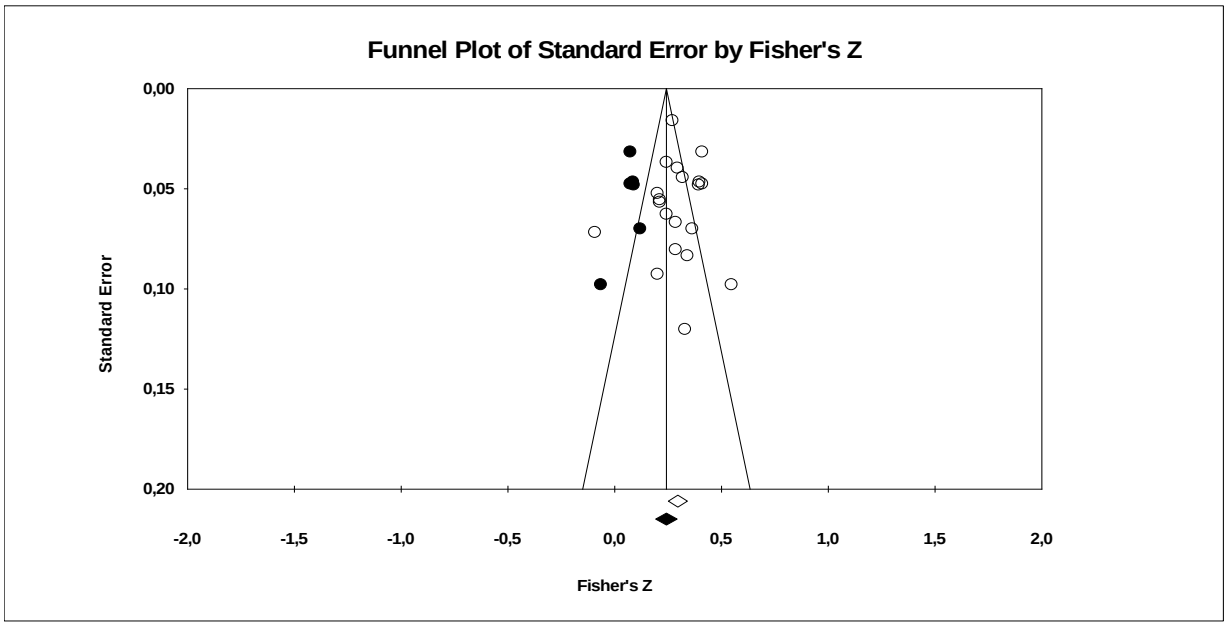

Figure 5. Funnel plot for role conflict using the Trim & Fill-technique (Duval & Tweedie, 2000).

TABLE 1

Key words in the literature search equation

Job characteristic	Depression
Work	Depress*
Work-related	Affective disorder
Job	Affective disorders
Job-related	Affective symptom
Occupation	Affective symptoms
Working condition	Mood disorder
Working conditions	Mood disorders
Uncertainty	Dysthymic disorder
Interdependence	Dysthymic disorders
Role conflict	Mental disorder
Role ambiguity	Mental disorders
	Mental illness
	Psychiatric disorder
	Psychiatric disorders
	Mental health

TABLE 2

Scientific journals included in the manual search

Journal name (in alphabetical order)	Language
European Journal of Work and Organizational Psychology	english
Journal of Affective Disorders	english
Journal of Applied Psychology	english
Journal of Occupational and Environmental Medicine	english
Journal of Occupational Health Psychology	english
Journal of Occupational and Organizational Psychology	english
Journal of Psychosomatic Research	english
Occupational and Environmental Medicine	english
Scandinavian Journal of Work, Environment and Health	english
Work & Stress	english
Zeitschrift für Arbeits- und Organisationspsychologie	german
Zeitschrift für Klinische Psychologie	german

TABLE 3

Summary of study characteristics

Study	N	*r (RA)*	*r (RC)*	Mean age	Occupation	Rating
Baba (1999)	119	x	0.20	37.3	nurses	> 5
Beehr (1976)	651	0.19	x	35.0	mixed	> 5
Bennett (2005)	617	0.35	x	39.6	medical staff	> 5
Borucki (1987)	107	0.44	0.50	44.1	Manager	< 5
Carayon (1995)	177	0.09	x	37.4	white collar	> 5
Edwards (1993)	318	0.19	x	x	mixed	<5
El-Bassel (1998)	735	0.32	0.24	41.0	social workers	> 5
Frone (1995)	195	0.28	x	39.9	mixed	> 5
Fusilier (1987)	312	0.18	0.21	34.2	police-/firemen	> 5
Ganster (1986)	326	0.26	0.21	32.5	mixed	> 5
Heinisch (1997)	442	0.33	0.39	37.0	mixed	> 5
Heyworth (1993)	201	0.51	x	42.2	medical staff	> 5
Hong (2004)	432	0.19	0.38	31.0	nurses	> 5
Iliescu (2004)	72	0.01	0.32	x	media	< 5
Iwata (1992)	256	0.12	0.24	34.0	white collar	> 5
LaRocco (1980)	633	x	0.29	x	mixed	> 5
Lowe (1988)	992	x	0.39	34.0	mixed	> 5
Mak (2001)	157	0.29	0.28	39.2	civil servants	> 5
McLachlan (1995)	146	0.31	0.33	39.8	nurses	> 5
Naisi (2009)	196	0.63	-0.09	x	various	> 5
Neill (2006)	223	0.30	x	39.8	clerical workers	> 5
Oliver (2005)	366	x	0.20	37.0	medical staff	> 5
Pomaki (2007)	226	x	0.28	44.7	medical doctors	> 5
Revicki (1989)	232	0.30	x	31.0	nurses	> 5
Revicki (1993)	484	0.48	x	30.0	medical staff	> 5
Sajo (2007)	460	0.29	0.38	43.6	firemen	> 5
Schwartzberg (1996)	142	0.19	x	x	mixed	> 5
Shimazu (2003)	4487	0.61	x	36.3	researchers	> 5
Singh (1995)	507	0.32	0.31	42.7	social workers	> 5
Tetrick (1987)	206	0.34	0.35	35.0	medical staff	< 5
Wännström (2009)	3848	0.21	0.27	x	mixed	> 5
Wilson (2004)	1130	0.16	x	x	salesperson	> 5

Yeh (1990)	531	0.07	x	32.8	nurses	< 5

Notes. Study = Name of study (abbreviated by first author); N = sample size; r (RA) = reported or transformed correlation coefficient role ambiguity – depression; r (RC) = reported or transformed correlation coefficient role conflict – depression

Table 4

Intercorrelations between role ambiguity and role conflict

Study	N	*r* (RA-RC)
Borucki (1987)	107	0.57
El-Bassel (1998)	735	0.13
Fusilier (1987)	312	0.32
Ganster (1986)	326	0.33
Heinisch (1997)	442	0.37
Iliescu (2004)	72	0.77
Mak (2001)	157	0.57
McLachlan (1995)	146	0.29
Singh (1995)	507	0.27
Tetrick (1987)	206	0.52
Wännström (2009)	3848	0.34

Notes. Study = Name of study (abbreviated by first author and year of publication); N = sample size; r (RA-RC) = reported correlation coefficient role ambiguity – role conflict

Table 5

Total intercorrelation between role ambiguity and role conflict

	Total *r* (RA-RC)
Number of studies	11
Total N	6858
CMA random r (95% CI)	0.404 (CI: 0.323 - 0.480)
CMA fixed r (95% CI)	0.335 (CI: 0.314 - 0.356)

Notes. CMA random r (95% CI) = point estimate and 95% confidence interval performed with the Hedges & Olkin random model approach; .CMA fixed = point estimate and 95% confidence interval performed with the Hedges & Hedges & Olkin fixed model approach; Total r (RA-RC) = estimated total correlation coefficient role ambiguity – role conflict

Table 6

Summary of meta-analytical results

	Role Ambiguity	Role Conflict
Number of studies	27	20
Total N	13703	10538
CMA random r (95% CI)	0.278 (CI: 0.233-0.322)	0.287 (CI: 0.246-0.327)
p-value	< .001	< .001
CMA fixed	0.253 (CI: 0.237-0.268)	0.288 (CI: 0.270-0.305)
HS bare bones	0.249 (CI: 0.210-0.288)	0.286 (CI: 0.251-0.321)
HS (icr)	0.279 (CI: 0.236-0.322)	0.318 (CI: 0.277-0.359)
Rating of 5 and above	0.290 (CI: 0.241-0.338)	0.275 (CI: 0.232-0.317)

Notes. CMA random r (95% CI) = point estimate and 95% confidence interval performed with the Hedges & Olkin random model approach; .CMA fixed = point estimate and 95% confidence interval performed with the Hedges & Olkin fixed model approach; HS bare bones = point estimate performed with the Hunter & Schmidt approach corrected for sample bias; HS (icr) = point estimate performed with the Hunter & Schmidt approach with individually corrected correlations.

Table 7

Meta-analytical results corrected for the influence of the other construct

	Role Ambiguity	Role Conflict
Number of studies	15	15
Total N	8202	8202
HS bare bones	0.251 (CI: 0.207-0.296)	0.281 (CI: 0.240-0.322)
HS (role)	0.262 (CI: 0.216-0.309)	0.293 (CI: 0.252-0.333)
HS (r_{yy})	0.286 (CI: 0.238-0.333)	0.317 (CI: 0.271-0.363)
HS (role and r_{yy})	0.299 (CI: 0.248-0.349)	0.332 (CI: 0.286-0.377)

Notes. HS bare bones = point estimate corrected for sample bias; HS (role) = point estimate corrected for the influence of the other construct, HS (r_{yy}) = point estimate corrected for unreliability in the criterion, HS (role and r_{yy}) = point estimate corrected for the influence of the other construct and unreliability in the criterion, CI = 95% confidence interval.

Table 8

Subgroup analyses

	Role Ambiguity			Role Conflict		
	k	*r*		k	*r*	
Occupational setting	**27**			**20**		
Hospital	8	0.322 (CI: 0.233-0.405)		6	0.293 (CI: 0.202-0.379)	
Office	4	0.170 (CI: 0.021-0.311)		3	0.347 (CI: 0.205-0.474)	
Police-/Firedept.	2	0.238 (CI: 0.054-0.406)		2	0.300 (CI: 0.152-0.435)	
Public	2	0.295 (CI: 0.102-0.467)		1	0.280 (CI: 0.036-0.493)	
Sales	1	0.160 (CI: -0.091-0.392)		0		
Social Workers	2	0.320 (CI: 0.148-0.473)		2	0.274 (CI: 0.131-0.407)	
Mixed	8	0.288 (CI: 0.200-0.372)		6	0.261 (CI: 0.178-0.341)	
Q/*df*/p			4.620/6/0.593			1.180/5/0.947
Country of study	**27**			**20**		
AUS, CAN, USA	16	0.266 (CI: 0.205-0.326)		10	0.303 (CI: 0.246-0.359)	
Europe	5	0.321 (CI: 0.208-0.425)		5	0.294 (CI: 0.208-0.376)	
Asian Region	4	0.171 (CI: 0.046-0.290)		3	0.338 (CI: 0238.-0.431)	
Other	2	0.473 (CI: 0.321-0.602)		2	0.109 (CI: -0.025-0.240)	
Q/*df*/p			9.874/3/0.020			8.651/3/0.034
Year of publication	**27**			**20**		
Up to 1990	7	0.245 (CI: 0.152-0.333)		6	0.318 (CI: 0.239-0.394)	
1991-2000	11	0.295 (CI: 0.224-0.363)		6	0.290 (CI: 0.208-0.368)	

2000-2009	9	0.283 (CI: 0.203-0.358)		8	0.259 (CI: 0.187-0.329)
Q/*df*/p			0.761/2/0.684		1.216/2/0.544

Notes. k = number of studies, *r* = point estimate, CI = 95% confidence interval, Q = Q-value, *df* = degrees of freedom, p = p-value.

APPENDIX 1

TABLE 9

Coding scheme Part 1: Study characteristics

Paragraph	code	Description
Target variables	Role Ambiguity	Assessment of role ambiguity (1=yes, 2=no)
	Role conflict	Assessment of role conflict (1=yes, 2=no)
	Depression	Assessment of depression (1=yes, 2=no)
General information	reference	Complete study reference
	Short reference name	First author (year)
	Year	year of publication
	Coder	Name of coder
	Study	Name, if the study was part of a research project
Sample	Sample size	total number
	Male	Total number of males, if given
	Female	Total number of females, if given
	Occupation	Occupation as named in the study
	Occupational group	Blue collar workers, white collar workers service workers, managers, civil servants, self-employed, mixed
	Country	Country, where the data was gathered

TABLE 10

Coding scheme Part 2: Results

Paragraph	code	Description
(Identifier)	(Short reference name)	(First author (year))
	Sample size	Sample size of subsample (total number)
	Age	Average age of subsample
Methodical Information	Instrument RA	Measurement of role ambiguity
	Instrument RC	Measurement of role conflict
	Instrument Dep	Measurement of depression
Statistical Information	Statistics	Given statistics, that can be used or converted
	Direction of results	Transformation needed (1 = yes, 2 = no)
	Effect size RA-Dep	Effect size role ambiguity-depression
	Controlled Effect Size RA-Dep	Effect size role ambiguity-depression controlled for confounding variables
	Design RA-Dep	Cross-sectional, longitudinal reporting of results
	Effect size RC-Dep	Effect size role conflict-depression
	Controlled Effect Size RC-Dep	Effect size role ambiguity-depression controlled for confounding variables
	Design RC-Dep	Cross-sectional, longitudinal reporting of results

TABLE 11

Coding scheme Part 3: Quality Rating

	code	Description
(Identifier)	(Short reference name)	(First author (year))
Methodical Information	Representative	Sample representative of organization studied
	Stratified	Sample stratified for gender, age or degree level
	Summary	Summary statistics for sample given
	Sample size	Sample size acceptable (min. 30 per group)
	Job characteristic	Measures of job characteristic acceptable (validity, reliability)
	Depression	Measures of depression acceptable (validity, reliability)
Statistical Information	Analysis	Appropriate analysis given
	Confounding variable	Adjustments made for confounding factors
	Response rate	Response rate adequate
	attrition	Attrition rate below 20% if longitudinal design

Notes. Identifier are written in brackets, because the variable was not part of the rating.

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The Job-demand-control-model and depression: a meta-analytical exploration of the relationships and the test of influencing factors

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ABSTRACT

Objectives: A growing number of studies researching the relationship of work-related factors and mental health have been published. Regarding depression as a precise outcome, reviews are present. Comprehensive meta-analyses are still missing. Further the use of older instruments measuring job-related factors at work is questionable because of the numerous changes that occur(ed) in the working environment of today.

Methods: A systematic search was conducted. Results yielded more than 50 000 hits that were carefully evaluated. Special emphasis was placed on validated, specific measures. 30 meta-analyses were conducted as the studies were grouped according to their design. Relationships regarding the measures of the job-demand-control model and depression were assessed. Methodological and statistical moderators were tested. The distribution of means that resulted from the use of the job-factors-measurements was examined. Further, a potential shift in the corresponding correlation coefficients of job demands and depression was investigated.

Results: In each analysis, negative job characteristics were positively related to depression. The highest overall relationship was found between isolated job-strain and depression in female samples (r=0.242). Longitudinal studies showed smaller effect size estimates than cross-sectional studies. A moderating influence was found for other methodological parameters, such as sample size. The answer pattern in the measurement of job-demands did not change with ascending years. The meta-analytical subgroup-analysis identified a rising shift in the relationship to depression.

Conclusion: The significant relationships substantiate the importance of health-preserving task-design. Further, measurements need to be revised to appropriately reflect changing working environments.

INTRODUCTION

During the last two decades job-related depression, a common and costly mental disorder, has become an emerging focus in occupational health research. Research claimed that „depression is the most serious psychological strain of work-stress“[1]. In Japan the term “karojisatsu” emerged, which describes work-related depression leading to suicide[2, 3].

A comprehensive literature search showed that in relation to depression especially the two currently most famous job-stress models - the Job-Demand Control Support Model (JDCSM)[4, 5] and the Effort-Reward Imbalance Model (ERIM)[6-8], - were predominantly examined. The JDCSM was developed in the second half of the 20th century, a time of far-reaching changes in the psychosocial work environment. According to the model, high psychological demands, low control and low social support at work are risk factors for the development of job strain, which leads to serious job-related diseases and disorders in the long run. By now, the JDCSM belongs to the most-examined models in occupational health research. Interestingly, already the first publication describing the model considered depression as an outcome[4].

What do we currently know about research evidence linking job characteristics to depression?

The following paragraph begins with an early and highly relevant milestone in this research area[9]. Subsequently, main findings of previous reviews targeting associations between job characteristics and depression and their limitations are described. Especially the latter will show that further reviews, or even better - methodically careful meta-analyses - , are highly needed.

(RE-)SETTING THE QUESTION

In the 1950ies one of the first comprehensive und well documented study addressing mental health at work was conducted[9]. The authors found that especially the use of abilities

and, to a somewhat lesser degree, income, work intensity, repetitiveness, human relations at work and opportunities for advancement contributed to the observed differences in mental health between workers. This work can be seen as pioneering research in the field of occupational mental health. However, during the following decades somatic diseases, such as musculoskeletal disorders or cardiovascular diseases, and their associated occupational risk factors were in the focus of research. It was not until the 80^{ies} of the previous century that there has been a growing body of studies on mental health at work.

In 1999 a comprehensive narrative review on research focusing on the JDCSM and its relationship with psychological well-being was published[10]. The authors included 63 studies that were published between 1979 and 1997 and used the vote-counting-method[11] for further analyses. The target variable was widely operationalized as general psychological well-being or job-related well-being. From eleven studies, that incorporated results on depression, eight showed significant findings.

In 2006, a detailed meta-analysis focusing on the relationship of job characteristics according to the JDCSM and ERIM and common mental disorders was published[12]. The authors included longitudinal studies between 1994 and 2005. Out of 11 studies that met the strict inclusion criteria, ten examined the JDCSM. The results confirmed prospective effects, especially for the combination of high psychological demands and low control (job strain) with regard to mental disorders. The review applied a rather general operationalization of mental disorders, i.e. did not exclusively concentrate on depression.

Two years later, in 2008, three reviews concerning job characteristics and depression were published[13-15]. One review[13] included 16 longitudinal studies published between 1966 and 2007. The statistical results corroborated significant associations between high job demands, low job control, low social support and high job strain with depression. Referring to the heterogeneity of the studies, the author argued against a statistical integration of the findings. Another review[14] was published in commission of the Danish National Board of

Industrial Injuries. Summarizing 14 studies published between 1960 and 2007, the authors found moderate but significant associations between high job demands/ low social support and depression, whereas the results regarding job control were contradictory. In regard to their analyses, the authors referred to a strong publication bias that weakened the evidence. Further, another review[15] included ten studies published between 1998 and 2008. In the summary of results (reminding of the vote-counting method) the author concluded that especially the combination of high job demands and low control as well as effort-reward-imbalance was associated with an elevated risk for depression.

Without denying the empirical and practical value of the previous reviews, the following limitations should be considered.

(a) Number of matches: Considering the search terms mentioned in the reviews the question came up, why the literature searches resulted in such comparatively small numbers of initial matches (Bonde: 3 507; Netterstrøm et al.: 3 416 und Siegrist: 15). In 2009 solely the combination of "work AND depression" obtained 6 032 matches in PsycInfo-database, 8 274 in the PubMed-database and 8 171 in the Web-of-Science-database. In our view these considerably higher numbers can not only be explained by the time duration between the end of the search periods of the previous reviews and our search, which was less than a year. Further, the two selected search terms do not represent the whole algorithms reported in the reviews, which would have to result in even more hits.

(b) Inclusion of studies: Two of the reviews[13, 14] reported similar inclusion criteria (search period 1960/66-2007, exclusively longitudinal studies, depressive disorders or symptoms as the dependent variable etc.). Remarkably, only seven of the overall 30 studies are included in both reviews. The inclusion criteria of the third review[15] were more restrictive (e.g. longitudinal studies 1998-2008, exclusively studies referring to the JDCSM or ERIM, odds ratios or risk ratios as statistical parameters) and thus, studies should be incorporated in

the other two reviews. However, we only found four studies of this latter review in the other two.

(c) Definition of job characteristics and quality of their measurement: The job characteristics accepted in two of the reviews[13, 14] show a wide range. Job demands and job control according to the JDCSM were considered just as widely applied and possibly less valid characteristics, such as downsizing, occupational traumatic events or violence at the workplace. Validated scales were not a prerequisite for inclusion. This seems astonishing since in matters of depression much stricter criteria were applied.

(d) Lack of non-English studies: All three reviews exclusively relied on peer-reviewed journals, published in the English language. Although an analysis[16] of 28 meta-analyses impressively showed that the exclusion of studies for linguistic reasons might be even more profound with regard to the validity of results than the often mentioned publication bias.

In a sum, previous research provides first and systematic overviews of the research evidence concerning job characteristics and depression. However, because of the above mentioned limitations they do not seem to represent a thorough picture of existent findings.

The present research question

This research pursues two different research questions. The first one targets a meta-analysis of the JDCSM-variables and their relation to depression. To do so, we apply a much more comprehensive review of the literature than the former authors did. This includes an extensive search for “grey literature” and unpublished studies. We expect a positive relationship for impairing job-characteristics and depression. Besides calculating the overall effect size estimate, we try to solve the problem of heterogeneity by concentrating on methodological and statistical influencing moderating factors.

The second research question focuses on the measurement of job demands and its transferability to the today`s work environment. The measurement of job-demands consists of a 4-point scale. It may be that the informative value of the scale shifts with economic and occupational changes. Due to the concentration of work and its environment in the past decade, we assume that the meaning of a certain value on that scale given today characterizes higher job demands on the worker than the same value given ten years ago. This might transfer into a higher relationship with depression. Thus, our aim is to investigate if reported means stay stable over the years but are accompanied by increasing correlation coefficients.

METHODS

For the preparation of this paper we respected the PRISMA-statement (http://www.prisma-statement.org/index.htm).

Inclusion/exclusion criteria

The definition of inclusion and exclusion criteria before extracting the primary data is important due to the objectivity of any meta-analysis. Studies had to meet the following criteria to be included in the analysis: (1) Specific components of the JDCSM had to be assessed. Global assessments of work stress or occupational position as a predictor were not considered. (2) The psychosocial job characteristics had to be assessed by the original or modified versions of the Job Content Questionnaire[17]. Studies that used translations of the questionnaire were also included. (3) Depression was explicitly measured as an outcome variable using a standardized questionnaire. Studies measuring psychological distress or mental morbidity in general were excluded. (4) Participants had to be employed at the time of the investigation and could be described as belonging to the 'normal' working population. Studies involving patients (except for depression) were excluded. Moreover, studies solely involving entrants were excluded, since we assume that a certain time of exposure to the job is required to investigate whether job characteristics constitute as risk factors for depression. (5) Studies were required to present sufficient statistical data for meta-analytical integration. (6) No language restriction was applied. The search was open to all languages.

Search for eligible studies

To identify all relevant primary studies and in an attempt to reduce the 'file drawer problem'[18], we conducted an extensive literature search using five different strategies. First we searched the databases PsycInfo, PubMed and Web of Science between 1965 and 2009 combining general as well as specific terms for job characteristics and depression. Table 1 shows the terms used for the literature search. Additionally, Psyndex was inspected using the

German translations of these search terms. Second, we conducted issue by issue searches of selected scientific journals to find potentially relevant studies that did not include one of the key words in the title. Third we manually studied reference lists of numerous empirical and theoretical articles to find references not identified through the other approaches. Fourth we inspected conference proceedings. Finally we contacted authors and asked for further results, if they did not report results appropriate for the analysis. Especially, with the help of the latter two strategies we attempted to identify unpublished studies.

Coding and Data Extraction

The literature search was part of a more comprehensive search and generated more than 50 000 hits. In a first step, title and abstract of each study were screened to identify studies that were dealing with a different research topic. In a second step, the remaining hits were thoroughly examined with regard to the inclusion criteria mentioned above. 56 studies met the inclusion criteria and thus constitute the pool of eligible studies. Nine studies represented multiple research reports existed, based on same samples. Instead of selecting one report for the analysis we aggregated their results according to standard formulas[19]. Thus we extracted the most information possible by still keeping the weight for the integration at one. A review protocol can be made available from the author.

Relevant aspects in terms of content and methods were retrieved from each study using a structured coding scheme. The scheme consisted of two parts: part 1 included general study characteristics; part 2 included the reported variables, statistical analyses and results. The full version can be requested from the author. To assure a good quality of the coding, all studies were coded independently by two authors. No average coding was used ever. Discrepancies were discussed until an agreement was reached. Odds-ratios, correlation coefficients or R^2s were extracted from the primary studies. If a study was identified that assessed the target

variables of this paper, but did not report their findings, we tried to contact the author and asked for these results.

Statistical analyses

The first research question was to conduct a comprehensive meta-analysis and thus analyze the relationship of the JDCSM-variables and depression. The data was integrated with a meta-analytical approach based on standardized correlation coefficients[20, 21] used in the software "Comprehensive Meta-Analysis 2"[22]. Preliminary hand-made calculations were supported by SPSS-20 as well as Microsoft Excel. We chose the random-effects-model for integration since it provides a more conservative integration.

Study populations were grouped into three categories (men, women, mixed sample). We extracted the most data possible. Only some studies reported data for all three categories. The majority of studies reported data only either for the total sample or for men and women. If so, we used the data for the integration of the two subsets and afterwards combined them for the total sample calculations. For heterogeneity purposes we computed the Q-value as well as the I^2-statistic[23]. We allowed longitudinal as well as cross-sectional studies for the integration. These studies were often operationalized diversely. Therefore we first separated the analyses for these subsets. In a next step we investigated the overall effect size by using those operationalizations together in the analyses. So our analyses resulted in a 3x3 paradigm for job-demand, control and job-strain. Because of the low number of studies that reported data on iso-strain, only the combination of longitudinal and cross-sectional studies was used for the meta-analytical computation was for this variable. Thus, we computed 30 independent meta-analyses to yield the overall correlation coefficient for the different operationalizations.

While coding we noticed some differences in effect sizes in relation to the study design and statistics. A first descriptive analysis of the data showed obvious heterogeneity between the studies concerning study size and associated results. Because of the descriptive findings

we entered the sample size as a potential moderator in the analysis. Odds-Ratios and correlation coefficients are easily transformable into each other. But due to the statistical analyses that underlie these statistics we expected heterogeneity between studies that reported Odds-Ratios vs. studies that reported correlation coefficients. Further we noticed that a lot of studies adjusted their results for influencing factors (e.g. age) whereas others did not. We hypothesized that the adjustments made reasonable impact on the size of the correlation coefficient. Thus, we conducted several subgroup analyses by dividing the analyses by sample size, statistical parameter and adjustments that were made. In this context, the overall correlation coefficient was not of primary interest. More important though was the influence of this moderator variable on the extracted primary data. Thus, these additional analyses were done by using the subgroup as the level of analysis.

Because of our extensive literature search we did not expect publication bias. Nevertheless we investigated a potential publication bias in our data by the use of a funnel plot. Additionally we computed the number of missing studies using the trim-and-fill-procedure[24].

The second research question targeted the measurement of job demands. Two subsequent steps were done: First, we investigated if means dispersed equally in size over the years. Therefore we adapted the SAMD-statistic[25] and computed eigenvalues in a self-computed Microsoft-excel spread sheet, which we arranged by ascending year. Further, we used the boxplot-procedure in SPSS-20 as a descriptive measure for potential outliers. Finally, we calculated a t-Test for independent subgroups, grouping the studies in a) published until the year 2001 and b) published past 2001.

RESULTS

Of our pool of eligible studies, 32 assessed the relationship between job demands according to the JDCSM and depression. Control was found in 31 studies. The analysis of job strain was reported by 20 studies. We also reached some studies that reported the relationship of iso-strain and depression, from which we could derive appropriate results of 3. The funnel-plots of the variables can be found in Figure 1.

The expected relationship for job demands, job- strain and iso-strain was that a higher level of the respective job characteristic would be associated with a higher level of depression. For control, the expected relationship was that low control would be associated with high depression. For all variables, differences in regard to the study design were investigated. Table 2 shows the summary of the meta-analytical results and parameters for heterogeneity, separated for study design and gender.

All variables were correlated in the expected direction. Job-strain and iso-strain reported higher estimates than control and job demands did. The aggregation of cross-sectional studies resulted in higher effect-sizes than the aggregation of longitudinal studies. The separate analysis of male and female samples mostly resulted in higher correlation coefficients, and therefore a higher relationship, for the male samples. An exception demonstrates the relationship of iso-strain and depression, in which the aggregation of female samples results in a higher coefficient than the one of male samples.

The Q-value marked significance for all of the calculations of job demand. For control and job-strain only some sample aggregations resulted in a significant Q-value. Iso-strain showed a homogeneous picture, none of the Q-values reached statistical significance. The computed I^2-valued for iso-strain appeared small for all aggregations. For the job demand and control aggregations the parameter showed small to moderate size for the female calculations. Small sizes were also reached for the male calculations in the job-strain analysis.

Further, the influence of the underlying statistical methods was tested. Two moderator variables ("Statistical analysis" and "Data adjustments") were extracted. In the job-strain-analysis, both moderators (OR vs. r; adjusted vs. non-adjusted), resulted in a significant Q-value for most of the groups. The influence on the other variables differed. The results of the following subgroup analyses are shown in Table 3 and Table 4.

The investigation of the sample size as a moderator revealed significant influence throughout the variables. For job demand ($Q=6.7; p<0.05$), control ($Q=5.8; p<0.05$) and for job-strain ($Q=12.8; p<0.001$), the subgroup of samples that incorporated more than 4500 study participants showed smaller coefficients than the subgroup of samples with less than 4500 persons.

Means, standard deviations and correlation coefficients of nineteen studies could be retrieved from the publication or from correspondence with the author. The dispersion of the means for job demands was expected to stay consistent over ascending years. The descriptive investigation with boxplots and the computed dispersions in Microsoft Excel affirmed this assumption (range: 2.20-3.38). A final t-test of the two groups (up to 2001; later than 2001) showed no significance (p = .498). The following meta-analytical subgroup-analysis resulted in a significant Q-value (Q = 4.1; p<0.05) and showed a higher correlation coefficient for studies published after 2001 (r = .176) than for studies published before that year (r = .093).

DISCUSSION

The research question of this paper was twofold. First, meta-analyses of the relationships of the JDCSM-variables were conducted and the potential influences of moderating variables were investigated. Second, the appropriate use of the job demand-measurement was questioned.

Results

Our meta-analytical computations included an appreciate number of studies. The final database that could be used for the integration incorporated 32 studies (53 independent subgroups) that assessed job demands. Control was assessed by 31 studies (51 independent subgroups), job-strain by 20 studies (33 independent subgroups) and iso-strain by 3 studies (7 independent subgroups). These studies represented a huge amount of individuals (job demand: N = 109 823, control: N = 107 797, job-strain: N = 49 078, iso-strain: N = 2 724) from a variety of countries, occupations, and industrial sectors.

Meta-Analysis

The results of the meta-analyses showed a differentiated picture about existing research. The relationships of the four variables and depression appeared in different sizes. All of them showed statistical significance. The highest effect size estimate was found for the relationship of iso-strain and depression in the female sample (r = 0.242). This result is a result on its own, but it becomes even more interesting, when comparing it to the results of the relationship of the job-strain-variable. For job-strain, the overall correlation-coefficient of male and female samples is much alike. Iso-strain, considered as job-strain that has developed and maintains under isolated working conditions, seems to have predominantly impact on women and their development of a depression rather than on men.

Guidelines[26] for the classification of effect sizes are not appropriately transferrable to the field of work and organizational psychology. Despite that fact, that research in this field shows smaller correlation coefficients, those results are still important and useful in a practical sense[27]. In our analyses, longitudinal studies seem to report smaller correlation coefficients than cross-sectional studies do. This might be a matter of time and prolonged exposure to impairing work places. Further, almost all longitudinal studies adjusted their data for confounding variables, such as age, gender, whereas a lot of cross-sectional studies did not. This adds to a smaller effect size estimates for the longitudinal studies.

Heterogeneity was assessed for all of the variables and each of the 30 meta-analytical computations. For job demands and control the I^2-value resulted in lower values for the female samples, reflecting less difference between studies. This picture differed from the assessment of heterogeneity for job-strain and iso-strain. Male samples were accompanied by I^2-values of 0.0 for job-strain. In the meta-analytical computation of iso-strain the Q-value remained insignificant and the I^2-value resulted in 0.0 for both samples. This strengthens the informative value of the relationship of iso-strain and depression, which resulted in the highest effect size estimate of the four variables and at the same time providing the best heterogeneity results.

Included studies showed a wide range of sample size. The smallest sample had around 100 persons and the biggest sample incorporated more than 13 000 individuals. Smaller sample sizes are associated with higher correlation coefficients. In return, due to the underlying meta-analytical calculations, lower correlation coefficients of the bigger samples may rule out results that are provided by smaller samples. Thus, we conducted subgroup analyses for job demands, control and job-strain (not enough studies existed for a meaningful analysis of iso-strain). Our assumption, that bigger sample sizes show smaller total point estimates were affirmed for all three variables. Obstacles that also may have influenced the heterogeneity in our data are described in the next paragraph.

Obstacles during data management

We carefully assessed the primary studies according to eligibility. When a study was considered eligible and thus was included in the study pool, the next step was to extract the data. Difficulties arose in regard to the way the primary studies calculated and presented their data. The first obvious extra work resulted from the declared study design. Longitudinal studies did not always report longitudinal results. Sometimes only baseline data was reported. If a longitudinal study reported data for more than one time-point, sometimes results had been given separate and therefore cross-sectional. The separation of longitudinal study design and longitudinal results was very time-consuming, but necessary for accurate computations. Thus, we based our calculations on the design of results and not on the design of the study.

Another important issue was the computation of control in the primary studies. Control (decision latitude) consists of two subscales: skill discretion and decision authority. Studies either reported the combined estimate of the two subscales or the estimate of the decision authority subscale.

Further, the computation of the odds-ratios in the primary studies was conducted different. A few studies divided the data by percentiles and calculating ORs with the use of this classification. Other studies used other classifications. The computation of ORs is an issue that has to be kept in mind. For high-job-strain, the majority of studies used the low-strain-cluster as the reference group. But some studies incorporated the passive-job-cluster as a reference. We could not solve this issue of differences in the computation of results of the primary studies. It has to be kept in mind when interpreting and evaluating our meta-analytical results, because there might be an influence and it also adds to heterogeneity in the data.

We included separate computations for adjusted and unadjusted data in our analyses. While coding studies that adjusted for confounding variables, we realized that the given

information about the amount of adjustment differed enormously. A few studies said that they adjusted their data, but did not tell which variables they considered confounding. Most studies reported what variables they adjusted for. Some of them adjusted only for age and gender. Others additionally adjusted for a variety of occupational factors. Other studies also adjusted for variables, such as anxiety or even burn-out, which highly relates to depression.

Longitudinal studies often controlled for baseline depression, but not all did. The time-period between the follow-ups also differed. In our analysis we integrated the highest adjusted result for age, gender and occupational factors, if present, but tried to avoid the inclusion of data that adjusted for anxiety or burn-out. In further research, distinctions for the levels of adjustment made would be clarifying. Unfortunately, this approach was not meaningful with the given data in the primary studies.

Transferability of measurements

For our second research question data could be retrieved from nineteen of the thirty-two studies that reported job demands. The measures that were computed for the assessment of the variability of means showed that answers given up to 2001 are in accordance with answers given past 2001. Thus, the answer pattern has not changed over the years. However, the subsequent subgroup analysis revealed a higher relationship for studies published after 2001. The year 2001 was chosen as a threshold, because of the critical economic changes that occurred during this time. Whereas control is more easily to assess, surveying job demands brings difficulties with it. Two examples may display these obstacles. First, the subjective representation of job demands and its incorporated features are more diverse than for control. This problem might be solved with the objective assessment of the variable. Studies gathering data using a validated objective measurement tool are rare and research is needed. Second, there may be a ceiling effect. The impact of job demands on the worker might be twofold. First, it acts as a work factor. Second it might also act as a factor which results from the work,

because individuals are only able report it from the point when they have already experienced the influence of it. The results support our assumption. Due to the tensed work-environment nowadays, job demands affect the well-being of individuals more strongly than they did several years ago. The probability of developing work-related depression seems to rise over the years. The work-environment has changed; a change that is not represented by the available measurements.

Strengths and weaknesses of our analyses

Compared with past reviews in this research area, the meta-analytical computations reported in this paper incorporate a much larger amount of primary studies. We did an extensive literature search and a careful and precise data extraction. Publication-bias was not present for job demand and control. The trim-and-fill-procedure imputed only five studies for job-strain, which can still be seen as a moderate result. For isolated-strain, two studies were imputed. Compared to the pool of three studies, this result indicates the presence of publication bias, which seems reasonable due to the small number of included studies. None of the former reviews conducted comprehensive meta-analytical computation on that specific topic.

Despite the thirty meta-analytical computations, we accomplished even more subgroup analyses to investigate the cause of heterogeneity. Moderating influence was brought forward. One might argue that we have been too strict on the focus of validated scales, but to assure a good quality of the included studies, we also excluded scales, that consisted of one-item-measures. Further, our meta-analysis is the first one that also included cross-sectional studies. Primary studies were of longitudinal and cross-sectional design. This brings up the question of causality. While results of longitudinal study designs can be used for a causal interpretation, this approach cannot be easily adopted for cross-sectional study designs, which are merely observational. Despite this fact we claim that the findings are still valuable for the

understanding of work places and the relation to the workers` health. Even longitudinal studies that adjusted for confounding factors showed a relationship of the four variables and the occurrence of depression. Considering the working population and the amount of hours that an individual spends at work at about 220 days per year, the importance of further research on this topic and the prevention and intervention of depression at the workplace becomes obvious.

CONCLUSION

The comprehensive meta-analytical computations in this paper showed significant relationships between the JDCSM-variables and depression. The highest effect size estimate was found for iso-strain, which ascribes the concept of social support at the workplace a notably role. It was shown that the sizes of correlation coefficients are related to computational techniques as well as to sample size. Besides the statistical significance of the estimates, the practical significance may appear even more important in the occupational setting. Work, being a dominant part of people`s life, should be designed in line with good health of the employees. Organizations should modify their working conditions to prevent illness resulting from the workplace. Further, intervention strategies need to be included in workplace health promotion. Tensed work environments, steadily rising working hours, the restructuring of organizations, temporary employment and so on constitute risk factors for the well-being and health of employees. Thus, measurement instruments, capturing psychosocial work characteristics at the workplace need to be adapted to these new situations.

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TABLE 1

Key words in the literature search equation

Job characteristic	Depression
Work	Depress*
Work-related	Affective disorder
Job	Affective disorders
Job-related	Affective symptom
Occupation	Affective symptoms
Working condition	Mood disorder
Working conditions	Mood disorders
time-pressure	Dysthymic disorder
complexity	Dysthymic disorders
demand and control	Mental disorder
demand and control and support	Mental disorders
decision latitude	Mental illness
decision authority	Psychiatric disorder
skill discretion	Psychiatric disorders
autonomy	Mental health

TABLE 2

Summary of meta-analytical results

Outcome	Study design	(sub)sample	k	point estimate (CI)	Heterogeneity	
					Q; p	I^2
demand	longitudinal					
		total	8	0.106 (0.063;0.148)	131.7; p<0.001	94.7
		men	4	0.088 (0.024;0.151)	58.3; p<0.001	94.9
		women	4	0.096 (0.050;0.142)	11.6; p<0.001	74.1
	cross-sectional					
		total	21	0.172 (0.135;0.208)	356.9; p<0.001	94.4
		men	7	0.159 (0.089;0.228)	78.9; p<0.001	92.4
		women	5	0.117 (0.068;0.165)	9.929; p<0.05	59.7
	combined					
		total	25	0.154 (0.125;0.184)	558.8; p<0.001	95.7
		men	9	0.139 (0.090;0.188)	153.3; p<0.001	94.7
		women	8	0.108 (0.075;0.141)	23.2; p<0.05	69.8
control	longitudinal					
		total	8	-0.113 (-0.162;-0.064)	158.4; p<0.001	95.6
		men	4	-0.103 (-0.150;-0.055)	32.5. p<0.001	90.8
		women	4	-0.100 (-0.126;-0.074)	3.8; p=0.279	21.8
	cross-sectional					
		total	19	-0.193 (-0.221; -0.166)	158.2; p<0.001	88.6

continued. overleaf

Table 2 (cont.)

Outcome	*Study design*	*(sub)sample*	*k*	*point estimate (CI)*	*Heterogeneity*	
					Q; p	I^2
		men	7	-0.175 (-0.228; -0.120)	44.7; p<0.001	86.6
		women	5	-0.128 (-0.144; -0.111)	3.3; p=0.512	0.0
	combined					
		total	24	-0.173 (-0.201; -0.145)	465.4; p<0.001	95.1
		men	9	-0.138 (-0.178; -0.098)	99.3; p<0.001	91.9
		women	8	-0.114 (-0.133; -0.095)	9.6; p<0.001	27.2
job strain	longitudinal					
		total	4	0.136 (0.0779; 0.191)	11.6; p=0.009	74.2
		men	2	0.145 (0.040; 0.246)	0.258; p=0.612	0.0
		women	2	0.098 (-0.011; 0.204)	1.017; p=0.313	1.7
	cross-sectional					
		total	13	0.263 (0.193; 0.331)	146.4; p<0.001	91.8
		men	3	0.196 (0.179; 0.212)	2.0; p=0.375	0.0
		women	3	0.198 (0.020; 0.364)	25.6; p<0.001	92.2
	combined					
		total	17	0.231 (0.183; 0.278)	166.1; p<0.001	90.4
		men	5	0.197 (0.178; 0.210)	3.1. p=0.533	0.0
		women	5	0.160 (0.046; 0.271)	26.7; p<0.001	85.0

continued. overleaf

Table 2 (cont.)

Outcome	*Study design*	*(sub)sample*	*k*	*point estimate (CI)*	*Heterogeneity*	
					Q; p	I^2
iso strain	combined					
		total	3	0.174 (0.123; 0.225)	2.6; p=0.270	23.7
		men	2	0.161 (0.071; 0.249)	0.6; p=0.456	0.0
		women	2	0.242 (0.107; 0.368)	0.1; p=0.904	0.0

Notes. k = number of studies, CI = 95% confidence interval, Q = Q-value, p = p-value, I^2= I^2-statistic.

TABLE 3

Moderator analyses for moderator variable “Statistical analysis”

			Odds-Ratio reported		correlation coefficient reported		
Outcome	Subgroup	k_{total}	k	point estimate	k	point estimate	Q; p
demand							
	both data designs, men only	11	5	0.128 (0.080; 0.176)	6	0.116 (0.064; 0.167)	0.1; p=0.730
	both data designs, women only	9	5	0.107 (0.066; 0.148)	4	0.102 (0.049; 0.155)	0.1; p=0.877
	longitudinal data only, both genders	17	12	0.103 (0.071; 0.135)	5	0.101 (0.052; 0.150)	0.1; p=0.953
	cross-sectional data only, both	36	13	0.127 (0.084; 0.169)	23	0.180 (0.147; 0.213)	3.8; p=0.051
	both data designs, both genders	53	25	0.114 (0.087; 0.141)	28	0.162 (0.135; 0.189)	6.1; p<0.05
control							
	both data designs, men only	11	5	-0.123 (-0.172; -0.073)	6	-0.164 (-0.215; -0.111)	1.2; p= 0.265
	both data designs, women only	9	5	-0.111 (-0.138; -0.084)	4	-0.119 (-0.157; -0.081)	0.1; p=0.735
	longitudinal data only, both genders	17	13	-0.089 (-0.120; -0.057)	4	-0.136 (-0.192; -0.079)	2.1; p=0.150
	cross-sectional data only, both	34	12	-0.197 (-0.228; -0.166)	22	-0.178 (-0.204; -0.151)	0.9; p=0.353
	both data designs, both genders	51	25	-0.139 (-0.165; -0.114)	26	-0.169 (-0.196; -0.141)	2,4; p=0.123
job-strain							
	both data designs, men only	6	4	0.164 (0.094; 0.232)	2	0.246 (0.172; 0.316)	2.6; p=0.109
	both data designs, women only	6	4	0.081 (0.018; 0.144)	2	0.279 (0.198; 0.355)	14.2; p<0.001
	longitudinal data only, both genders	8	8	0.130 (0.088; 0.171)			
	cross-sectional data only, both	25	16	0.186 (0.147; 0.224)	9	0.309 (0.263; 0.354)	16.1, p<0.001
	both data designs, both genders	33	24	0.166 (0.136; 0.195)	9	0.309 (0.265; 0.352)	27.2, p<0.001

Notes. k_{total} = number of total studies in the analysis, k = number of studies in specific subgroup, CI = 95% confidence interval, Q = Q-value, p = p-value.

TABLE 4

Moderator analyses for moderator variable “Data adjustments”

			adjusted		unadjusted		
Outcome	Subgroup	k_{total}	k	point estimate	k	point estimate	Q; p
demand							
	both data designs, men only	15	8	0.120 (0.083; 0.157)	7	0.106 (0.061; 0.151)	0.2; p=0.636
	both data designs, women only	9	5	0.107 (0.066; 0.148)	4	0.102 (0.049; 0.155)	0.1; p=0.877
	longitudinal data only, both genders	17	12	0.092 (0.059; 0.125)	5	0.127 (0.075; 0.177)	1.2; p=0.273
	cross-sectional data only, both genders	36	13	0.110 (0.067; 0.153)	23	0.189 (0.156; 0.221)	8.2; p<0.05
	both data designs, both genders	53	25	0.101 (0.073; 0.128)	28	0.175 (0.148; 0.202)	14.1; p<0.001
control							
	both data designs, men only	11	5	-0.123 (-0.172; -0.073)	6	-0.164(-0.215; -0.111)	1.2; p=0.265
	both data designs, women only	9	5	-0.111 (-0.138; -0.084)	4	-0.119 (-0.157; -0.081)	0.1; p=0.735
	longitudinal data only, both genders	17	13	-0.092 (-0.126; -0.058)	4	-0.127 (-0.187; -0.067)	1.0; p=0.313
	cross-sectional data only, both genders	34	12	-0.171 (-0.202; -0.141)	22	-0.195 (-0.220; -0.170)	1.3; p=0.247
	both data designs, both genders	51	25	-0.129 (-0.155; -0.103)	26	-0.180 (-0.208; -0.153)	7.112, p<0.05
job-strain							
	both data designs, men only	6	4	0.164 (0.094; 0.232)	2	0.246 (0.172; 0.316)	2,6; p=0.109
	both data designs, women only	6	4	0.081 (0.018; 0.144)	2	0.279 (0.198; 0.355)	14.2; p<0.001
	longitudinal data only, both genders	8	8	0.130 (0.088; 0.172)			
	cross-sectional data only, both genders	25	15	0.184 (0.145; 0.222)	10	0.309 (0.264; 0.354)	16.9; p<0.001
	both data designs, both genders	33	23	0.164 (0.135; 0.194)	10	0.309 (0.265; 0.352)	28,4, p<0.001

Notes. k_{total} = number of total studies in the analysis, k = number of studies in specific subgroup, CI = 95% confidence interval, Q = Q-value, p = p-value.

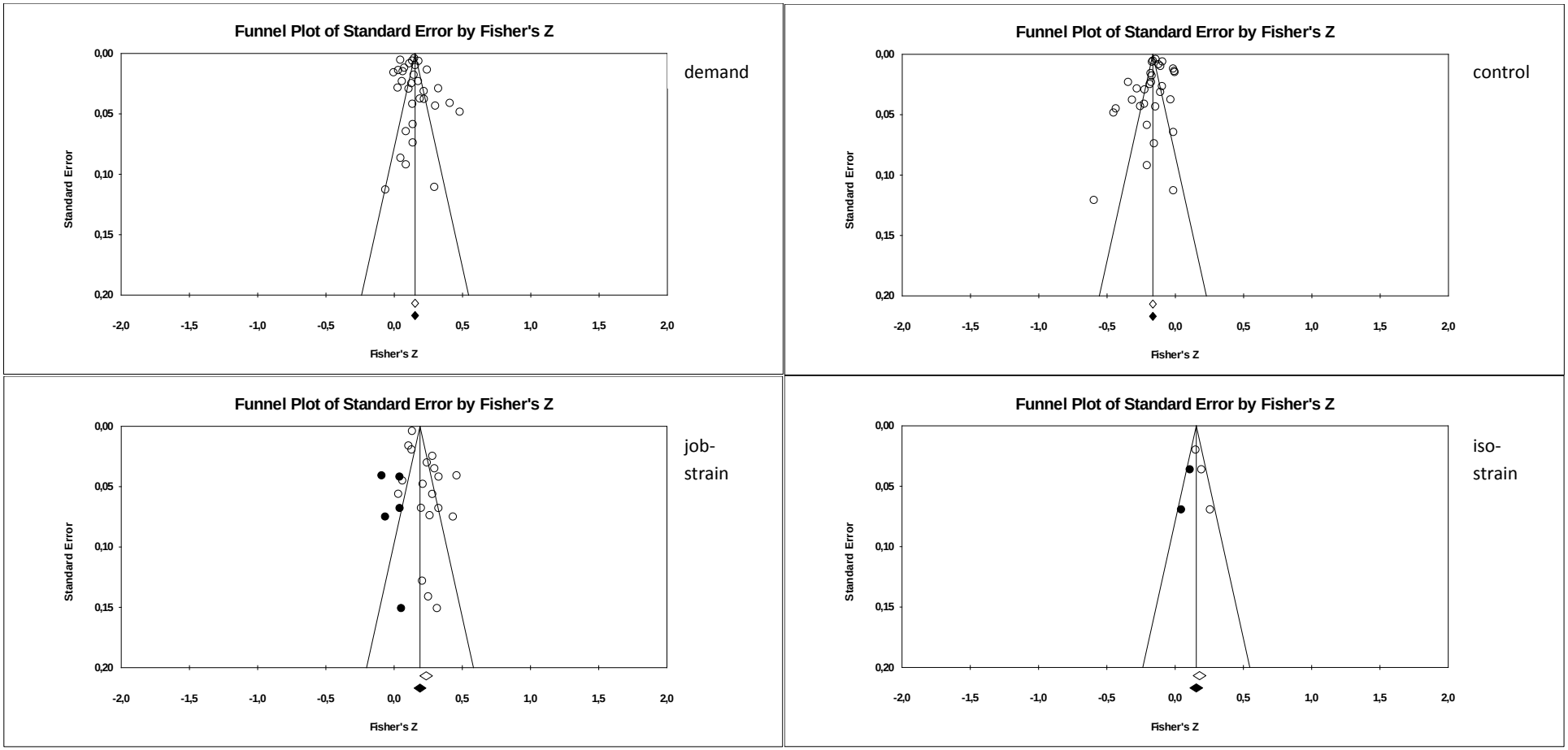

Figure 1. Funnel plots using the Trim & Fill-technique (Duval & Tweedie, 2000).

Full search strategy used in the database PubMed

Search (work OR work-related OR job OR job-related OR occupation* OR “workload” OR “work load” OR “working conditions” OR "work hours" OR "working hours" OR “time pressure” OR “complexity” OR “uncertainty” OR “task variety” OR “interdependence” OR "role conflict" OR "role ambiguity" OR “role overload” OR (demand AND control) OR (demand AND control AND support) OR "decision latitude" OR “decision authority” OR “skill discretion” OR (effort AND reward) OR “gratification” OR “skill variety” OR “task identity” OR “autonomy” OR “task significance” OR “feedback”) AND (depress* OR "affective disorder" OR "affective disorders" OR "affective symptoms" OR "mood disorder" OR "mood disorders" OR "dysthymic disorder" OR "dysthymic disorders" OR "mental disorder" OR "mental disorders" OR "mental illness" OR "psychiatric disorder" OR "psychiatric disorders" OR "mental health") Field: Text Word, Limits: Publication Date from 2008/11/01 to 2009/07/01, Humans, All Adult: 19+ years, Adolescent: 13-18 years, Adult: 19-44 years, Middle Aged: 45-64 years, Middle Aged + Aged: 45+ years

Abstract

On the one hand depressive disorders lead to substantial impairment in the life of the people concerned. On the other hand they lead to tremendous costs for businesses and society. The Global Burden of Disease Study (WHO, 2008) predicts that depressive disorders will be the second-leading cause of disease burden in 2020 (Murray & Lopez, 1997) and the leading cause by 2030 (WHO, 2008).

While there has been a growing number on primary research on depression in the last two decades, reviews are still rare. A few reviews exist that analyze the relationships of specific work characteristics and depression (Tennant, 2001; Bonde, 2008; Netterstrøm et al., 2008; Siegrist, 2008; van der Doef & Maes, 1999). A first meta-analysis analyzes job characteristics and their relationship to the wider conception of common-mental-disorders (Stansfeld & Candy, 2006). A comprehensive meta-analysis that relates job characteristics at the workplace to depression is not present.

This present work evaluates if specific work characteristics exist that possess relationships to depression and might be acting as promoters for developing a depression. This was done against the background of potential prevention at the workplace. The aim was to conduct meta-analyses that analyze the relationship of job characteristics and depression. To do so, present primary studies were integrated with meta-analytical techniques. Furthermore the concepts were evaluated in order to gain theoretical information. Two publications were composed.

As being the first meta-analysis in this area of research, publication 1 investigated the relationship of role stress and depression. This incorporated two variables, role ambiguity and role conflict according to Kahn et al. (1964). Results showed positive relationships for both variables, showing slightly higher correlation coefficients for role conflict. When correcting the results for the influence of the other construct, coefficients remained in considerable amount. Further, the independence of the constructs was meta-analytically assessed. Results revealed a common component of the variables, which could arise from the basic concept. Despite this assumption, theoretical considerations support the emergence from the work environment. A statistically significant moderator was found that showed a moderating influence of the geographic region where the data was conducted. These findings agree with primary research of Hofstede (1994), who identified six dimensions that vary in cultural groups.

The second publication includes two research questions that differ in their content-related and methodological approach.

First, the relationship of the variables included in the job-demand-control-model (Karasek, 1979; Karasek & Theorell, 1990) and depression was meta-analytically investigated. Second, the appropriateness of the job-demands-measurement was assessed. The meta-analytical results showed small to moderate, but significant, findings. The highest relationship was found for iso-strain (high job demands / low control/ isolated working environments). Detailed Analysis showed that the relationship of iso-strain and depression is the highest in female samples. Statistical variables that moderated the relationship were extracted.

In conclusion the second research question have shown that previous measurements need to be revised in order to adequately assess today`s working environments. Thus, they supplied practical implications. It became apparent that the answer pattern of employees has not changed in the last two decades. Nevertheless, the relationship of job-demands and depression increased. The results suggest that previous measurements do not represent the increasing concentration of the work environment (i.e. rising qualitative and quantitative job-demands that have to be fulfilled by less employees).

Erklärung

ich versichere, dass ich meine Dissertation

„Gesundheit am Arbeitsplatz: Meta-Analysen zum Zusammenhang von Arbeitsmerkmalen und Depression“

selbstständig, ohne unerlaubte Hilfe angefertigt und mich dabei keiner anderen als der von mir ausdrücklich bezeichneten Quellen und Hilfen bedient habe.

Die Dissertation wurde in der jetzigen oder einer ähnlichen Form noch bei keiner anderen Hochschule eingereicht und hat noch keinen sonstigen Prüfungszwecken gedient.

_____	_____
Marburg, den 20.05.2012	Susanne Schmidt