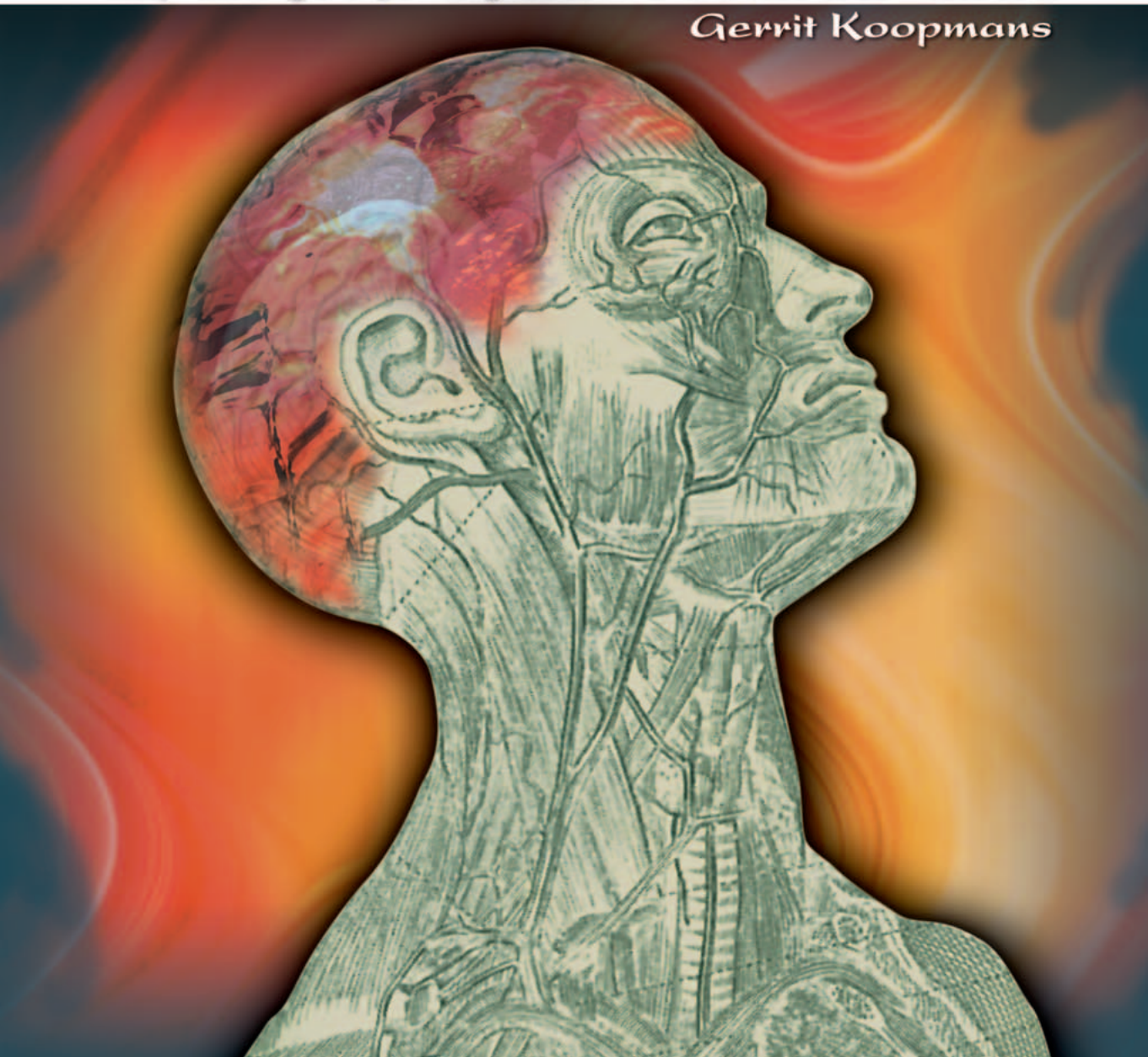
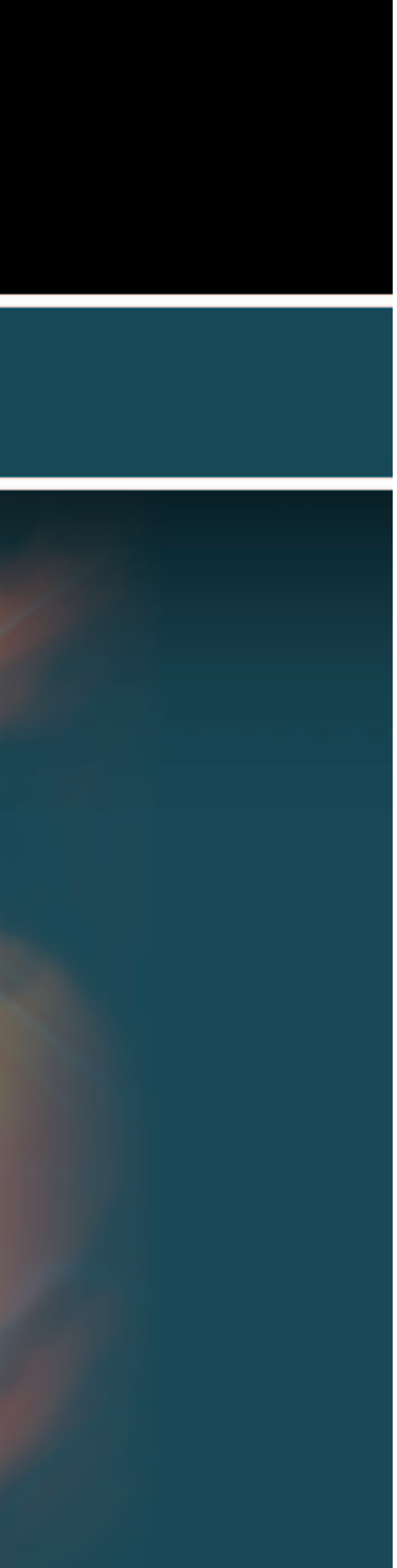
Mental Distress and the Use of Somatic Health Care

Gerrit Koopmans





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Design, cover & graphics:
Fernando Sanchez-Marquez, Amsterdam
Printed by:
Fokker Printing & More, Amsterdam

ISBN-10: 90-9020529-2
ISBN-13: 978-90-9020529-8

Mental Distress and the Use of Somatic Health Care

Psychische klachten en het gebruik van somatische gezondheidszorg

Proefschrift
ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de rector magnificus
Prof.dr. S.W.J. Lamberts
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
donderdag 20 april 2006 om 13:30 uur
door
Gerrit Tjitte Koopmans
geboren te Sneek

Promotiecommissie

Promotoren:
Prof.dr. F.F.H. Rutten
Prof.dr. M.C.H. Donker

Overige leden:
Prof.dr. A.T.F. Beekman
Prof.dr. M.W. Hengeveld
Prof.dr. J. Ormel

Financial support by Erasmus MC and the Institute of Health Policy and Management for the publication of this thesis is gratefully acknowledged.

To Mem

Publications

Chapters 2 to 9 are based on the following articles:

2 - **Common mental disorders and use of general health services: A review of the literature of population based studies**[1]
Koopmans, G.T., Donker, M.C.H., & Rutten, F.F.H.
Acta Psychiatrica Scandinavica 2005, 111(5), 341-350

3 - **Length of hospital stay and health services use of medical inpatients with comorbid non-cognitive mental disorders: A review of the literature**[2]
Koopmans, G.T., Donker, M.C.H., & Rutten, F.F.H.
General Hospital Psychiatry 2005, 27(1), 44-56

4 - **Assessing the construct validity of three indicators of psychological distress in relation to perceived health and physical illness**[3]
Koopmans, G.T., & Lamers, L.M.
Social Psychiatry and Psychiatric Epidemiology 2005, 40(12), 1012-1018

5 - **Chronic conditions, psychological distress and the use of psychoactive medications**[2]
Koopmans, G.T., & Lamers, L.M.
Journal of Psychosomatic Research 2000, 48(2), 115-123.

6 - **Comparing the effects of depressive complaints and chronic medical conditions on illness behaviour and medical consumption**[4]
Koopmans, G.T., & Lamers, L.M.
Journal of Mental Health Policy and Economics 2001, 4(2), 91-100.

7 - **Is the impact of depressive complaints on the use of general health care services dependent on severity of somatic morbidity?**[2]
Koopmans, G.T., & Lamers, L.M.
Journal of Psychosomatic Research 2006, in press

8 - **The use of general health care services by depressed adults without serious manifest physical morbidity**
Koopmans, G.T., & Lamers, L.M., submitted

9 - **Gender and health care utilization: The role of mental distress and help seeking propensity**
Koopmans, G.T., & Lamers, L.M., submitted

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Chapter 1

Introduction

Mental disorders are common in the general population. In the Netherlands, the 12-month prevalence of all disorders is 23.5%, the lifetime prevalence 41.2%. Especially depression, anxiety disorders and alcohol abuse and dependence show high prevalences. The lifetime prevalence of schizophrenia and other non-affective psychoses is, however, quite low (0.4%) (*Bijl, Van Zessen & Ravelli, 1997*).

Similar to physical disorders, mental disorders may lead to dysfunctioning in personal, social or economic domains, reducing the quality of life (*Wells & Sherbourne, 1999*). These losses in wellbeing, health and functional capacities will generally trigger a need for informal or formal care (*Ormel, Lindenberg, Steverink, & Vonkorff, 1997*). This need for care may be partly expressed as a demand for specialist mental health care, but also as a demand for primary care (*Zantinge, Verhaak, & Bensing, 2005*). In addition, however, this need for care is sometimes expressed as a demand for general medical care, such as the consultation of medical specialists, the use of prescription drugs or even an admission to a general hospital or a longer hospital stay (*Manning & Wells, 1992*). To which extent, and how mental disorders, or mental distress (not exactly the same, as will be explained later) affect the use of general (somatic) medical health care is the main question of this thesis.

In health services utilization research, the behavioural model developed by Andersen et al. (*Andersen, 1968; Andersen, 1995*) is often used as a conceptual framework. In this model, three clusters of factors that affect service use are distinguished: predisposing, enabling and need factors. Predisposing factors are personal characteristics assumed to be predictive of the tendency to use health care, such as age, gender, social-economic status, genetic differences, cultural differences and so on. Enabling factors make it possible (or just impossible) to use health care, such as income or knowledge, or concern more system related factors, such as health insurance arrangements, availability of or distance to services, which may facilitate of just impede the use of these services. Need factors can be distinguished in perceived need for care (as seen by the individual) and evaluated need (as seen by a health care professional). In understanding the relation between mental distress and somatic health care use, these needs factors and how they are shaped, are especially pivotal.

Mental distress can stimulate perceived need of somatic health care as an independent factor, when signs and symptoms that accompany mental distress are interpreted as symptoms of somatic illness that need medical attention (*Barsky, 1998*). Mental distress can also stimulate the perceived need of somatic health care as it changes the perception and interpretation of physical signs and symptoms, thus lowering the threshold to perceive bodily signs as symptoms or lowering the threshold for asking (informal or formal) support and assistance (*Barsky, Cleary, Barnett, Christiansen, & Ruskin, 1994; Gijsbers Van Wijk & Kolk, 1997; Simon, 1992*). Furthermore, mental distress can lead to more somatic morbidity, or slow down recovery from existing somatic morbidity, thus stimulating need for care and perceived need for care (*Friedman, Sobel, Myers, Caudill, & Benson, 1995; Maier & Watkins, 1998; O'Donohue & Cucciare, 2005*).

Combining these elements a path model can be elaborated linking mental distress and health care utilization. The main components and pathways are depicted in figure 1. This model will be explained briefly in the section that follows. (A more elaborated model will be presented in the introduction of the last empirical study.)

The model depicted in figure 1, states that in studying the relation between mental distress and utilization, physical illness is a major component that affects both mental distress (and visa versa) as well as somatic health care utilization. Utilization is affected through two pathways: via perceived need and via evaluated need. Mental distress is also assumed to affect directly perceived and evaluated need as well, and, indirectly, utilization through both need variables.
Age, gender and other personal characteristics can be seen as predisposing factors, partly because they may act as risk factors for mental distress as well as physical illness, and partly because they may have an independent effect on the tendency to use health care services. As enabling factor, only health care provision is linked to utilization. By using this term, we abstract from a more detailed description of structural and financial characteristics of the health care system, wich may each have an impact on the utilization of health care.
Apart from the direct and indirect relations between mental distress, physical illness and utilization that are depicted in the model, some interactive effects (not shown in the model) may be possible. That means that mental distress is not only related to utilization through both need variables, but may also moderates the relations between physical illness and need variables. Physical

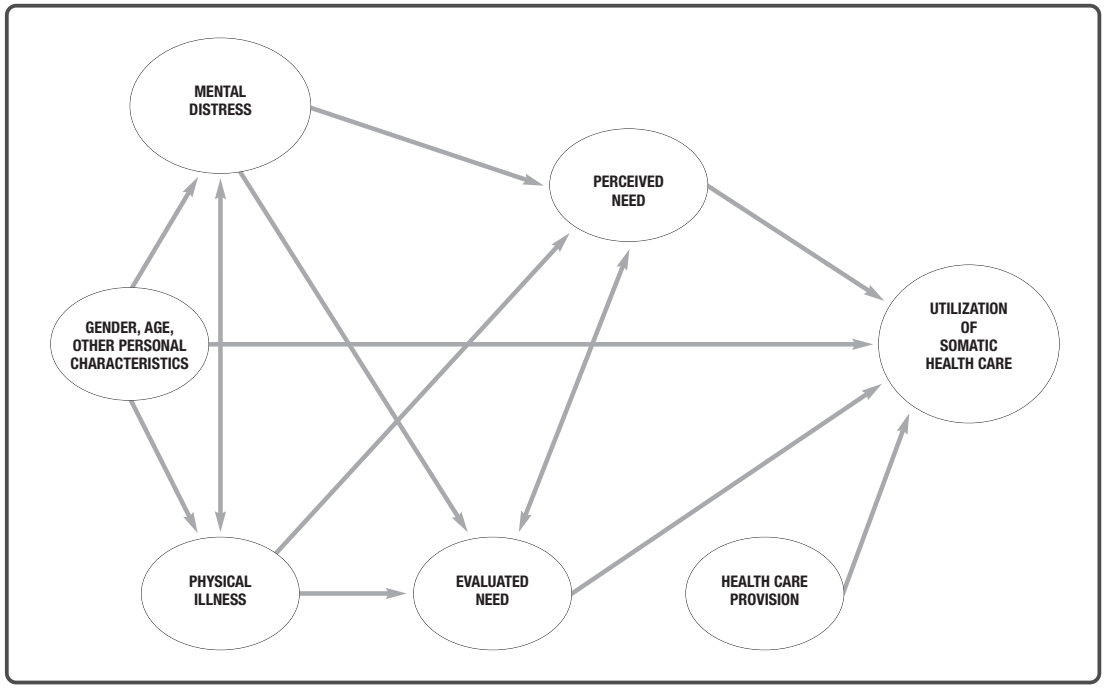

Figure 1. **Main interconnections between mental distress, physical illness and health care utilization.**

illness may have moderating effects on the mental distress – need (and thus utilization) relations. Finally age, gender and other personal characteristics may have modifying effects on the relation mental distress and need (or utilization).

Following this model, the question how mental distress affects somatic health care utilization cannot be studied without taking the effects of physical illness into account. Furthermore, perceived need as well as evaluated need have an impact on utilization. This implies that utilization is not only dependent on the behaviour of patients but also on the behaviour of health care professionals and that (ideally) this factor should be accounted for. The same goes for the health care system itself: as both patient and professional act within boundaries and along structures of a given health care system, these system characteristics will act upon health care utilization. Ideally, these effects should also be accounted for.

Mainly for practical reasons, we will restrict our studies to variables that are related to the characteristics and the behaviour of patients (consumers) within one health care system during a restricted period of time, leaving out variables related to behaviour of health care professionals. Consequently, the possible effects of enabling factors, as well as the effects of evaluated need factors, are beyond the scope of our study.

Before presenting more specific research questions, we will first elaborate on the key concepts as mentioned in the model.

Mental disorders and mental distress

Speaking of mental disorders implies a reference to medical diagnostic classification systems. In the field of mental health, two systems prevail: the International Classification of Diseases (ICD), which is now in its 10th edition, and the Diagnostic and Statistical Manual of Mental Disorders (DSM), wich is in its fourth edition. Although there are differences between both systems, there is a common core of diagnostic (main) categories: the DSM uses diagnostic codes derived from the ICD. Important chapters of diagnostic categories are: cognitive, mood, anxiety, psychotic, personality, eating, substance related, sexual, adjustment, sleep and somatoform disorders.
We will focus on mood disorders and the category of neurotic, stress-related and somatoform disorders[1],

sometimes denominated as common mental disorders (*Goldberg & Huxley, 1992*), as these are frequently seen in the community. We will not, however, adhere to the restrictive definition of these disorders. According to the DSM- or ICD-classifications, disorders are discrete entities, separated from normality and from one another by characteristic symptoms and distinctive features (*Slade & Andrews, 2005*). Classification systems make a sharp distinction as to whether or not a case belongs to a certain category. The discrete classes that are created in this way will be a simplification of the underlying processes (*Surtees, Wainwright, Gilks, Brugha, Meltzer, & Jenkins, 1997; Wainwright, Surtees, & Gilks, 1997*). Especially in relation to mood disorders, evidence that mental disorders should be considered on a continuous scale is accumulating (*Aggen, Neale, & Kendler, 2005; Parker, 2005; Slade & Andrews, 2005*), but also in the classification of psychosis, a dimensional approach appears to be useful (*Murray, McKee, Miller, Young, Muir, Pelosi et al., 2005; Van Os, Gilvarry, Bale, Van Horn, Tattan, White et al., 1999*). To study the relation between mental disorders and health care utilization, we prefer to consider these disorders as continuously distributed syndromes rather than as discrete diagnostic entities. To avoid confusion, we will use the term mental distress (and not disorder) when referring to mental problems that are considered to vary on a continuous scale.

Mental and general health care use

The relation between mental distress and health service use is not only dependent on the definition of mental distress, but also on how the health care system is organized and structured (not to mention all other social and cultural factors that are related).
Especially the distinction between mental health care and general (i.e. non-mental or somatic) health care is relevant in this respect. This distinction is not absolute. It can vary over time (*Druss, 2002*), but is also dependent on the structure of the health care system as a whole, that can vary, for instance, from nation to nation. For the Dutch situation, the position of the general practitioners (GPs) is quite typical (*Boerma, Van der Zee, & Fleming, 1997*), as they usually are the first contact with the health care system when a patient seeks help.
That implies that services of a general practitioner (GP) can be directed to both kinds of health problems: somatic as well as mental. Consequently, GPs play an important role in mental health care (*Boerma & Verhaak, 1999*) and their workload is considerably affected by patients with mental health problems (*Zantinge, Verhaak, & Bensing, 2005*). Outpatient and inpatient general health care can be considered somatic health care mostly, with the exception of outpatient services delivered by a psychiatrist or inpatient care delivered by the psychiatry department of a general (or university) hospital.
Specialty mental health care is delivered by dedicated institutions or professionals. Outpatient and inpatient general health care, as well as specialty mental health care is only accessible after referral by a medical provider, which is in most cases a GP.

The structure of the Dutch health care system implies that in primary care, especially in GP delivered care, both types of health problems (somatic and mental) are treated. The spending of a considerable amount of resources in primary care to patients with mental health problems should therefore not come as a surprise. In outpatient and inpatient general health care, a possible relation between mental health problems and resource spending is less obvious. Why should we expect that a depressed hip fracture patient has a longer hospital stay than a non-depressed hip fracture patient? Are there medical reasons that can explain that distressed visitors of an outpatient clinic get more X-rays and other diagnostic examinations than non-distressed visitors? These types of phenomena, or more generally stated: the presumed excess use of general (somatic) health care in relation to mental health problems, are the central topic in this thesis.

For that reason we will restrict ourselves to the use of health services that are primarily aimed at somatic problems. This implies that we will relate mental distress to general health service use, with the exclusion of specialty mental health services (of all types), GP consultations, consultations of psychiatrist within a general outpatient clinic, or admission to a psychiatric department of a general hospital.

Mental distress and somatic morbidity

The distinction between mental distress and somatic morbidity can be problematic. The measurement of mental distress can be contaminated by somatic signs or symptoms, which makes the distinction less clear-cut (*Berkman, Berkman, Kasl, Freeman, Leo, Ostfeld et al., 1986; Johnson & Wolinsky, 1993*). For instance, poor appetite, shortness of breath or constipation might be considered

[1]These correspond with ICD-10 Chapter V codes F30-F39 and F40-F48.

as somatic manifestations of a mental disorder, but these signs are not very specific for mental disorders. The interpretation of findings of older studies is often hampered by the fact that contaminated measures of mental distress were used. More recent developed depression scales, as used in most studies at present, are relatively less biased by such somatic complaints than older ones (*Foelker & Shewchuk, 1992*).
However, there are also possible causal links between both concepts: somatic morbidity may lead to mental distress, and otherwise, mental distress may cause a higher risk of somatic morbidity (*Aneshensel, Frerichs, & Huba, 1984; Greden, 2003*). Moreover, mental distress may affect the course of somatic illness (*Von Korff, Katon, & Lin, 1990*).

When studying the relation between mental distress and health service use, these possible measurements problems and interconnections between mental and somatic morbidity, are complicating factors. To disentangle the connections between mental and somatic morbidity, the availability of measures (or indicators) of mental distress that have proven construct validity, is a prerequisite. Our first empirical study is therefore directed to the question of how to measure mental distress and avoid somatic contamination. For that purpose, three indicators of mental distress will be compared on their construct validity.

Outline

The chapters that follow can be divided into two sections. The first section contains two reviews of the literature; the second one brings together a series of empirical studies.

In chapter 2, a review of the literature of population-based studies is presented. Studies in which 'common' mental disorders (mood and anxiety disorders, somatoform disorders, mental distress) were related to general health service use (according to definitions we explained before) were included in this review if the study had a prospective design, i.e. the assessment of service use was over a period after the assessment of mental distress. Moreover, to be included in the review, studies should have sound corrections of possible confounders, especially for the effect of somatic morbidity.
In chapter 3 a comparable review is presented, wich was based on studies among medical inpatients. In these studies, mental distress can be considered a condition, comorbid with some somatic morbidity. Moreover, the subjects in these studies are already in contact with the health care system. Both factors may have a differential effect on the relation mental distress and health service use. In this review, the same inclusion criteria as to study design were used as in the first review.

In the section in which the empirical studies are presented, the model as depicted in figure 1 is used as a framework with some restrictions on variables and relations that will be studied, as explained before. The three main concepts (mental distress, physical illness and health care utilization) are supposed to be related, i.e. both mental distress and physical illness are considered causal factors in relation to health care utilization. Furthermore, physical illness and mental distress are seen as interrelated, with causal effects in both directions.

Before analyzing possible causal pathways, an important question that should be addressed is the construct validity of measures that can be applied to assess mental distress.
For that reason, the question is addressed (in chapter 4) how to measure mental distress as a concept to be differentiated from somatic morbidity. The construct validity of three available measures of mental distress will be compared, aiming at the lowest possible association with somatic morbidity but with a relatively good predictive power of perceived health that can be considered a proxy for perceived need.

In chapter 5, the relation of mental distress and somatic morbidity is addressed again, however not as a measurement problem but from a causal perspective. Several chronic conditions (diabetes, heart failure, lung disease, arthritis, back pain, hypertension, migraine) are compared as to their impact on mental distress, as well as the use of psychoactive medication. The main research question was whether type of condition would make a difference or just the number of chronic conditions, irrespective of the specific underlying types concerning their possible impact on mental distress.

In the three chapters that follow (6 to 8) the relation between mental distress and utilization is focal.
In chapter 6, the impact of mental distress on health services use and health related behaviour is put in perspective by comparing it with the differential impact of several chronic conditions (as in chapter 5) on the same outcomes.

In chapter 7, the question is addressed whether the severity of somatic morbidity moderates the impact of mental distress on health care utilization. As somatic

morbidity is a risk factor for mental distress and both somatic morbidity and mental distress can be expected to raise chances of health care utilization, it is unclear in which direction the combined effect will go.

In chapter 8 focus is on the other side of the spectrum of somatic morbidity: subjects that have apparently no serious somatic morbidity. In this study, the association of mental distress with utilization will be examined and related to gender and age.

Finally, in chapter 9, we will test a more elaborated model, which is intended to explain health care utilization, using factors we focussed on separately in the aforementioned studies as well some additional (intermediate) factors, i.e. symptom perception and perceived health. From the literature and from our own studies gender often appears to be a notable effect modifier. Especially the impact of mental distress on symptom perception and perceived health seems to be gender related. These gender related differentiations within the model will be tested.

In chapter 10 we will review the findings of the studies, discuss limitations and possible extensions of research aims and conclude with recommendations for further research and practical measures. ■

Chapter 2

Common mental disorders and use of general health services:
A review of the literature on population-based studies

Summary

We reviewed 12 population-based studies on the association between common mental disorders and the use of general (non-mental) health care services.
For that purpose a literature search in Medline and PsychLit databases was undertaken. Only studies with a prospective design and correction for somatic morbidity were included for review.
We found that in the majority of studies, mental disorders were associated with higher service use, if considered on the most general level of outcomes. This general tendency is not consistently reflected in the use of specific health care services, but is materialised in different patterns of outpatient and inpatient service utilization, which vary from study to study. Findings for the elderly were less clear-cut than for other age groups. It can therefore be concluded that mental disorders are related to higher general health care service use on a global, aggregated level. However, these associations are not specific for certain types of services.

Introduction

Numerous epidemiological studies have shown that among physically ill patients found in clinical settings, such as primary care, outpatient clinics or general hospitals, the prevalence of mental disorders is high (*Coyne, Fechner-Bates, & Schwenk, 1994; Hansen, Fink, Frydenberg, & al, 2001; Kessler, Burns, Shapiro, Tischler, George, Hough et al., 1987; Liu, Prince, Blizard, & Mann, 2002; Martucci, Balestrieri, Bisoffi, Bonizzato, & al, 1999; Rapp, Parisi, & Wallace, 1991*). At the same time, mental disorders are often not recognized in these settings and, therefore, remain untreated. How this is affecting treatment course and resource use within general medical provisions has been the subject of many studies (*Barsky, Delamater, & Orav, 1999; Fink, Sorensen, Engberg, Holm, & Munk-Jorgensen, 1999; Gerdes, Yates, & Clancy, 1995; Lefevre, Reifler, Lee, Sbenghe, Nwadiaro, Verma et al., 1999; Luber, Hollenberg, Williams-Russo, DiDomenico, Meyers, Alexopoulos et al., 2000; McQuaid, Stein, Laffaye, & McCahill, 1999; Ormel, Van den Brink, Koeter, Giel, Van der Meer, Van de Willige et al., 1990; Simon, Chisholm, Treglia, & The, 2002; Simon & Von Korff, 1995; Vazquez-Barquero, Garcia, Simon, Iglesias, Montejo, Herran et al., 1997; Von Korff & Simon, 1996*). In many cases, recommendations are given for a better management of these comorbid mental disorders, promising not only better health or quality of life, but also a reduction in utilization of medical resources (*Hunsley, 2003*).

Findings from studies among clinical populations cannot be generalized to the general population. Therefore, the association of mental disorders with health care utilization among people living in the community has to be studied among samples appropriate for that goal. Reviews of population studies (*Cummings, 1996; Friedman, Sobel, Myers et al., 1995; Greenberg, Sisitsky, Kessler, Finkelstein, Berndt, Davidson et al., 1999; Hunsley, 2003; Simon, 2003; Simon & Katzelnick, 1997*) are, however, mainly based on retrospective or cross-sectional studies, which are not appropriate to exclude the possible confounding effects of concurrent or preceding medical illnesses. To our knowledge, a review of studies that fulfil some elementary design requirements, i.e. have a prospective design and control for physical health status, does not exist.
We have undertaken such a review, in which we focus on 'common mental disorders' or mental health problems, as defined by Goldberg and Huxley (1992), which implies that we exclude organic disorder like dementia (cognitive impairment), confusional states and delirium.

Schizophrenia and other psychotic disorders are also excluded, as well as substance abuse. This means that mainly affective disorders, anxiety disorders and somatisation are included, albeit without using strict diagnostic criteria, as used in formal diagnostic classification systems like DSM-IV or ICD-10. The reason for choosing such a broad definition of mental disorders is based on evidence that sub-threshold mental disorders may have serious disabling consequences and may, therefore, affect illness behaviour in general and more specific health service use (*Brugha, 2002; Judd & Akiskal, 2000; Rucci, Gherardi, Tansella, Piccinelli, Berardi, Bisoffi et al., 2003; Sherbourne, Wells, Hays, Rogers, Burnam, & Judd, 1994; Wittchen, Nelson, & Lachner, 1998*).

Aims of the study

This review aims to test the hypothesis that common mental disorders in the general population are related to higher utilization of general health care services.

Method

This review is part of a more comprehensive review of the literature concerning, not only population studies, but also outpatient and inpatient studies. For that comprehensive review, a literature search was conducted using Medline and PsychLit databases from 1984, with several search terms related to mental health problems (excluding organic disorders and schizophrenia), and utilization of general health care services. Search terms used for mental health problems were: mental disorders, psychological complaints, psychological distress, depression, anxiety, somatoform disorders. For service utilization, we used: service utilization, service use, consultations, costs, treatment duration, length of stay, general hospital, outpatient care and primary care. Searching was done by making combinations of specific terms from each category. A first search was executed in 2001, followed by an additional search in 2003 and a final search in October 2004. In addition, a manual search was done by going through the table of contents of a selection of 20 journals over the same period and by browsing through reference lists of selected studies. A differentiation in clinical and population studies was effected after searching, since the only reliable way to make this differentiation was by reading the method section of the published studies.

Studies were included only if they had a prospective design, i.e. the assessments of somatic and mental health status were made before the follow-up period. Further if the sample were drawn from the general population and if somatic morbidity as a possible confounding variable were adjusted for in the analyses. Some studies were partly prospective and partly retrospective in this respect (*Beekman, Penninx, Deeg, de Beurs, Geerlings, & Van Tilburg, 2002; Koopmans & Lamers, 2001*). In such cases, we used only the prospective part of the reported findings. Assessment of mental disorders should be independent of treatment status. Therefore, studies that use the state of being in treatment for mental health problems as caseness criterion are not included.

If descriptions of study design, methods or results in the original publication were unclear in some respects relevant for this review, the authors were contacted and asked to provide additional information.

Results

The initial searches (in 2001) in Medline and PsychLit databases, tables of contents of selected journals and reference lists, produced 484 references. We eliminated 289 studies after reading the abstracts. Out of the remaining 195 studies, there were seven population-based studies fulfilling our criteria. The second search (in 2003) produced five additional studies. The final search (in October 2004) did not produce any study that met our inclusion criteria. Of the 12 studies to be reviewed, six studies were published in 2000 or later, four between 1990 and 1999.

General characteristics of reviewed studies

Relevant characteristics of the reviewed studies are summarized in table 2-1.

- **Characteristics of population samples**
  Most studies used sample sizes of at least 1000 observations. Three studies had sample sizes between 200 and 1000.
  Half of the studies included people of all ages (but one excluded the elderly), five studies were restricted to the elderly (65 or older; one study 55 or older) and one to middle-aged and older people.

- **Service use measures used**
  A wide variety of service use measures was applied: general measures; measures for outpatient or inpatient utilization; as a single measure or as multiple indicators, i.e. a combination of measures. Most studies used physician visits as one of the service use measures.

In three studies (*Koopmans & Lamers, 2001; Levkoff, Cleary, & Wetle, 1987; Tessler, Mechanic, & Dimond, 1976*) this was the only outcome measure used. Hospital admissions or inpatient days were also widely used as one of the service use measures. Two studies (*Anttila, 1991; Huang, Cornoni-Huntley, Hays, Huntley, Galanos, & Blazer, 2000*) focussed on just these outcomes.
Seven studies used a combination of service use measures, such as physician visits, hospital days and paramedical service use. These measures were sometimes aggregated in one general measure, such as number of contacts with medical care system (*Green & Pope, 1999*), or overall costs of general medical services (*Unutzer, Patrick, Simon, Grembowski, Walker, Rutter et al., 1997*), but they were mostly used as multiple indicators, each one representing a different type of health care service. Hunkeler et al. (*Hunkeler, Spector, Fireman, Rice, & Weisner, 2003*) used both an aggregated measure (overall costs) and multiple indicators of outcome. A comparable method was used by Manning et al. (*Manning & Wells, 1992*).

- **Observation period of service use**
  In five studies, service use during one year was observed in the period directly following the baseline measurements. In two studies, service use during one year was observed in a period from four to five years, respectively, five to six years after baseline. In three studies, this observation period was shorter (six to seven months) and in two studies, it was longer than one year. In one of these studies (*Anttila, 1991*), hospital admissions during an eight-year period were observed; in the other study (*Green & Pope, 1999*) an observation period of 22 years in total was used, divided in shorter periods for analytical purposes.

- **Assessment of mental disorders**
  In all studies, mental disorders were assessed by self-report, for which several methods were used, that varied from one simple question in an interview, to standardized and well-validated questionnaires, such as the CES-D for depression. This instrument was used in four studies.

  Formal diagnostic systems, i.e. DSM-IV or ICD-10 in combination with clinical interviews, were not used. In one study, assessment with a questionnaire (Geriatric Depression Scale) was validated in a subsample against assessment with a diagnostic interview (DIS)(*Fischer, Wei, Rolnick, Jackson, Rush, Garrard et al., 2002*).

  Seven studies focussed on depression as the main independent variable. Three studies (*Levkoff, Cleary, & Wetle, 1987; Manning & Wells, 1992; Tessler & Mechanic, 1978*) focussed on psychological distress, and two studies used a broader definition of mental disorders (*Green & Pope, 1999; Hunkeler, Spector, Fireman et al., 2003*).

- **Adjustment for somatic morbidity**
  A variety of indicators was applied to measure somatic morbidity. Indicators that measure number or type of chronic illnesses in some way were applied in the majority of the studies. Some studies used measures for functional impairment (such as OECD scales), to adjust for somatic morbidity. A combination of the aforementioned measures was applied in a number of studies. Somatic morbidity and other illness-related variables as possible confounding factors were adjusted for by appropriate statistical methods like multiple regression analysis or analysis of covariance.

Study findings

Findings of the reviewed studies can be found in table 2.2. Studies using general measures for service utilization, such as overall costs or health care contacts, were all supportive of the hypothesis that common mental disorders are related to higher resource use. Green & Pope (1999) found an association between mental health symptoms and the use of medical services (of any kind). Manning & Wells (1992) reported comparable findings: psychological distress was related to the use of medical services in general.
Hunkeler et al. (*Hunkeler, Spector, Fireman et al., 2003*) reported higher costs in relation to psychiatric symptoms, as did Unutzer et al. (*Unutzer, Patrick, Simon et al., 1997*) in relation to depressive symptoms.

Studies that included outpatient service utilization (physician contacts, outpatient costs) as indicator show less consistent findings as to this specific domain. Three (out of eight) studies (*Beekman, Penninx, Deeg et al., 2002; Levkoff, Cleary, & Wetle, 1987; Manning & Wells, 1992*) reported no association between mental disorders and the use of outpatient general health services. Four studies (*Fischer, Wei, Rolnick et al., 2002; Koopmans & Lamers, 2001; Rowan, Davidson, Campbell, Dobrez, & MacLean, 2002; Tessler, Mechanic, & Dimond, 1976*) however reported positive findings. One study (*Hunkeler, Spector, Fireman et al., 2003*) reported an association between anxiety and the use of emergency care.

Table 2-1. Main characteristics of reviewed studies

study	population; setting	age (years)	service use measurements
Anttila (1991) - Depressive symptoms and general hospital care in the elderly: A population-based study	elderly in population (n=1040)	65+	one measure: high use (at least 60 admission days in general hospital) in 8 yr. period, based on register data
Beekman et al. (2002) - The impact of depression on the well-being, disability and use of services in older adults: A longitudinal perspective	sample of elderly in population (n=3107)	55-85	5 measures based on self report, representing contacts GP and medical specialist, paramedic, ancillary services use, admissions during 6 months
Fischer et al. (2002) - Geriatric depression, antidepressant treatment, and healthcare utilization in a health maintenance organization	HMO-members, depressed (n=245) vs. nondepressed (n=271)	65+	5 measures from administrative database: inpatient admissions, inpatient days, inpatient charges, outpatient visits, outpat. charges in 1 yr.
Green & Pope (1999) - Gender, psychosocial factors and the use of medical services: A longitudinal analysis	HMO-members (n=2603)	18+	one measure per period, representing medical care contacts (office visit, ER visit, hospital admission) during several (max. 22) yrs.; based on medical records
Huang et al. (2000) - Impact of depressive symptoms on hospitalization risk in community-dwelling older persons	community-dwelling elderly (n=3486)	65+	one measure based on Medicare records, representing hospitalization risk in 6 month period
Hunkeler et al. (2003) - Psychiatric symptoms, impaired function, and medical care costs in an HMO setting	HMO-members (n=10084)	18+	one measure, representing outpatient and inpatient medical care costs in 1 yr.; 4 measures for use of emergency care, hospital admission, prescription drugs, radiology/lab tests; based on data from administrative and clinical databases
Koopmans & Lamers (2001) - Comparing patients with depressive complaints and patients with chronic medical conditions on their functioning and medical consumption	population based sample (n=9428);	15-90	one measure: consultations of medical specialists in 7 months period; based on claims database
Levkoff et al. (1987) - Differences in determinants of physician use between aged and middle-aged persons	population based sample (n=388);	45+	one measure: physician visits in 12 months; based on chart reviews
Manning & Wells (1992) - The Effects of Psychological Distress and Psychological Well-Being on Use of Medical Services	general population, not elderly (n=4829; 16319 person-years)	5-62 yr	four measures based on claims database: any use, any hospital use, costs if outpatient use only, costs if any inpatient use (costs of general medical services per year, up to 5 years, excluding dental and mental health care)
Rowan et al. (2002) - Depressive symptoms predict medical care utilization in a population-based sample	sample of general population (n=3227)	18+	four measures: physician visits, outpatient costs, hospitalizations, hospital days in 12 m., based on database
Tessler et al. (1976) - The effect of psychological distress on physician utilization: a prospective study	general population, enrollees in prepaid group practices (n=326)	18-67	two measures: self-initiated and total number of outpatient physician visits in 1 year; based on medical records
Unutzer et al. (1997) - Depressive symptoms and the cost of health services in HMO patients aged 65 years and older. A 4-year prospective study	Medicare recipients; enrollees in primary care HMO (n=2558)	65+	one measure based on claims database, representing costs of general medical services (inpatient, outpatient, long-term care, drugs) in 1 yr.

	assessment of mental disorders	adjustment for somatic morbidity by:	adjustment for other illness related variables by:	adjustment for other variables by:
	depressive symptoms by one question in nurse interview	specific self reported diseases (with high use risk); Men: urinary tract infection; Women: urinary tract infection, chronic bronchitis, diabetes mellitus, heart failure	none	age
	depression by CES-D; baseline and follow up	number of self reported chronic illnesses (from list of 26 illnesses); functional limitations (OECD-scale), cognitive impairment (MMSE)	none	age, gender, education, social support
	depression by GDS as screener; stratified sample: depression/mania component of DIS-interview	comorbidity index (adapted Charlson index, based on ICD-codes of outpatient and inpatient encounters)	none	age, gender, anti-depressant treatment
	by Mental Health Symptom Index (subset from Langner Mental Health Index)	self reported physical symptom index (from list of 13 symptoms)	overall health status (perceived health), illness behaviour, response to symptoms	age, gender, educational level
	depression by modified CES-D	self reported chronic conditions (weighted disease count; EPESE-scale), physical disability, number of prescription medications, cognitive impairment	self rated health status (perceived health)	age, gender, marital status, income, educational level, urban-rural residence
	psychiatric symptoms by Psychiatric Severity Scale (violent behav., depressed mood, anxiety, panic) of the Addiction Severity Index	medical conditions (self report: arthritis, diabetes, cancer, heart disease, asthma, other respiratory diseases, digestive problems)	cigarette smoking, role dysfunction	age, gender, race
	serious depressive complaints by self report	number of self reported chronic illnesses (from list of 26 illnesses), specific chronic illnesses (seven most prevalent types)	none	age, gender, marital status, educational level, living situation
	psychophysiologic symptoms and psychological distress by PERI-scales; neuroticism by Eysenck scal	number of different medical diagnoses in year before (physician based measure); number of chron. conditions (self-report)	perceived health	gender, marital status, educational level, health insurance, health care attitude
	psychological distress by Mental Health Inventory	self reported disease count (out of a list of 26 diseases); daily functioning (role limitations)	health perceptions (GHI)	age, gender, health plan, site
	depression by CES-D	number of self reported chronic illnesses (from list of 23 illnesses); functional disability (one measures based on OECD-scales)	none	age, gender
	psychological distress by summary index based on 5 scales	number of self reported chronic illnesses (from list of 34 illnesses)	perceived health; bed disability days; propensity to seek care	age, gender, religion, employment, income, race, education, marital status, scepticism
	depression by CES-D	chronic disease score based on pharmacy data from database	none	age, gender, race

Table 2-2. Findings of reviewed studies

study	main results	detailed results
Anttila (1991)	depressive symptoms related to high use of hospital care with men, not with women	relative risks of depressive symptoms – hospital use: unadjusted: 1.48 (men), 1.49 (women); adjusted for age, somatic morbidity: men – OR = 1.93; women - OR = 1.36 (ns)
Beekman et al. (2002)	no association with five utilization indicators and baseline measures of depression	betas baseline depression - service utilization (adjusted): contacts GPs: .03 (ns); contacts med. spec.: .04 (ns); hospital admissions: .05 (ns); paramed. services: .04 (ns); ancillary services: .01 (ns)
Fischer et al. (2002)	depression related to outpatient utilization, not to inpatient utilization	exponentiated betas depression – service utilization (adjusted): outpatient visits: expon. beta = 1.191; outpatient charges : expon. beta = 1.300
Green & Pope (1999)	mental health symptoms predict health care utilization (also 19-22 yrs. later)	betas of mental health symptoms – health service use (adjusted): 7 yr. use (period 1970-76) - beta: .065; 12 yr. use (70-81) - beta .099; 17 yr. use (70-86) - beta: .082; 22 yr. use (70-91) - beta: .075; last 5 year (87-91) - beta: .095
Huang et al. (2000)	depression related to higher hospitalization risk with men aged 75 yr or older, not with other groups	adjusted relative risks (with 95% CI) of depressive symptoms on hospitalization, age-gender stratified: men, age 65-74: 2.15 (0.75-6.22); men, age 75+: 3.43 (1.33-8.86); women, age 65-74: 1.12 (0.53-2.36); women, age 75+: 0.46 (0.19-1.13)
Hunkeler et al. (2003)	persistent anxiety and depressed mood related to higher costs	adjusted mean general medical care costs (product predicted probability of care and pred. mean health care costs given any care); reference= no psych. symptoms, no role dysfunction - costs $ 1968; no role dysfunct. and (...): persistent anxiety $2456; depressed mood $2352; both $2933; three areas of role dysfunction and (...): no psych. sympt. $2601; pers. anx. $3243; depr. mood $3092; both $3853; persistent anxiety related to higher probability (+5.9%) of emergency care and (+4.6%) prescription drug use; depressed mood to (+4.1%) radiology/lab tests
Koopmans & Lamers (2001)	depressive complaints related to consultations of medical specialists	depressive complaints (in absence of chronic illness): 48% consultations of med. spec., compared to lowest users (arthritis - without comorbidities): 37%, highest users (lung disease - without comorbidities): 52%; OR of depressive complaints (adjusted for somatic morbidity and other variables): 1.37
Levkoff et al. (1987)	no association of psychol. distress with physician use	psychophysiologic symptoms and psychological distress (PERI-scales) are not associated with physician visits; neuroticism (Eysenck scale) - beta (unadjusted): .20 ; beta: .11 (ns), after adjustment for somatic morbidity, perceived health and other possible confounders
Manning & Wells (1992)	no association with outpatient medical utilization; psychological distress related to higher probability of hospital admission	elasticities of 10% increase in psychological distress: .21 for any inpatient medical care; .16 for total medical care expenditures
Rowan et al. (2002)	depression associated with more health care use (in all four domains)	ORs depressed vs. non-depressed after adjustments: physician visits above median: 1.5; out-patient treatment costs above median: 1.6; occurrence of hospitalization: 1.5; hospitalization days above 3: 2.0.
Tessler et al. (1976)	psychological distress related to more physician visits (self-initiated and total)	betas of psychological distress, after adjustments for somatic morbidity: total visits: .16; self initiated visits: .21; after adjustments for health status, sociodemographic and attitudinal variables: .16 and .20 respectively
Unutzer et al. (1997)	depression related to higher costs across all categories of care	1.9% (95% CI: 1.4%-2.3%) cost increase for each point of increase in the CES-D (after adjustments)

CI = confidence interval; OR = Odds Ratio; ns = not significant

Seven studies included the use of inpatient care (hospital admission, hospital days, inpatient costs) as an outcome measure. Study findings related to this outcome measure were even more equivocal and differentiated than findings related to outpatient service utilization. Two studies (*Manning & Wells, 1992; Rowan, Davidson, Campbell et al., 2002*) reported positive findings; three studies (*Beekman, Penninx, Deeg et al., 2002; Fischer, Wei, Rolnick et al., 2002; Hunkeler, Spector, Fireman et al., 2003*) could not demonstrate an association between mental disorders and general inpatient care. Two studies reported findings that differ depending on gender or age (*Anttila, 1991; Huang, Cornoni-Huntley, Hays et al., 2000*). In the study of Anttila (1991) it was found that depressive symptoms were related to more use of hospital care with men, but not with women. In the study of Huang et al. (2000) similar results were found, though somewhat more specific: with men aged 75 years or older, depression was related to a higher hospitalization risk, but not with women and not with men younger than 75 years of age.

Discussion

We reviewed 12 population studies, that all fulfilled some elementary methodological criteria of internal validity. On the most general level of outcomes considered, studies were in favour of the hypothesis that common mental disorders are related to higher resource use.
In relation to more specific types of health care services, the picture is less clear.
An association between mental disorders and outpatient utilization was found in five studies, but could not be demonstrated in three studies. Inpatient utilization was positively related to mental disorders in two studies, not related in three studies and conditionally related in two studies.

There are several factors that could contribute to false negative study findings, whereas other factors could contribute to false positive findings.

First of all, the possibility exists that studies with a relatively small sample size have produced the negative or conditional findings. However, as to outpatient utilization only one negative study had a relatively small sample size, whereas, at the same time we see two studies with this sample size with positive findings and two studies with a large size that demonstrated negative findings. As to inpatient utilization, only one study had a small sample size, in which negative findings were reported; the other six inpatient studies all had a larger sample size and displayed mixed findings (negative as well as positive, and also conditional findings). It is not likely that sample size and findings are related in this case. Moreover, even studies with smaller sample sizes seem to be large enough (with about 400 observations) to produce significant findings, if any association would have existed. We therefore do not consider sample size a major factor in explaining negative (i.e. non significant) findings.

Secondly, there might be an influence of the method used to assess mental health problems: using formal diagnostic schedules might tap more severe mental disorders, leading to higher risk of health service utilization than the assessment of mental disorders by rating scales or questionnaires. However, formal diagnostic systems, such as DSM-IV or ICD-10 in combination with clinical interviews, were not used. In the study that used a DIS-interview, this was used to count symptoms of depression, but not for diagnostic purposes. The CES-D instrument was used in several studies, but it was not consistently related to the direction of the association found: in one study it was absent, in two studies it was positive and in one study more differentiated.

Thirdly, contamination of measures of somatic morbidity with mental disorders might have created false negative outcomes. Among the reviewed studies, a wide variety of indicators of somatic morbidity was used. Disease counts (straight or weighted), which were used in most studies, can be considered as relatively objective measures of somatic morbidity that predict use of medical resources (*Almeida & Carlsson, 1996; de Groot, Beckerman, Lankhorst, & Bouter, 2003; Harboun & Ankri, 2001*). Indicators like role dysfunction, perceived health or illness behaviour may tap on psychological distress or mental disorders (*Mackenbach, Simon, Looman, & Joung, 2002*), so that adjusting for these variables may give an overcorrection and may thus cause false negative findings.
In six studies (*Green & Pope, 1999; Huang, Cornoni-Huntley, Hays et al., 2000; Hunkeler, Spector, Fireman et al., 2003; Levkoff, Cleary, & Wetle, 1987; Manning & Fusilier, 1999; Tessler, Mechanic, & Dimond, 1976*) the association between service use and mental disorders was not only adjusted for somatic morbidity (as measured by some kind of disease count or physical restrictions) but also for perceived health or other illness-related variables. Nevertheless, only one of these studies did not find any positive association at all, the other ones at least reported some positive findings.

In prospective studies undertaken in natural settings, besides the risk factors on which the study is focussed, other events, for which no systematical observations were done, might have influenced the outcome of the study and thus caused false negative findings. This so-called history effect (*Cook & Campbell, 1979*) has a general component, which implies that one may expect that studies with a longer observation period are less likely to produce positive findings. However, there is also a specific component in this case, namely the possible use of mental health services by subjects with mental disorders and the consequences of the use of these services on the utilization of general health services.

Although one would expect that a longer observation period would weaken a possible association between mental disorders and service use, this is not consistently reflected in the findings of the reviewed studies. This conclusion is supported by the findings of one of the reviewed studies (*Green & Pope, 1999*), in which observation time span ranged from 3 to 22 years. The results of this study were not related to length of observation period.

As to the more specific component of intermediate mental health service use, there was just one study (*Fischer, Wei, Rolnick et al., 2002*) in which this factor was incorporated explicitly in the analyses. The use of anti-depressant medication appeared to be positively related to outpatient charges. However, this study also reported positive associations between depressive symptoms and outpatient utilization (charges as well as visits). In all other studies intermediate mental health service use was not incorporated as a factor that could have influenced the outcomes. Whether this has caused false negative findings remains an open question. From what we know from the literature, this does not seem very likely (*Chiles, Lambert, & Hatch, 1999*).

A factor that might contribute to false positive findings is the possible use of invalid indicators of somatic morbidity. None of the indicators used in the studies was specially designed to predict service utilization, like DRG-based measures that are often used among clinical populations (*McGuire, 1991*). As there is – to our knowledge - no ranking of these indicators as to their validity to predict service utilization, it is not possible to relate validity of indicators to study outcome. As already noted, among these studies, over-correction for apparent somatic morbidity seems to be a greater threat to the validity of findings.

The possible contamination of measures of mental disorders with somatic morbidity is a second factor that may contribute to false positive findings. Two studies used measures of mental disorders that might be contaminated by somatic morbidity. Green and Pope (1999) used the Mental Health Symptom Index, which is based on the Langner MHI (*Seiler, 1973; Srole, Langner, Michael, Kirkpatrick, Opler, & Rennie, 1962*) that contains many items with a psychophysiological content (e.g. poor appetite, shortness of breath) and is not very specific for mental disorders. In the study of Levkoff et al. (*Levkoff, Cleary, & Wetle, 1987*) the PERI-scales were used (*Dohrenwend, Shrout, Egri, & Mendelsohn, 1980*). The anxiety subscale of this instrument is mainly tapping on the somatic manifestations of anxiety (poor appetite, constipation, headache, cold sweats, trembling hands, acid stomach). So the positive association between mental disorders and health service utilization as found in the Green and Pope study (1999), might be related to the use of a contaminated measure of mental disorders. In the Levkoff et al. study (*Levkoff, Cleary, & Wetle, 1987*) the use of such a measure was not related to positive findings.
Instruments to assess depression, which were used in the reviewed studies, were the CES-D and the GDS. The CES-D and its somatic scale are relatively unbiased by somatic complaints (*Foelker & Shewchuk, 1992*). The GDS is less sensitive to somatic illness than older depression-scales, such as the SDS of Zung (*Applegate, Miller, Graney, Elam, Burns, & Akins, 1990*) and the Hamilton (*Yesavage, 1988; Yesavage, Brink, Rose, & al., 1983*).

The last factor contributing to false positive findings that we will discuss is a possible flaw in the measurement of service use. We assumed that in the reviewed studies, indicators of general health service use were separated from mental health service use. Six studies (*Anttila, 1991; Beekman, Penninx, Deeg et al., 2002; Hunkeler, Spector, Fireman et al., 2003; Koopmans & Lamers, 2001; Manning & Wells, 1992; Rowan, Davidson, Campbell et al., 2002*) made it explicitly clear that at least a part of mental health service use was excluded and thus not part of general health service use. It is not clear whether the other studies included mental health service use or not. As there is no consistent pattern between exclusion of mental health service use and study outcome, we consider this possible threat of internal validity just of theoretical interest.

Summarizing the possible weaknesses and differences in study design discussed above, it can be concluded that it

is reasonable to assume that factors other than methodological differences should give an explanation of the variances found.

From the factors that may lie behind the differentiation in findings, we will elaborate on a) age differences between selected populations, and b) possible differences in type or severity of mental disorders.

Negative or conditionally positive findings were almost exclusively found in studies that used samples from the elderly, or a sample of middle-aged and elderly people. As to inpatient utilization, there seemed to be an association with mental disorders among elderly men only. As to outpatient utilization, findings among the elderly were mixed. The six studies that were not restricted to the elderly, all reported positive findings in at least one respect, although two of these studies reported negative as well as positive findings.
These differences are hinting to age as an important moderator variable, implying that mental disorders are more strongly related to utilization among the non-elderly than among the elderly.

It does not seem likely that type of mental disorder is making a difference. In the category of studies that focussed on distressed people or included a broad spectrum of psychiatric symptoms, some studies reported partly negative findings, but positive findings prevailed. Although within the category of studies focussing on depression, there were two (out of seven) studies with (partly) negative findings and two with findings that were conditionally positive, all these studies were focussed on samples of elderly. We tend to believe that the age factor is more important than disorder type.

Summing up the results of the reviewed studies, we can conclude the following:
- People living in the community who are depressed or distressed use, in general, more resources from general health care services than those who are not depressed or distressed.
- This general tendency is not consistently reflected in the use of specific health care services, but is materialised in different patterns of outpatient and inpatient service utilization.

The reasons for these variances are not clear. A factor might be that health care utilization is not only dependent on patient needs, but also on the availability and accessibility of specific services, both mental health and general health services. That makes utilization dependent on local circumstances, and the findings of studies as reviewed also, at least partly, dependent on these local circumstances, especially if they are related to differences on the system level (*Hoyt, Conger, Valde, & Weihs, 1997; Rogler & Cortes, 1993; Taylor, Anderson, McNeney, Diehr, Lavis, Deyo et al., 1998; Wells, 1994*).

For the elderly, this association is less clear-cut, as already noticed. As to inpatient use, it seems that an association exists only among elderly men, whereas, among the population at large, evidence for a positive association predominates. As to outpatient use, we see most studies reporting a positive association but, among the elderly, negative findings prevail.
We can only speculate about the underlying causes. It might be that the possible impact of mental disorders on service use is masked among the elderly because their service use is already on a certain raised level. Another possibility is that the elderly tend to wait longer (postpone the decision) to ask for help because of decreased emotional responsiveness or increased emotional control (*Jorm, 2000*). Only when their mental health problems seriously impinge on their daily functioning, are they ready to ask for help.

This means, overall, that interventions aiming at a reduction of general health care use that is associated with mental disorders, make sense in general, but cannot be based solely on that overall association. Assuming that utilization patterns tend to be locally specific, interventions should be based on local (and recent) information on the use of specific service types. Interventions cannot be based on the assumption that an overall association has consequences on each service level. They can only be designed to be successful and on target, if there is knowledge of the local circumstances and utilization patterns of specific services. This is even more the case if an intervention is aiming at the elderly, among whom successful interventions seem to be rare (*Freudenstein, Jagger, Arthur, & Donner-Banzhoff, 2001*). ■

Chapter 3

Length of hospital stay and health services use of medical inpatients with comorbid non-cognitive mental disorders: A review of the literature

Summary

We reviewed 23 studies on the association between non-cognitive mental disorders and the use of general health care services by medical patients admitted to a general hospital. Only studies with a prospective design and with a correction for possible confounding factors were included. In most studies, only service use during index admission was observed, but eight studies included a longer observation period during follow-up after hospital discharge.

The 15 studies that were restricted to service use during index admission, showed mixed results: length of hospital stay was related to common mental disorders in some studies, but other studies did not find such an association. The eight studies that used a longer observation period showed findings that are more consistent. They demonstrated mainly that symptoms or complaints of depression are related to a higher resource use within general medical services.

Introduction

In the last 30 years, there has been a continuous stream of studies that apparently demonstrate that mental disorders among patients admitted to a general hospital because of their physically ill condition, prolong length of stay. When a decade ago Saravay and Lavin (1994) reviewed 26 studies that assessed the effect of psychiatric comorbidity on the length of hospital stay for medical and surgical patients, their conclusions were positive. Most studies included in that review demonstrated an association between psychiatric comorbidity and length of hospital stay. The majority of these studies, however, had serious methodological weaknesses. They were retrospective, did not correct for illness severity, and detection of psychopathology was not systematic, but based on referrals or spontaneous identification. Saravay and Lavin concluded that the findings of methodologically sound studies demonstrate that psychiatric cormorbidity contributes to increased costs by extending hospital length of stay and by contributing to greater hospital use after discharge from an index admission. In fact, these conclusions were based on four so-called third generation studies that had a prospective design and were controlling for severity of illness. Three of these four studies were positive, the other one (*Narain, Rubenstein, Wieland, Rosbrook, Strome, Pietruszka et al., 1988*) showed negative findings. Of the three positive studies one concerned the association between delirium and LOS (*Francis, Martin, & Kapoor, 1990*). The other two studies measured a broad spectrum of psychopathology, including cognitive impairment (*Levenson, Hamer, & Rossiter, 1992; Saravay, Steinberg, Weinschel, Pollack, & Alovis, 1991*). The correction for illness severity was done by testing the association between illness severity and LOS or testing the association of illness severity and psychopathology. Finding these associations not to be significant was considered sufficient reason to conclude that psychopathology and LOS were positively associated.

The empirical evidence as reviewed by Saravay and Lavin is mainly pointing to an association between organic or cognitive mental disorders and hospital resource use. The question whether non-cognitive mental disorders are associated with higher resource use in general hospitals is therefore still open. For that reason and because new studies were published in the last decade, we decided to undertake a review of studies on that subject that fulfilled at least some elementary methodological standards, avoiding the internal validity problems of most older studies.

This review aims to test the evidence for the assumption that comorbid mental disorders are associated with higher resource use from general medical services among patients admitted to general hospitals because of their physically ill condition, by systematically reviewing the empirical literature on that association.
More specifically, we will focus on non-cognitive psychiatric comorbidities and mental health problems, thus excluding organic disorders like dementia (cognitive impairment), confusional states and delirium. Schizophrenia, other psychotic disorders and personality disorders will also be excluded, as well as substance abuse.
In population studies the disorders we included are sometimes indicated as 'common mental disorders' (*Goldberg & Huxley, 1992*).This means that mainly affective disorders, anxiety disorders and somatisation will be included, however without using strict diagnostic criteria, as used in formal diagnostic classification systems like DSM-IV or ICD-10. The reason for choosing such a broad definition of mental disorders is based on evidence that subthreshold mental disorders may have serious disabling consequences and may therefore affect illness behaviour in general and more specifically health service use (*Brugha, 2002; Judd & Akiskal, 2000; Rucci, Gherardi, Tansella et al., 2003; Sherbourne, Wells, Hays et al., 1994; Wittchen, Nelson, & Lachner, 1998*).
To be included in the review a study should be directed to groups admitted to a general hospital. Assessment of resource use should start with the index admission. The observation period might be restricted to the admission only or might be extended to a longer period.

Method

This review is part of a more comprehensive review of the literature concerning not only inpatient studies, but also outpatient and population studies. For that comprehensive review a literature search was conducted using Medline and PsychLit databases from 1984, with several search terms related to mental health problems (excluding organic disorders, schizophrenia, psychotic disorders, personality disorders) and utilization of general health care services. Search terms used for mental health problems were: mental disorders, psychological complaints, psychological distress, depression, anxiety, somatoform disorders. For service utilization, we used service utilization, service use, costs, treatment duration, length of stay, and for medical patients we used medical inpatients, medical outpatients, surgical inpatients, surgical outpatients, general hospital, primary care, physical illness, and somatic illness. Searching was done by making combinations of specific terms from each category. A first search was executed in 2001, followed by an additional search in 2003. In addition, a hand search was done by going through the tables of contents of a selection of 20 journals over the same period and by browsing through reference lists of selected studies.
Studies were only included in the review, if they had a prospective design and the outcomes were corrected for possible confounding factors, especially somatic morbidity. This implies that retrospective and cross-sectional studies were excluded, as well as prospective studies that did not use any correction for possible confounders.
A study was considered prospective if the assessment of mental health problems had taken place before the observation period of service utilization. For studies related to inpatient groups this would mean, strictly interpreted, that assessment of mental health problems must have taken place before admission. For practical reasons studies using pre-admission assessment are very complicated and (therefore) almost non-existent. As to inpatient studies we will consider the design prospective if the assessment of mental health problems has taken place within the first days of hospital admission.

Results

The initial searches (in 2001) in Medline and PsychLit, the tables of contents of selected journals and in reference lists, produced 484 references. After reading the abstracts, in order to check whether the content of the study matched the aim of the review, 289 studies were eliminated. It proved to be impossible to make a reliable judgment of the research design based on information contained in the abstracts. Therefore, the decision to include a study meeting the research quality criteria was made after reading the Method sections of the full papers. Out of 195 studies there were 13 inpatient studies fulfilling our criteria. The second search (in 2003), in order to add recent studies, produced seven additional studies. Of the 20 studies to be reviewed, nine studies were published in 2000 or later, 5 between 1995 and 1999.

General characteristics of reviewed studies

- **Observation period of service use**
  In most inpatient studies, only service use during the

index admission is observed. There was however also a category that observed service during a longer (follow up) period. Three studies combined both observation periods. Because observation period was an important distinctive feature, we will present our findings separately for these categories of studies in two tables. Studies that combined both observation periods will appear in both tables.
The 20 original studies will therefore presented as 23 'virtual' studies. From these 23 studies, 15 were based on observations during the index admission (admission studies), and eight were based on observations during a longer follow up period (follow up studies).
Relevant characteristics and main results of the admission studies are summarized in table 3-1. Findings from the follow up studies are summarized in table 3-2.

- **Outcome measures used**
  A commonly used outcome measure for inpatient studies is length of hospital stay (LOS). All 15 admission studies used LOS as an outcome measure. Four admission studies combined LOS with other outcome measures, such as costs, charges or number of procedures. Four out of 8 follow-up studies used LOS (or readmission days) as an outcome measure, four studies used other measures.
  Follow up studies showed a greater variety of utilization measures, like number of procedures, diagnostic tests, consultants seen, or costs.

- **Correction for severity of illness**
  A variety of indicators was applied to measure severity of illness. The Karnofsky scale was used in two admission and two follow up studies, but other studies adopted Charlson comorbidity index or Duke Severity of Illness scale. DRG-weights were also applied as proxy for illness severity. Some studies used measures for functional impairment (e.g. FAMS, FIM) or even a proxy for functional impairment (residence), to adjust for illness severity. Studies related to specific patient groups (like cardiac patients) made sometimes use of clinical physiological measures that are related to the severity of that specific physical illness.
  The possible influence of illness severity on outcome was in most studies adjusted by the use of appropriate statistical corrections (regression models including possible confounders, analysis of covariance). Studies that were designed as case control studies used indicators of illness severity as matching variables. A small number of studies used a more straightforward way to correct for illness severity: the association between illness severity and mental health problems was tested whether significant or not.

- **Assessment of psychiatric morbidity**
  Four admission studies used formal diagnostic systems, i.e. DSM-IV or ICD-10 in combination with clinical interviews, to assess mental disorders. Questionnaires or rating scales were mostly used (in 6 admission and 5 follow up studies). Five admission and three follow up studies combined both methods, that means the whole sample was screened using a rating scale or questionnaire and a selection - in most cases those reaching a certain cutoff-score - was interviewed and diagnosed.

- **Characteristics of patients samples**
  Most studies used sample sizes of several hundreds observations. Four admission studies and one follow up study had a small sample size (less than 200), two admission studies and two follow up studies had large sample sizes (more than 1000). Post hoc power calculations suggest that most reviewed studies did have sufficient power to detect meaningful differences in length of stay or other outcome measures. For example, one study of Levenson et al. (1992) would have had a 94% power to detect a difference of three days, but a 22% power to detect a difference of just one day, the study of Creed et al. (2002) would have had a 99% power to detect a difference of US$1000 between compared groups, but a 59% power to detect a difference of US$200.

A majority of the studies included patients of all ages, but three admission and three follow up studies were restricted to the elderly. Only four studies (two admission and two follow up) focused on specific patients categories (hip fracture, gall bladder, or cardiac patients), the other studies sampled patients from general medical or surgical wards or from general medical patients in rehabilitation wards.

Study outcomes

- **Admission studies**
  Within the category of studies relating mental health problems (anxiety, depression) to length of stay (LOS) seven studies were positive in demonstrating such an association and seven were negative (i.e. did not report significant associations). One study (*Galynker, Cohen, Salvit, Miner, Phillips, Focseneanu et al., 2000*) reported

Table 3-1. Studies with observation period limited to index admission

authors	title	population; setting	age	design	service use measures
Berod, A. C., M. Klay, et al. (2000)	Anxiety, depressive, or cognitive disorders in rehabilitation patients: effect on length of stay.	physical rehabilitation inpatients (n=1385)	elderly	prospective	LOS in rehabilitation centre
Boeke, S., D.Stronks (1991)	Psychological variables as predictors of the length of post-operative hospitalization.	patients with gall-bladder disease - elective cholecystectomy (n=58)	19-78 yr	prospective; baseline measurement before operation; follow up 3 days after operation	LOS
Creed, F., R. Morgan, et al. (2002)	Depression and anxiety impair health-related quality of life and are associated with increased costs in general medical inpatients.	medical inpatients (n=263)	18+	prospective, follow up at 5 months	LOS
deGruy, F., J. Crider, et al. (1987)	Somatization disorder in a university hospital.	medical, surgical inpatients (n=223); cases (n=19)	18+	case-control, matching by age, gender, race, admitting service, admision date	LOS, hospital costs, consultations, tests, negative tests during index admission
Friederich, H. C., M. Hartmann, et al. (2002)	Psychische komorbiditaet bei internistischen Krankenhauspatienten: Praevalenz und Einfluss auf die Liegedauer. / Psychiatric comorbidity in medical inpatients--Prevalence and effect on length of stay.	patients admitted to two departments of medicine (n=570)	16-91 yr.	prospective	LOS during index admission
Fulop, G., J. J. Strain, et al. (1998)	A prospective study of the impact of psychiatric comorbidity on length of hospital stays of elderly medical-surgical inpatients.	geriatric medical/surgical inpatients (n=467)	elderly	prospective	LOS during index admission
Furlanetto, L. M., R. V. da Silva, et al. (2003)	The impact of psychiatric comorbidity on length of stay of medical inpatients.	medical inpatients (n=317)	18-64 yrs	prospective	LOS during index admission
Galynker, I., L. Cohen, et al. (2000)	Psychiatric symptom severity and length of stay on an intensive rehabilitation unit.	inpatients admitted to intensive rehabilitation unit (n=44)	mean age 70 yr	prospective	LOS in rehabilitation unit, during index admission
Hansen, M. S., P. Fink, et al. (2001)	Complexity of care and mental illness in medical patients.	medical inpatients (n=294)	18+	prospective	complexity of care (i.e. LOS, tests, medications, nurse interventions, consultants during index adm.)
Holmes, J. and A. House (2000)	Psychiatric illness predicts poor outcome after surgery for hip fracture: a prospective cohort study.	hip fracture patients (n=731)	elderly	prospective	LOS during index admission
Koenig, H. G., F. Shelp, et al. (1989)	Survival and health care utilization in elderly medical inpatients with major depression.	medical inpatients (n=82)	elderly men	case-control, matching by age, severity of illness, functional status, diagnosis	LOS of index admission
Levenson, J. L., R. M. Hamer, et al. (1990)	Relation of psychopathology in general medical patients to use and cost of services.	medical inpatients (n=455)	adults	prospective	LOS, charges, procedures, during index admission
Levenson, J. L., R. M. Hamer, et al. (1992)	Psychopathology and pain in medical inpatients predict resource use during hospitalization but not rehospitalization.	medical inpatients (n=1020)	adults	prospective	LOS, charges, procedures
Saravay, S. M., M. D. Steinberg, et al. (1991)	Psychological Comorbidity and length of stay in the general hospital.	medical and surgical inpatients (N=278)	18+	prospective	LOS of index admission
Wancata, J., N. Benda, et al. (2001)	Does psychiatric comorbidity increase the length of stay in general hospitals?	medical and surgical inpatients (n=993)	18+	prospective	LOS of index admission

mental health status assessment	control for medical illness by:	control for other variables	correction method used	main results (after adjustment)
anxiety and depression (HADS)	Functional Autonomy Measurement System (FAMS); diagnosis, LOS in acute care hospital	age, gender	confounders included in regression analysis	no association
state anxiety inventory; inadequacy, trait anxiety, ego strength	number of previous operations; preoper. stay; kind of operation, duration of anaesthesia, amount of blood loss; post-operative complications	age, gender	confounders included in regression analysis	post-operative anxiety is associated with longer LOS; no association with preoperative anxiety and personality characteristics
Hospital Anxiety and Depression Scale; HADS > 10: ICD-10 diagnosis	Karnofsky Performance Status Scale; Duke Severity of Illness scale	gender, social class, social benefit	possible confounders (gender, social class, social benefit, severity of illness - Duke) were adjusted for in analysis of covariance	anxiety/depression no association with LOS
DSM-III somatisation disorder	admitting service	age, gender, race (see design)	correction by study design; simple analyses, using t-tests to compare cases and controls	no association with utilization measures; more negative test results
Hospital Anxiety and Depression Scale (HADS) and general depression scale (ADS); ICD-10-diagnosis	severity of illness (vitale Gefaerdung) 4 levels; illness duration	age, gender, marital status, education, professional status	possible confounders (illness duration, severity of illness) were adjusted for in analysis of covariance	psychopathology is related to longer LOS; depression/anxiety are not
depression and anxiety (SCID-interview on third hospital day); Geriatric Depression Scale; cognitive impairment (MMSE)	DRG weights, functional status	age, gender, ethnicity, health insurance, discharge way	multiple regression controlling for age, gender, ethnicity, health insurance, discharge way, DRG weights	no association with anxiety and depression
affective dis.(DSM-IV) based on Schedule for Affective Disorders and Schizophrenia (+ cogn. impairment)	Charlson Comorbidity Index of Illness	age	covariance analysis including age and severity of illness	no association with LOS (except cognitive impairment)
Hamilton Rating scale for De-pression; psychiatric symptoms (PANSS-g) (+ cogn. impairment)	capacity to function independently (FIM)	age, gender	multiple regression controlling for age, gender, FIM admission, FIM discharge	no association of depression with LOS; longer LOS with psychiatric symptoms (PANSS-g; mainly anxiety related)
anxiety, depression (SCL-8D), somatisation (Whiteley-7); ICD-10 diagnosis (somatoform, subst.abuse, depresion/anxiety)	severity of illness (life threatening, chronic), subjective health, physical disability	age, gender	logistic regression controlling for age, gender, chronic and life-threatening disease	mainly, no association of mental disorder, psychol. distress or somatisation with care complexity.
depression (Geriatric Mental State schedule); + dementia, delirium, other	fracture type, residence (ADL proxy), physical illness, physical drugs	age, gender, soc. deprivation	Cox Proportional Hazards model adjusted for age, gender, hospital, residence, fracture type, deprivation score, physical illness, physical drugs	depression related to longer hospital stay
depression: Geriatric Depression Scale, Hamilton Depression Rating Scale, DSM-III (major depression)	severity of illness (Am.Soc. Anestesiol.), functional status, physical diagnosis	age	correction by study design; simple analyses, using t-tests to compare cases and controls	depression related to longer LOS at index admission
anxiety and depression (SCL-90) + cognitive dysfunction, pain	DRGs (categories, weights)	age, gender, race, primary payer	DRG weights were not used as confounders and corrected for in the analyses; study groups showed no differences when compared on DRG weights	all psychopathology related to longer LOS, higher costs, more procedures
anxiety and depression (SCL-90) + cognitive dysfunction, pain	DRGs (categories, weights), disease staging (TOTSCALE-score)	age, gender, race, primary payer	illness severity variables were not corrected for in the analyses; study groups showed no differences when compared on these and other confounding variables	all psychopathology (general, depression, anxiety) related to higher service use during index admission
depression, anxiety (Zung, SCL-90), + cognitive impairment (3-5 days after adm.)	Karnofsky scale, discharge med. diagnosis, discharge condition, limitations of activities	age, living arrangements, occupational status, day of testing	no correction in analyses; no association was found between LOS and age, discharge med. diagnosis, living arrangements, occupational status, day of testing, discharge condition, limitations of activities	Zung-depression and SCL-anxiety related to longer hospital stays; SCL-depression nearly significant related
anxiety, depression, psychosom. dis. (DSMIIIR based on CIS-interview); + other psychiatric disorders	number and type of somatic diagnoses, previous hospital admissions	age, gender, marital status, social class, living situation	multiple regression controlling for age, gender, marital status, social class, somatic diagnosis, number of som. diagn., living situation, previous hospital admissions, rural vs. urban	no association of LOS with psych. disorders except alcohol and drug related disorders (and dementia)

Table 3-2. **Studies with observations during follow up period**

authors	title	population; setting	age	design	service use measures
Creed, F., R. Morgan, et al. (2002)	Depression and anxiety impair health-related quality of life and are associated with increased costs in general medical inpatients.	medical inpatients (n=263)	18+	prospective, follow up at 5 months	costs of hospital, primary and community care (NHS data + self report)
Druss, B. G., R. M. Rohrbaugh, et al. (1999	Depressive symptoms and health costs in older medical patients.	medical and surgical inpatients - veterans (n=1316)	60+	prospective	costs of service use in 6 months (admission data)
Frasure-Smith, N., F. Lesperance, et al. (2000)	Depression and health-care costs during the first year following myocardial infarction.	patients admitted for acute MI, who survived 1 yr (n=848)	unknown	prospective	costs of service use in 1 yr. (Medicare data)
Koenig, H. G. and M. Kuchibhatla (1999)	Use of health services by medically ill depressed elderly patients after hospital discharge.	medical patients after hospital admission (n=331)	60+	prospective, follow up after 3, 6, 9, 12 m.	use of inpatient and outpatient health services in 4 follow up periods of 3 months (self-report)
Koenig, H. G., F. Shelp, et al. (1989)	Survival and health care utilization in elderly medical inpatients with major depression.	medical inpatients (n=82)	elderly men	case-control, matching by age, severity of illness, functional status, diagnosis	inpatient days during follow up period (5 months), total hospital days, clinic visits (adm. data)
Levenson, J. L., R. M. Hamer, et al. (1992)	Psychopathology and pain in medical in-patients predict resource use during hospitalization but not rehospitalisation.	medical inpatients (n=1020)	adults	prospective	readmissions (in same hospital) within at least 6 months; cumulative LOS, hospital costs/charges, procedures (admission data)
Levine, J. B., N. A. Covino, et al. (1996)	Psychological predictors of subsequent medical care among patients hospitalized with cardiac disease.	patients admitted w. cardiac disease (n=210)	mean age 64 yr	prospective	readmission days for cardiac reasons and any reason within 6 months (admission data + self report)
Saravay, S. M., S. Pollack, et al. (1996)	4-Year Follow-Up of the Influence of Psychological Comorbidity on Medical Rehospitalisation.	medical/surgical inpatients (n=273)	18+	prospective, follow up after 4 years	readmissions and readmission days in same hospital within 4 yrs. (admission data)

mixed findings: LOS was associated with anxiety related symptoms but not with depression. Some of these seven negative studies were successful in demonstrating associations of length of stay with other mental disorders like cognitive impairment (*Fulop, Strain, Fahs, Schmeidler, & Snyder, 1998; Furlanetto, da Silva, & Bueno, 2003*), or substance abuse (*Wancata, Benda, Windhaber, & Nowotny, 2001*). One positive study (*Boeke, Stronks, Verhage, & Zwaveling, 1991*) showed in fact mixed findings: post-operative anxiety was related to extended hospital stay, but this was not the case with pre-operative anxiety.

- **Follow up studies**

  Within the studies with a longer observation period, the findings are quite consistent: six out of eight demonstrate a positive association between mental health problems and use of general medical services. Most of these positive studies were limited to symptoms of depression. In one of these studies, which also included anxiety (*Levine, Covino, Slack, Safran, Safran, Boro et al., 1996*), depression was positively associated with readmission days, but anxiety was not significantly associated. In two studies (*Frasure-Smith, Lesperance, Gravel, Masson, Juneau, Talajic et al., 2000; Levenson, Hamer, & Rossiter, 1992*) no significant association was found.

Discussion

We reviewed 20 inpatient studies, that all fulfilled some elementary methodological criteria of internal validity. Three studies combined a short observation period (during index admission) with a longer observation period during follow up, and were therefore considered to be composed of two separate studies published as one study.

The 15 studies that were restricted to service use during index admission, showed mixed results. The eight studies

	mental health status assessment	control for medical illness by:	control for other variables	correction method used	main results (after adjustment)
	Hospital Anxiety and Depression Scale; HADS > 10: ICD10 diagnosis	Karnofsky Performance Status Scale; Duke Severity of Illness scale	gender, social class, social benefit	possible confounders (gender, social class, social benefit, severity of illness - Duke) were adjusted for in analysis of covariance	anxiety/ depression associated with higher total costs during follow up
	Depression - subscale of Rand Mental Health Index	number of medical diagnoses, service use before index admission	age, race, income, region, distance to hospital, service connection	calculated least square means adjusting for covariates: age, race, income, region, distance to hospital, service connection, number of medical diagnoses, service use before index admission	higher costs for highest depression quartile
	depression (Beck) 5-15 days after Myocardial infarction	several cardiologic measures, past cardiac operations	age, gender	multiple regression controlling for gender, education, smoking, history of hypertension, Killip class	depression is not associated with higher costs (11% cost increase related to depr., p=.083)
	major and minor depression based on CES-D, Hamilton-D and DIS	impaired ADL (20 items)	no	logistic or linear regression controlling for ADL-impairment	depression related to more physician visits, higher rates of rehospitalisation, more days in nursing home
	major depression: Geriatric Depression Scale, Hamilton Depression Rating Scale, DSM-III (major depression)	severity of illness (Am.Soc. Anestesiol.), impaired ADL (11 items), phys. diagnosis	age	correction by study design; simple analyses, using t-tests to compare cases and controls	depression related to more readmissions and hospital days during follow up
	anxiety and depression (SCL-90) + cognitive dysfunction, pain	DRGs (categories, weights), disease staging (TOTSCALE-score)	age, gender, race, primary payer	illness severity variables were not corrected for in the analyses; study groups showed no differences when compared on these and other confounding variables	all psychopathology (general, depression, anxiety) not related to readmissions and service during follow up
	depression (Beck), anxiety (Spielberger), after intensive care, <1 week after admission	severity of cardiac disease, comorbidity (number of diagnoses)	age, gender	correction for disease severity in regression analysis	depression related to more readmission days (cardiac and any reason); anxiety not related
	depression, anxiety (Zung, SCL-90) + cognitive impairment 3-5 days after admission	Karnofsky scale; prior hospital days	age	covariance analysis including age and functional impairment (Karnofsky), cogn. impairment, prior hospital days	Zung-depression related to almost twice as many readmission days

that used a longer observation period showed findings that are more consistent. They demonstrated mainly that symptoms or complaints of depression are related to a higher resource use within general medical services.

Before we will try to make an interpretation of these findings, we will first check for possible weaknesses in the reviewed studies that might have influenced the outcomes that were found.

First, the possibility exists that underpowered studies have produced the negative (i.e. non significant) findings. We estimated the power of the reviewed studies as accurate as possible, using the statistical information as available in the reported studies and a dedicated software program (nQuery Advisor) (*Elashoff, 2002*). For one admission study (*Hansen, Fink, Frydenberg, de Jonge, & Huyse, 2001*) it was impossible to estimate the power in a reasonable way. Among the admission studies with non-significant findings only one (*DeGruy, Crider, Hashimi, Dickinson, Mullins, & Troncale, 1987*) was seriously underpowered and another one (*Fulop, Strain, Fahs et al., 1998*) had a power of less than 80% to detect a moderate effect. The other negative studies had a power of at least 80%, but most had a power of at least 90% to detect a moderate effect.

Among the follow up studies the non-significant findings were produced by two studies, one (*Frasure-Smith, Lesperance, Gravel et al., 2000*) having a power of at least 90% to detect an 1% increase in costs, the other one (*Levenson, Hamer, & Rossiter, 1992*) underpowered to detect a difference of three readmission days, but with a power of 90% to detect a difference of five readmission days. Overall, this means that non-significant findings may be partly, but not solely, due to a lack of power.

Second, studies with a solid correction for confounders might have produced negative results, whereas the positive findings are related to insufficient correction for

confounders.
In the discussion of this topic a distinction has to be made between the analytical method used to adjust for confounding, and the content and validity of the measures used to assess the confounding variables. As to adjustment methods, statistical correction of possible confounders (using multiple regression analysis or analysis of covariance) can generally be considered a method that is superior to methods in which associations between confounders and outcome are tested in order to eliminate these possible influences (*Anderson, Auquier, Hauck, Oakes, Vandaele, & Weisberg, 1980*). Matching on confounding variables as applied in case-control studies can be considered equivalent to statistical correction. Three admission studies and one follow up study were not using statistical correction methods or a matching strategy. Among the admission studies all 3 of these weaker studies demonstrated positive findings, while among the 12 stronger admission studies 4 demonstrated positive and 1 mixed findings; 7 studies reported no associations. Among the follow up studies six out of seven stronger designed studies reported positive findings.
Therefore, among the admission studies there seems to be a tendency for weaker studies to produce positive findings. That does not mean that stronger admission studies produce negative findings. Indeed, studies with a stronger correction method partly produce non-significant associations, but also positive associations.
The most important possible confounding variable in the studies we reviewed is severity of physical illness. All selected studies used at least one variable related to illness severity, but there was a great variety in measures applied for that purpose. As we are relating resource use (length of hospital stay, expenditures or other resource measures) to mental disorders, measures of illness severity that predict resource use should be preferred as being more valid. Some of the measures used in the studies, were originally designed for that purpose, as diagnosis-related group (DRG) classification -schemes and other measures based on DRG-categories (*Christoffensson, Conklin, & Gonella, 1988; Horn, Sharkey, Buckle, Backofen, Averill, & Horn, 1991; Lungen & Lauterbach, 2002*). However, most measures of illness severity were not designed as iso-resource measures, but as predictors of mortality or in hospital survival (*Charlson, Pompei, Ales, & MacKenzie, 1987; Charlson, Sax, MacKenzie, Braham, Fields, & Douglas, 1987; Rochon, Katz, & al, 1996*) or for the assessment of clinical outcome, health status or burden of illness (*Almeida & Carlsson, 1996; de Groot, Beckerman, Lankhorst et al., 2003; Harboun & Ankri, 2001*). This does not imply, however, that measures designed for these purposes may not be used as predictors of resource use, if their validity in this respect has been demonstrated (*Bowling, 1995*).
Three admission studies used DRG-based variables to correct for confounding. The study of Fulop et al (1998) could not demonstrate a relation between anxiety or depression and LOS after correction, but the studies of Levenson and Hamer (*Levenson, Hamer, & Rossiter, 1990; Levenson, Hamer, & Rossiter, 1992*) presented positive associations. They did not, however, used a statistical correction method, but used an elimination strategy in which DRG-weights appeared not to be different between comparison groups. Most other studies used a variety of iso-outcome measures, mostly weighted disease counts and other measures of functional status or disability, such as the Functional Independence Measure (FIM) (*Granger, Cotter, Hamilton, Fiedler, & Hens, 1990; Granger & Hamilton, 1990; Keith, Granger, Hamilton, & Sherwin, 1987; Stineman, Escarce, & al., 1998*), the Functional Autonomy Measurement System (FAMS) (*Hebert, Carrier, & Bilodeau, 1988*), Karnofsky Performance Status (*Karnofsky, Abelmann, Craver, & al, 1948*), several versions of Duke-indices (*Parkerson, Broadhead, & Tse, 1990, 1991a, 1991b, 1993; Parkerson, Broadhead, & Tse, 1995; Parkerson, Gehlbach, Wagner, James, Clapp, & Muhlbaier, 1981*). Although these instruments were not developed to predict resource utilization, one may assume that functional disability and health services use are related (*Rochon, Katz, & al, 1996; Stineman, 1997*), making these measures appropriate to correct for the confounding effect of medical illnesses. There was, however, not a consistent pattern between the application of these measures and outcomes found.
Three studies used physiological measures to correct for severity of illness. The only admission study using this type of measure (*Boeke, Stronks, Verhage et al., 1991*) was positive, one follow up study (*Frasure-Smith, Lesperance, Gravel et al., 2000*) was negative, but the other one (*Levine, Covino, Slack et al., 1996*) was positive. One admission study (*Furlanetto, da Silva, & Bueno, 2003*) using a seemingly less appropriate measure, i.e. the Charlson index which is predicting mortality (*Charlson, Pompei, Ales et al., 1987*), nevertheless reported non-significant findings. In the admission study of DeGruy et al (1987) an indirect and quite crude measure (i.e. admitting service) was used as a proxy for illness severity. Notwithstanding this fact, the findings were negative.
Overall, one may conclude that the applied measures of illness severity differed with respect to content validity,

but that these differences are not systematically related to variances in study results.

Third, there might be an influence of the method used to assess mental health problems (diagnostic schedules vs. rating scale or questionnaires). Of the four studies using a diagnostic interview to assess a psychiatric morbidity according to criteria of the DSM or ICD, one reported a positive result and the other three non-significant results. Assessment based on questionnaires or rating scales, produced four positive admission studies, one with mixed findings and one negative, and admission studies using a combination were in three cases negative and in two cases positive. Among follow-up studies, diagnostic interviews were not used to assess morbidity. However, a combination of questionnaires and interviews was used in three studies, all demonstrating a positive association. Assessment based on questionnaires or rating scales only was used in five follow up studies. Three of these studies reported positive findings

As far as there is any relation between assessment method and study findings, it is not in the expected direction: formal caseness criteria based on a diagnostic classification system (which will tend to exclude less serious morbidity compared to screening lists) seem to produce more non-significant results instead of the expected positive results.

A different issue related to the assessment of mental health problems, is the question whether and in which degree the measures used were contaminated by physical health problems.

Especially questionnaires, but also rating scales that can be used to assess affective functioning, may tap on physical signs and symptoms that are associated with depression or psychological distress, but might be related to physical illnesses as well.

In the studies we reviewed, in addition to a formal diagnostic assessment of depression (mostly based on a structured clinical interview) nine different depression scales were used. For the assessment of anxiety, three different scales were used. Beck Depression Index (*Beck & Steer, 1987; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961*) was used in two studies. It contains a quite distinct 'somatic disturbance' component (*Beck, Steer, & Garbin, 1988*).The Selfrating Depression Scale, developed by Zung (1983) and used in two reviewed studies, is also containing several items that refer to somatic symptoms and is therefore considered inappropriate to assess depression among the elderly (*Applegate, Blass, & Williams, 1990*). The Hamilton Rating Scale for Depression (*Hamilton, 1960, 1967*), used in three studies, has a rather complex structure and is tapping on somatic symptoms (*Gibbons, Clark, & Kupfer, 1993*). In one reviewed study this property was even mentioned as a reason to prefer this scale, as the inclusion of neurovegetative symptoms might increase sensitivity to common manifestations of depression in elderly patients (*Galynker, Cohen, Salvit et al., 2000*). Scales that were developed more recently assume a more stringent definition of depression, avoiding somatic oriented items (*Derogatis, 1975; Derogatis & Cleary, 1977a, 1977b; Hautzinger & Bailer, 1993; Long Foley, Reed, Mutran, & DeVellis, 2002; Radloff, 1977; Yesavage, 1988; Yesavage, Brink, Rose et al., 1983; Zigmond & Snaith, 1983*). The depression subscale of the Rand Mental Health Index, used in one study, was developed with the explicit strategy to avoid any somatic manifestations of depression (*Burnam, Wells, Leake, & Landsverk, 1988; Stewart, Ware, Sherbourne, & Wells, 1992; Ware, Johnston, Davies-Avery, & Brook, 1979*). Two of three used anxiety scales were part of more comprehensive instruments: the Hospital Anxiety and Depression Scale (*Zigmond & Snaith, 1983*) and the Hopkins Symptoms Checklist (*Derogatis, 1975*), which belong to the category of instruments from which scores are less or not affected by the presence of physical illness. The third anxiety scale: the State-Trait Anxiety Inventory of Spielberger (*Spielberger, 1983*) has this quality as well.

In three admission studies (*Galynker, Cohen, Salvit et al., 2000; Koenig, Shelp, Goli, Cohen, & Blazer, 1989; Saravay, Steinberg, Weinschel et al., 1991*) scales were used that are contaminated by the presence of a physical illness, but two of these studies combined that with other more valid instruments or diagnostic procedures. The study of Galynker et al. (2000) used the Hamilton scale only and reported no association between depression and length of stay (but positive findings related to general psychopathology). Consequently, the positive findings among the admission studies are not related to the use of contaminated distress measures.

Among the follow up studies only three studies (*Creed, Morgan, Fiddler et al., 2002; Druss, Rohrbaugh, & Rosenheck, 1999; Levenson, Hamer, & Rossiter, 1992*) used distress measures that were not contaminated. Two of these studies reported positive findings, but the study of Levenson et al. (1992) did not find any association. However, this study might be underpowered. In three studies, contaminated measures of depression were used. Nevertheless Frasure-Smith et al. (2000) did not find an association with higher costs, but Saravay et al. (1996) reported a relation of Zung-depression with more readmission days. They also found SCL-depression to be

related to readmission days, but this association was not corrected for severity of illness. In the study of Levine et al. (*Levine, Covino, Slack et al., 1996*) no association with anxiety (measured with the STAI of Spielberger) was found, but depression, measured with Beck Depression Inventory, was related to readmission days.
In two follow up studies (*Koenig & Kuchibhatla, 1999; Koenig, Shelp, Goli et al., 1989*) a combination of measures and diagnostic procedures was used to assess depression or other mood disorders, which reduces the risk of contamination. Both studies reported positive findings
As a result, we can state that among the follow up studies that report positive findings, two of these are not beyond all doubts. Because of the measures used in these studies, the relation between health service use and mental disorders is not unequivocal. However, the other reviewed follow up studies reporting positive findings showed associations that are unequivocal.

Summarizing the above-discussed possible weaknesses, it can be concluded that whereas studies that used relatively weaker correction methods tend to produce more positive findings, these kinds of study characteristics cannot explain the general tendencies among the studies we reviewed. That means that inpatient admission studies (with a short observation period) did not consistently demonstrate positive associations (and showed even a tendency to non-significant associations). Follow up studies (with a long observation period) in general showed more positive associations.

The reasons for the differentiated findings among admission studies remain to be explained. We present some, partly speculative, considerations.

- The studies we reviewed had all at least some correction for possible confounding factors, especially illness severity. This was a major difference compared to studies reviewed earlier. Only two admission studies (*Berod, Klay, Santos-Eggimann, & Paccaud, 2000; Wancata, Benda, Windhaber et al., 2001*) presented results of analyses with and without correction for illness severity. In both instances, mood disorders were related to length of stay before correction for illness severity, but not after correction.
- The inconsistent picture of this type of studies might be partly caused by the character of the typical outcome measure used: length of stay. This measure is not only influenced by patient and clinical characteristics, but also by differences between the health care systems in which the hospitals under study have to function. Moreover these health care systems have changed over time in an era where pressure to minimize costs has grown. Different reimbursement systems, the proliferation of control systems such as managed care and disease management has reduced the average length of stay after hospital admission and the elasticity of this variable (*Gregory, Baigelman, & Wilson, 2003; Kane, Keckhafer, Flood, Bershadsky, & Siadaty, 2003; Mardis & Brownson, 2003*). The positive admission studies were all, except one, published around 1990, the exception being a non-US study published ten years later.
- One might wonder whether length of stay is a good outcome measure at all. From a broader perspective of cost-effectiveness (and cost-offset effects), focusing on LOS, without counting other uses of health care resources, does not make much sense. A more comprehensive approach, incorporating all kind of utilization that can be related to an illness episode, should be preferred. Consequently, the category of studies with a longer observation period should be given more weight.

Following that line of reasoning, we might as well focus our review and conclusions based on the last item.
As stated before, the findings of this category of studies tend more consistently to point to one direction, i.e. that mental disorders are associated with higher resource use within general health services. Two studies show a different picture. In one case (*Levenson, Hamer, & Rossiter, 1992*) the authors explain this finding by pointing to short lived nature of the measured symptom states, rather than enduring traits. It is however unlikely that this is the main reason, considering the findings of the study of Saravay et al (1996) in which the same screening list (SCL-90) was used. A limitation of the Levenson study is their method used to assess service use: they only measured readmission in the same hospital, not in other hospitals. In the study of Levine et al (1996) the association of depression with readmissions was stronger when all readmissions were included rather than readmissions in the same hospital. The second study with non-significant findings (*Frasure-Smith, Lesperance, Gravel et al., 2000*) was not interpreted as such by the authors, because they consider this association "marginally" significant. Therefore, they do not give a possible explanation for what we consider nonsignificant results. This study had in a sense the same limitation as the study of Levenson et al.: resource use was restricted to physician's costs, other hospitalization costs were not

included or were estimates based on global budget averages.

The other follow up studies consistently demonstrated an association between depression and service use, whether in terms of costs, physician visits, or in terms of hospital (readmission) days. Depression was in all studies related to service use (although these findings might be due to the use of contaminated depression measures in two studies), but that was not the case with anxiety. It may be, that among medical inpatients anxiety assessed within the first days of admission, is more a transient state, triggered by a stressful event as hospital admission, than depression. That means that anxiety (as a state) will only have short-term consequences. This interpretation is supported by one admission study that measured both trait and state anxiety (*Boeke, Stronks, Verhage et al., 1991*), where state but not trait anxiety was associated with LOS.

Summing up both categories of studies, we can conclude from our review the following:

- Medical and surgical inpatients that are depressed use in the months that follow hospital admission more resources from general health care services than patients that are not depressed did.
- The relation between mental disorders and length of stay in a general hospital is not sharp. A major reason for that finding may be, that length of stay is very much dependent on other factors, like health care system characteristics. Moreover, studying resource use of medical-surgical inpatients with comorbid mental disorders by only examining length of hospital stay can be considered a too narrow focus. ■

Chapter 4

Assessing the construct validity of three indicators of psychological distress in relation to perceived health and physical illness

Summary

In this article three indicators of psychological distress are compared on the strength of their association with subjective (or perceived) health, after adjusting for physical illness measures and other possible confounding variables.

For the analyses data were used from a community-based sample of adults (N=9428). Psychological distress was measured using three different instruments: the Negative Affect Scale (NAS) of Bradburn; a Nervousness scale; self-reported depressive complaints. Physical illness was measured by seven specific chronic conditions, a co-morbidity index of 17 conditions and 2 disability measures. Subjective health was assessed by a single question. OLS and logistic regression, as well as structural equation modelling were used to analyse the data.

We found that the relation between subjective health and psychological distress is strongest in case nervousness and this, or negative affect, are used as indicators of psychological distress. The measure of depressive complaints is less strongly, but still substantially, related to subjective health.

After correction for physical illness variables, the change in strength of the association is slightest for depressive complaints and highest for nervousness. Only small differences between negative affect and nervousness were established. These measures, which were more contaminated by physical ill health than depressive complaints, have the strongest association with subjective health, both before as well as after correction for physical illness components.

We can conclude that negative affect and nervousness are reliable and valid indicators of psychological distress, which can be used to predict subjective health. However, for this purpose, a correction for the confounding effects of physical illness variables will be necessary. The depressive complaints measure is less predictive of subjective health but also less contaminated by physical illness variables, making it a better indicator of psychological distress if correction for physical illness variables is not possible.

Introduction

In illness related behaviour, such as absence from work, search for help, consultations with physicians, both physical as mental health factors may play a part. When studying such behaviour, it is important to be able to make a clear distinction between physical and mental aspects of health and illness. If mental disorders are measured in addition to other measures of illness and physical functioning, the assessment of these disorders should be as independent as possible from physical illnesses and symptoms.

However, common mental disorders such as psychological distress or mood disorders are often accompanied by physical symptoms or bodily complaints, which may complicate the distinction between physical and mental disorders (*Goldberg & Huxley, 1992*).

This implies that when choosing an instrument appropriate for studies of illness related behaviour, measures of psychological distress contaminated with physical symptoms should be avoided, or, alternatively, measures with the lowest degree of contamination should be preferred.

In this study, we will focus on the assessment of the construct validity of three measures that can be used as indicators of psychological distress (PD). Validity will be assessed from two perspectives:

1) the association of these psychological distress measures with physical illness measures;
2) the performance of these psychological distress measures to predict perceived health.

The first perspective is chosen in order to assess the degree of contamination of the PD-measures. If the association is weak, we consider the degree of contamination to be low. The second perspective is less obvious, but is related to the background of this study: our intention is to use (one of) these measures to predict help seeking behaviour and utilization of general, i.e. non-mental, health care. Therefore, it may seem logical to compare these measures on the strength of their associations with the utilization of general health services. However, health service use is also influenced by characteristics of the health care system itself, such as availability and accessibility of specific services (*Andersen & Newman, 1973; Andersen, 1995*) from which we want to refrain in this stage. For that reason, we examine the relation between psychological distress and subjective health (perceived health status) because we

consider subjective health as the nearest next link on the causal pathway to health care utilization, which is not influenced by structural characteristics of the health care system or physician behaviour (*Cockerham, Kunz, & Lueschen, 1988; Preville, Potvin, & Boyer, 1998*), but is closely associated with health care utilization (*Borgquist, Hansson, Nettelbladt, Nordstrom, & Lindelöw, 1993; Goldstein, Siegel, & Boyer, 1984; Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997*). A measure of psychological distress that is best in predicting subjective health has the highest validity in this respect. However, subjective health will not be related to psychological distress only, but to other subject related factors as well, especially physical (ill) health (*Kaplan & Baron-Epel, 2003; Kempen, Miedema, Van den Bos, & Ormel, 1998*). At the same time, physical illness may lead to psychological distress (*Cassem, 1995; Jacobi, Wittchen, Holting, Sommer, Lieb, Hofler et al., 2002*). This implies that both psychological distress and subjective health may be related to physical illness and that physical illness may act as a confounder in the association of psychological distress and subjective health (see also figure 4-1). Therefore, we will also study the effects of physical (ill) health (and other possible confounders), on the association between psychological distress and subjective health and adjust for their effect.

In combining these objectives, the aim of this study is to compare three indicators of psychological distress on the strength of their association with subjective health and to analyse to what extent these associations will change after adjustment for physical illness measures and other possible confounding variables. An indicator of psychological distress with minimal physical health components will show less change in degree of association with subjective health if this association is adjusted for physical health, which will be seen as an indication of higher construct validity.
The main concepts and measures and their supposed relations are depicted in figure 4-1.

Method

Study population

For this study, data were used from a community-based sample of adults (from 15 to 90 years of age), from a population of enrollees of a sickness fund working in the western part of the Netherlands, who had responded to a health survey mailing (N=9428). The design of the procedure for conducting the survey was guided by Dilman's (*Dilman, 1978*) recommendations. The first mailing of the survey was in February 1993. In this sample, individuals who were hospitalised in a period before the survey were deliberately overrepresented. The net response rate to the survey was 70.4 %. Respondents and non-respondents differed slightly in their medical consumption. Nonresponse bias will result in a small

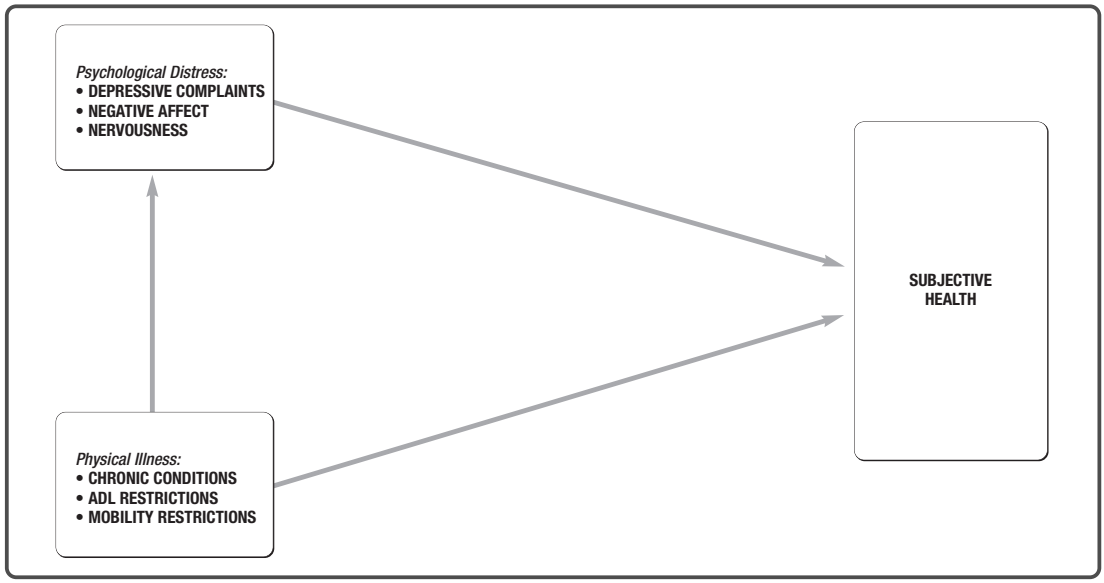

Figure 4-1. **Relations between main concepts and measures.**

over-estimation of utilization of prescribed drugs (*Lamers, 1997*).

Data

As part of the survey, psychological distress was measured using three different instruments. The first instrument was the Negative Affect Scale (NAS), i.e. the negative items of Bradburn's Affect Balance Scale (*Bradburn, 1969*). The NAS is a five-item scale, which appeared to be quite reliable (Cronbach's α = .80) in this study. It is related to factors such as anxiety and depression (*Bradburn, 1969*), neuroticism and psychological complaints (*Ormel, 1980*). The second instrument was a Nervousness-scale. This three item scale was originally part of a larger scale designed to measure work related stress and subjective health (*Dirken, 1969; Van Sonsbeek, 1990*). Its reliability appeared to be satisfactory (alpha = .74). It measures feelings of nervous tension and irritability, and it is correlated to neuroticism (*Van Sonsbeek, 1990*).
As part of the survey, chronic conditions (25 types), including depressive complaints, were assessed by self-report, using the same checklist as listed in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*). Self-reported depressive complaints (a single item measure) were used as a third indicator of psychological distress.

To measure physical illness, only active chronic conditions, i.e. conditions for which treatment was going on at the moment of completing the questionnaire, were used. Seven different active chronic conditions (arthritis, back problems, diabetes, heart disease, hypertension, lung disease, migraine) that had the highest prevalence in the sample were used as seven independent dummy variables. Data on the other 17 conditions (excluding depressive complaints) were used to form a co-morbidity index by counting the number of chronic conditions for which treatment had been sought.
In addition to these disease related variables two other possible confounding variables, were included in the analyses. Two measures of disability, based on indicators developed by the O.E.C.D. (*McWhinnie, 1981*), were used: ADL-restrictions and mobility-restrictions. The reliability (Cronbach's α) of these measures was 0.89 and 0.85, respectively.

Subjective health was assessed as part of the survey by asking a single question ("How is your health in general") with five answer categories, ranging from 'very good' to 'poor'.

The socio-demographic variables that were included in the analyses were age, gender, marital status (divorced/separated/widow(er) vs. other), living situation (household size) and educational level.

Analyses

The analyses were conducted in two steps.
First, we wanted to detect which illness and disability variables and which socio-demographic variables should be considered as confounding variables, as to the relation between psychological distress and subjective health. For that purpose, the measures of psychological distress and subjective health were each used as dependent variables in regression analyses, which used general and specific chronic illness variables as well as socio-demographic variables as independent variables. This was done separately for each category of independent variables, as well as combined for all categories of independent variables. To be considered a confounding variable requires that the same (independent) variable is associated with the measure of psychological distress under consideration, as well as with subjective health. This implies that both (standardised) regression coefficients related to the same independent variable should have a minimal significance level of 1%.
Secondly, for each measure of psychological distress, two regression models predicting subjective health were estimated: firstly a basic model (unadjusted, with psychological distress as the only independent variable), and, secondly, an adjusted model with psychological distress and the confounding variables selected in the first step as independent variables.

All models were estimated by using standard multiple regression analysis. As 'depressive complaints' is a binary variable, using multiple regression analysis might result in biased coefficients. We therefore checked the results by replicating the analyses related to this variable using logistic regression analysis instead of linear regression analysis.

As a final check, a structural equation model (reflecting the model depicted in figure 4-1) was tested for each measure of psychological distress. In this model, physical illness will be considered as a latent variable, which is measured by several observed indicators. The EQS 6.1 program (*Bentler & Wu, 1995*) was used for that purpose.

Results

Sample characteristics

Almost 57% of the respondents were female. The largest age category was 25-34 years (28%), while 17.4% were aged 65 or more.
The majority of the respondents (75%) rated their health as good or very good.
However, 40% had one or more chronic conditions. Nearly 16% had a chronic condition with at least one co-morbid condition. Back problems were predominant (8.8%), followed by migraine (7.3%) and arthritis (6.7%). Only 5% had some degree of ADL-restrictions, mobility restrictions being more frequently seen (almost 20% had some restrictions).
Almost 13% had depressive complaints and more than 5% sought treatment for these complaints. On the nervousness scale, 19% scored two or more complaints (out of 3 possible complaints). On the negative affect scale, 44% did not have any negative feeling at all, 30% had sometimes one or two negative feelings (out of five). The other 26% had at least several negative feelings on occasion, such as loneliness or being upset.
Additional sample characteristics can be found in table 4-1.

Psychological distress and subjective health

In tables 4-2 and 4-3, the results of the regression analyses, as described in the method section, are presented. Table 4-2 contains standardised regression coefficients (betas) of the regression models with the three variables indicating psychological distress and subjective health variable as dependent variables. This table shows the strength of the associations of the indicators of psychological distress with physical illness measures and demographic variables. For each dependent variable, the coefficients of the three separate models (demographics, general illness and specific chronic conditions) are presented in the left column, whereas the coefficients of the combined model are presented in the right column.

The relation between physical illness and psychological distress is weak, in the case where 'depressive complaints' is used as an indicator of psychological distress. The general illness measures explain just 2% of the total variance, the specific chronic conditions 3% and the combined model, i.e. the combination of these measures with socio-demographic variables, explains 4% of the variance. In comparison to the other indicators, 'negative affect', used as an indicator of psychological distress, has the strongest association with general illness

Table 4-1. **Samples characteristics**

Variable	N	%
Gender		
Male	4,065	43.1
Female	5,363	56.9
Age		
15-24 yr	878	9.3
25-34 yr	2,635	28.0
35-44 yr	1,738	18.4
45-54 yr	1,450	15.4
55-64 yr	1,090	11.6
65-74 yr	922	9.8
75 yr or older	714	7.6
Marital status		
Married/living with partner	6,436	68.3
Never married	1,818	19.3
Divorced/separated	316	3.4
Widow	739	7.8
Unknown	118	1.3
Living situation		
Alone	1,461	15.5
With one person	3,146	33.4
With two or more persons	4,508	48.0
Unknown	312	3.3
Educational level		
Low	5,429	57.6
Middle	2,619	27.8
High	1,087	11.5
Unknown	293	3.1
Number of chronic conditions (w/o depressive complaints and 7 specific conditions)		
0	7,303	77.5
1	1,462	15.5
2	344	3.7
3 or more	123	1.3
Unknown	195	2.1
Specific conditions		
Osteoarthritis	633	6.7
Back problems	831	8.8
Diabetes	172	1.8
Heart disease (-infarct)	175	1.9
Hypertension	682	7.2
Lung disease	436	4.6
Migraine	689	7.3
Psychological distress		
Depressive complaints	1,187	12.6
Psychological distress	*Mean*	*SD*
Negative Affect (Affect Balance Scale)	6.60	2.21
Nervousness Scale	0.62	0.98
Measures of health and disability	*Mean*	*SD*
Subjective health	2.14	0.83
ADL-restrictions	3.10	0.69
Mobility restrictions	3.62	1.69

measures (adjusted R^2=.07; with the combined model adjusted-R^2 becomes .12). 'Nervousness' is in between these indicators.

Subjective health is much better explained by the same independent variables. The general illness measures explain 29% of the total variance; the specific measures 19%. Both categories combined with demographics, results in 34% explained variance.

From table 4-2 we can also learn which independent variables (physical illness measures, demographics) may function as confounders. As already stated in the Method section, independent variables that have significant regression coefficients with subjective health as dependent variable, as well as with one of the psychological distress variables as dependent variable, may be considered confounders as to the relation between psychological distress and subjective health. Within the category of socio-demographic variables, age is clearly a confounder (although not very convincingly related to nervousness). Low educational level is related to nervousness and subjective health as well.
Within the category of the general physical illness variables, both the number of chronic conditions and mobility restrictions may act as confounding variables related to all three psychological distress measures.
Within the category of seven specific chronic conditions, 'back problems' and 'migraine' may act as confounders, related to each psychological distress measure.
Hypertension and lung disease may be considered confounders related to negative affect and nervousness.

In table 4.3, the results can be found of the regression analyses in which subjective health was the dependent variable, and one of the psychological distress indicators (depressive complaints, negative affect or nervousness), being the main independent variable combined with other independent variables, which may act as confounders.

Table 4-2. **Prediction of three indicators of psychological distress and of subjective health by sociodemographic and illness variables**

dependent variable:	**Depressive complaints**		**Negative affect (ABS)**		**Nervousness**		**Subjective health**	
	3 models	combined model	3 models	combined model	3 models	combined model	3 models	combined model
	beta	beta	beta	beta	beta	beta	beta	beta
demographic variables:								
Age	n.s	-0.05	-0.08	-0.17	0.08	n.s.	0.29	0.11
Gender - male	0.07	0.05	0.12	0.09	0.09	0.06	n.s.	n.s.
Marital status: divorced/separated/widow	n.s	n.s.	0.10	0.08	n.s.	n.s.	n.s.	n.s.
Living situation	-0.05	-0.05	-0.12	-0.11	n.s.	n.s.	n.s	n.s.
Educational level - low	n.s	n.s.	n.s	n.s.	0.04	0.05	0.05	0.06
Educational level - high	n.s	n.s.	n.s	n.s.	n.s.	n.s.	n.s	n.s.
adj-R^2 (model 1):	*.01*		*.05*		*.02*		*.10*	
general illness variables:								
Number of chronic conditions	0.12	0.10	0.12	0.11	0.15	0.14	0.29	0.23
ADL-restrictions	n.s.	n.s.	0.06	0.05	n.s.	-0.03	n.s.	n.s.
Mobility restrictions	0.06	0.05	0.17	0.15	0.13	0.10	0.39	0.27
adj-R^2 (model 2):	*.02*		*.07*		*.05*		*.29*	
specific chronic conditions:								
Lung disease	n.s.	n.s.	0.06	0.03	0.05	0.03	0.17	0.11
Hypertension	n.s.	n.s.	0.03	0.03	0.08	0.07	0.10	0.05
Back problems	0.07	0.05	0.07	0.03	0.06	0.03	0.19	0.12
Osteoarthritis	0.04	n.s.	0.06	n.s.	0.05	n.s.	0.15	0.03
Migraine	0.13	0.11	0.11	0.09	0.10	0.09	0.09	0.09
Diabetes	n.s.	n.s.	0.03	n.s.	0.04	n.s.	0.09	n.s.
Heart disease (-infarct)	n.s.	n.s.	n.s	n.s.	n.s.	n.s.	0.14	0.04
adj-R^2 (model 3):	*.03*		*.03*		*.04*		*.19*	
adj-R^2 (combined model):		*.04*		*.12*		*.07*		*.34*

Table 4-3. Prediction of subjective health by three indicators of psychological distress and possible confounding illness and demographic variables

Psychological distress is indicated by:	**Depressive complaints**	**Negative affect (ABS)**	**Nervousness**
models:	**Depressive complaints + all proven confounders**	**Negative affect + all proven confounders**	**Nervousness + all proven confounders**
	beta	beta	beta
Psychological distress indicator	0.24	0.33	0.35
adj-R^2 (not adjusted model):	*.06*	*.11*	*.12*
Psychological distress indicator	0.17	0.21	0.22
Age	0.16	0.15	0.10
Educational level - low			0.06
Number of chronic conditions	0.24	0.21	0.21
Mobility restrictions	0.28	0.23	0.26
Lung disease		0.11	0.11
Hypertension		0.05	0.04
Back problems	0.11	0.11	0.11
Migraine	0.07	0.07	0.07
adj-R^2 (compr. model):	*.35*	*.38*	*.38*

From table 4-3, we can learn that all indicators of psychological distress are related to subjective health, if not adjusted for confounders. Negative affect and nervousness are stronger associated with subjective health than depressive complaints.

The relationship of 'depressive complaints' with (worse) subjective health is attenuated after adding age, number of chronic conditions and mobility restrictions (as well as two specific chronic conditions) to the regression model, but it is still significant. The

Table 4-4. Summaries of structural equation models: fit coefficients and model parameters

psychological distress (PD) is indicated by:	**Depressive complaints**	**Negative affect (ABS)**	**Nervousness**
model fit			
comparative fit index (CFI)	0.74	0.77	0.76
LISREL goodness-of-fit index (GFI)	0.94	0.94	0.94
LISREL adjusted goodness-of-fit index (AGFI)	0.85	0.86	0.86
standardized root mean-square residual (SRMR)	0.10	0.10	0.10
root mean-square error of approximation (RMSEA)	0.14	0.14	0.14
model chi-square	2,223.09	2,154.25	2,163.39
model parameters (standardized solution)			
path coefficient PD - subjective health	0.10	0.06	0.11
path coefficient physical illness factor - subjective health	0.71	0.70	0.70
factor loading PD on physical illness factor	0.23	0.45	0.33

beta-coefficient of depressive complaints is reduced by 29%, from .24 to .17.

In case 'negative affect' (instead of depressive complaints) is used as indicator of psychological distress, the addition of confounders results in a reduction of 33% of the coefficient of negative affect (from .33 to .22). 'Nervousness' as a predictor of subjective health is behaving almost similar as to negative affect, with a slightly greater reduction (from .35 to .22, i.e. 37%) of the beta-coefficients related to nervousness, when confounders are added.

The results of testing the structural equation model are summarised in table 4-4. In this model, the same variables were used, as shown in table 4-3, as far as they were common in all regression models shown in that table. Consequently, educational level, lung disease and hypertension were not included in the analyses. We postulated a latent variable physical illness, which was measured by the number of chronic conditions, mobility restrictions, back problems and migraine. Physical illness was related to subjective health in two ways, directly and via psychological distress (see also figure 4-1). Subjective health was supposed to be related to physical illness, psychological distress and age.
All three models (with different psychological distress indicators) had, more or less, the same goodness of fit. However, the model parameters showed some interesting differences. The path coefficients of the psychological distress indicators and subjective health were almost comparable for depressive complaints and nervousness, and the lowest for negative affect. Factor loadings of psychological distress indicators on the physical illness factor (latent variable) were highest for negative affect and lowest for depressive complaints.

Discussion

We assessed the construct validity of three indicators of psychological distress by comparing the strength of their relations with subjective health, before and after adjustment for mainly physical illness effects.

The relation between subjective health and psychological distress is strongest in the case where nervousness is used as an indicator. However, the strength of that relation is almost on the same level where negative affect is used as an indicator. The measure of depressive complaints is less strong, but still substantial, related to subjective health. After adjustment for physical illness variables and other confounding variables, such as age, the change in strength of the association is the slightest for depressive complaints and highest for nervousness. There are only slight differences between negative affect and nervousness. These measures, which are more contaminated by physical ill health than depressive complaints, have the strongest association with subjective health, both before as well as after correction for physical illness components. However, the measure of depressive complaints has the highest construct validity as a measure of psychological distress if a measure with the lowest physical health components is required.

Our study has several limitations and possible weaknesses.
Firstly, our indicators of physical illness were all based on self-report. Theoretically, this might have inflated the observed associations between physical illness measures and subjective health perception, as well as psychological distress measures. The most important physical illness indicators were based on self-reported chronic conditions. As we not only asked about the presence of such a condition, but also whether a treatment for such a condition was being sought or was still going on, it can be assumed that these indicators are not just tapping health perceptions, but also more objective health differences. Nevertheless, we might have overestimated the strength of the associations between physical ill health and psychological distress measures, thus overcorrecting their assumed contamination effects. This may affect the precise strength of the corrected associations, but this will be the case for all measures of psychological distress, implying that it will not affect our main findings.
Secondly, we were not able to establish the reliability of the measure of depressive complaints, as it is a single item measure. If, for this or other reasons, this measure is less reliable than the other indicators of psychological distress, which were at least sufficiently reliable, then the strength of the association with subjective health will be attenuated. This might explain the lower predictive validity of this measure in relation to subjective health.

The association of negative affect with subjective health is consistent with findings of other studies (*Aronson, Barrett, & Quigley, 2001; Kolk, Hanewald, Schagen, & Gijsbers Van Wijk, 2003; Vassend & Skrondal, 1999; Watson, 1988*). Most of these studies, however, relate negative affect to several forms of illness behaviour, such as

symptom perception, symptom reporting and somatic complaints, resulting in a stronger association than we found. Moreover, it appears that somatic complaints and symptoms reporting are better explained by negative affect than by differences in physical illness. Studies that relate subjective or perceived health (instead of symptom reporting or somatic complaints), to other measures of health, negative affect and mood disorders are less dominant compared to measures of physical ill health (*Barsky, Cleary, & Klerman, 1992; Kempen, Miedema, Van den Bos et al., 1998*). This could mean that negative affect has more effect on the reporting of symptoms than on the perception of symptoms (*Barsky, Cleary, Barnett et al., 1994*).

Both nervousness and negative affect showed similar patterns of associations with other measures of illness largely. The finding that nervousness is behaving in a more or less parallel way compared to negative affectivity, was not expected. The nervousness scale is a part of a larger, more comprehensive scale on work related stress. This comprehensive scale is susceptible for both physical and psychological distress (*Van Sonsbeek, 1990*). Our assumption, being that the nervousness subscale would be more related to physical distress than negative affect, appeared not to be correct. A closer look at the specific items that constitute 'negative affectivity' and 'nervousness' respectively does not provide a self-apparent explanation of the parallels of these measures. Negative affectivity comprises items related to loneliness, restlessness, depressed mood, while nervousness is related to agitation and sensitivity. On the two bipolar dimensions regularly used in the literature on affects and emotions (*Russell, 1980; Tellegen, 1985*), both measures load on the negative side of the (un)pleasantness dimension, but it is not clear whether they differentiate on the second dimension of level of activation (arousal vs. sleepiness), as both contain just one item related to arousal.
Presumably, depressive complaints can be positioned further away from the arousal side than negative affectivity and nervousness. If that interpretation is correct, it might explain, as least partly, the weaker association of it with subjective health compared to the other measures of psychological distress (*Vassend, 1994*).

Many questionnaires and rating scales have been developed to measure depression. They differ largely as to their contamination with physical symptoms (*Bowling, 1995; Furer, König-Zahn, & Tax, 1995*). A simple question on depressive complaints, used as a screening tool among clinical groups, appeared to be highly predictive of depressive disorder (*Lloyd-Williams, Spiller, & Ward, 2003*). It seems that the same simple question results in a measure that is relatively free of contamination with ill health. The reliability of this measure should, however, be further examined.

In conclusion, we can state that both the negative affect measure and the nervousness scale are reliable and valid indicators of psychological distress that can be used to predict subjective health and health related behaviour. If used for that purpose, they should, however, be corrected for the confounding effects of physical illness variables. Depressive complaint is less strongly related to subjective health and may therefore be less valid as a predictor of health related behaviour. It is however less contaminated by physical illness variables, making it a better indicator of psychological distress if correction for physical illness variables is not possible. ■

Chapter 5

Chronic conditions, psychological distress and the use of psychoactive medications

Summary

This study examined, in a community-based sample of adults (N=9428), whether number and type of chronic conditions are related to psychological distress, fatigue and the use of psychoactive medications.

Strong, linear associations were found between the number of chronic conditions on one hand, and psychological distress and, most of all, fatigue, on the other hand. There was a less strong, but still distinctive association between these factors and the use of medication against anxiety and stress, the use of sleeping pills or tranquillisers and the use of anti-depressants. There was only a partial association between type of condition, psychological distress and fatigue. Migraine had the broadest impact, having an effect on psychological distress and fatigue and on the use of anxiolytics, as well as the use of anti-depressants.

The association of chronic conditions with psychological distress, fatigue and the use of psychoactive medications appeared to be more related with the number of conditions than with type.

Introduction

Chronic patients will often experience, as a consequence of their medical condition, changes in their daily functioning, such as loss of independence, loss of function and role, and changes in interpersonal relationships, such as the availability of social support. These changes may have a negative impact on psychosocial functioning (*Hays, Wells, Sherbourne, Rogers, & Spritzer, 1995; Vilhjalmsson, 1998*).

Gaining insight into the relationship of chronic conditions and psychological functioning is important for several reasons. Comorbid depressive symptoms and other psychological problems may be very consequential for functioning and well being, having additive effects comparable with the effects of chronic medical conditions (*Ormel, Kempen, Deeg, Brilman, Van Sonderen, & Relyveld, 1998*). Moreover, psychological functioning has a substantial impact on treatment course as well as outcome (*Levenson, 1992*). Consequently, psychosocial adjustment to illness appears to be an important predictor of health services utilization (*Brown, Salive, Guralnik, Pahor, Chapman, & Blazer, 1995; Browne, Arpin, Corey, Fitch, & Gafni, 1990; Manning & Wells, 1992*). In addition, psychological problems are the most important cause for disability in adults of working age, affecting work and daily activities (*Stewart-Brown & Layte, 1997*).

The relationship between chronic conditions in general and psychological status has been examined in several studies (*Palinkas, Wingard, & Barrett-Connor, 1990; Stewart-Brown & Layte, 1997; Wells, Golding, & Burnam, 1988a*). Most of these studies were restricted to a specific chronic condition, or did not differentiate between conditions. However, as chronic conditions show a broad range of the symptoms and disabilities accompanying them, one might expect differences in impact on psychological and social functioning related to type of chronic condition. In just a few studies, these kinds of comparisons were made (*Cassileth, Lusk, Strouse, Miller, Brown, Cross et al., 1984; Kempen, Ormel, Brilman, & Relyveld, 1997; Mason, Weener, Gertman, & Meenan, 1983; Ormel, Kempen, Penninx, Brilman, Beekman, & Van Sonderen, 1997; Penninx, Beekman, Ormel, Kriegsman, Boeke, Vaneijk et al., 1996; Stewart, Greenfield, Hays, Wells, Rogers, Berry et al., 1989*).

The results of these studies are far from unequivocal. Some report differences in psychological functioning between chronic conditions (*Kempen, Ormel, Brilman et al., 1997; Ormel, Kempen, Penninx et al., 1997; Penninx,*

Beekman, Ormel et al., 1996), others did not find any difference in that domain related to type of chronic condition (*Arpin, Fitch, Browne, & Corey, 1990; Cassileth, Lusk, Strouse et al., 1984; Mason, Weener, Gertman et al., 1983*), or only found differences between patients with a chronic condition and patients without such a condition (*Stewart, Greenfield, Hays et al., 1989*).

The aforementioned studies, which found a differential impact of type of chronic condition, were community-based and restricted to the elderly. Studies among adults showed less clear-cut results and, moreover, used samples from outpatient populations. We therefore undertook an investigation to assess the impact of chronic conditions on psychological functioning in a community-based population of adults (both elderly and non-elderly), partly as a cross-validation of findings obtained with samples of the elderly.

In this article, we shall present the results of this community-based study, with the intention to examine the question of whether number and type of chronic conditions are related to psychological distress, fatigue and the use of psychoactive medications. We have included fatigue as a dependent variable, because psychological distress and fatigue are closely related (*Chen, 1986; Lewis & Wessely, 1992*), and fatigue might be an alternative mode of the expression of mental problems, as it is considered more socially acceptable. Fatigue has also a physical aspect. We expect therefore fatigue to be a more sensitive measure to assess differences in functioning and well being related to chronic conditions than measures of psychological distress only. In addition to these indicators, we included some measures reflecting the use of psychoactive medications. They have been included partly as an alternative indicator for psychological functioning, that are not contaminated by possible reporting biases, as might be the case with the self-report measures. Another reason for inclusion is, that these measures will provide us insight into the extent to which psychological distress is recognised and treated.

In particular, the following research questions will be addressed:

- Is there a difference in psychological distress (including fatigue), and the use of psychoactive medication, between people both with and without chronic conditions, and are these differences related to the number of chronic conditions?
- Is there a differential effect of type of chronic condition on the level of psychological distress and fatigue and the extent of use of psychoactive medication?

Method

For this study, data were used from a community-based sample of adults (from 15 to 90 years of age), from a population of enrollees of a sickness fund working in the western part of the Netherlands, who had responded to a health survey mailing (N=9428). The design of the procedure for conducting the survey was guided by Dilman's (1978) recommendations. The first mailing of the survey was in February 1993. In this sample, individuals who were hospitalised in a period before the survey were deliberately overrepresented.

The net response rate to the survey was 70.4 %. Respondents and non-respondents differed slightly in their medical consumption. Nonresponse bias will result in a small over-estimation of utilization of prescribed drugs (*Lamers, 1997*). As part of the survey, psychological distress was measured using the Negative Affect Scale (NAS), i.e. the negative items of Bradburn's Affect Balance Scale (*Bradburn, 1969*), and a Nervousness sub-scale, which formed part of a questionnaire on subjective health (*Dirken, 1969; Van Sonsbeek, 1990*). The NAS is a five item scale, which appeared to be quite reliable (Cronbach's $\alpha = .80$) in this study. It is related to factors such as anxiety and depression (*Bradburn, 1969*), neuroticism and psychological complaints (*Ormel, 1980*). The three item Nervousness sub-scale was originally part of a scale to measure work related stress and subjective health. Its reliability appeared to be satisfactory ($\alpha = .74$). It measures feelings of nervous tension and irritability, and it is correlated to neuroticism (*Van Sonsbeek, 1990*). Fatigue was measured with a separate sub-scale from the same questionnaire on subjective health. This 4-item scale, with a reliability of .75, is sensitive to changes in both mental and physical health. Chronic conditions (21 types), using the same checklist as listed in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*), were assessed by self-report. Only active conditions, i.e. conditions for which treatment was going on at the moment of completing the questionnaire, were included. Seven different conditions, with the highest prevalence in the sample, were used for comparative analyses. Data on the other conditions were used in combination with these seven conditions as part of a comorbidity index

(number of conditions). Information on use of psychoactive medications was extracted from a claims database of prescribed drugs. These claims data could be matched with the health survey data. Use was counted over the period from May to December, directly following the period when the mailed health survey was conducted. Three categories of psychoactive medications were distinguished: anxiolytics, hypnotics and sedatives and anti-depressants. These categories were defined in accordance with the main categories N05B, N05C and N06A of the Anatomical Therapeutic Chemical (ATC) classification index, developed by the WHO (WHO, 1996). Only the event of utilization was measured, not quantity or dosage.
In addition to these primary dependent variables, two other dependent variables, measuring disability, were included in the analyses in order to test the main assumption of our study that chronic conditions differ in accompanying symptoms and disabilities. Two measures of disability, based on indicators developed by the O.E.C.D. (*McWhinnie, 1981*), were used: ADL-restrictions and mobility-restrictions. The reliability (Cronbach's α) of these measures was 0.89 and 0.85, respectively.

Bivariate associations between demographic and dependent variables (psychological distress, fatigue and use of psychoactive medication) were assessed using T-tests, analysis of variance and Chi-square tests. To examine the effect of the presence and the number of chronic conditions on the dependent variables, several analyses of variance were performed, adjusting for the following confounding factors: gender, age, marital status (married or not, separated, widowed), living situation (alone or with others) and educational level.

To determine whether type of condition has a differential effect on psychological distress and use of psychoactive medication as well as disability, two different comparisons were made. First, a comparison between types was made on a selection of people with only one chronic condition, using analysis of variance with the confounding factors as covariates. In addition, the differential effect of type of condition was examined by means of multiple regression analyses. In these analyses, all cases were included (with and without comorbidities). Two models were compared on their ability to explain variance in psychological distress and fatigue, as well as disability. The same was done using logistic regression analyses for the explanation of the utilization of psychoactive medications. In all models, controlling for confounders, as mentioned earlier, was applied. In the first model, besides confounding factors, only the number of chronic conditions (comorbidities) was used as a predictor; in the second model, seven dummy variables for types of chronic conditions were added as predictors.

To make results representative of the original population of sickness fund enrollees, they are corrected by means of weighing for age-sex and prior hospitalisation. All results, whether summarised in a table or presented in the text only, are based on analyses in which a 1% significance level was used.

Results

Sample characteristics

Almost 57% of all respondents were of the female gender. The largest age category was 25-34 years (28%), while 17.4% was aged 65 or more. Forty percent had one or more chronic conditions. Nearly 16% had a chronic condition with at least one comorbid condition. Back problems were predominant (8.8%), followed by arthritis (6.7%), and migraine (7.3%).

The distribution of measures of psychological distress and fatigue was - as expected - highly skewed. Most individuals reported no complaints or just a few. The percentage reporting the maximum number of complaints, ranged from between 5.5% and 8.6%.

Psychoactive medications were prescribed for 13.9% of the respondents. Medications against anxiety and stress were prescribed for 7.9%, whereas 6.2% were given prescriptions for sleeping pills or tranquillisers and 2.2% for anti-depressants. In table 5-1, a more comprehensive summary of the distribution of sample characteristics can be found.

The presence of chronic conditions was clearly related to age. In the youngest age category (to 34 years), 28% had one of more chronic conditions and 8% two or more. In the oldest (55 years or older), 53% had at least one chronic condition and 27% two or more. Within the youngest age category, migraine was most frequently found (7.3%), followed by back problems. In the middle-aged (35 to 54 years), it was the other way around: back problems were prevalent (11.3%), followed by migraine (10%). Within the oldest age group, back problems were still quite prevalent (11.7%), but arthritis (15.8%), and hypertension (16.6%), were predominant.

Table 5-1. **Sample characteristics**

Variable	N	%
Gender		
Male	4,065	43.1
Female	5,363	56.9
Age		
15-24 yr	878	9.3
25-34 yr	2,635	28.0
35-44 yr	1,738	18.4
45-54 yr	1,450	15.4
55-64 yr	1,090	11.6
65-74 yr	922	9.8
75 yr or older	714	7.6
Marital status		
Married/living with partner	6,436	68.3
Never married	1,818	19.3
Divorced/separated	316	3.4
Widow	739	7.8
Unknown	118	1.3
Living situation		
Alone	1,461	15.5
With one person	3,146	33.4
With two or more persons	4,508	48.0
Unknown	312	3.3
Educational level		
Low	5,429	57.6
Middle	2,619	27.8
High	1,087	11.5
Unknown	293	3.1
Number of chronic conditions		
0	5,562	59.0
1	2,187	23.2
2	868	9.2
3 or more	615	6.5
Unknown	195	2.1
Specific conditions		
Osteoarthritis	633	6.7
Back problems	831	8.8
Diabetes	172	1.8
Heart disease (-infarct)	175	1.9
Hypertension	682	7.2
Lung disease	436	4.6
Migraine	689	7.3
Use of psychoactive medications (during 8 months)		
Anxiolytics	746	7.9
Anti-depressants	205	2.2
Hypnotics & sedatives	583	6.2
Psychological distress	*Mean*	*SD*
Negative Affect (Affect Balance Scale)	6.60	2.21
Nervousness Scale	0.62	0.98
Fatigue Scale	0.93	1.27
Disability	*Mean*	*SD*
ADL-restrictions	3.10	0.69
Mobility restrictions	3.62	1.69

Age, sex, marital status, living situation and educational level were all related to psychological distress, fatigue and the use of psychoactive medications.
Women were higher on negative affect, nervousness, fatigue, and were using more medications against anxiety and stress, more sleeping pills and tranquillisers, as well as more anti-depressants. Age was linearly related to fatigue and the use of psychoactive medications. The same pattern was found in the relationship between age and nervousness, to the age of 65. Negative affect, however, showed a different pattern: it is slightly declining up to the age of 74, but peaked in the age category of 75 and older. Respondents who were separated or have lost their partner showed more psychological distress and fatigue and were using more psychoactive medications when compared to those who were married or those who had never married. The same pattern was found with people living alone compared to those living with others. People with the lowest educational level showed more nervousness and fatigue and were using more psychoactive medications than the others.

Differences related to chronic conditions

Comparison between those having a specific chronic condition and those not having that specific condition showed that each specific condition is associated with a higher level of psychological distress, fatigue and more usage of psychoactive medications (table 5-2). A major exception to this pattern involved the use of anti-depressants, the use of which was not related to diabetes and heart disease (nor, although less distinctly, to lung disease). Furthermore, heart disease did not make a difference related to negative affect, nor did migraine in relation to use of hypnotics and sedatives. All conditions, with the exception of migraine, were associated with more activities of daily living (ADL) and mobility-restrictions.

Because differences in psychological distress, fatigue, use of psychoactive medications and disability, were also shown to be related to socio-demographic factors, corrections were applied for these possible confounders in the subsequent analyses.

Table 5-3 shows the results of the analyses relating number of chronic conditions, level of psychological distress, fatigue, use of psychoactive medications and disability, after correcting for the effects of age, sex, marital status, living situation and educational level. People with and without any chronic condition differed

Table 5-2. **Means of psychological distress and fatigue(*), and proportions of users of psychoactive medications(**) according to chronic conditions**

Conditon:	Negative Affect	Nervousness	Fatigue	Anxiolytics	Hypnotics & Sedatives	Anti-depressants	ADL-restrictions	Mobility-restrictions
Arthritis								
no	6.54	0.59	0.87	0.073	0.054	0.020	3.07	3.48
yes	7.39	0.92	1.71	0.165	0.174	0.049	3.65	5.62
p	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*
Back problems								
no	6.53	0.59	0.85	0.074	0.056	0.020	3.09	3.49
yes	7.35	0.91	1.73	0.128	0.124	0.045	3.32	4.95
p	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*
Diabetes								
no	6.59	0.61	0.91	0.078	0.059	0.022	3.10	3.59
yes	7.22	1.00	1.73	0.157	0.186	0.023	3.66	5.47
p	*.002*	*.000*	*.000*	*.001*	*.000*	*.790*	*.000*	*.000*
Heart disease								
no	6.59	0.61	0.91	0.077	0.060	0.022	3.10	3.59
yes	6.93	0.93	1.84	0.171	0.171	0.023	3.50	5.05
p	*.103*	*.000*	*.000*	*.001*	*.000*	*.794*	*.002*	*.000*
Hypertension								
no	6.57	0.59	0.88	0.071	0.055	0.019	3.09	3.55
yes	7.01	0.97	1.53	0.179	0.151	0.053	3.27	4.53
p	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*	*.000*
Lung disease								
no	6.56	0.60	0.90	0.077	0.059	0.021	3.10	3.58
yes	7.30	0.91	1.61	0.124	0.121	0.037	3.27	4.51
p	*.000*	*.000*	*.000*	*.001*	*.000*	*.042*	*.000*	*.000*
Migraine								
no	6.52	0.58	0.87	0.074	0.060	0.019	3.11	3.62
yes	7.52	1.01	1.66	0.140	0.080	0.064	3.11	3.67
p	*.000*	*.000*	*.000*	*.000*	*.060*	*.000*	*.941*	*.381*

(*) p-values based on T-tests
(**) p-values based on Chi-square tests

Table 5-3. **Adjusted means of psychological distress and fatigue, and of proportions of users of psychoactive medications according to number of chronic conditions(*)**

Number of chronic conditions	N1	Negative Affect	Nervousness	Fatigue	N2	Anxiolytics	Hypnotics & Sedatives	Anti-depressants	N3	ADL-restrictions	Mobility restrictions
0	5104	6.29	0.47	0.66	5169	0.06	0.04	0.01	5088	3.05	3.33
1	2053	6.71	0.67	1.03	2072	0.08	0.06	0.02	2041	3.08	3.62
2	809	7.23	0.92	1.48	826	0.12	0.10	0.05	819	3.09	3.82
3 or more	555	7.89	1.19	2.19	563	0.15	0.12	0.05	560	3.46	5.04
	8521				8630				8508		
F		*123.20*	*125.24*	*345.32*		*27.66*	*28.47*	*17.81*		*84.18*	*260.05*
p		*.000*	*.000*	*.000*		*.000*	*.000*	*.000*		*.000*	*.000*

Means and proportions adjusted for age, gender, marital status, living situation and educational level
N1: number of observations on measures of psychological distress and fatigue
N2: number of observations on measures of psychoactive medication
N3: number of observations on measures of disability
F: ratio between variance explained by number of chronic conditions and residual variance

(*)Note: Adjusted proportions of users of psychoactive medications were calculated using analysis of variance, to make them comparable to proportions reported in other tables.
In addition, logistic regression was used, which is more appropriate for this type of data. The results did not differ significantly from those reported in the table.

as expected: the more chronic conditions, the higher the level of psychological distress and fatigue, the larger the utilization of psychoactive medications, and the greater the extent of disabilities. Differences in psychological distress and disability were greater than in utilization of psychoactive medications. Fatigue showed the greatest variance in relation to the number of chronic conditions, followed by mobility restrictions.

To determine whether type of condition has a differential effect on psychological distress, use of psychoactive medication and disability, a comparison was first made on a selection without comorbidity. As seen in table 5-4, these comparisons, after correcting for the effects of age, sex, marital status, living situation and educational level, did not reveal any differences on psychological distress, utilization of medications against anxiety or stress, utilization of sleeping pills and tranquilizers, nor in utilization of anti-depressants.

There was, however, a difference in fatigue: people with heart disease were showing the highest level of fatigue and people with hypertension the lowest. Both measures of disability were also showing differences between conditions.

Table 5-5 gives a summary of the results of the analyses, which were done to compare two models for explaining differences in the dependent variables. In the first model, besides confounding factors, only the number of chronic conditions (comorbidities) was used as a predictor; in the

second model, seven types of chronic conditions were added as predictors. It was seen that the differences between both models were very small or even non-existent, except for both measures of disability. Extending the model with specific chronic conditions as independent variables apparently did not add much explained variance in both psychological distress and fatigue as well as in the use of psychoactive medications. The largest difference between the models was in the explanation of mobility-restrictions. Of the primary dependent variables, fatigue (which already had the highest amount of explained variance among these variables) showed the relatively largest difference between both models. Three of the seven chronic conditions were shown to have some association with fatigue. Back problems and migraine were having an augmenting effect on fatigue, but the third one (arthritis), worked in an opposite manner - in the given context of the other independent variables. Migraine appeared to be the type of condition with the broadest effects; that is, it affected both indicators of psychological distress as well as fatigue, but also the use of medications against anxiety and stress and the use of anti-depressants. Adding hypertension, respiratory diseases, heart failure and diabetes to the model did not have any effect.

The most prominent predictor of psychological distress and fatigue was the number of chronic conditions. As to the use of psychoactive medications, age

Table 5-4. **Adjusted means of psychological distress and fatigue, and proportions of users of psychoactive medications according to specific conditions (without comorbidities)(*)**

Specific condition	N1	Negative Affect	Nervousness	Fatigue	N2	Anxiolytics	Hypnotics & Sedatives	Anti-depressants	N3	ADL-restrictions	Mobility restrictions
Lung disease	163	6.83	0.66	1.12	165	0.09	0.09	0.01	159	3.08	3.91
Hypertension	252	6.74	0.76	0.89	258	0.13	0.06	0.05	253	3.01	3.28
Back problems	278	6.71	0.70	1.23	281	0.08	0.12	0.03	273	3.10	4.38
Arthritis	159	6.58	0.48	0.91	161	0.07	0.07	0.03	159	3.24	3.98
Migraine	299	6.62	0.74	1.27	299	0.12	0.09	0.04	298	3.09	3.59
Diabetes	46	6.83	0.79	1.14	47	0.11	0.02	0.00	47	3.15	3.86
Heart disease	51	6.67	0.59	1.30	52	0.08	0.06	0.01	51	2.95	3.42
F		*0.27*	*1.64*	*2.70*		*1.03*	*1.42*	*1.43*		*4.92*	*11.57*
p		*.950*	*.132*	*.011*		*.401*	*.202*	*.199*		*.000*	*.000*

Means and proportions adjusted for age, gender, marital status, living situation and educational level
N1: number of observations on measures of psychological distress and fatigue
N2: number of observations on measures of psychoactive medication
N3: number of observations on measures of disability
F: ratio between variance explained by number of chronic conditions and residual variance

(*)Note: Adjusted proportions of users of psychoactive medications were calculated using analysis of variance, to make them comparable to proportions reported in other tables.
In addition, logistic regression was used, which is more appropriate for this type of data. The results did not differ significantly from those reported in the table.

Table 5-5. **Standardized regression coefficients for psychological distress and fatigue (N=8841), disability (N=8508) and odds ratio for use of psychoactive medication (N=8800) among demographic and disease variables**

Dependent Variable	Negative Affect		Nervousness		Fatigue		Anxiolytics		Hypnotics & Sedatives		Anti-depressants		ADL-restrictions		Mobility-restrictions	
Model:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Independent Variable:																
Age	-0.133	-0.122	0.024	0.035	0.034	0.047	1.028	1.030	1.055	1.056	1.012	1.017	0.168	0.155	0.278	0.261
Gender	0.109	0.105	0.073	0.066	0.115	0.114	1.946	1.861	2.097	2.080	2.336	2.068	n.s.	n.s.	0.047	0.062
Separated/widow (yes/no)	0.093	0.093	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.060	0.057	0.067	0.062
Living situation	-0.120	-0.123	-0.025	-0.028	-0.084	-0.088	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	-0.053	-0.046	-0.100	-0.094
Low educational level	n.s.	n.s.	0.049	0.051	0.027	0.027	1.352	1.353	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.051	0.048
High educational level	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s	n.s
Comorbidities	0.211	0.214	0.208	0.228	0.339	0.325	1.278	1.237	1.300	1.239	1.376	1.391	0.172	0.196	0.275	0.193
Lung disease		n.s.		n.s.		n.s.		n.s.		n.s.		n.s.		n.s.		0.024
Hypertension		n.s.		n.s.		n.s.		n.s.		n.s.		n.s.		-0.060		-0.035
Back problems		n.s.		n.s.		0.032		n.s.		n.s.		n.s.		-0.024		0.115
Arthritis		n.s.		-0.044		-0.032		n.s.		n.s.		n.s.		0.077		0.102
Migraine		0.029		0.033		0.037		1.768		n.s.		2.126		-0.065		-0.064
Diabetes		n.s.		n.s.		n.s.		n.s.		n.s.		n.s.		0.033		0.039
Heart disease		n.s.		n.s.		n.s.		n.s.		n.s.		n.s.		n.s.		n.s
adj R²	*.096*	*.097*	*.058*	*.061*	*.162*	*.167*	*.043*	*.045*	*.073*	*.073*	*.013*	*.016*	*.100*	*.112*	*.276*	*.302*

Models:
1: demographics and number of chronic conditions
2: model 1 and specific chronic conditions

was the most important predictor, followed by the number of chronic conditions. Being female had a significant effect on all dependent variables.

Discussion

In our study among adults, aged between 15 and 90 years and living in the community, we found strong, linear associations between the number of chronic conditions and negative affect, nervousness and, most of all, fatigue.

These findings confirm those from previous comparative studies among the elderly (*Kempen, Ormel, Brilman et al., 1997; Penninx, Beekman, Ormel et al., 1996; Prince, Harwood, Blizard, Thomas, & Mann, 1997*), as well as among outpatient groups (*Stewart, Greenfield, Hays et al., 1989*), in regard to the impact of the presence and the number of chronic conditions and thus demonstrates, that the association of chronic conditions with psychological distress not only exists within patient groups in clinical settings, or within the population of the elderly, but can be generalised to all age groups in the general population. Our finding that chronic conditions have a stronger association with fatigue than with psychological distress is in accordance with the results of the

study of Kempen et al. (*Kempen, Ormel, Brilman et al., 1997*), which demonstrated that mental health was the domain of quality of life least affected by chronic conditions. Moreover, the results of our study show that these associations are not restricted to subjective reports of negative feelings, but also pertain to the use of psychoactive medication, including the use of anti-depressants, as assessed from sources independent from self-report.

We could not demonstrate a clear association between type of chronic condition and psychological distress, although we found differences in disability related to type. Only fatigue differed between some types of conditions: heart disease was related to the highest levels of fatigue, hypertension to the lowest.
Contrary to our findings, some studies (*Kempen, Ormel, Brilman et al., 1997; Ormel, Kempen, Penninx et al., 1997; Penninx, Beekman, Ormel et al., 1996; Stewart, Greenfield, Hays et al., 1989*) have reported quite substantial associations between specific chronic conditions and psychological distress. Three of these studies (*Kempen, Miedema, Ormel, & Molenaar, 1996; Ormel, Kempen, Penninx et al., 1997; Penninx, Beekman, Ormel et al., 1996*), which reported differential impacts of chronic conditions were restricted to the elderly. We re-analysed, therefore, our data stratified on age (below 55 years vs. 55 years or older). Although the results were slightly different between strata, the overall picture was comparable: most chronic conditions did not have a specific effect on psychological distress or fatigue. Therefore, a possible interaction effect of age and type of chronic condition is not a plausible explanation of our results.

Another reason why type of condition did not have a real effect may involve the selection of chronic conditions included in the study. For instance, we did not include cancer or stroke as specific types in our study. However, when we compared conditions included in our study with findings from other comparative studies related to the same type of condition, some conditions (hypertension, diabetes, migraine) show patterns very similar to what we found; but others (back problems, heart diseases) indicated mixed results. In regard to two types of conditions, the results of our study are at odds with those of other comparative studies. Most studies (except the study of Cassileth et al. (1984)), reported clear negative impacts of lung disease or arthritis on mental health, whereas, in our study, the impact of lung disease was neutral and the impact of arthritis even positive (within the context of other conditions and confounding factors). An explanation for these differences can only be speculative, as comparison of the cited studies is hampered by the fact that they investigated divergent study populations, and also used different measures and definitions.

Although differences in the definitions of the chronic conditions studied and in the inclusion criteria used to limit categories are a possible source of varying results, we conclude that, considering the small amount of variance explained by type of condition in studies that were positive, and taking into account quite a number of studies that also found no such relationship (*Arpin, Fitch, Browne et al., 1990; Cassileth, Lusk, Strouse et al., 1984; Egberts, Leufkens, Hofman, & Hoes, 1997; Mason, Weener, Gertman et al., 1983*), condition type is not a major factor in explaining differences in psychological distress, fatigue or the use of psychoactive medication.

These findings can be seen as a demonstration of the limitations of characterising disease in terms of type. Other factors, like illness severity, recency of onset of illness, accompanying disabilities and handicaps, as well as coping resources, have a considerable impact on illness behaviour and psychological status (*Bury, 1982; Ormel, Kempen, Penninx et al., 1997; Prince, Harwood, Blizard et al., 1997; Von Korff, Ormel, Keefe, & Dworkin, 1992*). These factors, however, are more or less independent of type and can vary substantially within each type of illness. Although the chronic conditions in our study differed, on average, significantly in disabling consequences, we did not analyse the associations between disabilities and psychological distress (and other dependent variables) within each condition, as that was beyond the scope of this article. Analyses to explore these pathways are a topic for further research.

Our findings stress the importance of multiple chronic conditions for functioning in general, and for psychological status in particular. The number of chronic conditions was much more predictive of the dependent variables than any type of illness. These findings might indicate that chronic conditions share a generic component, which adds up (in case of multiple conditions) over conditions. Disabilities may be seen as an instance of such a generic component, which appears to be closely related to comorbidities. The even stronger association we found between the number of conditions and fatigue (irrespective of type) may be seen as another example of such a generic component. Fatigue or lack of energy, in combination with functional impairments

that make it more demanding to continue normal daily activities, may lead to a situation in which social or professional contacts are breaking down and all kinds of valued activities are being reduced or even come to a halt. Impairments become handicaps in that way, which are strongly related to psychological distress and depression (*Prince, Harwood, Blizard et al., 1997*).

Our study has several limitations. As the design was mainly cross-sectional, with some follow-up data on the use of medication, causal interpretations of the associations we found are not appropriate. Although it is likely that chronic conditions can cause psychological distress, an alternative explanation for the association between the number of chronic conditions and psychological distress might be that both indicators are influenced by a general tendency to complain and to report these complaints. Although this possible bias cannot be ruled out completely, there are several reasons for not attributing these associations to reporting bias alone. First, we found not only an association between psychological distress (as reported) and chronic conditions, but also between the use of psychoactive medications and chronic conditions. Because the assessment of the use of psychoactive medications was not dependent on self-report, while there was still an association as described, an explanation in terms of reporting bias becomes less likely. Moreover, it is not very plausible, that the self-reported chronic conditions are purely subjective complaints. We asked for active conditions only, which meant that the respondents should still be consulting a physician for their condition. It appears that the self-report of physician's visits were quite reliable. A comparison of actual claims for specialist care and the self-report of visits to a specialist indicate a predictive value of 84% of self-reported visits (*Lamers, 1995*).

Another possible explanation, related to the one mentioned earlier, is that the associations are due to a generic vulnerability to psychological and physical distress, or that the respondents in which chronic conditions and psychological distress co-occur share an unhealthy, stressful and illness-provoking environment. As these factors were not included in our study, these possible explanations remain open.

Despite these limitations, it can be concluded that the association of chronic conditions with psychological distress, fatigue and the use of psychoactive medication is more dependent on the number of chronic conditions than on the type of condition. Disease characteristics, as measured by type of condition, are not substantially related to mental health. These conclusions hold for both the elderly and the younger age groups. In addition, it can be concluded that chronic conditions are not only associated with more subjective reports of negative feelings and distress, but that they are also accompanied by a higher use of psychoactive medications, including the use of anti-depressants.

Our findings imply that is important to control for comorbidity when studying the impact of illness on psychological distress and functioning. Physicians should be aware of the possible presence of other chronic conditions, not only as a background for the complaints they are consulted for, but also because of the higher risks on psychological distress in cases with comorbidity. High-risk patients should be screened on the presence of psychological distress, as it may have serious consequences for diagnosis, treatment, and treatment course (*Katon & Sullivan, 1990; Simon, Ormel, VonKorff, & Barlow, 1995*). To the extent that the impact of chronic illness on mental health is mediated through disabilities and handicaps (*Ormel, Kempen, Penninx et al., 1997; Prince, Harwood, Blizard et al., 1997; Turner & Noh, 1988*), treatment may become more effective if directed towards alleviating these generic consequences. A whole range of interventions, effective in ameliorating the conditions and circumstances of the patient irrespective of the specific type of disease, but not curing the disease, may reduce the unfavourable psychological outcomes of chronic conditions. ■

Chapter 6

Comparing patients with depressive complaints and patients with chronic medical conditions on their functioning and medical consumption

Summary

Several studies have found that depressive complaints are associated with limitations in functioning that are at least comparable with those of chronic medical conditions, such as diabetes or lung diseases. However, the consequences of these associations for the utilization of general health care services are not known, certainly not for health care settings outside the United States. For that reason we studied the association of depressive complaints with functioning and health care utilization, in comparison to the associations of chronic medical conditions with functioning and health care utilization. For the analyses data were used from a community-based sample of Dutch adults (N=9428). Chronic conditions (21 types) and depressive complaints were assessed by self-report. Only active conditions and depressive complaints, for which treatment was taking place, were selected for the analyses. Health status and disabilities were also assessed by self-report. Information on the utilization of health care services was based on self-report as well as on data extracted from a claims database. This database also provided data on the use of psychoactive medications. The associations between chronic conditions, depressive complaints and dependent variables were analysed by analysis of variance or regression analysis, adjusting for possibly confounding factors (gender, age, living conditions).

We found that depressive complaints, more than any chronic condition (except back problems), were associated with fatigue, poor subjective health and with days spent in bed. Those having depressive complaints visited their general practitioner (GP) more often than the others did. They also contacted a medical specialist more often than other patient categories, apart from patients with heart diseases.

The combination of depressive complaints and chronic medical conditions was not associated with increased utilization or lower functioning.

It can be concluded that depressive complaints are not only connected to functioning, but also to the utilization of general health care services. The strength of these associations is comparable with that of chronic medical conditions. This study stresses the pertinence of (research on) the management and treatment of patients with depressive complaints in general health care settings.

Introduction

Depressed patients show limitations in functioning and well-being that are similar or even worse than limitations associated with chronic medical conditions, such as diabetes, arthritis or heart failure (*Bonicatto, Dew, Zaratiegui, Lorenzo, & Pecina, 2001; Ormel, Kempen, Deeg et al., 1998; Wells, Golding, & Burnam, 1988b; Wells & Sherbourne, 1999; Wells, Stewart, Hays, Burnam, Rogers, Daniels et al., 1989*). Patients with depression are restricted in a wide range of daily activities and functioning, which seem to persist over time. These long-term effects of depression were found to be at least of equal size to those effects of chronic medical conditions (*Hays, Wells, Sherbourne et al., 1995*). Depression increases the risk of onset of disability (*Ormel, Vonkorff, Oldehinkel, Simon, Tiemens, & Ustun, 1999*) and changes in depression are connected with changes in disability (*Von Korff, Ormel, Katon, & Lin, 1992*).

Since depression, like chronic medical conditions, is associated with limitations and disabilities, there will be a loss of autonomy and a growing dependence on others. Therefore, a greater need for support will arise, leading to a demand for both informal (non-professional) and professional help. The need for professional help may be expressed as a demand for specialty mental health services. The need for help may also be expressed, at least partly, as a demand for general medical services, like primary care services, or services from outpatient departments of general hospitals (*Druss & Rosenheck, 1999; Kimerling, Ouimette, Cronkite, & Moos, 1999; Simon, Ormel, VonKorff et al., 1995*), because depression is often not recognised and accompanied with bodily signs and symptoms (*Ormel, Van den Brink, Koeter et al., 1990*).

Whether and to what extent depressive disorders are associated with an increased use of general health care, or, conversely, lead to a reduced use of these services, as shown in some studies (*Cooper-Patrick, Crum, Pratt, Eaton, & Ford, 1999; Druss & Rosenheck, 1997*), is still undecided. As health care utilization is partly dependent on the organisation and structure of the health care system and most comparable studies were done in the United States, replication studies in other settings, seem to be desirable. Moreover, it is not known whether the association between depressive disorders and utilization is restricted to disorders only (as defined by formal classification systems like DSM-IV), or can be generalised (to a certain extent) to depressive symptoms or depressive

complaints, as suggested by some previous studies (*Beekman, Deeg, Braam, Smit, & VanTilburg, 1997; Klerman & Weissman, 1992; Unutzer, Patrick, Simon et al., 1997*).
In our study, we will compare patients with depressive complaints (not necessarily disorders) with patients having a chronic medical condition, using these patients as a frame of reference.
As chronic conditions are associated with a higher rate of mental health problems (*Cuffel, Wamboldt, Borish, Kennedy, & Crystal-Peters, 1999; Koopmans & Lamers, 2000*) the combined effect of chronic medical conditions and mental health problems has drawn and still deserves some special attention (*De Boer, Wijker, & De Haes, 1997*). For that reason we will study, in addition, the combined effect of chronic medical conditions and depressive complaints.
In this article, we will therefore address these two questions:
To what extent are depressive complaints, compared with chronic medical conditions, associated with limitations in functioning and raised health care utilization?
To what extent is the combination of depressive complaints and chronic medical conditions associated with limitations in functioning and raised health care utilization?

Method

For this study, data were used from a community-based sample of adults (from 15 to 90 years of age), from a population of enrollees of a sickness fund working in the western part of the Netherlands, who had responded to a health survey mailing (N=9428). The design of the procedure for conducting the survey was guided by Dilman's (*Dilman, 1978*) recommendations. The first mailing of the survey took place in February 1993. In this sample, individuals who had been hospitalised during a period before the survey were deliberately overrepresented. The net response rate to the survey was 70.4 %. An analysis of the nonresponse showed that respondents and non-respondents differed slightly in their medical consumption. This nonresponse bias will result in a small over-estimation of utilization of prescribed drugs (*Lamers, 1997*).
As part of the survey, chronic conditions (21 types) and depressive complaints were assessed by self-report, using the same checklist as listed in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*). Only active chronic conditions and depressive complaints, for which treatment was taking place, were selected for the analyses. Seven different conditions (arthritis, back problems, diabetes, heart disease, hypertension, lung disease, migraine), with the highest prevalence in the sample, were used for comparative analyses in contrast with depressive complaints. Data on the other conditions were used in combination with these seven conditions as part of a comorbidity index (number of conditions).

To validate the self-reported depressive complaints, several measures of psychological functioning, i.e. distress, were available, as was information on the use of psychoactive medications. Psychological distress was measured using the Negative Affect Scale (NAS), i.e. the negative items of Bradburn's Affect Balance Scale (*Bradburn, 1969*), and a Nervousness sub-scale, which formed part of a questionnaire on subjective health (*Dirken, 1969; Van Sonsbeek, 1990*). The NAS is a five-item scale, which appeared to be quite reliable (Cronbach's $\alpha = .80$) in this study. It is related to factors such as anxiety and depression (*Bradburn, 1969*), neuroticism and psychological complaints (*Ormel, 1980*). The three item Nervousness sub-scale was originally part of a scale to measure work related stress and subjective health. Its reliability appeared to be satisfactory ($\alpha = .74$). It measures feelings of nervous tension and irritability and it is correlated to neuroticism (*Van Sonsbeek, 1990*).

Information on the use of psychoactive medications was based on data extracted from a claims database. These claims data could be matched with the health survey data. Use was counted over two periods: from January to April, directly before or during the period when the mailed health survey was conducted, and from May to December, directly following that period. Three categories of psychoactive medications were distinguished: anxiolytics, hypnotics/sedatives and anti-depressants. These categories were defined in accordance with the main categories N05B, N05C and N06A of the Anatomical Therapeutic Chemical (ATC) classification index, developed by the WHO (*WHO, 1996*). Only the event of utilization was measured, not quantity or dosage.

Functioning was assessed by self-report using several health-related indicators, i.e. physical disabilities, fatigue and subjective health. Two measures of disability, based on indicators developed by the O.E.C.D. (*McWhinnie, 1981*), were used: restrictions in Activities of Daily Living (ADL) and mobility restrictions. The reliability

(Cronbach's α) of these measures was 0.89 and 0.85, respectively.
Fatigue was measured with a separate sub-scale from the aforementioned questionnaire on subjective health (*Dirken, 1969*). This four-item scale, with a reliability of 0.75, is sensitive to changes in both mental and physical health (*Van Sonsbeek, 1990*).
A single item, asking to rate one's health in general, measured subjective health. The same item is used in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*).
Information on illness behaviour and the utilization of health care services was mainly based on self-report. Days in bed, consultations of a general practitioner and of medical specialists during the period (6, respectively 12 months) before the survey, were assessed by self-report. In addition, consultations of medical specialists in the period directly following the health survey were assessed using claims data. Subsequent consultations of medical specialists were counted over the period from May to December 1993, directly following the health survey.

The associations between chronic conditions, depressive complaints and dependent variables were analysed by analysis of variance or regression analysis, adjusting for possibly confounding factors (gender, age, living conditions, educational level).
To determine whether depressive complaints are associated with functioning and health care utilization in a way that is different to chronic conditions, two comparisons were made. First of all, a comparison between types of chronic conditions and cases with depressive complaints was made on a selection of subjects with only one chronic condition or with depressive complaints only, using analysis of variance with the confounding factors as covariates. In addition, the differential association of depressive complaints and type of chronic condition was examined by means of multiple regression analyses or logistic regression analyses. In these analyses, all cases were included (with and without comorbidities). Three models were compared on their ability to explain variance in functioning and utilization. In all models, controlling for hypothesized confounders, as mentioned earlier, was applied. In the first model, seven dummy variables for types of chronic conditions and a variable indicating the number of other chronic conditions (comorbidities) were used as predictors. In the second model, having depressive complaints was added as a dummy. Finally, in the third model, interactions between chronic conditions (seven types of condition as well as the number of other chronic conditions) and having depressive complaints were added. Comparing first and second model will show the strength of the association between depressive complaints and dependent variables in contrast with chronic medical conditions (research question 1). From the comparison of the second and the third model, we can learn whether the combinations of depressive complaints and chronic medical conditions have additional associations with the dependent variables (research question 2).

To make results representative of the original population of sickness fund enrolees, they are corrected by means of weighing for age-sex and prior hospitalisation. All results, whether summarised in a table or presented in the text only, are based on analyses, in which a 1% significance level (two-tailed) was used.

Results

Almost 57% of the respondents were female. The largest age category was 25-34 years (28%), while 17.4% was aged 65 or more. Forty percent had one or more chronic conditions. Nearly 16% had a chronic condition with at least one comorbid condition. Back problems were predominant (8.8%), followed by arthritis (6.7%) and migraine (7.3%). More than 5% had depressive complaints, for which treatment was being sought.

More than 16% of the respondents stayed at least four days in bed (during the last 6 months), because they felt ill. Most respondents (78.6%) consulted their GP at least once during the last 12 months, 21.6% at least twice within the last two months. A medical specialist was consulted by 37.6% during the last 12 months and by 40.3% in the subsequent period.
Additional information on sample characteristics can be found in table 6-1.

As we used self-reported mental health problems and consultations of specialists for those problems as a criterion for depressive complaints, it is useful to compare this category of respondents on several measures of psychological distress and use of psychoactive medication, with those reporting chronic medical conditions. As can be seen in table 6-2, the seven selected chronic medical conditions show a quite similar pattern in contrast to the category of depressive complaints. This category has - as expected - substantial

Table 6-1. **Sample characteristics**

Variable	N	%
Gender		
Male	4,065	43.1
Female	5,363	56.9
Age		
15-24 yr	878	9.3
25-34 yr	2,635	28.0
35-44 yr	1,738	18.4
45-54 yr	1,450	15.4
55-64 yr	1,090	11.6
65-74 yr	922	9.8
75 yr or older	714	7.6
Marital status		
Married/living with partner	6,436	68.3
Never married	1,818	19.3
Divorced/separated	316	3.4
Widow	739	7.8
Unknown	118	1.3
Living situation		
Alone	1,461	15.5
With one person	3,146	33.4
With two or more persons	4,508	48.0
Unknown	312	3.3
Educational level		
Low	5,429	57.6
Middle	2,619	27.8
High	1,087	11.5
Unknown	293	3.1
Number of chronic conditions (w/o depressive complaints)		
0	5,562	59.0
1	2,187	23.2
2	868	9.2
3 or more	615	6.5
Unknown	195	2.1
Specific conditions		
Osteoarthritis	633	6.7
Back problems	831	8.8
Diabetes	172	1.8
Heart disease (-infarct)	175	1.9
Hypertension	682	7.2
Lung disease	436	4.6
Migraine	689	7.3
Depressive complaints	516	5.5
Current use of psychoactive medications		
Anxiolytics	530	5.6
Anti-depressants	133	1.4
Hypnotics & sedatives	436	4.6
Recent utilization of health services (based on survey)		
GP consultation (last 12 m.)	7,412	78.6
at least 2 GP consultations (last 2 m.)	2,043	21.7
consultation of med. spec. (last 12 m.)	3,541	37.6
Subsequent utilization (based on claims data)		
consultations of med. specialists	3,801	40.3
Measures of health and disability		
at least 4 days in bed - last 6 months	1,517	16.1
	Mean	**SD**
Psychological distress		
Negative Affect (Affect Balance Scale)	6.60	2.21
Nervousness Scale	0.62	0.98
Measures of health and disability		
Fatigue Scale	0.93	1.27
Subjective health	2.14	0.83
ADL-restrictions	3.10	0.69
Mobility restrictions	3.62	1.69

higher mean scores on both measures of psychological distress and higher proportions of respondents using psychoactive medication. An exception was the utilization of hypnotics/sedatives, which is higher with some chronic conditions such as arthritis, diabetes and heart disease.

After excluding patients with comorbid conditions and adjusting for possibly confounding factors, i.e. age, gender, marital status, living situation and educational level, a comparison of different conditions (see table 6-3) shows that depressive complaints are especially associated with fatigue, subjective health and the number of GP consultations. Diabetes and heart disease are most strongly related with recent and subsequent consultations of medical specialists. Depressive complaints are the next most strongly associated condition with a high proportion of recent consultations of medical specialists, and are more related than any other condition to a higher number of GP consultations. The proportion of respondents with depressive complaints consulting medical specialists in the period directly following the health survey is in the mid-range compared to other conditions.

Table 6-4 and 6-5 summarize of the results of two basic regression models analyses, which were done to estimate the associations of chronic conditions and depressive complaints with functioning and health care utilization. For this purpose three regression models were tested at first, as described in the Method section. The results of the third model (in which interaction terms were added) are not shown in the tables, as most interaction effects appeared to be not significant. From the other two models only coefficients related to chronic conditions and depressive complaints are shown, not those related to possibly confounding factors.

Table 6-4 summarizes the results as to functioning and subjective health. Arthritis has the strongest association with ADL-restrictions; back problems with mobility restrictions, subjective health, and days in bed; migraine with fatigue. The number of other chronic conditions is most strongly associated with fatigue and subjective health. Adding depressive complaints as a predictor (model 2) does not lead to an improvement of the explanatory power of the models related to disabilities. However, it has significant and substantial associations with fatigue, subjective health and days in bed. These are comparable to or even stronger than the associations of back problems with these domains.

Table 6-2. **Means of indicators of psychological distress(*) and proportions of users of psychoactive medication(**) according to chronic conditions and depressive complaints**

Conditon:		Negative Affect	Nervousness	Current use of Anxiolytics	Current use of Hypnotics & Sedatives	Current use of Antidepressants
Arthritis						
	no	6.54	0.59	0.052	0.039	0.013
	yes	7.39	0.92	0.119	0.141	0.034
Back problems						
	no	6.53	0.59	0.052	0.041	0.013
	yes	7.35	0.91	0.099	0.099	0.024
						(n.s.)
Diabetes						
	no	6.59	0.61	0.055	0.044	0.014
	yes	7.22	1.00	0.104	0.153	0.027
				(n.s.)		*(n.s.)*
Heart disease						
	no	6.59	0.61	0.055	0.044	0.014
	yes	6.93	0.93	0.108	0.143	0.027
		(n.s.)		*(n.s.)*		*(n.s.)*
Hypertension						
	no	6.57	0.59	0.050	0.040	0.013
	yes	7.01	0.97	0.140	0.119	0.033
Lung disease						
	no	6.56	0.60	0.055	0.044	0.014
	yes	7.30	0.91	0.087	0.088	0.018
				(n.s.)		*(n.s.)*
Migraine						
	no	6.52	0.58	0.052	0.045	0.013
	yes	7.52	1.01	0.115	0.056	0.034
					(n.s.)	
Depressive complaints						
	no	6.37	0.53	0.045	0.042	0.006
	yes	10.44	2.08	0.246	0.120	0.153

(*) p-values based on T-tests
(**) p-values based on Chi-square tests
For all differences: $p < .01$; n.s.= not significant ($p > .01$)

Table 6-5 presents the results of several logistic regression analyses, which were done to estimate recent utilization (as measured by consultations of GPs and medical specialists), and subsequent utilization (as measured by consultations of medical specialists).

It shows that subjects with lung disease, especially, have had more GP consultations; and that subjects with heart disease had an elevated level of consultations of medical specialists.

Having depressive complaints was associated with all four dependent variables. Subjects with depressive complaints had a higher number of recent GP consultations than those with lung disease. Depressive complaints were associated with recent consultations of medical specialists to a lesser degree than heart disease

Table 6-3. Adjusted means of measures of health and functional status, and proportions of medical service utilization accordimg to specific conditions (without comorbidities)(*)

Specific condition	N	ADL-restrictions	Mobility-restrictions	Fatigue	Subj. health (worse)	4> days in bed - last 6 m**	GP consult.- last 12 m**	> 2 GP- of consult.- last 2 m**	consult. med.spec.- last 12 m**	subsequent consult. of med.spec.**
Arthritis	150	3.26	3.98	0.89	2.17	0.15	0.87	0.28	0.46	0.37
Back problems	261	3.08	4.31	1.10	2.44	0.22	0.89	0.23	0.44	0.45
Diabetes	46	3.15	3.87	1.14	2.31	0.20	0.85	0.31	0.68	0.68
Heart disease	51	2.96	3.54	1.23	2.64	0.23	0.88	0.23	0.92	0.86
Hypertension	238	2.99	3.23	0.78	2.11	0.10	0.96	0.20	0.41	0.39
Lung disease	154	3.08	3.78	1.08	2.37	0.25	0.95	0.36	0.48	0.52
Migraine	268	3.09	3.56	1.08	2.12	0.19	0.86	0.18	0.38	0.44
Depressive complaints	133	3.07	3.65	2.40	2.63	0.20	0.91	0.41	0.55	0.48
F		*5.14*	*8.91*	*21.46*	*11.45*	*2.34*	*2.84*	*5.40*	*8.18*	*7.80*
p		*.0000*	*.0000*	-	-	*.0200*	*.0061*	*.0002*	*.0000*	*.0000*

Means and proportions adjusted for age, gender, marital status, living situation and educational level

F: ratio between variance explained by specific chronic conditions and residual variance
**: proportions instead of means

Note: Adjusted proportions of users of medical services were calculated using analysis of variance, to make them comparable to proportions reported in other tables.
In addition, logistic regression was used, which is more appropriate for this type of data.The results did not differ from those reported in the table.

Table 6-4. Standardized regression coefficients for functioning and health status, odds ratios for days in bed among disease variables and depressive complaints

Dependent Variable	ADL-restrictions		Mobility restrictions		Fatigue		Subjective Health		4> days in bed - last 6 m. (y/n)	
Model:	1	2	1	2	1	2	1	2	1	2
Independent Variable:										
Arthritis	0.127	0.127	0.150	0.149	0.048	0.037	0.072	0.065	n.s.	n.s.
Back problems	n.s.	n.s.	0.164	0.163	0.110	0.093	0.160	0.150	2.245	2.151
Diabetes	*0.031*	*0.031*	0.038	0.039	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Heart disease	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.045	0.049	n.s.	n.s.
Hypertension	n.s.	n.s.	n.s.	n.s.	0.062	0.048	0.058	0.050	n.s.	n.s.
Lung disease	n.s.	n.s.	0.062	0.062	0.071	0.066	0.130	0.127	1.828	1.805
Migraine	n.s.	n.s.	n.s.	n.s.	0.119	0.078	0.089	0.065	2.187	1.969
Number of other chronic conditions	0.124	0.123	0.122	0.120	0.213	0.182	0.267	0.248	1.455	1.406
Depressive complaints		n.s.		n.s.		0.255		0.151		2.127
R^2	*0.115*	*0.115*	*0.300*	*0.300*	*0.167*	*0.228*	*0.287*	*0.308*	*0.085*	*0.093*

Models:
1: demographics, 7 specific chronic conditions and other chronic conditions
2: model 1 and depressive complaints
n.s.: not significant (P> .01); coefficients in italic: .001 < P < .01; in normal font: P < .001

Table 6-5. **Odds ratios for current and future utilization among disease variables and depressive complaints**

Dependent Variable	GP-consultation last 12 m (y/n)		GP-consultation - 2> - last 2 m (y/n)		Consultation of med. spec.- last 12 m. (y/n)		Subsequent consult. of med.spec. (y/n)	
Model:	1	2	1	2	1	2	1	2
Independent Variable:								
Arthritis	1.912	1.835	1.541	1.488	n.s.	n.s.	n.s.	n.s.
Back problems	3.376	3.246	1.675	1.599	1.661	1.590	1.525	1.499
Diabetes	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	*1.872*	*1.888*
Heart disease	n.s.	n.s.	n.s.	n.s.	5.104	5.263	4.236	4.295
Hypertension	5.510	5.318	n.s.	n.s.	1.546	1.501	n.s.	n.s.
Lung disease	6.325	6.170	2.272	2.239	1.715	1.685	1.677	1.666
Migraine	2.610	2.385	1.756	1.520	*1.325*	n.s.	1.371	*1.316*
Number of other chronic conditions	2.858	2.798	1.687	1.628	2.540	2.489	1.734	1.713
Depressive complaints		3.964		2.724		2.263		*1.374*
R^2	*0.167*	*0.173*	*0.115*	*0.129*	*0.178*	*0.186*	*0.128*	*0.129*

Models:
1: demographics, 7 specific chronic conditions and other chronic conditions
2: model 1 and depressive complaints
n.s.: not significant **(P> .01); coefficients in italic: .001 < P < .01; in normal font: P < .001**
R^2: R square (Nagelkerke)

and to a higher degree than all other conditions. Depressive complaints are also positively associated with subsequent consultations of medical specialists, but not as strongly as with recent utilization.

Discussion

Subjects with depressive complaints suffered more disabilities, more fatigue, more days in bed and a worse subjective health than those without such complaints. Health care utilization is higher in the presence of depressive complaints. Most of all, consultations of GPs are more frequent, but so are recent as well as subsequent consultations of specialists. These associations remain after correction for hypothesized confounders such as age, gender and other demographic characteristics, and several disease variables, i.e. chronic medical conditions.

Most important findings related to the first research question were that depressive complaints are more connected to fatigue, subjective health and days in bed than are any of the chronic medical conditions (except back problems). As to health care utilization, depressive complaints are most strongly linked to the number of GP consultations. The association with recent and subsequent consultations of medical specialists is weaker than that of heart disease but comparable or even stronger than that of back problems.

As to the second research question regarding the association of the interaction of depressive complaints and chronic medical conditions with functioning and health care utilization, our findings suggests that these associations are mainly additive.

These findings are mainly an extension of those from other studies, which focused on depressive disorders or were limited to their consequences for functioning and health status. Depressive complaints (not necessarily disorders) have a substantial impact on the utilization of general health care services that goes beyond the consultation of GPs. These findings stress the importance of research on the management and treatment of patients with depressive complaints in general health care settings, since our study group of cases with depressive complaints was already in treatment for these complaints. It may be that, as other studies have shown (*Gater, Goldberg, Evanson, Lowson, McGrath, Tantam et al.,*

1998; Katon, von Korff, Lin, Bush, & Ormel, 1992; Tiemens, Ormel, Jenner, Van der Meer, Van Os, Van den Brink et al., 1999), the treatment given was inadequate. Although the mental health care system is quite well developed in the Netherlands, the availability of this type of knowledge and expertise within the general health care sector may still be insufficient. The development and implementation of training programs and treatment protocols, which are taking place these days (*Tiemens, Ormel, Jenner et al., 1999; Wells, 1999*), may change the situation.

Our study may have several limitations. First, it cannot be ruled out that the association between depressive complaints and utilization is mainly caused by those having a (major) depressive disorder, as formally defined by diagnostic criteria. As no direct information is available to make such a distinction, this remains in principle an open question. However, we were able to make a distinction within the category of respondents with depressive complaints based on utilization of anxiolytics or antidepressants. Although the category of users seemed to be more disabled and was feeling more ill than the category with depressive complaints not using these medications, there were no substantial differences on other measures of mental health. As to medical utilization the association was the opposite of what we expected: use of anxiolytics or antidepressants was related to less recent consultations of medical specialists. The interpretation of these additional findings is rather complicated, as they may also reflect the disputable validity of the distinction that was made. It is not only a possible indicator of severity of depression but also a marker that specific mental health treatment is being received, which may be effective in preventing additional (or inadequate) medical service utilization.

Second, and in relation to the aforementioned limitation, the absence of interaction effects might be caused by the inclusion of respondents not meeting diagnostic criteria for depression. As with the first-mentioned limitation, we cannot rule out this possibility on the basis of our data. However, most other studies showing clear effects not only of depression but also of psychological distress, failed to find interaction effects (*De Boer, Wijker, & De Haes, 1997*).

Third, depressive complaints may just be an indication of severity of illness and, as such, cause an association with health care utilization. To disentangle these aspects of illness is partly a matter of definition, and will, consequently, lead to a discussion that goes beyond the scope of this paper. Other studies (*Kempen, Miedema, Van den Bos et al., 1998; Williamson & Schulz, 1992*) have shown that these aspects, although associated, are not exchangeable. Since we found associations between depressive complaints and health care utilization not only in the presence of chronic conditions but also in cases without any chronic condition, an interpretation that considers depressive complaints and illness severity as identical would seem highly unlikely.

Finally, our definition of a chronic condition was dependent on respondents' self-report, which is different to clinical caseness criteria. As far as this is a weakness, it does not have a major impact on the main findings of our study: that depressive complaints are substantially associated with raised health care utilization and more restricted functioning. Moreover, we learned from earlier studies based on the same data that self-report data on the consultation of medical specialists are very consistent with comparable data extracted from a health insurance claim database (*Lamers, 1995*). As we asked for active conditions (i.e. conditions for which treatment was on-going), this supports the assumption that the self-reported chronic conditions were a valid proxy for clinical assessed conditions.

Thus, our findings underscore the importance of an appropriate treatment of depression in general health care settings because of its effects on functioning and service utilization and its higher prevalence among chronic medical patients. These associations do not seem to be restricted to patients with depressive disorders, but, as our study indicates, are probably also present in case of mild depression or depressive complaints. Formal caseness criteria for depressive disorder, as used in diagnostic classification systems, seem to be dysfunctional for the assessment of the at-risk population, which might benefit from additional treatment focused on mental health problems. ■

Chapter 7

Is the impact of depressive complaints on the use of general health care services dependent on severity of somatic morbidity?

Summary

The aim of this study was to examine the effects of depressive complaints and chronic medical illnesses on prospective somatic health care utilization and the possible heterogeneity of the effect of depressive complaints across levels of medical illness severity.
We used data from a community-based sample of adults (N=9428), of whom a health survey and claims data, indicating health care use, were available. Assessments of depressive complaints and somatic illnesses were based on self-report. Binomial regression analyses were used to study the expected relations.
Depressive complaints and somatic morbidity were both positively related to general health care utilization. Somatic morbidity has an attenuating effect on the impact of depressive complaints: if it becomes more severe, the impact of depressive complaints on utilization is reduced. Depressive complaints are especially related to the use of paramedic services, use of prescriptions drugs and consultations of medical specialists.
It can be concluded that depressive complaints predict somatic health care utilization, but that somatic morbidity attenuates this relation. Future research on this subject should include interactions effects of depressive complaints and somatic morbidity. Interventions aiming to reduce excess use related to mental distress should be primarily targeted on subjects with mental distress that have no comorbid somatic morbidity.

Introduction

It has been demonstrated in a number of studies that the functioning and well-being of persons with depression, depressive complaints or mental distress is reduced to levels lower or comparable to patients with chronic medical illnesses, such as diabetes or arthritis (*Hays, Wells, Sherbourne et al., 1995; Koopmans & Lamers, 2001*). Depression is also related to a higher use of general (somatic) health care services. This relation has been studied extensively (*Koopmans, Donker, & Rutten, 2005b, 2005a*). These studies demonstrate generally that depression (or mental distress) is associated with higher somatic health care use, even after correction for possible confounding factors, such as somatic morbidity.

Physical ill health and mental distress tend to be associated. (*Beekman, Kriegsman, Deeg, & Van Tilburg, 1995; Geerlings, Beekman, Deeg, & Van Tilburg, 2000*). Especially chronic diseases can have a serious impact on mental health, leading to mental distress comorbid to somatic morbidity (*Bisschop, Kriegsman, Beekman, & Deeg, 2004; Goldney, Phillips, Fisher, & Wilson, 2004; Katon, 2003; Koopmans & Lamers, 2000; Kruse, Schmitz, & Thefeld, 2003; Ormel, Kempen, Penninx et al., 1997; Penninx, Beekman, Ormel et al., 1996; Schnittker, 2005; Wells, Golding, & Burnam, 1989*). When mental distress (depression or depressive complaints, anxiety) is comorbid to chronic medical illness, the prognosis of a medical condition becomes generally more unfavourable and treatment more complicated, thus, causing additional use of health care (*Black, Markides, & Ray, 2003; Joynt, Whellan, & O'Connor, 2003; Musselman, Betan, Larsen, & Phillips, 2003; Rudisch & Nemeroff, 2003; Sherbourne, Wells, Meredith, Jackson, & Camp, 1996; Spiegel & Giese-Davis, 2003*).

The interplay between mental distress and somatic morbidity is a complication when studying the impact of mental distress on the utilization of general health services. In general, the analytic strategy in studying this association is to adjust for somatic illness severity. If the impact of mental distress in relation to somatic morbidity is studied, focus is on the main effect of mental distress, after correction for the main effect of somatic morbidity (*Ciechanowski, Katon, & Russo, 2000; Egede, Zheng, & Simpson, 2002; Kupfer & Frank, 2003*). How the main effect of mental distress is modified by the presence of somatic morbidity, is however beyond the scope of most studies. Because of the frequently seen

co-occurrence, this combined effect of mental and somatic morbidity (i.e. the modifying effect of somatic morbidity on the relation between mental distress and health service use) is an important issue. Gaining more insight in this respect can be helpful in designing future studies on this topic and might support priority setting when interventions will be developed (*Wacholder & Weinberg, 1986*).

The present study therefore aims to describe how mental distress is related to the use of general health care services and how this relation might be modified by the presence of somatic morbidity and differences in illness severity.

Determinants of health care use for problems as mental distress have been studied in earlier studies, but these studies focus mainly on factors differentiating between the use of primary care and specialty mental health care (*Alegria, Bijl, Lin, Walters, & Kessler, 2000; Lefebvre, Lesage, Cyr, Toupin, & Fournier, 1998; Spijker, Bijl, de Graaf, & Nolen, 2001*). As to the situation in the Netherlands, studies based on the Netherlands Mental Health Survey, were concentrated on determinants in help seeking and health care use for mental health problems in relation to primary care and specialty mental health care (*Ten Have, de Graaf, Vollebergh, & Beekman, 2004; ten Have, Oldehinkel, Vollebergh, & Ormel, 2003; ten Have, Vollebergh, Bijl, & Ormel, 2002*). Studies based on the first and second Dutch National survey of general practice are focused on the same type of differentiation (*Verhaak, 1993; Verhaak, Heijmans, Peters, & Rijken, 2005; Verhaak, Van de Lisdonk, Bor, & Hutschemaekers, 2000; Verhaak, Van den Brink-Muinen, Bensing, & Gask, 2004; Verhaak, 1995a, 1995b; Verhaak & Tijhuis, 1992*). Utilization of general health care beyond primary care in connection with mental distress has not been studied in the Netherlands on the population level, except for the elderly (*Beekman, Penninx, Deeg, de Beurs, Geerling, & Van Tilburg, 2002; de Beurs, Beekman, Van Balkom, Deeg, Van Dyck, & Van Tilburg, 1999*).

In this paper, we will concentrate on general health care utilization beyond primary care and with exclusion of specialty mental health care. This implies that all types of general (non-mental) health care will be included, but that services of General Practitioners (GPs) will be excluded. We focused on depressive complaints instead of (more broadly defined) mental distress. More specific research questions were:

- To what extent are depressive complaints related to the use of general health care services?
- Are depressive complaints related to the use of specific type(s) of somatic care?
- To what extent is the relationship of depressive complaints and general health care utilization dependent on the presence and level of somatic morbidity? Has somatic morbidity a modifying effect on the impact of depressive complaints on utilization?

Method

Sample

For this study, data were used from a community-based sample of adults (from 15 to 90 years of age), from a population of enrollees of a sickness fund working in the western part of the Netherlands, who had responded to a mailed health survey (N=9428), that was conducted by the second author. These data were originally collected to predict health care utilization and calculate risk adjusted capitation payments for Dutch sickness funds (*Lamers, 1999*). The design of the procedure for conducting the survey as to sending reminders in case of (initial) nonresponse was guided by Dilman's (1978) recommendations. The first mailing of the survey took place in February 1993. In this sample, individuals who had been hospitalized during a period before the survey were deliberately overrepresented. The net response rate to the survey was 70.4 %. An analysis of the nonresponse showed that respondents and nonrespondents differed slightly in their medical consumption. This nonresponse bias will result in a small over-estimation of utilization of prescribed drugs (*Lamers, 1997*).

Data

As part of the survey, chronic medical conditions (24 types) and depressive complaints were assessed by self-report, using the same checklist as listed in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*). A medical condition was considered present only if the respondent had answered positively on the question "Do you have still complaints related to this condition or are you under treatment (surveillance) for this condition now?"

Depressive complaints were assessed on the basis of the question (that could be answered with yes or no) whether the respondent had complaints of stress, depression or serious nervousness now or in the last 5 years.

As simple unweighted disease counts to measure comorbidity have less predictive value (*Perkins, Kroenke,*

Unutzer, Katon, Williams, Hope et al., 2004), we decided to construct a somatic comorbidity index using a weighted count of the number of chronic conditions.
Each assessed chronic medical condition was assigned a standard weight that was derived from findings of a study of Sprangers et al. (2000). In that study, mean SF36 scores were tabulated per medical condition. We used only the mean scores of two SF36 scales: physical functioning and bodily pain. These scales were chosen, as we assumed they were the least contaminated with mental health components. For convenience of interpretation, the direction of these scores was changed, resulting in scores theoretically ranging from 0 (no disability or pain) to 100 (highest disability or pain intensity). In fact, the mean scores ranged from 27.3 to 50.7.
In this way, there were two weights available for each medical condition: a disability weight and a pain weight. These were used to calculate two weighted counts of medical conditions for each subject, resulting in a pain score and a disability score. The somatic morbidity index was defined as the mean of these scores. The distribution of this somatic morbidity index, ranged from 0 to 100 for the first 94.5% of the cases, with a maximum of 478. We reduced the original score to four somatic morbidity levels: 1) no or very low morbidity, 2) moderate, 3) high, or 4) very high morbidity, using 20 as cutoff point between no or low and moderate morbidity, 60 as next cutoff point and 100 as cutoff point between high and very high morbidity.
Cutoff points were based on lowest and median disability or pain mean scores as mentioned previously. This will induce a certain correspondence of levels of somatic morbidity with the number of chronic medical conditions.

In addition, seven different conditions with the highest prevalence in the sample (arthritis, back problems, diabetes, heart disease, hypertension, lung disease, migraine) were used as dummy variables in the analyses as specific somatic morbidity indicators. These variables were added as they might carry specific information predictive of health care utilization, that will be lost in a (weighted) disease count.

Self-reported depressive complaints were coded as a binary variable. This variable was used as the main indicator of psychological distress, for which to other indicators were available: the negative affect scale of Bradburn (Bradburn, 1969) and the nervousness subscale of the VOEG (Dirken, 1969; Van Sonsbeek, 1990). The variable 'Depressive complaints' was chosen as measure of psychological distress, because it appeared to have the highest construct validity when studying the association between psychological distress and health care utilization (Koopmans & Lamers, 2005). It had the lowest factor loading on a somatic morbidity factor (0.23 vs. 0.45 and 0.33 for negative affect and nervousness respectively) and an association with subjective health on the same level as nervousness (path coefficients of 0.10 and 0.11 respectively) and relatively stronger than negative affect (path coefficient of 0.06).

In order to analyze the heterogeneity of the effect of depressive complaints depending on levels of somatic morbidity an interaction variable was constructed by multiplying both variables (level of somatic morbidity and depressive complaints).

The sociodemographic variables that were included in the analyses were age, gender, marital status (divorced/separated/widow(er) vs. other), living situation (household size) and educational level. These variables were also part of the above-mentioned survey.

Previous health care utilization was measured retrospectively as part of the survey. Subsequent health care utilization was measured prospectively, using data extracted from the claims database of the sickness fund. These claims data could be matched with the health survey data. The claims database covers all types of health services, except general practitioner (GP) consultations and services from specialty mental health care providers. Because in the Netherlands, GPs receive a uniform annual fee for each of the patients on their list, services delivered by GPs are not registered. Specialty mental health care is covered by special public funds and is therefore not registered by sickness funds. From these claims data five binary utilization variables were constructed indicating that there was any use in general or any use of a specific medical service: use of health care, use of prescriptions drugs (excluding psychoactive medication), use of paramedic services (mainly physiotherapy), consultation of a medical specialist and hospital admission. These categories of specific health services are not exclusive: any subject that has some health care use, can use just one specific health care service or use (to the maximum) all four distinguished categories. To assess utilization we used data from two periods: eight months directly following the survey (short term: May to December 1993) and the 12 months thereafter (medium term: January to December 1994). Findings related to medium term utilization will be

reported extensively; findings related to short term utilization only in case of differences compared to medium term.

Analyses

As individuals who had been hospitalised during a period before the survey were overrepresented deliberately, all analyses were conducted on a weighted sample, to make it representative for the population of the sickness fund.
We predicted any use of any type of general (somatic) health service as well as the use some specific types of health care. Four types of health care services were selected for this purpose: use of prescription drugs, use of paramedic services, consultations of medical specialists (outpatient service use), and hospital admission.
Data were analysed using binomial regression analysis. For this purpose, we used the GLM-procedure of STATA, version 8.0 (Stata, College Station, Texas), specifying a binomial distribution function and an identity link function. This makes it possible to estimate a possible additive interaction effect, which is not possible in logistic regression analyses (*Wacholder & Weinberg, 1986*).
For each utilization category to be predicted, two models were compared: a basic model with depressive complaints and somatic morbidity as main predictors, corrected for possible confounding variables and an extended model, with the same predictors and variables as in the basic model and the interaction of depressive complaints and somatic morbidity.
In all analyses, weighted comorbidity was used as a proxy for somatic morbidity. Robustness of these findings was tested by rerunning the analyses after substituting the number of medical condition as a proxy. Findings of these tests will only be reported in case different results were found.

Results

Sample characteristics

From the entire sample (N=9428) 8698 cases were selected for analytical purposes. Cases were rejected if they were not enrolled during the complete observation period ending in 1994[2]. Characteristics of the selected cases in comparison with the rejected cases can be found in table 7-1. The selected and rejected subsamples differed significantly on most demographic characteristics, but not on somatic morbidity. Relatively more subjects with depressive complaints were excluded from the analytical sample.

Almost 57% of the respondents were female. The largest age category was 25-34 years (27%; in excluded subsample, 37%), while 17.3% was aged 65 years or more.
As to their physical health, 61% of the subjects reported no or low somatic morbidity, 23% moderate and more than 5% reported very high somatic morbidity. Nearly the same pattern was found in the excluded group. Back problems were most prevalent (9%), followed by migraine (7%) and hypertension (7%). More than 12% had depressive complaints, and 5.4% were still under treatment for these complaints at the time of the survey. In the excluded group, these percentages were 17.4% and 6.5% respectively.

Most respondents (79.1%) consulted their GP at least once during the last 12 months, 21.8% at least twice within the last two months, based on self-reported data from the health survey (table 2). A medical specialist was consulted by 38.4% during the last 12 months preceding the survey.

In the eight months period after the survey 76.1% of the subjects used some kind of health care (based on claim data). Prescriptions drugs were most common (66.9%), but medical specialists were also consulted quite frequently: 40.6% consulted a medical specialist or made use of other outpatient services. Paramedic services were used by 15.9% of all subjects and 5.6% were admitted to a hospital (table 7-2).

Health care utilization in the full year after the survey (1994), based on claim data, appears to be quite similar: 87.9% of the sample has used some kind of health care service, 72.3% used prescription drugs and 39.5% consulted a medical specialist.
Hospital admission occurred to 7.1% of all subjects (table 7-2).

Utilization in general

Depressive complaints were not associated with probability of any use of health care in the basic model (table 7-3). In the extended model, where the interaction term is included, the main effects of depressive complaints as well as somatic morbidity were enhanced and there was a significant interaction effect. The significant interaction (with a negative sign) shows that

[2]Main reasons for disenrollment were: death, moving to a different region, job or income change.

Table 7-1. Characteristics of sample: excluded vs. subsample

Variable	excluded from sample (N=730)		analytical subsample (N=8698)		analysis
	N	*%*	*N*	*%*	*p-values*
Gender					n.s.
Male	318	43.6	3,747	43.1	
Female	412	56.4	4,951	56.9	
Age					0.000
15-24 yr	117	16.0	761	8.8	
25-34 yr	271	37.1	2,365	27.2	
35-44 yr	94	12.9	1,645	18.9	
45-54 yr	69	9.4	1,381	15.9	
55-64 yr	50	6.8	1,039	11.9	
65-74 yr	41	5.6	882	10.1	
75 yr or older	89	12.2	626	7.2	
Marital status					0.000
Married/living with partner	437	60.4	5,999	69.0	
Never married	197	27.2	1,621	18.6	
Divorced/separated	21	2.9	295	3.4	
Widow	69	9.5	670	7.7	
Unknown			113	1.3	
Living situation					0.000
Alone	154	22.0	1,308	15.0	
With one person	209	29.9	2,937	33.8	
With two or more persons	336	48.1	4,173	48.0	
Unknown			280	3.2	
Educational level					0.000
Low	309	43.6	5,120	58.9	
Middle	227	32.0	2,392	27.5	
High	173	24.4	914	10.5	
Unknown			271	3.1	
Weighted somatic morbidity					n.s.
Low (0-20)	439	60.2	5295	60.9	
Moderate (21-60)	170	23.3	1983	22.8	
High (61-100)	56	7.7	769	8.8	
Very high (>100)	43	5.9	472	5.4	
Unknown	21	2.9	174	2.0	
Specific conditions					
Osteoarthritis	46	6.3	587	6.8	n.s.
Back problems	49	6.7	782	9.0	0.037
Diabetes	18	2.5	155	1.8	n.s.
Heart disease (-infarct)	17	2.3	158	1.8	n.s.
Hypertension	46	6.3	637	7.3	n.s.
Lung disease	31	4.2	405	4.7	n.s.
Migraine	52	7.1	637	7.3	n.s.
Psychological distress					
Depressive complaints (last 5 years)	123	17.4	1,064	12.2	0.000
Depressive complaints (now treated)	46	6.5	470	5.4	n.s
Current use of psychoactive medications					
Anxiolytics	24	3.3	506	5.8	0.004
Anti-depressants	13	1.8	120	1.4	n.s.
Hypnotics & sedatives	52	7.1	384	4.4	0.001
	Mean	*SD*	*Mean*	*SD*	
Psychological distress					
Negative Affect (Affect Balance Scale) - range: 5-20	6.87	2.55	6.57	2.18	0.002
Nervousness Scale - range: 0-3	0.63	0.98	0.61	0.98	n.s.
Measures of health and disability					
Subjective health (worse) - range: 1-5	2.12	0.98	2.14	0.81	n.s.
ADL-restrictions - range: 3-12	3.33	1.38	3.09	0.58	0.000
Mobility restrictions - range: 3-12	3.97	2.38	3.59	1.62	0.000

n.s.: not significant

Table 7-2. **Summary statistics of health care utilization for analytical subsample**

	subsample (N=8698)	
	N	*%*
Recent utilization of health services (based on survey)		
GP consultation (last 12 month)	6793	79.1
at least 2 GP consultations (last 2 month)	1856	21.8
consultation of medical specialist (last 12 month)	3236	38.4
Health care utilization (based on short term claims data)		
any health care use (GP services excluded)	6621	76.1
use of prescription drugs	5821	66.9
consultations of paramedical services	1379	15.9
consultations of medical specialists and other outpatient use	3533	40.6
hospital admissions	484	5.6
Patterns of health care utilization (based on short term claims data; exclusive categories)		
consultations of medical specialists - no hospital admission	3071	35.3
use of prescription drugs or paramedical service; not other service	3078	35.4
none of the above mentioned services	2066	23.7
Health care utilization (based on medium term claims data)		
any health care use (GP services excluded)	7647	87.9
use of prescription drugs	6290	72.3
consultations of paramedical services	1731	19.9
consultations of medical specialists	3432	39.5
hospital admissions	617	7.1
Patterns of health care utilization (based on medium term claims data; exclusive categories)		
consultations of medical specialists - no hospital admission	2887	33.2
use of prescription drugs or paramedical service; not other service	3466	39.8
none of the above mentioned services	1728	19.9

the positive effect of depressive complaints on utilization diminishes if somatic morbidity is present and becomes more severe.
Migraine reduces the chance of any use of health care (hypertension too, but only in short term), higher age and low educational level have the same effect, and heart disease enhances that chance, as does female gender. [These findings should be understood against the background of other independent variables and how they are defined – see Discussion)].

Utilization of specific health care services

The use of *prescriptions drugs* was positively related to depressive complaints and to somatic morbidity as well. The interaction between depressive complaints and somatic morbidity did have a significant effect: higher levels of somatic morbidity reduced the positive impact of depressive complaints on medium term utilization (table 7-4).
Lung disease, hypertension, heart disease and female gender are related to a higher risk of the use of prescription drugs, osteoarthritis and back problems to a lower utilization risk.
There was no interaction effect in short term use of *prescription drugs*, which implies that depressive complaints raise the short term use of prescription drugs independent of comorbid medical conditions (data not shown).

Depressive complaints are stronger associated with the medium term use of *paramedic services* than somatic morbidity (that did not reach significance). Adding the interaction term enhanced the main effects. It was itself not significant (p=.07) and had a negative direction.
Back problems, osteoarthritis, female gender and lower education are related to a higher risk of the use of paramedic services, hypertension and lung disease to a lower risk.
There appeared to be a significant interaction effect as to

Table 7-3. **Predictors of use of somatic health care(*)**
Main and interaction effects(**)

	coefficient	p-value
model 1:		
Weighted comorbidity (0-3)	0.044	0.000
Depressive complaints	0.018	0.097
model 2:		
Weighted comorbidity (0-3)	0.051	0.000
Depressive complaints	0.057	0.000
Interaction: depr. compl. * comorb. (0-3)	-0.045	0.000
Mobility restrictions (3-12)	0.009	0.010
ADL restrictions (3-12)	-0.014	n.s.
Lung disease	0.023	n.s.
Hypertension	-0.032	n.s.
Back problems	-0.026	n.s.
Osteoarthritis	0.002	n.s.
Migraine	-0.049	0.003
Diabetes	0.073	0.000
Heart disease (-infarct)	0.065	0.006
Age (16-91)	-0.004	0.000
Female	0.042	0.000
Divorced/separated or widow	0.024	n.s.
Living with others	0.023	n.s.
Low educational level	-0.027	0.007
High educational level	0.007	n.s.

(*)GP Services excluded
(**)adjusted for possible confounders
model 1: confounders included, but only coefficients of two main factors are shown
n.s.: coefficient not significant (α=.05)
coefficients are risk differences

the short-term use of *paramedic services*: the positive effect of depressive complaints is reduced when somatic morbidity becomes more severe.

As to *consultations of medical specialists* in the medium term period, there was no effect at all of depressive complaints. The interaction term appeared to be significant, again in the negative direction, while enhancing the main effects. There was a (not significant) tendency now of depressive complaints to predict the consultation of medical specialists (table 7-4). Using the number of chronic conditions as a proxy for somatic morbidity made the effect of depressive complaints a bit stronger, but still not significant (p-value = .08; data not shown).

Depressive complaints were associated with the *consultation of medical specialists and use of other outpatient services*, in the short term. The interaction-term was significant and negatively directed, as seen before. Diabetes, higher age and female gender raised the chance of outpatient service utilization. Heart disease, hypertension and osteoarthritis were only related to short-term utilization within this category (data not shown).

Hospital admissions were not related to depressive complaints, the interaction effect is nonexistent (table 7-4). Age and living with others raised the chance of hospital admission. Hypertension and osteoarthritis, as well as female gender had the opposite effect.

All findings related to main and interaction effects remained stable after substituting the alternative proxy variable for somatic morbidity (number of chronic conditions instead of weighted comorbidity), except those that we mentioned explicitly.

Comparing short and medium term observation periods it appears that most findings correspond, although there is a tendency towards more and stronger associations in the short term. The short-term use of outpatient clinic services was related to depressive complaints, which was not the case as to medium term consultations of medical specialists.

Discussion

We found that depressive complaints were positively related to prospective general health care utilization. This association is however attenuated in the presence of somatic morbidity: if somatic morbidity becomes more severe, the impact of depressive complaints on utilization is reduced. As to more specific health care services, depressive complaints were related to the use of prescription drugs and paramedic services. They were not related to hospital admissions. However, we found positive relations in connection with utilization of services of medical specialists, i.e. outpatient service use, but only in the short-term observation period. The combination of depressive complaints and somatic morbidity had mostly an attenuating effect on the association with utilization and sometimes no (significant) effect, but never a boosting effect.

In addition to these main findings, some other associations of specific morbidity characteristics with utilization were found. For example: migraine (and hypertension) appeared to be negatively related to any

use. These findings should be understood against the background of other independent variables and how they are defined. In this case the background is the weighted comorbidity index, which already contains a components related to migraine and hypertension. The independent effect of migraine (or other specific conditions) is in fact a correction of a similar component that is part of the comorbidity index. It should therefore not be interpreted as an estimate of the gross independent effect of migraine.
The negative associations of age and low educational level with utilization in general, are counterintuitive and contrary to findings from the literature. We presume that these associations are the results of corrections of the effects of other independent variables, as both variables correlate positively with utilization. Moreover, age as well as low educational level is positively related to some specific health care categories (both to hospital admission, age to outpatient use and low educational level to paramedic service use).

Before trying to explain our findings, we will start with a critical appraisal of possible limitations of our study.

First, the attenuating effect of somatic morbidity might be caused by a lack of variance in utilization rates in case of severe somatic morbidity. We checked the utilization rates of subjects within different levels of somatic morbidity, but did not find a significant lack of variance in any case, even among the category with the highest somatic severity. In general medium term utilization variables had lower variances than short-term variables, but attenuation was found in both periods. Utilization of paramedic services was among the variables with the highest variances, but it was affected clearly by the attenuating effect of somatic morbidity. These findings make it quite unlikely that a lack of variance caused the interaction effect that was found.
Second, we used a general interaction term (the product of depressive complaints and level of somatic morbidity), in that way abstracting from possible specific interaction effects that may exist in connection to specific chronic diseases, such as heart disease or diabetes. From other studies, it is known that the consequences of a chronic disease are partly disease specific (*Penninx, Beekman, Ormel et al., 1996; Stewart, Greenfield, Hays et al., 1989*). We incorporated the main effects of seven most prevalent diseases in our analyses, but on the most general level they appeared not to be a confounder nor had their own independent impact on utilization, except migraine (negative) and heart disease (positive), and partly hypertension (negative, during short term observation period). Otherwise stated: their effects were already included in the constructed weighted comorbidity index that we used to represent somatic morbidity.
Thus, we do not expect major interaction effects of specific diseases on this global level of utilization, also because the comorbidity measure we used was constructed carefully and based on validated disability measures.

On the level of utilization of specific health care resources only migraine and hypertension acted as confounders and some specific diseases were more or less consistently related to utilization of specific resources (not as confounders, but as independent predictors). Back problems and arthritis were positively related to the use of paramedic services. Lung disease, hypertension, heart disease were all positively related to the use of prescription drugs (back problems too, but negatively). Heart disease and diabetes were mostly related to consultations of medical specialists, hypertension and arthritis were negatively related to consultations.
It is clear that these specific diseases carry information (not included in the comorbidity index) that is relevant in predicting specific resource utilization. A further exploration beyond these main effects may reveal interaction effects on this level, that could be in the opposite direction (amplifying instead of attenuating), but is beyond the scope of this study as we expect that the addition of another set of interaction terms will exhaust our dataset. Furthermore, such an analysis requires more extensive disease-specific information.

A third possible limitation we have to discuss are flaws in the way we measured depressive complaints. Although this indicator had the highest construct validity of all three available measures (*Koopmans & Lamers, 2005*), it might be that a different indicator of mental distress would have shown different results. Especially the rather simple distinction in terms of presence or absence of depressive complaints in combination with the fact that a special category of diagnosed (major) depression was lacking, may have contributed to the results as we found. From the literature, we know that the association between depression and health care utilization is not restricted to major depression (*Beekman, Deeg, Braam et al., 1997; Lyness, King, Cox, Yoediono, & Caine, 1999; Strik, Lousberg, Cheriex, & Honig, 2004*). Nevertheless, it cannot be excluded that interaction effects will be different if several levels of psychological distress (instead of a

dichotomy) had been used. We conducted therefore some additional analyses as a (partial) test of that hypothesis by using information contained in the second best indicator of psychological distress that we had available. Within the category of subjects with depressive complaints we made a distinction in four levels of distress by using the negative affect variable, that was based on the Affect Balance Scale of Bradburn (1969). We repeated the series of binomial regression analyses after substituting a new interaction term, that was the product of these new levels of psychological distress variable and the level of somatic morbidity variable as constructed before. The results of these analyses appeared to be mainly the same. The direction of the interaction effects remained stable.

A fourth limitation of our study is the restriction in the range of health care services that were covered. Especially the exclusion of primary health care, as delivered by general practitioners, leaves us with some unanswered questions. For instance, it would be interesting to see whether the attenuating effect of the interaction is compensated by a higher use of primary care or whether it is paralleled. These possible effects could not be checked.

Finally, our findings might not be generalisable to the population as a whole and to the present time, as the data we used were collected more than 10 years ago among specific subpopulation, namely enrollees of sickness fund.
Strictly, our findings cannot be generalised to the population as a whole, as we took a sample from sickness fund enrollees, which represent a part of the population (about 65%) in the lower income brackets. That may have influenced our findings, as people with lower incomes tend to have different utilization patterns compared to people with higher incomes. These differences in utilization can however largely be related to differences in morbidity (*Huisman, Kunst, & Mackenbach, 2003; Mulatu & Schooler, 2002*). Others found a relation between education and help seeking for mental problems (*Ten Have, Oldehinkel, Vollebergh et al., 2003*), whereas the tendency to somatize mental distress seems to be greater among low education groups (*Creed & Barsky, 2004*). This could mean that the associations we have found will be weaker for privately insured part of the population.
Our study was based on data collected in 1993-94, more than a decade ago. In such a relatively long period, several developments may have taken place that could have had an impact on our findings. Physicians seem to be more aware of signs of mental distress and recognize the importance of treatment (*Verhaak, Van de Lisdonk, Bor et al., 2000; Volkers, de Jong, de Bakker, & Van Dijk, 2005*). These developments are mainly seen within primary care services, in which more supportive structures to assist physicians in the treatment of mental problems were developed in recent years (*Verhaak, Groenendijk, Zantinge, Vonk, Voordouw, & Van der Veen, 2005*). In secondary outpatient care and hospital care these developments are less stronger and awareness of possible comorbid mental distress among medical patients has still to be propagated (*Huyse, Slaets, de Jonge, & Ormel, 2004*). This could mean, that the associations we have found, have become weaker, as more mental distress is recognized and treated, thus, preventing possible adverse effects of mental distress on somatic health outcomes and health care utilization. Although we cannot exclude that these developments have partly eroded our findings, we do not believe that they washed away the associations we have found, especially as we focused on health care utilization beyond primary care, whereas the developments in treating mental distress mainly took place within primary care.

Although our study has some limitations, we consider especially the direction of the interaction effects plausible and alternative explanations of these effects quite unlikely.

Our findings correspond partially with those from other studies in which mental distress appeared to be related to health care utilization (*Koopmans, Donker, & Rutten, 2005b*). However, these studies focused on the main independent effects of psychological distress and somatic morbidity, and did not take into account the interaction of both components. To our knowledge, the modifying effect of different levels of somatic morbidity on the relation of psychological distress with health care utilization has not been studied before. That implies that we cannot compare our findings with similar studies. Therefore, we can only speculate about possible reasons for this tendency.

We expected to find comparable mechanisms in studies that relate the co-occurrence of several chronic conditions or impairments on disability. However as far as these studies have analysed the interactive effect of several impairments, they all (except one) found only main (additive) effects (*Marengoni, Aguero-Torres, Cossi, Ghisla, De Martinis, Leonardi et al., 2004; Otiniano, Du,*

Ottenbacher, & Markides, 2003; Stuck, Walthert, Nikolaus, Bula, Hohmann, & Beck, 1999). The exception was the study of Kempen et al. (*Kempen, Verbrugge, Merrill, & Ormel, 1998*) that demonstrated that impairments and depressive symptoms not only act independently on disability, but in some cases also interactively: the combination of depressive symptoms with vision or hearing loss is affecting disability more than the added main effects of depressive symptoms and vision or hearing loss. Therefore, it seems that a negative interaction effect is typical when utilization is predicted, contrary to disability.

A reason for the phenomenon that the marginal effect of depressive complaints in addition of several chronic conditions is lower than the marginal effect if just one chronic condition is present, may be that in the presence of one or more chronic conditions care is already used and available on a nearly sufficient level. An additional reason might be that patients that have considerable somatic morbidity, don't perceive the symptoms associated with depression or mental distress that encourage other patients without somatic morbidity to seek medical care.
Moreover, physicians who generally have problems in recognizing depression and mental distress in medical patients will probably have even more recognition problems when these patients have serious medical illnesses. Such a mechanism was found on the level of a single medical visit in the study of Rost et al. (*Rost, Nutting, Smith, Coyne, Cooper-Patrick, & Rubenstein, 2000*): depression treatment was less likely in the presence of more physical problems.

We conclude, that depressive complaints predict somatic health care utilization, but that somatic morbidity attenuates this relation. Hospital admissions were unrelated; all other types of care were prospectively related to depressive complaints. Future research on this subject should include interaction effects of depressive complaints and somatic morbidity.
As far as excess use that is related to mental distress can be considered inappropriate use, interventions aiming to reduce such use should be primarily targeted on subjects with mental distress that have no comorbid somatic morbidity. ■

Chapter 8

The use of somatic health care services by depressed adults without serious manifest physical morbidity

Summary

Among clinical populations, mental health problems complicate treatment and recovery, thus resulting in higher health care utilization. This study focuses on the relation between mental distress and somatic health services use among adults without manifest somatic morbidity.

Data were used from a community-based sample of adults from which a selection was made of subjects with no or just minor somatic morbidity (N=5132).

Depressive complaints were related to prospective health care utilization and analysed using binomial regression analysis.

We found that depressive complaints predict health care use, especially the use of prescription drugs and paramedic services and partly of the use of medical specialists and hospital admissions. Age and gender were mainly related to the use of specific services as independent predictors, not as modifiers.

It can be conclued that depressive complaints predict somatic health care use among adults without serious somatic morbidity, but mainly the use of prescription drugs and paramedic services.

Introduction

The excess use of general health services by patients with mental health problems that are comorbid to the primary somatic complaints has been demonstrated by numerous studies among clinical groups, such as medical inpatients or attenders of outpatient clinics (*De Boer, Wijker, & de Haes, 1997; Koopmans, Donker, & Rutten, 2005a*). Findings of community-based studies generally point into the same direction (*Koopmans, Donker, & Rutten, 2005b; Simon, 1992*).

Findings of a population based study we undertook (*Koopmans & Lamers, 2006*) suggested a stronger impact of depressive complaints on general health care utilization among subjects without or with just minor somatic morbidity than among subjects with more severe somatic morbidity. If such is the case, it is a phenomenon that cannot be explained by the fact that recovery from a physical illness is complicated by mental health problems, thus resulting in a more extensive use of general (somatic) health care resources, as is usual in clinical studies (*Barsky, Delamater, & Orav, 1999; Musselman, Betan, Larsen et al., 2003; Simon & Katzelnick, 1997; Smith, 1994; Souetre, Lozet, Cimarosti, Martin, Chignon, Ades et al., 1994; Walker, Katon, & Jemelka, 1993*). The interplay of physical and mental health problems in treatment and recovery does not exist (or is just existing in a much lesser degree) among population groups that could be considered physically well, but that do have mental health problems. Comparing this group with people that are physically well and without mental health problems can give us a further understanding of the relation of mental distress and general health care utilization.

In this study we will therefore focus on the relation between mental distress and health services use among adults without manifest somatic morbidity and explore whether this relation is dependent on age and gender, both commonly used risk factors in utilization research. We will consider the role of mental distress as a risk factor for the utilization of somatic health services in a subpopulation that can be expected to have a low risk for such health care utilization.

Age is generally related to somatic morbidity and mainly through that pathway related to health service utilization. However, when somatic morbidity is controlled for (by selecting subjects without manifest somatic morbidity) the impact of age on utilization is less clear.

In general adaptation to distress and negative events varies with age (*Karel, 1997*). Biological vulnerability to depression is higher among the aged, but the main cause for this tendency is the higher prevalence of medical illnesses, which implies that we do not expect that this factor will have a substantial impact among subjects that are healthy or have just a minor (transient) illness. Psychological vulnerability to depression is showing a diminishing tendency with growing age, mainly because of more effective coping behaviour (*Markus & Herzog, 1991*). That implies that depression is negatively related to age as far as it stems from psychological vulnerability. The same coping behaviour might also lead to less service utilization if mental distress is felt. Stressful life events are more frequent in the lives of young adults and less common among the aged (apart from the onset of illnesses and disabilities) (*George, 1994; Murrell & Norris, 1984*). Together these tendencies can be expected to accumulate, among subjects that are healthy or have just a minor (transient) illness, in a lower prevalence of mental distress related to age and a more effective way of coping if mental distress exists.

Gender is not only related to differences in morbidity and mortality, but also to differences in health and illness related behaviour (*Anson, Paran, Neumann, & Chernichovsky, 1993; Benyamini, Idler, Leventhal, & Leventhal, 2000; Corney, 1990; Hankin & Abramson, 2001; Ladwig, Marten-Mittag, Formanek, & Dammann, 2000*). Women show higher rates of depression (*Hankin & Abramson, 2001*) and evaluate their health on a broader range of symptoms (*Benyamini, Leventhal, & Leventhal, 2000*). Moreover, women have a higher tendency to consult others in case of health worries (*Corney, 1990*). This implies that it can be expected that women not only have a higher rate of health services use, but that mental distress will have a higher impact on utilization among women compared to men.

If a relation is found between psychological distress and service use among subjects without manifest somatic morbidity, it might be that some underlying but latent morbidity, that might be associated with psychological distress, is causing that relation. Latent morbidity is not measured, by definition. However, proxy variables that indicate such morbidity, such as restrictions in mobility or in daily functioning, or health care utilization in a previous period, can be measured (and are available).

The hypothesized relation between depressive complaints and somatic health care utilization and the way other factors impact on that relation, are depicted in Figure 8-1. It is presumed that depressive complaints, age, gender and (latent) health all have independent effects on health care utilization (as depicted by solid lines) and that age, gender and latent health also modify the relation between depressive complaints and health care utilization (as depicted by dotted lines).

In this study, we will try to answer the following questions:

- Is psychological distress among subjects without serious somatic morbidity related to health care utilization in general and (if that is the case) to which types of health care services more specifically?
- Can the relation between psychological distress and utilization in this population be explained by latent health differences?
- Is the strength of the association between psychological distress and utilization in this population moderated by age, gender or latent health differences?

Method

Study population

For this study, data were used from a community-based sample of adults (from 15 to 90 years of age), from a population of enrollees of a sickness fund working in the western part of the Netherlands, who had responded to a health survey mailing (N=9428). The design of the procedure for conducting the survey as to sending reminders in case of (initial) nonresponse was guided by Dilman's (1978) recommendations. The first mailing of the survey was in February 1993.

The net response rate to the survey was 70.4 %. Respondents and nonrespondents differed slightly in their medical consumption. Nonresponse bias will result in a small over-estimation of utilization of prescribed drugs (*Lamers, 1997*).
As individuals who had been hospitalised during a period before the survey (i.e. in 1988), were overrepresented deliberately, all analyses were conducted on a weighted sample to make it representative for the population of the sickness fund. From this community based sample a selection was made of respondents with no somatic morbidity. Subjects with no chronic somatic illness (from a list of 24 conditions; see below) were included. This resulted in a subsample of 5562 subjects. As we intended to analyse health care utilization in a period up to the

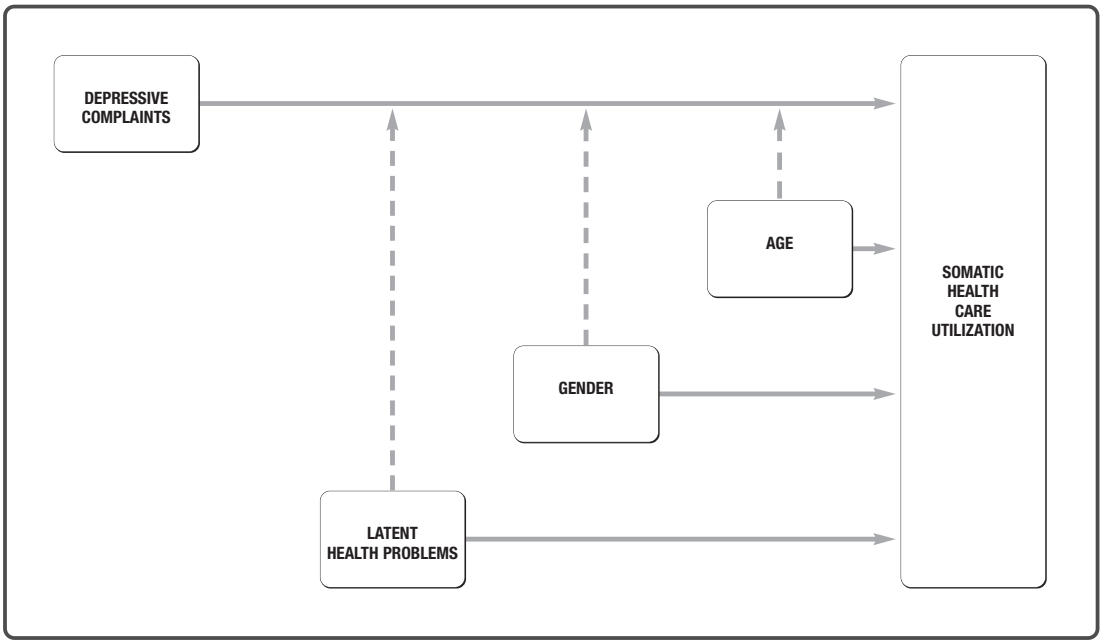

Figure 8.1 **Relation between depressive complaints and somatic health care utilization and the impact of latent health, gender and age on that relation.**

end of December 1994, subjects that were not member of the sickness fund during the whole observation period, i.e. 1993-1994, were excluded. This exclusion reduced the size of the subsample to 5132 subjects.

Data

As part of the survey, chronic conditions (24 types) and depressive complaints were assessed by self-report, using the same checklist as listed in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*).
The survey contained three measures of psychological distress: self-reported depressive complaints, the Negative Affect Scale (NAS), i.e. the negative items of Bradburn's Affect Balance Scale (*Bradburn, 1969*), and a Nervousness subscale, which formed part of a questionnaire on subjective health (*Dirken, 1969; Van Sonsbeek, 1990*). Self-reported depressive complaints were used as an indicator of psychological distress. The two other indicators of psychological distress that were available were not used in the main analyses. In a previous study, we found self-reported depressive complaints more appropriate when studying the relation of psychological distress and health service use (*Koopmans & Lamers, 2005*).
The sociodemographic variables that were included in the analyses were age, gender, marital status (divorced/separated/widow(er) vs. other), living situation (household size) and educational level (three categories). These variables were also part of the above-mentioned survey. Age was coded in two dummy variables: young age (below 45 years of age vs. others) and old age (above 65 years of age vs. others).

Somatic health care utilization was measured prospectively, using data extracted from the claims database of the sickness fund. These claims data could be matched with the health survey data. Use was counted over two periods: May-December 1993, and January-December 1994. It included all kinds of somatic health care provided by medical specialists, outpatient clinics and hospitals, but not primary care, i.e. care from general practitioners (GPs). Because in the Netherlands GPs receive a uniform annual fee for each of the patients on their list, services delivered by GPs are not registered. Specialty mental health care is also not included, as it is covered by special public funds and is therefore not registered by sickness funds.

Analyses

In the analyses, we made a distinction in two observation periods of health care utilization, the first

period comprising the eight months directly following the survey (short term: May to December 1993) and the second period the 12 months thereafter (medium term: January to December 1994). Findings related to medium term utilization will be reported extensively; findings related to short term utilization only in case of differences compared to medium term utilization.
Within the selection of healthy subjects, two types of predictions were done for each observation period. First, we predicted any use of any type of general (somatic) health service, using measures of psychological distress and possible confounding sociodemographic characteristics as predictors. Second, we predicted whether they used some specific type of health care. Four types of health care services were selected for this purpose: use of prescription drugs (psychoactive medication not included), use of paramedic services, use of outpatient services, and any hospital admission.
Variables used as proxy for latent health were (absence of) mobility restrictions, (absence of) restrictions in daily activities (ADL) and low previous health care costs. Previous health care costs were considered low, if they were below the population median of Dfl 311 (approx. €140)[3].

Data were analysed using binomial regression analysis. For this purpose, we used the GLM-procedure of STATA, version 8.0 (Stata, College Station, Texas), specifying a binomial distribution function and an identity link function. This makes it possible to estimate a possible additive interaction effect, which is not possible in logistic regression analysis.

Three models were tested: a basic model (1) including depressive complaints and sociodemographic variables as predictors, an extended model (2) in which three variables were added that we considered proxy variables for latent health (or latent somatic morbidity). The third model was based on the extended model and included four interaction-terms (depressive complaints with young respectively old age, with female gender and with low previous health care costs).
The modifying effect of age and gender as well as low previous costs (latent health), could be studied by comparing model 2 and 3. Comparing models 1 and 2 will demonstrate whether there is any (confounding) effect of latent health (latent morbidity).

[3]The mean costs in the preceding 16 months were Dfl 1770, the median costs Dfl 311, as calculated for the original sample (Dfl 100=€45, approx.).

Results

Sample characteristics

Compared with the excluded subsample the selection of subjects without somatic morbidity contains relatively more youngsters and more men (table 8-1). The percentages of married people were almost identical, that of never married higher and that of divorced/separated or widowed were lower in the selection There were only minor differences between the selection and the excluded subsample as to educational level. The percentages of people living alone or with just one person were lower.
Although we selected the relatively healthy (as we may call these subjects who do not have a serious manifest physical illness), 71 % had visited their GP at least once in the previous year, 14 % at least twice in previous two months. These utilization rates are below those found in the excluded subsample.
The selected subjects had less psychological distress and less serious depressive complaints than the excluded subsample. There was some use of psychoactive medications, but less frequently than in the excluded subsample.

Summary of prospective utilization characteristics

In our selection of the sample (n=5132), 72.6 % used any health care service in the first prospective observation period (May-December 1993). Only 3.8 % was admitted to a general hospital. More than 31% made use of a medical specialist. In the second prospective observation period (January-December 1994), these figures are moderately higher, but this period counted 12 months instead of 8 months (table 8-2).

Prediction of any use

The results of the analyses that were intended to find possible associations between depressive complaints and health care utilization are presented in table 8-3.
The relation of psychological distress with medium term use was positive and statistically significant, also after correction for demographic variables. These were all related to utilization, except old age.
Adding proxy variables for latent health/morbidity (mobility and ADL-restrictions, previous low health care costs) attenuated the relation of depressive complaints with health services use just marginally. Female gender and young age appear to predict more use, but low educational level or being widowed or separated are reducing the chance of medium term use in this specific selection. Lower previous health care costs is related to

Table 8-1. Characteristics of excluded and selected subsamples

Variable	excluded subsample (N=4295)		selected subsample N=5132 *		analysis
	N	*%*	*N*	*%*	*p-value*
Gender					<.000
Male	1,643	38.2	2,422	47.2	
Female	2,653	61.8	2,710	52.8	
Age					<.000
15-44 yr	2,014	46.9	3,238	63.1	
45-64 yr	1,305	30.4	1,235	24.1	
65 yr or older	977	22.7	660	12.9	
Marital status					<.000
Married/living with partner	2,937	69.1	3,499	69.2	
Never married	686	16.1	1,132	22.4	
Divorced/separated	173	4.1	143	2.8	
Widow	456	10.7	283	5.6	
Unknown					
Living situation					<.000
Alone	772	18.5	689	13.9	
With one person	1,524	36.6	1,623	32.8	
With two or more persons	1,873	44.9	2,636	53.3	
Unknown					
Educational level					0.015
Low	2,442	58.7	2,987	60.1	
Middle	1,181	28.4	1,438	28.9	
High	540	13.0	547	11.0	
Unknown					
Number of chronic conditions (without depressive complaints) **					<.000
0	430	10.5	5,132	100.0	
1	2,187	53.3	-	-	
2	868	21.2	-	-	
3 or more	615	15.0	-	-	
Psychological distress					
Depressive complaints (with ongoing treatment)	384	9.4	132	2.6	<.000
Depressive complaints (in last 5 years; treated or untreated)	742	18.1	445	8.7	<.000
Recent utilization of health services (based on survey)					
GP consultation (last 12 m.)	3,818	90.7	3,593	70.6	<.000
at least 2 GP consultations (last 2 m.)	1,322	31.7	721	14.3	<.000
Health care utilization before health survey (based on claims data)					
consultations of med. specialists	1,645	38.3	1,014	19.8	<.000
use of paramedical services	708	16.5	408	7.9	<.000
hospital admissions	205	4.8	80	1.6	<.000
Current use of psychoactive medications (based on claims data)					
Anxiolytics	350	8.1	180	3.5	<.000
Anti-depressants	86	2.0	47	0.9	<.000
Hypnotics & sedatives	321	7.5	114	2.2	<.000
	Mean	*SD*	*Mean*	*SD*	
Psychological distress					
Negative Affect (Affect Balance Scale) - range 5-20	6.95	2.44	6.30	1.95	<.000
Nervousness Scale - range 0-3	0.79	1.06	0.47	0.88	<.000
Measures of health and disability					
ADL-restrictions - range: 3-12	3.20	0.95	3.03	0.28	<.000
Mobility restrictions - range: 3-12	4.05	2.15	3.26	1.05	<.000

*subjects without somatic morbidity and with complete claims data in year following health survey only
**this was criterium for selection of subjects; by definition selected subsample had 0 condition

Table 8-2. **Summary statistics of health care service use(*)**

	N	%
subjects without somatic morbidity having complete claims data in year following health survey	5,132	100.0%
any health care use in May-Dec. 93	3,724	72.6%
any health care use in Jan-Dec. 94	4,418	86.1%
any use of prescription drugs in May-Dec. 93	2,974	57.9%
any use of prescription drugs in Jan-Dec. 94	3,262	63.6%
any use of paramedic services in May-Dec. 93	622	12.1%
any use of paramedic services in Jan-Dec. 94	850	16.6%
any use of medical specialists in May-Dec. 93	1,602	31.2%
any use of medical specialist in Jan-Dec. 94	1,634	31.8%
any hospital admission in May-Dec. 93	196	3.8%
any hospital admission in Jan-Dec. 94	267	5.2%

(*)sample of subjects without manifest somatic morbidity at baseline

less utilization, other variables are not related. When interaction terms are introduced, the fit of the model does not improve: none of the interactions is significant, neither is the contribution of depressive complaints in this model.

In the prediction of short-term use, a comparable pattern is found, with one noticeable exception: psychological distress is not predictive in the extended model, in which latent health variables are added. Especially low previous health care costs reduce the risk of any short-term utilization.

Prediction of use of specific services

The results of the analyses of the association of psychological distress and the use of specific health care services can be found in table 8-4a, for short-term use, and table 8-4b, for medium term use.

The medium term use of *prescription drugs* is related to depressive complaints, as well as to being female, low educational level and old age. Among variables used as a proxy for latent health, low previous health care (HC) costs has a (reducing) effect on the use of prescription

Table 8-3. **Prediction of any short and medium term use by psychological distress, sociodemographic and (latent) health variables and interactions**

period:	short term			medium term		
model:	*1*	*2*	*3*	*1*	*2*	*3*
	coeff.	coeff.	coeff.	coeff.	coeff.	coeff.
Depressive complaints	0.05	n.s	n.s.	**0.06**	**0.04**	n.s.
Widowed or separated	n.s	-0.06	-0.06	-0.04	-0.05	-0.05
Gender (female)	**0.12**	**0.11**	**0.11**	**0.05**	**0.04**	**0.04**
Low educ. level	n.s	n.s	n.s.	**-0.04**	**-0.04**	**-0.04**
Young age	**0.10**	**0.10**	**0.11**	**0.12**	**0.13**	**0.13**
Old age	n.s	-0.05	-0.05	n.s.	n.s.	n.s.
Mobility restrictions		n.s	n.s.		n.s.	n.s.
ADL -restrictions		n.s	n.s.		n.s.	n.s.
Low health care costs before		**-0.18**	**-0.19**		**-0.10**	**-0.10**
Interaction: depressive complaints * young			n.s.			n.s.
Interaction: depressive complaints * old			n.s.			n.s.
Interaction: depressive complaints * female			n.s.			n.s.
Interaction: depressive complaints * low costs before			n.s.			n.s.

n.s.: coefficient not significant (α=.05)
coefficients are risk differences
risk differences: normal font: p<.05; bold font: p<.01; n.s.: not significant
N=4826

Table 8-4a. **Prediction of use of specific health care services** (short term)

type of health care:	prescription drugs			paramedic services			medical specialists			hospital admissions		
model:	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*	1	2	3
Depressive complaints	**0.08**	**0.07**	0.04	**0.10**	**0.08**	n.s.	**0.10**	**0.07**	n.s.	n.s.	n.s.	n.s.
Widowed or separated	**-0.08**	**-0.08**	**-0.09**	n.s.	n.s.	n.s.	n.s.	-0.05	n.s.	n.s.	n.s.	n.s.
Gender (female)	**0.31**	**0.30**	**0.30**	**0.03**	n.s.	n.s.	**0.07**	**0.05**	**0.04**	n.s.	n.s.	-0.01
Low educ. level	**0.04**	**0.04**	**0.04**	**0.03**	**0.03**	**0.03**	n.s.	n.s.	n.s.	**0.02**	**0.02**	**0.02**
Young age	**0.06**	**0.06**	**0.07**	n.s.	n.s.	n.s.	-0.04	n.s.	-0.04	n.s.	n.s.	n.s.
Old age	**0.17**	**0.16**	**0.17**	n.s.	n.s.	n.s.	**0.16**	**0.15**	**0.14**	**0.05**	**0.04**	**0.04**
Mobility restrictions		n.s.	n.s.		**0.02**	**0.02**		n.s.	n.s.		**0.01**	**0.01**
ADL -restrictions		n.s.	n.s.		n.s.	n.s.		n.s.	n.s.		n.s.	n.s.
Low previous health care costs		**-0.08**	**-0.09**		**-0.12**	**-0.13**		**-0.19**	**-0.20**		**-0.04**	**-0.04**
Interaction: depressive complaints * young			n.s.			n.s.			n.s.			n.s.
Interaction: depressive complaints * old			n.s.			n.s.			n.s.			n.s.
Interaction: depressive complaints * female			n.s.			**0.09**			0.10			0.04
Interaction: depressive complaints * low previous costs			0.10			0.08			n.s.			n.s.

n.s.: coefficient not significant (α=.05)
risk differences: normal font: p<.05; bold font: p<.01; n.s.: not significant
n=4826

drugs and mobility restrictions a positive effect, without affecting the associations in the basic model. Adding interactions does not improve the model.
In this respect, there is a difference with short-term utilization of prescription drugs.

Adding interactions now leads to a substantial shift from the main effect of depressive complaints to the interaction of depression and low previous HC costs, which means, that depressive complaints are especially related to the (short term) use of prescription drugs

Table 8-4b. **Prediction of use of specific health care services** (medium term)

type of health care:	prescription drugs			paramedic services			medical specialists			hospital admissions		
model:	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*	1	2	3
Depressive complaints	**0.10**	**0.09**	n.s.	**0.10**	**0.08**	n.s.	n.s.	n.s.	n.s.	**0.03**	0.03	n.s.
Widowed or separated	-0.06	**-0.08**	**-0.08**	n.s.	n.s.	n.s.	n.s.	-0.05	n.s.	-0.03	**-0.03**	**-0.03**
Gender (female)	**0.30**	**0.29**	**0.29**	**0.05**	**0.04**	**0.04**	**0.07**	**0.06**	**0.06**	n.s.	n.s.	n.s.
Low educ. level	0.03	0.03	0.03	**0.06**	**0.06**	**0.06**	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Young age	0.04	**0.04**	**0.05**	n.s.	n.s.	n.s.	**-0.06**	**-0.05**	**-0.05**	**-0.03**	**-0.02**	**-0.03**
Old age	**0.19**	**0.17**	**0.17**	n.s.	n.s.	n.s.	**0.19**	**0.17**	**0.17**	**0.09**	**0.08**	**0.08**
Mobility restrictions		**0.03**	**0.03**		0.01	0.01		**0.02**	**0.02**		**0.02**	**0.02**
ADL -restrictions		n.s.	n.s.		n.s.	n.s.		n.s.	n.s.		n.s.	n.s.
Low previous health care costs		**-0.10**	**-0.11**		-0.12	-0.12		**-0.16**	**-0.16**		**-0.03**	**-0.03**
Interaction: depressive complaints * young			n.s.			n.s.			n.s.			n.s.
Interaction: depressive complaints * old			n.s.			n.s.			n.s.			n.s.
Interaction: depressive complaints * female			n.s.			n.s.			n.s.			n.s.
Interaction: depressive complaints * low previous costs			n.s.			n.s.			n.s.			n.s.

n.s.: coefficient not significant (α=.05)
risk differences: normal font: p<.05; bold font: p<.01; n.s.: not significant
n=4826

among those that had low health care costs in de period before the health survey.

The medium term use of *paramedic services* (mainly services provided by physiotherapists) is significantly and positively associated with depressive complaints, also after correction for demographic variables. When latent health proxies are added, there is some attenuation of these associations, which remain substantial however. From these variables, mobility restrictions are positively related to the use of paramedic services and low previous HC costs negatively.
When interaction terms are added the model does not improve: none of these terms is significant.

As to short-term utilization, the first two models are comparable. However, when interaction terms are added a shift can be seen from the main effect of depressive complaints towards two interactions: depression with female gender and depression with low previous costs. This means, that depressive complaints are especially related to the short-term use of paramedic services among females and among subjects that had low previous HC costs.

Medium term use of *medical specialists* is not related to depressive complaints in any model. Old age is the most important predictor of the medium-term use of these services, followed by being female. Young age reduces the risk of utilization. Adding latent health proxies resulted in a small reduction of the strength of these associations. Low previous HC costs are again related to a lower chance of use of medical specialists. When interaction terms are added, the model does not improve.

As to short term use of *medical specialists*, many predictors behave differently. Depressive complaints is a significant predictor now, as is old age and being female. Low previous HC costs predict less use of medial specialists. When interaction terms are added, the main effect of depressive complaints disappears, but one interaction appears to be positively related: depression among women is giving a higher chance of short-term use of medical specialists.

Medium term *hospital admission* is – unexpectedly – related to depressive complaints, as is old age (not unexpected). After adding health related variables depressive complaints are still associated, as are mobility restrictions, while low previous HC costs reduce the chance of hospital admission. Adding interaction terms does not improve the model.
Hospital admission (short term) is not predicted by depressive complaints. Higher age and low educational level are related to higher hospitalisation risks. From the latent health proxies mobility restrictions were positively and low previous HC costs negatively related to hospitalisation. Female gender combined with depressive complaints is related to hospitalisation.

Discussion

We studied the relation between psychological distress and the use of general (somatic) health care, in a population based sample of adults with no or just minor somatic morbidity. Depressive complaints appeared to be predictive of short as well as medium term health care use. This association could not be explained by *latent health* differences as to medium term use, although previous health care costs were also related to utilization in this period.
Although *young age* and *female gender* were related to higher utilization, age and gender did not modify the association of psychological distress with utilization in general.

Depressive complaints are predictive of short and medium term use of prescription drugs and paramedic services, short-term use of medical specialists and medium term hospital admissions. Medium term use of medical specialists as well as short-term use of hospital services is not predicted by depressive complaints among the study population.
No relations could be explained by *latent health* differences.
Age and gender, as well as latent health differences were generally associated with various specific types of health care as independent predictors, but not as modifiers. Interaction effects were only found pertaining to short-term utilization. The interaction of female gender with depressive complaints was a significant predictor of paramedic service use, use of medical specialists and hospital admission. Low previous health care costs (indicating latent health) combined with depressive complaints, predicted use of prescription drugs and use of paramedic services.

Our findings show that psychological distress and health care utilization are related among subjects without serious manifest somatic illness, and that these relations not only concern the use of prescription drugs and

paramedic services, but partly also use of medical specialists and hospital admissions.
Most of these associations are probably not caused by latent health differences. The modifying effect of age or gender was limited to short term use and a few types of health care services. Gender was often a modifier but not age. Latent health (absence of somatic morbidity) was also a modifier occasionally.

This study has some limitations.
First, our selection of the study sample, that was based on manifest somatic morbidity (for which treatment or regular check-ups was going on), can be criticised. As that selection is based on a list of chronic diseases, the resulting sample will be dependent on composition of that list. We believe, however, that the validity of our findings is not threatened by a possible selection bias. First, because the list seems to be well validated as it is frequently used in epidemiological and health services studies in the Netherlands (*Kempen, Ormel, Brilman et al., 1997; Kriegsman, Penninx, Van Eijk, Boeke, & Deeg, 1996; StatisticsNetherlands, 1996*). Moreover the last item of the list is asking about other not mentioned illnesses, which makes is reasonable to assume that the list is comprehensive pertaining to major somatic morbidity. Furthermore, we made a correction in our analyses for possible differences in latent somatic morbidity, thus correcting, at least partly, possible flaws in the assessment of manifest somatic morbidity. The concept of latent morbidity is of course not without problems, but by using three proxy variables to cover that concept, we can be quite confident that our findings are sufficiently corrected for a possible confounding effect of latent morbidity.

Second, we were limited in the type of service use that could be included in our study. Especially the use of primary care service, i.e. consultations of general practitioners, could not be analysed, as these data were not available, as explained in the Method section. This might to lead to an underestimation of the associations we studied, especially the association between psychological distress and health services use in general. This limitation is however relative, as our focus was on somatic health services exclusively, whereas primary care is meant to serve somatic as well as mental health problems.

There is a whole body of research relating depressive symptoms with somatization, unexplained physical symptoms and high service utilization (*Barsky, 1998; Bell, 1994; Creed & Barsky, 2004; Escobar, Golding, Hough, Karno, Burnam, & Wells, 1987; Fink, Sorensen, Engberg et al., 1999; Hiller & Fichter, 2004; Smith, 1994; Speckens, Hemert, Bolk, Rooijmans, & Hengeveld, 1996; Vedsted, Fink, Sorensen, & Olesen, 2004; Von Korff, Ormel, Katon et al., 1992; Williams, Guthrie, Mackway-Jones, James, Tomenson, Eastham et al., 2001*). Our study is different from these studies, as it is a prospective population study contrary to the above-referred studies, which are mostly samples among clinical groups selected on their utilization behaviour or specific medical complaints.
Depressive complaints are assessed retrospectively in these studies, after the assessment of health care utilization. As these studies report an association between health care utilization and depressive symptoms, it not clear which causal interpretation is appropriate, because it could be in both directions. Prospective studies that can be compared with our study do not exist to our knowledge. One study that comes relatively closest to our study was undertaken by Wolinsky et al. (*Wolinsky, Callahan, Fitzgerald, & Johnson, 1994*), which used health worries as a more specific measure of psychological distress. In that study, that was restricted to the elderly, no substantial relation was found between these 'worries' and health care utilization (only 3 out of 33 possible relations between health care utilization and worries were significant). Our findings demonstrate a general association between psychological distress and utilization that was not attenuated by old age. If we had found an attenuating effect of old age, that could have explained the findings of the study of Wolinsky. A more probable reason for that difference could be that we used depressive complaints as predictor, not health worries.

Generally, age is associated with higher service utilization, primarily because it is a good proxy for somatic morbidity. Within the selection on which this study is focussed, somatic morbidity is much more homogeneous than in the general population. Consequently, age is now not useful as a proxy for somatic morbidity. The associations of age with service utilization now show a pattern that is different from that found in the general population. Young age predicts a higher chance of any utilization, but it predicts a lower chance of consulting a medical specialist and (partly) a lower chance of hospital admission. Old age does not predict utilization in general, but it predicts all types of care, except paramedic services. This could mean that among the younger age group the threshold for seeking medical care is lower, implying that a higher proportion will seek help when there are just minor ailments. That

could explain that young age is related to a lower chance of getting more substantial health care (medical specialist consultations and hospital admission). On the other side, old age is not related to use of health care in general, but it predicts more substantial health care use, that will probably be related to more severe somatic morbidity.

The general associations between psychological distress and utilization that we found were not modified by *age*. So there is a direct effect of age on utilization, not an attenuating (or boosting) effect on the relation of depressive complaints with utilization. Presumably, the modifying effect of age is only present when it is related to differences in somatic morbidity (*Koopmans & Lamers, 2006*).

Gender more often appeared to be a modifier. Being female enhances the effect of depressive complaints on the (short term) use of paramedic and outpatient services, as well as hospital admissions. Moreover, being female has also an independent positive impact on utilization. The last finding is not surprising, as it is the result of many studies (*Briscoe, 1987; Corney, 1990; Fernandez, Schiaffino, Rajmil, Badia, & Segura, 1999; Green & Pope, 1999; Tudiver & Talbot, 1999*). It is also known that women are more at risk to develop depression than men (*Hankin & Abramson, 2001*), but these facts cannot explain why depressive complaints are stronger related with utilization among women compared to men. Factors that might explain these differences are gender related differences in health perceptions (*Anson, Paran, Neumann et al., 1993*) and information processing in the self-assessment of health (*Benyamini, Idler, Leventhal et al., 2000; Benyamini, Leventhal, & Leventhal, 2000; Ladwig, Marten-Mittag, Formanek et al., 2000*), implying that women tend to use a broader range of factors (including mental health) than men to evaluate their health (*Corney, 1990*).

The fact that gender but not age modifies the focal relation could mean that the effect of psychological distress on service use is more dependent on coping style, and that adaptation to mental distress does not play a part or does not exist.

Latent health status appeared to be a modifier too, although less broadly. Low previous health care costs (indicating latent health) enhance the effect of depressive complaints on short-term utilization. This finding mirrors the findings of our previous study (*Koopmans & Lamers, 2006*) that demonstrated an attenuating effect of somatic morbidity on the relation mental distress and health care utilization. Seemingly, on the other side of the spectrum of somatic morbidity mental distress has the highest impact among the healthiest.

In conclusion, we can state, that depressive complaints predict somatic health care utilization among adults without serious somatic morbidity, regardless of differences in age. The associations can only partly be explained by differences in latent morbidity. Among users of health care services, depressive complaints are consistently related to the use of prescription drugs and paramedic services, and partly to medical specialists and hospital admissions. Among women and those with low previous health care costs, there was a stronger association between depressive complaints and health care utilization, but this was only found regarding short term utilization and seemed to be restricted to less substantial types of care. ■

Chapter 9

Gender and health care utilization: The role of mental distress and help seeking propensity

Summary

Many studies report higher levels of health care utilization among women. We developed and tested a model that might explain these gender related differences.
In this model, somatic and other illness variables as well as mental distress were related to utilization, both directly and indirectly via symptom perception and perceived health. We expected that higher utilization levels among women might be explained by two differences: first, higher levels of somatic morbidity, mental distress and utilization propensity among women, and second, a stronger impact of mental distress among women on symptom perception and perceived health, thus stimulating health care utilization.
Data were used from a community-based sample of adults, from a population of enrolees of a sickness fund, who had responded to a mailed health survey (N=9428). Health care utilization was measured prospectively, using data extracted from a claims database held by the sickness fund, which covers all types of health services, except general practitioner (GP) consultations and services from specialty mental health care providers. The model was tested using structural equation modelling.

We found more somatic morbidity and mental distress among women that might explain – at least partly – these gender related differences in utilization.
The expected gender related differentiation in model parameters could however not be demonstrated. That means that we did not find differences across gender as to the relation mental distress and symptom perception, neither in the relation mental distress and perceived health, nor in the relation mental distress and utilization. This implies that mental distress is related to utilization in a way that is not gender specific. However, levels of mental distress (as well as physical illness) are higher among women, thus leading to a higher utilization of somatic health services.

Introduction

It is a well known fact that women use more health care services than men, even after correcting for the use of health care services that are specific for women, such as gynaecology (*Briscoe, 1987; Corney, 1990; Green & Pope, 1999; Ladwig, Marten-Mittag, Formanek et al., 2000; Svarstad, Cleary, Mechanic, & Robers, 1987*).

Differences in utilization can partly be explained by differences in *somatic morbidity*: women tend to have more minor (transient) illnesses and nonfatal chronic diseases, men have more fatal chronic diseases and have higher mortality rates (*Lahelma, Martikainen, Rahkonen, & Silventoinen, 1999; Wingard, Cohn, Kaplan, Cirillo, & Cohen, 1989*). These differences in morbidity can be found from early adolescence (*Sweeting, 1995*). Whether these differences are consistent across the life span, is however less clear-cut than generally assumed (*Kandrack, Grant, & Segall, 1991; Macintyre, Hunt, & Sweeting, 1996*).

A female excess of affective disorders or mental distress in comparison to men, seems to be a more consistent finding (*Hankin & Abramson, 2001; Macintyre, Hunt, & Sweeting, 1996; Popay, Bartley, & Owen, 1993; Rojas, Araya, & Lewis, 2005; Silverstein, 2002*). This might also partly explain the higher use of general health care of women (*Koopmans, Donker, & Rutten, 2005b, 2005a*).

Several factors have been suggested that might attribute to the explanation of these gender related differences in health care utilization and morbidity, such as acquired risks, psychosocial factors and health-reporting behaviour (*Verbrugge, 1989*).

Among these an important factor might be the greater awareness of physical symptoms among women compared to men (*Gijsbers Van Wijk & Kolk, 1997*) that triggers help seeking in an earlier state or more frequently. Related to this factor is the role of negative affect on the self-assessment of physical symptoms: among women, negative affect is more prevalent and stronger related to a negative interpretation of physical signs and symptoms (*Pennebaker & Watson, 1991; Watson & Pennebaker, 1989*). This corresponds with findings from other studies that demonstrate that women include all types of somatic morbidity (not only fatal) and psychosocial problems in their self-evaluations of health status contrary to men (*Benyamini, Leventhal, & Leventhal, 2000; Corney, 1990; Parslow, Jorm, Christensen, Jacomb, & Rodgers, 2004*). Perceived health is for that

reason a better predictor of mortality among men (*Benjamins, Hummer, Eberstein, & Nam, 2004*). Taken together, these psychological factors, in combination with the higher prevalences of mental distress among women, can be expected to produce a higher use of health care services among women. In addition men tend less than women to share their health concerns with significant others, including health care professionals (*Tudiver & Talbot, 1999*). This tendency will lead to a lower utilization propensity of men.

Factors and their relations as described above, can be summarized in a model, as shown in figure 9-1, that predicts health service use

In this model, gender is differentially related to mental distress, physical illness and utilization propensity and is moderating the association between mental distress and symptom perception as well as perceived health. Gender does not have a direct relation with utilization, but is related through several pathways indirectly. The first pathway is through utilization propensity, that is supposed to be directly related to utilization and is expected on average to be higher among women. The second pathway is through mental distress that is supposed to be linked to utilization via perceived health (subjective health, self assessed health) and is expected to be more prevalent among women. Mental distress is linked to perceived health in two ways: directly and through symptom perception. Directly, as it is one of the components of health status that is evaluated in the self-assessment of health. This relation is moderated by gender, as women tend to weight mental distress more heavily than men in the self-assessment of health do. Mental distress is further linked through symptom perception, as mental distress raises the awareness of physical symptoms. This relation will also be moderated by gender, as mental distress is stronger related to a negative interpretation of physical signs among women. (We do not expect a direct relation between mental distress and utilization, but in testing the model, such a relation will be allowed; this path is therefore depicted as a dotted line in the diagram). The third pathway that links gender to utilization is through physical illness, as female gender will be related to a higher level of somatic morbidity.
Physical illness is a factor directly related to utilization, but also indirectly through symptom perception, perceived health, as well as mental distress.
From the sociodemographic characteristics that might

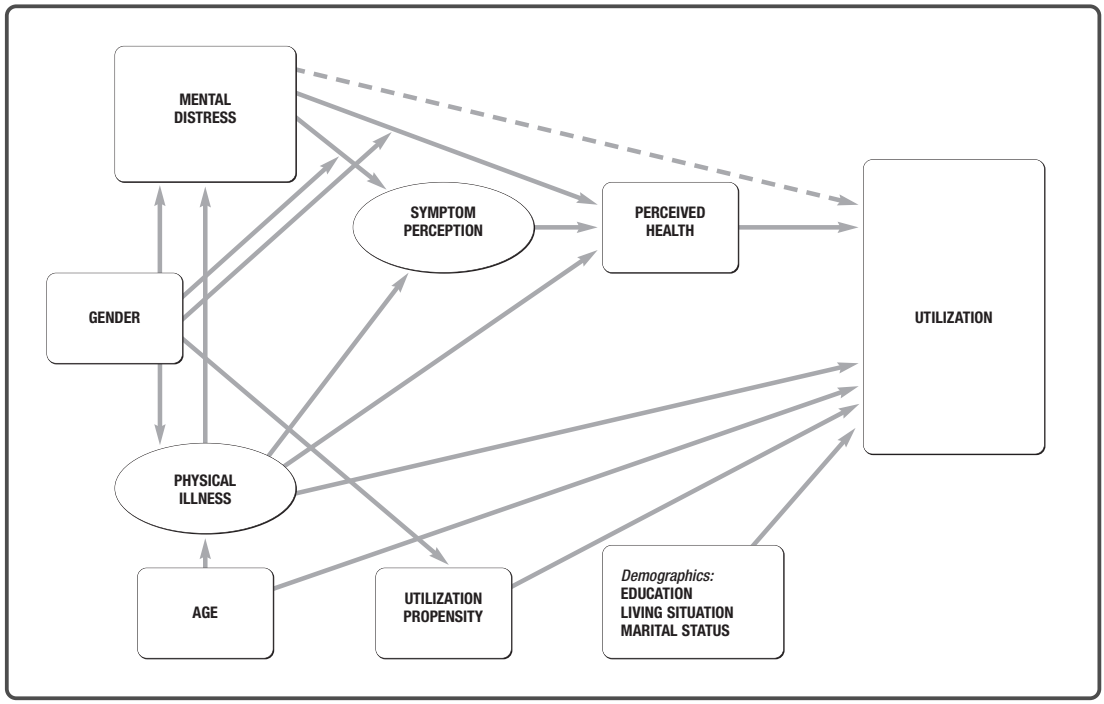

Figure 9-1. **Conceptual model to predict health care utilization**

influence health care utilization, we assume that age is the major factor, related to utilization both directly and indirectly through physical illness.

In this paper, we will first test the gender related differences as to average levels of mental distress as well as utilization propensity. After that we will test the proposed model and gender related differences in that model as described above, that relates mental distress, physical illness and utilization propensity (among other factors) with utilization.

Method

Sample

For this study, data were used from a community-based sample of adults (from 15 to 90 years of age), from a population of enrolees of a sickness fund working in the western part of the Netherlands, who had responded to a mailed health survey (N=9428). These data were originally collected to predict health care utilization and calculate risk adjusted capitation payments for Dutch sickness funds (*Lamers, 1999*). The design of the procedure for conducting the survey as to sending reminders in case of (initial) nonresponse was guided by Dilman's (1978) recommendations. The first mailing of the survey took place in February 1993. In this sample, individuals who had been hospitalised during a period before the survey were deliberately overrepresented. We will therefore use a weighted sample to correct this bias when testing differences between means.
From the original sample, cases were rejected if they were not enrolled during the complete prospective observation period ending in 1994, thus reducing the number of observations that could be used for analytical purposes to 8698. Main reasons for disenrollment were: death, moving to a different region, job or income change.
The net response rate to the original survey was 70.4 %. An analysis of the nonresponse showed that respondents and non-respondents differed slightly in their medical consumption. This nonresponse bias will result in a small over-estimation of utilization of prescribed drugs (*Lamers, 1997*).

The distribution of health status and health care utilization within the sample was heavily skewed (in the direction of better health and less utilization), which will obstruct the intended analyses to test to proposed structural equation model. We therefore constructed a second analytical sample by post-stratifying the original sample, using physical illness (see below) as stratifier and by resampling within each stratum in order to approach a normal distribution. The four levels of physical illness defined the strata, which had disparate numbers of observations, with the highest number in the lowest illness level and the lowest number in the highest illness level, as expected. A normal distribution was approached by matching the numbers of observation in both extreme levels of illness, as well as in both middle levels. Resampling was only done within both strata with the highest number of observations, in both other strata all original observations were maintained. This resulted in a sample size of N=3872. Resampling was done using the sampling procedure available in the SPSS statistical analysis program.

Data

As part of the survey, chronic conditions (24 types) and depressive complaints were assessed by self-report, using the same checklist as listed in the periodical General Health Survey of the Central Office of Statistics in the Netherlands (*StatisticsNetherlands, 1996*).
In order to measure *physical illness* several variables were constructed.
A somatic morbidity index was constructed using a weighted count of the number of chronic conditions. The procedures that were followed to construct this index are described in more detail in chapter 7. We reduced the original score to four somatic morbidity levels: 1) no or very low morbidity, 2) moderate, 3) high, or 4) very high morbidity, which correspond to some extent with the number of chronic medical conditions. This somatic morbidity classification was used as a stratifier in the resample process as described before.
In addition, two measures of disability, based on indicators developed by the O.E.C.D. (*McWhinnie, 1981*), were used: ADL-restrictions and mobility-restrictions. The reliability (Cronbach's α) of these measures was 0.89 and 0.85, respectively.

Mental distress was measured by self-reported depressive complaints. These were coded as a binary variable. This indicator was chosen as measure of mental (or psychological) distress, because it appeared to have the highest construct validity when studying the association between psychological distress and health care utilization (*Koopmans & Lamers, 2005*). It had the lowest factor loading on a somatic morbidity factor (0.23 vs. 0.45 and 0.33 for negative affect and nervousness respectively) and an association with subjective health on the same level as nervousness (path coefficients of 0.10 and 0.11

respectively) and relatively stronger than negative affect (path coefficient 0.06).
The sociodemographic variables that were included in the analyses were of course *gender*, but also age, educational level, marital status and living situation. These variables were also part of the above-mentioned survey.

To measure *symptom perception* seven subscales from the so-called VOEG-scale were used with exclusion of the 3-item nervousness-subscale. The VOEG scale was originally part of a larger scale designed to measure work related stress and subjective health (*Dirken, 1969; Van Sonsbeek, 1990*). Its reliability appeared to be satisfactory. Subscales used were: (complaints about) chest, stomach, nose, coughing, mobility, fatigue, and headache.
Perceived health was assessed as part of the survey by asking a single question ("How is your health in general") with five answer categories, ranging from 'very good' to 'poor'.
Utilization propensity was measured by a Likert-scale that combined five items asking intended illness behaviour (physician consultation) in case of specified health complaints. The reliability (Cronbach's α) of this measure was 0.67.

Health care utilization was measured prospectively, using data extracted from a claims database held by the sickness fund. These claims data could be matched with the health survey data. The claims database covers all types of health services, except general practitioner (GP) consultations and services from specialty mental health care providers. Because in the Netherlands GPs receive a uniform annual fee for each of the patients on their list, services delivered by GPs are not registered. Specialty mental health care is covered by special public funds and is therefore not registered by sickness funds. From these claims data that were available we focussed on utilization in the full year (January-December 1994) after the survey. Utilization is expressed in monetary terms (costs). As the distribution of this main dependent variable appeared to be skewed (even after resampling) a log-transformation was applied.

Analyses

Expected differences in mean levels of morbidity and utilization propensity were tested with t-tests, using the original (weighted) sample from which cases were rejected if they were not enrolled during the complete observation period ending in 1994. The selected and rejected subsamples differed significantly on most demographic characteristics, but not on gender nor on somatic morbidity. Relatively more subjects with depressive complaints were excluded from this analytical sample.

The proposed model, as depicted in figure 9-1, was tested using structural equation modelling (SEM) (*Bollen, 1989*) as implemented in the EQS software program (*Bentler, 1995*). With SEM, it is possible to decompose the total variance of the dependent variable in components that are related directly or indirectly to independent variables. An independent variable can have a direct effect on the dependent variable (depicted as a direct path or link in the model) or one or more indirect effects (depicted as a path consisting of a chain of links between independent, intermediate and dependent variables). Standardized path coefficients (standardized partial regression coefficients) represent the strength of each link. Variables used in SEM can be observed or latent. Allowing latent variables makes the difference between path analysis and SEM. Latent variables are not measured directly but are assumed to express themselves in observed variables. These relations should be specified in the overall model by linking each latent variable to several specific observed variables. The specifications of the latent variables are to be considered as the measurement part of the model, which is tested separately before the path coefficients are estimated.
We assumed gender related differences in several path coefficients, not in the measurement model. We therefore applied multi-group analyses using gender as the grouping-variable. The general model, tested across and within each gender, is shown in figure 9-2. We follow the convention to depict latent variables as ovals and observed variables as rectangular boxes.

It is mainly a path model that includes two measurement components for physical illness and symptom perception, respectively. Physical illness is measured by the observed variables ADL restrictions (v11), Physical restrictions (v28) and weighted somatic morbidity (v38). Symptom perception is measured by the observed VOEG subscales stomach complaints (v3), chest complaints (v4), mobility complaints (v6), fatigue (v7), nose complaints (v8), headache (v9), and coughing (v10). Within this general framework different specific models were tested and compared across gender, varying the constraints that were imposed. As a reference, a model was fitted that had constraints on all relations in the model, thus assuming no gender related differences. In the main hypothetical model relations were constraint

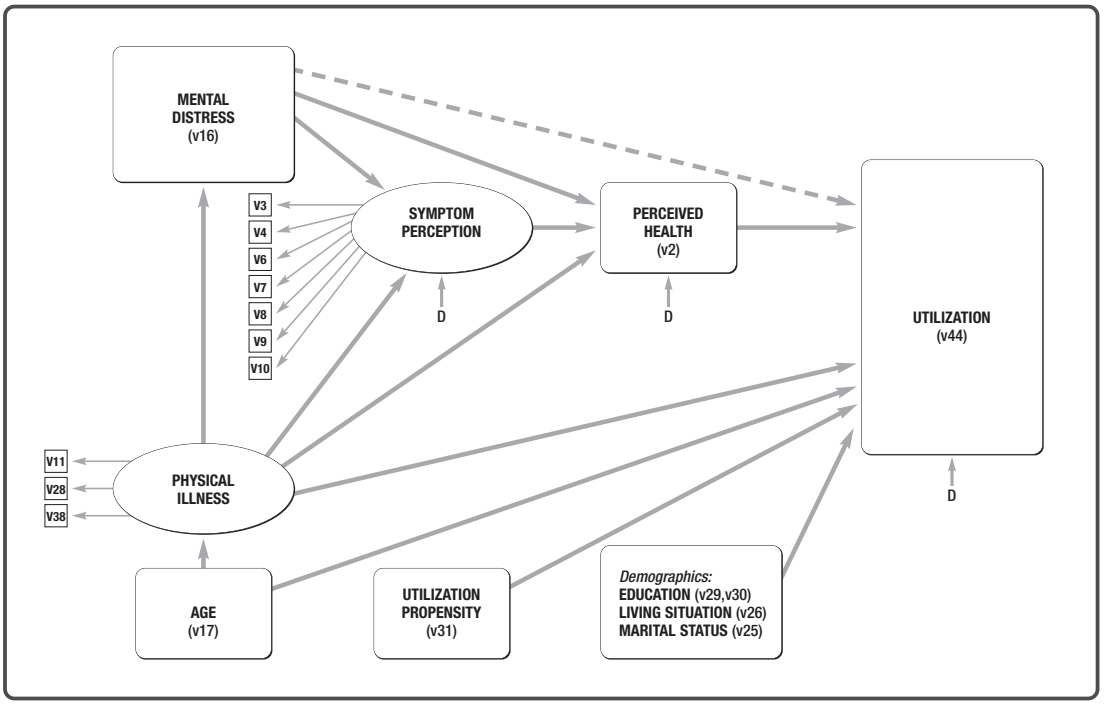

Figure 9-2. **Hypothetical path and measurement model to predict health care utilization**

that were not directly gender related, leaving the expected gender dependent relations unconstraint, so they could vary across gender.

The hypothetical model will give a better fit than the reference model, but if the difference between both models is not significant, the reference model will be preferred and thus the hypothetical model will be rejected. Unfortunately there is not just one goodness of fit statistic that is acceptable for all purposes (*Boomsma, 2000; Hoyle & Panter, 1995*). It is common practice to present several goodness of fit statistics that can be used to evaluate the tested model. We will present the following statistics:

- Chi-square: small values with $p > .05$ refer to good fit;
- Comparative Fit Index (CFI): values > .90 represent good fit;
- Root Mean Square Error of Approximation (RMSEA): values < .05 represent good fit.

Results

Sample characteristics and gender differences

From the entire sample (N=9428) 730 cases were rejected, as they were not enrolled during the complete observation period ending in 1994, leaving 8698 cases for analytical purposes. Characteristics of this sample and how these differ across gender are summarized in table 9-1.

Women have a higher level of somatic morbidity, tend to have more physical illnesses apart from heart disease, appear to have more depressive complaints, and use more psychoactive medications. They also have a higher utilization propensity.

As to the utilization of health care services there is also a tendency of higher utilization in relation to female gender. Both as to type of health care service (use of prescription drugs, consultations of medical specialists or hospital admissions) as well as to costs of service use, women tend to use more (table 9-2).

SEM results

In order to test the structural equation model 3872 cases were selected from the entire sample in the resampling process, as described in the Method section. In addition 286 cases were rejected, as they were not enrolled during the complete observation period ending in 1994, leaving 3586 observations for analysis. As expected this second analytical sample differed from the subsample that was

Table 9-1. Sample characteristics in relation to gender

	complete sample (N=8698)		Male (N=3747)	Female (N=4951)	analysis
	N	*%*	*%*	*%*	*p-value*
Age					0.00
15-24 yr	761	8.8	9.8	7.9	
25-34 yr	2,364	27.2	29.6	25.4	
35-44 yr	1,644	18.9	18.9	18.9	
45-54 yr	1,381	15.9	14.7	16.8	
55-64 yr	1,039	11.9	12.4	11.6	
65-74 yr	882	10.1	9.6	10.6	
75 yr or older	626	7.2	5.0	8.8	
Marital status					0.00
Married/living with partner	5,998	69.9	73.5	67.2	
Never married	1,621	18.9	22.2	16.4	
Divorced/separated	295	3.4	2.4	4.2	
Widow	670	7.8	1.9	12.3	
Living situation					0.00
Alone	1,308	15.5	10.6	19.3	
With one person	2,937	34.9	36.2	33.9	
With two or more persons	4,173	49.6	53.2	46.8	
Educational level					0.00
Low	5,121	60.8	67.6	55.6	
Middle	2,392	28.4	25.3	30.7	
High	914	10.8	7.1	13.7	
Somatic morbidity					0.00
low	5,469	62.9	68.5	58.7	
moderate	1,982	22.8	20.8	24.3	
high	770	8.9	7.0	10.2	
very high	472	5.4	3.6	6.8	
Specific conditions					
Osteoarthritis	588	6.8	5.3	7.9	0.00
Back problems	782	9.0	8.6	9.3	n.s.
Diabetes	155	1.8	1.3	2.1	0.01
Heart disease (-infarct)	159	1.8	2.7	1.2	0.00
Hypertension	636	7.3	4.8	9.2	0.00
Lung disease	406	4.7	4.5	4.8	n.s.
Migraine	637	7.3	3.2	10.5	0.00
Psychological distress					
Depressive complaints (last 5 years)	1,064	12.5	9.7	14.6	0.00
Depressive complaints (now treated)	470	5.5	3.9	6.7	0.00
Current use of psychoactive medications					
Anxiolytics	506	5.8	3.5	7.6	0.00
Anti-depressants	120	1.4	0.8	1.8	0.00
Hypnotics & sedatives	384	4.4	2.5	5.8	0.00
	Mean	*SD*	*Mean*	*Mean*	
Psychological distress					
Negative Affect (Affect Balance Scale) - range: 5-20	6.57	2.18	6.19	6.87	0.00
Nervousness Scale - range: 0-3	0.61	0.98	0.52	0.68	0.00
Measures of health and disability					
Subjective health (worse) - range: 1-5	2.14	0.81	2.10	2.17	n.s.
ADL-restrictions - range: 3-12	3.09	0.58	3.06	3.11	0.00
Mobility restrictions - range: 3-12	3.59	1.62	3.37	3.76	0.00
Symptom perception					
Mobility complaints - range: 0-4	0.96	1.07	0.84	1.05	0.00
Chest complaints - range: 0-4	0.47	0.91	0.39	0.53	0.00
Stomach complaints - range: 0-3	0.38	0.86	0.35	0.40	0.01
Fatigue complaints - range: 0-4	0.92	1.27	0.68	1.10	0.00
Other					
Utilization propensity - range: 5-25	14.94	3.75	14.63	15.18	0.00

Table 9-2. **Health care utilization in relation to gender**

	complete sample (N=8698)		Male (N=3747)	Female (N=4951)	analysis
Health care utilization in '94 (based on claims data)	N	%	%	%	*p-value*
any health care use	7,648	87.9	85.3	89.9	0.00
use of prescription drugs	6,291	72.3	58.3	83.0	0.00
consultations of paramedical services	1,732	19.9	16.5	22.5	0.00
consultations of medical specialists	3,432	39.5	33.5	43.9	0.00
hospital admissions	617	7.1	6.8	7.4	n.s.
Costs of health care in '94 (based on claims data)	M	s.d.	M	M	
log-costs (M=mean)	5.79	1.62	5.62	5.92	0.00
log-costs (M=median)	5.66		5.45	5.82	
absolute costs (M=mean)	1,389	5,009	1,246	1,496	0.02
absolute costs (M=median)	232		172	283	

Note: costs are expressed in Dutch guilders (Dfl; exchange rate: 1 euro = approx. Dfl 2.20)

not selected. In general the analytical sample is older and sicker than this subsample.

As a first step in testing the structural equation model the measurement model was tested. As stated before, we assumed two associated latent variables (symptom perception and physical illness) that were measured with seven and three observed variables, respectively. The fit of this model was not satisfactory (CFI=.83; RMSEA=.097; χ^2=1272.25; df=34; p<.000). It appeared that were three core-variables (chest complaints, mobility complaints, and fatigue), related to the latent variable 'symptom perception', and that the observed variable 'weighted somatic morbidity' was not fitting very well with the latent variable 'physical illness'. Omitting that variable from the measurement model would imply that physical illness would be measured by only two variables, which does not make much sense (it is assumed that each latent variable should be measured by at least three observed variables). We decided, therefore, to reduce the measurement model to just one latent variable (symptom perception) with three observed core variables.
As this is a just identified (saturated) model, the fit of this model has not to be estimated.

The results of testing the measurement model made it necessary to adapt the original hypothetical path model. This adapted model is depicted in figure 9-3.

Compared to the earlier version there is just one latent variable (symptom perception) that is measured by three observed variables. Instead of the latent variable physical illness the model now shows two observed variables: somatic morbidity and physical restrictions. These are related to utilization along the same pathways as physical illness. Mental distress, somatic morbidity, physical restrictions and age are all considered exogenous variables that may covary. When covariation is expected, variables are linked using a double-headed arrow.
The reference path model that was tested imposed constraints on all path coefficients and factor loadings across gender, making these coefficients (loadings) gender invariant. The fit of this model was satisfactory (CFI=.94; RMSEA =.047; χ^2=583.46; df=65; p<.000). On hypothetical grounds three constraints were released: the path from mental distress to symptom perception, the path from mental distress to perceived health and the path from mental distress to utilization, thus allowing these path coefficients to be different across gender. The fit of this model as such was satisfactory (CFI=.94; RMSEA =.048; χ^2=572.89; df=61; p<.000), but the difference with the reference model was only marginal (χ^2=10.57; df=4; p<.05; scaled χ^2=7.56; df=4; p>.05). Therefore this model, representing the hypothesised gender related differences in strength of the relations, was rejected.
The Lagrange Multiplier tests were suggesting that releasing some other constraints would lead to a better

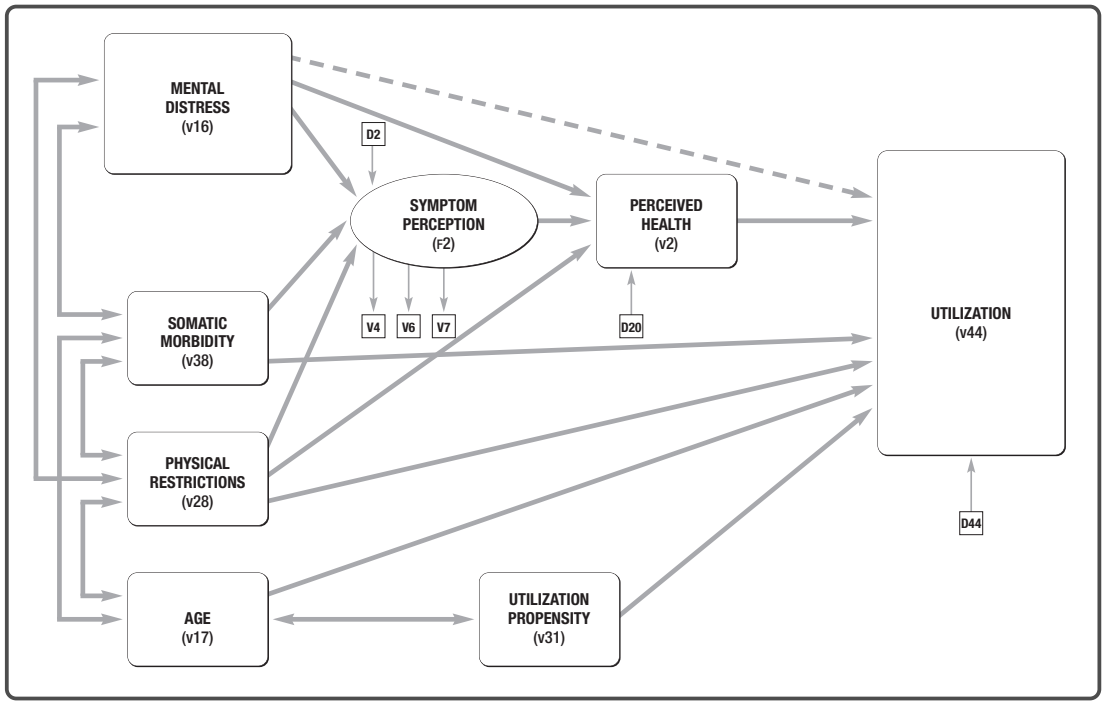

Figure 9-3. **Hypothetical model after adaptation of measurement model**

fit. The three most important constraints to be released were: path from physical restrictions to perceived health, the path from age to utilization, and the covariance between physical restrictions and somatic morbidity. After releasing these constraints the fit of the model became better (CFI=.945; RMSEA =.046; χ^2=525.66; df=61; p<.000). The difference between both models was clearly significant (χ^2=57.8; df=4; p<.000).
The final model, with standardized path coefficients and factor loadings, is shown in figure 9-4. In this model perceived health, somatic morbidity and physical restrictions have a direct effect on utilization of a more or less comparable size. Mental distress and utilization propensity do not have direct effects on utilization. Age has a gender related effect: it is stronger related to utilization among men. Mental distress is indirectly related to utilization via symptom perception (that is strongly linked to perceived health), and also via perceived health, but with a negative sign. That implies that mental distress is related to (worse) perceived health as it is associated with higher symptom perception, but this relation is partly weakened by the negative relation between mental distress and perceived health. The net effect of mental distress, both pathways taken together, is 'positive': mental distress is related to worse perceived health.
Symptom perception, which is strongly related to perceived health, is mainly influenced by somatic morbidity, but also by physical restrictions and (as already mentioned) by mental distress.

In order to test the robustness of the reported findings we applied the same SEM analyses using a correlation matrix instead of variance-covariance matrix as input data. This correlation matrix was calculated based on the complete sample of cases with full enrollment in 1994 (N=8698), the variance-covariance matrix used only cases from the second analytical sample (N=3586). The last SEM analyses yielded nearly the same model parameters as the first series, as reported, with only marginal differences.

Discussion

We found higher levels of utilization of health care among women compared to men and also more somatic morbidity and mental distress, that might explain – at least partly – these gender related differences in utilization.
The hypothetical model intended to predict health care

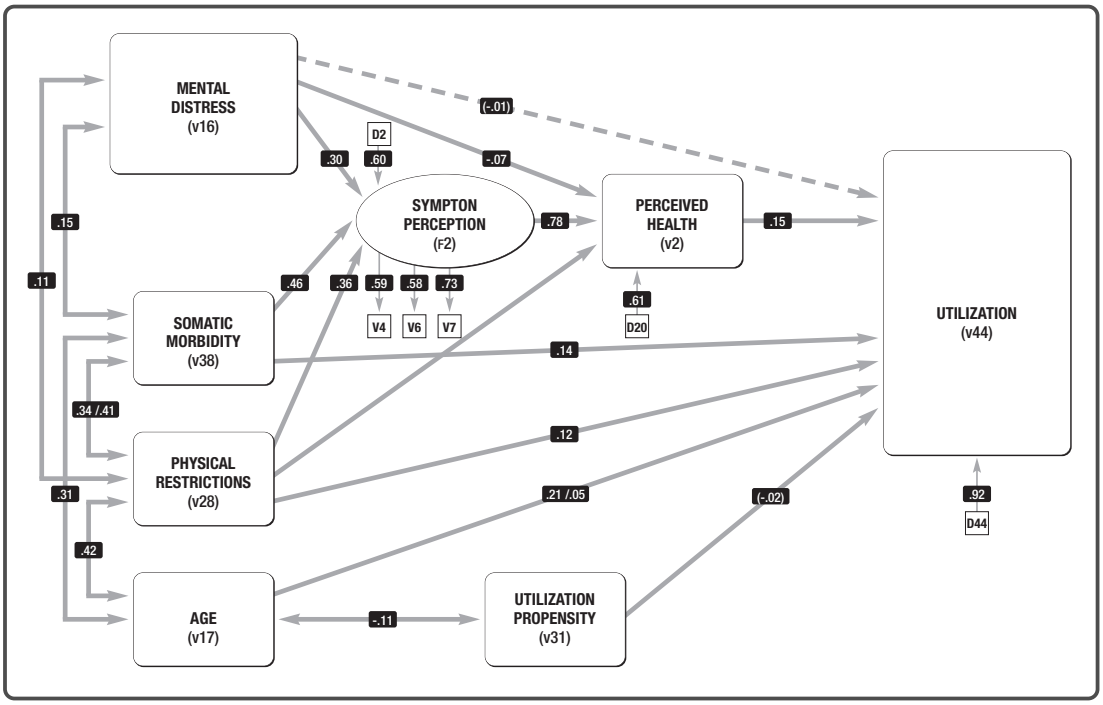

Figure 9-4. **Final model with estimated path coefficients**

utilization based on (among others) mental distress, somatic and other illness variables, and utilization propensity, was expected to yield partially different patterns of model parameters of women compared to men.

After some adaptations in the measurement model (and consequently in the path model), the model as such had a good fit with the data. Mental distress appeared to be related to utilization, mainly via symptom perception. Other presumed predictors (somatic morbidity, physical restrictions, age and perceived health) were also related to utilization, with the exception of utilization propensity. The expected gender related differentiation in model parameters (path coefficients) could however not be demonstrated. That implies that we did not find differences across gender as to the relation mental distress and symptom perception, neither in the relation mental distress and perceived health, nor in the relation mental distress and utilization. However, some other path coefficients appeared to be gender related. Age predicted utilization more strongly among men than among women. Physical restrictions were more strongly related to perceived health among men. This means that mental distress is related to utilization in a way that is not gender specific. However, levels of mental distress (as well as physical illness) are higher among women, thus leading to a higher utilization of somatic health services.

The gender related differences in health and health care utilization that we found are comparable with findings from other studies. The role of mental distress, however, was not completely as expected: it was mainly indirectly related to perceived health and gender did not moderate these relations.

We found mental distress to be positively related to symptom perception, but negatively to perceived health, while others (*Anson, Paran, Neumann et al., 1993; Benyamini, Leventhal, & Leventhal, 2000*) found a positive and direct relation between mental distress and perceived health.

An important difference between these studies and our study was, however, that a possible pathway via symptom perception was lacking in the previous studies. It seems likely that if such a pathway should have been included, the results would have been more comparable: mental distress and (worse) perceived health are positively correlated in our sample. In a study focussed on the pathway from mental distress to symptom perception (symptom reporting) associations comparable

with our findings were found (*Gijsbers Van Wijk, Huisman, & Kolk, 1999*). Symptom perception seems to be an important mediator between mental distress and perceived health. Therefore, differences between studies in the mental distress-perceived health relation can be considered mainly the result of leaving out the mediating variable of symptom perception in other studies.

We expected a *modifying effect of gender* on the relation mental distress and perceived health, as reported by the study of Benyamini et al. (2000).
As this relation seems to be altered by adding symptom perception as mediator, we may at least expect a modifying effect of gender on the relation mental distress and symptom perception. This was however also not the case. The reasons for these contrasting findings are not clear and can only be speculated about.

A point might be, that others studying this relation, made a differentiation in symptom types, as we used just one aggregated (latent) symptom perception variable. Although Watson et al. (1991)- summarizing a series of studies - did not find any relation between symptom type and negative affectivity, in a more recent study (*Van Diest, De Peuter, Eertmans, Bogaerts, Victoir, & Van den Bergh, 2005*) different results were reported. In this study a stronger association was found between negative affectivity (NA) and symptom reporting among women, but also a gender related differentiation as to symptom type causing that association. Among women more serious (life threatening) symptom were associated with NA, among men common, daily symptoms (stuffed nose, sore throat, ringing ears) were associated with NA. Men seem to overrate the severity of such conditions (*Macintyre, 1993*). In our final measurement model indicators of symptom perception related to common daily symptoms (such as coughing, nose complaints and headache) were rejected and only more serious symptoms were maintained. Applying the findings of Van Diest (2005), would make us expect a stronger relation between mental distress and symptom perception (as we measured it) among women, but - as mentioned - that was not found. So, while the specification of our symptom perception measure was favouring a gender related difference between mental distress and symptom perception, it was nevertheless not found. There is however an important difference with our study, that might explain these contrasting results: Van Diest et al. used a sample of university students, which is very homogeneous as to age and education, while our sample was from sickness fund enrollees, aged 16 to 90 years of age. Besides demographic differences it can be expected that our sample is much more heterogeneous as to physical illness, which is a major factor in symptom perception.

There was, on average, no difference in perceived health between men and women. At first sight this seems to be an odd finding, as it is contrary to the findings of most studies (but certainly not all, as we already mentioned in the Introduction) that morbidity among women is higher. Moreover somatic morbidity and mental distress, both related to perceived health, are higher among women. Therefore, this finding seems to contradict both the empirical literature as well as the validity of our model.
To start with the last mentioned problem: one of the relations that appeared to be gender related (unexpectedly) was the path from physical restrictions to perceived health. Men do not have, on average, more physical restrictions, but in case they have it, it influences their perceived health more strongly than is the case among women. Whether this mechanism can explain the lack of difference, remains an open question.
In addition, our findings on perceived health are more or less in concordance with those reported by Lahelma et al (*Lahelma, Martikainen, Rahkonen et al., 1999*): although women appeared to have worse somatic health, as measured on several indicators, perceived health among men, especially aged 50 years or older, was worse compared to women.

We found some gender related differences that were not expected. Most striking is the relation between age and utilization, which is much stronger for men than for women. We presume that age is a better predictor of future morbidity that needs medical attention among men. Differences in morbidity patterns (showing that among men serious and life threatening diseases are more prevalent), already visible in the survey data (see table 9-2), will probably persist in the near future.
Moreover, perceived health is among men in our study more related to physical restrictions than among women. This can be seen as a confirmation of findings from the Benyamini study (2000), that showed that perceived health was related to serious (life threatening) illnesses among men, and to both serious and other (disruptive, but not life threatening) illnesses among women. However, this interpretation is not self evident and needs to be tested, as physical restrictions are not exclusively related to life threatening illnesses.

Mental distress was measured by a single question about having experienced a condition of nervous tension, depression or serious nervousness in the last five years. It seems likely that this question not only taps on depressive complaints, but also on feelings of stress and anxiety. Although depression and anxiety are interrelated it might have been useful to use separate measures for each aspect of mental distress, especially in case the relation with symptom perception is scrutinized. The anxiety component is probably more related to symptom perception, especially in the cardiovascular domain, which will trigger help seeking behaviour (*Van Diest, De Peuter, Eertmans et al., 2005*). Findings from other studies suggest that anxiety is more related to high utilization than depression (*Ford, Trestman, Steinberg, Tennen, & Allen, 2004; Ford,Trestman, Tennen, & Allen, 2005*).

In our study health care utilization did not include primary care and specialty mental health care. This makes our study incomparable with studies that focus on primary care, which report a higher level of primary care consultations among women in relation to psychological distress (*Corney, 1990; Korten, Jacomb, Jiao, Christensen, Jorm, Henderson et al., 1998*). A stronger relation between symptom perception (or perceived health) and utilization, as was reported by Gijsbers Van Wijk et al. (1999), might also be caused by the fact that in this study utilization was measured by counting GP consultations.
In addition, our finding that utilization propensity was not at all related to utilization, could be caused by the fact the primary care was not included. As primary care consultations are to a great extent patient initiated and secondary care (such as consultations of medical specialists) can only be accessed after referral by a GP (a strict rule for sickness fund patients), the exclusion of primary care in our utilization parameter seems to be a plausible explanation of this complete unrelatedness. This interpretation is supported by findings from a study among a Dutch population (*Van der Meer & Mackenbach, 1998*) in which utilization propensity appeared to be predictive of GP consultations.

Our study has several limitations, partly already discussed in the previous sections. First, our measure of symptom perception might have been biased towards symptoms of more serious illnesses, as symptoms of more common daily symptoms were excluded. As these symptoms did not fit in one global measure of symptom perception, a differentiation in symptom perception seems to be more appropriate.
Second, we used a measure of mental distress, which may have been too limited, as it does not allow making a distinction between anxiety and depression. These aspects of mental distress may have different relations with symptom perception and gender, which remain obscured when anxiety and depression are taken together in one measure. Third, not including primary care in our measure of health care utilization may be considered a limitation. It is clear that it limits the possibility to compare our findings with studies that focus on primary care. On the other side, our focus on service use beyond primary care (and excluding specialty mental health care) can be considered a more appropriate definition of somatic health care, when studying excess health care use in relation to mental distress.

We can conclude that we were not able to demonstrate gender related differences in possible mechanisms through which mental distress affects symptom perception and perceived health. Such differences do not seem to exist if broadly defined categories of mental distress and symptom perception are used. Applying more specific and differentiated measures of mental distress and symptom perception, fruitful among young and healthy adults (*Van Diest, De Peuter, Eertmans et al., 2005*), might reveal gender related differences in mechanisms that relate mental distress with symptom perception.
Our study corroborates, however, findings from other studies that report higher levels of somatic health care utilization among women and relate this to higher levels of mental distress (in combination with elevated levels of other morbidity measures). This implies that women not only consult their GP more often (as demonstrated by others), but also have excess use in secondary somatic health care and that this can be related (partly) to mental distress. ■

Chapter 10

General discussion, conclusions and recommendations

Main findings

From our first literature review of population based studies, we concluded that mental distress is related to more general health care use. As we included only prospective studies that corrected for possible confounding factors, especially somatic morbidity, this association can be considered well founded. We did not, however, find a consistent pattern of raised utilization levels of specific types of health care, for instance, prescription drugs or paramedic services. This means that mental distress is globally related to health care utilization, but not to the use of specific types of health care. The expression of that global relation in specific care can vary and is probably dependent on local circumstances and arrangements of the health care system.
Our review of hospital based studies was leading to comparable conclusions: on the most general level, mental distress among medical inpatients was associated with more health service use, but this was not a consistent finding as to a more specific utilization parameter, namely length of hospital stay: in some studies mental distress was related to prolonged hospital stay, but other studies did not find such an association.

To disentangle the effects of mental distress and somatic morbidity, it is necessary to use indicators of these concepts that have a tried and tested construct validity. In the health survey that we used, three indicators of mental distress were included: nervousness, depressive complaints and negative affect. When we compared these indicators on their power to predict subjective health and on the degree of contamination by somatic morbidity, it appeared that depressive complaints had the lowest degree of contamination, while its association with subjective health was reasonable, but not the highest. This indicator should therefore be preferred for use in studies of determinants of health care utilization, especially if correction for somatic morbidity is not possible.

Somatic morbidity can be a risk factor for mental distress. We studied the association between chronic medical conditions, on the one hand, and mental distress, fatigue, as well as the use of psychoactive medication, on the other. Main question was whether type of medical condition would differentiate on the outcome measures. We could not demonstrate a clear association between type of chronic condition and psychological distress. Only fatigue differed between some types of conditions: heart disease was related to the highest levels of fatigue, hypertension to the lowest. Contrary to type of condition, the number of chronic medical conditions was convincingly related to outcome: we found strong, linear associations between the number of chronic conditions and negative affect, nervousness and, most of all, fatigue. The results of this study further show that the associations between somatic morbidity and mental distress are not restricted to subjective reports of negative feelings or mental distress, but also pertain to the use of psychoactive medication, including the use of anti-depressants, as assessed from sources independent from self-report.

To get an impression of the effect size of the (presumed) association of mental distress and health care utilization, we compared the impact of mental distress with the impact of several chronic medical conditions on recent utilization of health services and other illness related behaviour, as was done before in other studies, however without utilization as outcome measure (*Wells & Sherbourne, 1999*) or without including mental distress (*Verbrugge & Patrick, 1995*). Mental distress was related more than any included medical condition to fatigue and worse subjective health (which was among the mental distressed on the same level as among those with heart disease). The association of depressive complaints with sickness-absence (disability-days) was comparable with that of back problems. Those having depressive complaints had visited their general practitioner (GP) more often than the others. They also contacted a medical specialist (excluding psychiatrists) more often than other patient categories, apart from patients with heart disease.
The combination of depressive complaints and chronic medical conditions was not associated with increased utilization in the same period (before or just after the baseline survey), nor to lower functioning.

In the last mentioned study, the effect of mental distress was compared with that of medical conditions, while correcting for the possible confounding effect of these medical conditions. As mental distress is often comorbid to medical conditions, the combined effect becomes of interest. We studied therefore the modifying effect of somatic morbidity on the relation of mental distress with utilization in a 12 months period starting about eight months after the survey. Main question was whether a higher level of somatic morbidity would amplify or

attenuate the impact of mental distress on utilization. The last mentioned possibility appeared to be the case. Consequently the impact of mental distress on utilization is relatively higher among those subjects that show less somatic morbidity.

This conclusion was the main rationale to take a closer look at factors leading to utilization among subjects that show less somatic morbidity, focusing on the possible impact of age and gender.
Age and gender appeared not to modify the general associations of depressive complaints with health care use in general. Depressive complaints were especially predictive of the use of prescription drugs and the use of paramedic services and partly of the use of medical specialists and hospital admissions. Age and gender were mainly related to the use of specific services as independent predictors, not as modifiers. Among this selection of relatively healthy subjects young age and female gender are both related to more utilization.

For a better understanding of the processes that may underlie the associations between mental distress, health care utilization and other variables that may act as confounders, mediators or moderators, we developed a model intended to predict health care utilization. In this general model, mental distress can stimulate somatic health care utilization via several pathways: via symptoms perception, via perceived health, and directly (although we considered the last pathway not very likely). From the literature we predicted differences in the importance (weights) of these pathways related to gender. It was expected that, for women, the impact of mental distress on symptom perception, as well on perceived health, is bigger than that for men. Together with a higher prevalence of mental distress among women, this could explain (at least partly) the higher use of health care with women, which is found in most studies.
These hypothesized differences were, however, not supported by the collected data.
The general model was (after some adaptations) predictive of health care utilization, and not gender related as predicted, but on some other pathways not related to mental distress: age and physical restrictions predict utilization more strongly among men, somatic morbidity is more strongly associated with physical restrictions among women.

General limitations

Literature reviews

In both literature reviews we applied some elementary inclusion criteria (i.e. prospective study design and appropriate correction for confounders, mainly somatic morbidity), in order to select studies that could be considered scientifically sound.
Nevertheless, a major obstacle in reviewing the literature of empirical studies was related to research methods applied in these studies, as there is a complete lack of standard methodology.
Services utilization is mostly measured by counting contacts with the health care system (number of consultations, number of hospital days). Comprehensive measures (reflecting all resources that were used) are not available, although costs might be such a measure, if clarity of the components used to calculate total costs would exist. In practice, in studies that use cost measures, it is not clear how these costs were calculated. In such cases costs are mostly based on negotiated tariffs, which do not necessarily reflect the actual resources used. For example, data on the costs of consultations of medical specialist will not reflect the number of visits, if these cost figures are based on tariffs for different 'entrance tickets' to outpatient care, that vary in time periods (but not in number of visits) for which these tickets are valid, as is the case for Dutch sickness fund patients. Moreover, the assessment of resource use is often limited to just one subsystem of the health care system, such as a general hospital, whereas the utilization of different subsystems can be assumed interdependent. Shifts in resource use stay invisible when just one subsystem is monitored.

Measures of mental distress differ widely. Just a few measures (HADS, Hamilton and CES-D) were applied in more than one study. Moreover, the construct validity of several instruments, especially among those designed to assess depression, can be questioned, as they are contaminated with elements of physical morbidity. Although these weaknesses were not a real threat to the findings of the review, they become an obstacle in case more precise estimates or comparisons are needed.

Measures of severity of medical illness, used to correct for possible confounding effects of somatic morbidity, were even more dissimilar. Just a few of these measures (all based on DRG-classifications) were designed to predict resource use. The validity of the other instruments for that purpose was mostly unknown.

Furthermore, some of these measures, mainly self-assessed health or measures based on illness behaviour, were presumably contaminated with mental distress. For future inpatient studies, measures based on DRG-classifications are to be recommended. For population-based studies, well-validated measures are not readily available, but might be based on risk adjustment systems that were developed (and are still under development) to refine capitation payment systems for health insurance plans (*Hughes, Averill, Eisenhandler, Goldfield, Muldoon, Neff et al., 2004; Lamers, 1999; Lamers & Van Vliet, 2004*). Especially when such a system is based on medical needs (separated from risk adjusters that compensate for inefficiencies and other factors that are beyond the control of a health plan), it can be an appropriate tool to correct for illness severity in population studies (cf. (*Schokkaert & Van de Voorde, 2004*)).

Empirical studies

Our empirical studies were based on data collected in 1993-94, more than a decade ago. In such a relatively long period, several developments may have taken place that could have had an impact on our findings. A new generation of psychoactive medications has become available, from which especially antidepressant medication might have had an impact. There has been a shift from the prescription of tricyclic antidepressants (TCAs) to mainly selective serotonin reuptake inhibitors (SSRIs), and the prescription of anti-depressant medication has reached much higher rates (*Meijer, Heerdink, Leufkens, Herings, Egberts, & Nolen, 2004; Sambamoorthi, Olfson, Walkup, & Crystal, 2003; Sclar, Robinson, Skaer, & Galin, 1998*). In the Netherlands the number of users of antidepressants rose by 61% in the period from 1996 to 2001, while the volume (number of standard daily dosages) rose by 110% (*De Valk, 2003*). Most antidepressants were prescribed by GPs and the volume prescribed by GPs also rose in that period (from 70% to 78%).

Physicians seem to be more aware of signs of mental distress and recognize the importance of treatment (*Verhaak, Van de Lisdonk, Bor et al., 2000; Volkers, de Jong, de Bakker et al., 2005*). These developments are mainly seen within primary care services, in which supportive structures to assist physicians in the treatment of mental problems were developed in recent years (*Verhaak, Groenendijk, Zantinge et al., 2005*). In secondary outpatient care and hospital care, these developments are less strong and awareness of possible comorbid mental distress among medical patients has still to be propagated (*Huyse, Slaets, de Jonge et al., 2004*).

This could mean, that the associations we have found, have become weaker, as more mental distress is recognized and treated, thus preventing possible adverse effects of mental distress on somatic health outcomes and health care utilization. Although we cannot exclude that these developments have partly eroded our findings, we do not believe that they have washed away the associations we have found. The main reasons for these assumptions are twofold. Firstly, we focused on health care utilization beyond primary care, whereas the developments in treating mental distress mainly took place within primary care. Secondly, in the literature we reviewed (see chapters 2 and 3) there was not a time related trend in the findings of the reported studies. Although the more recent studies had a stronger design (making false positive findings less likely), a significant number of these recent studies still reported positive findings.

Whether the results of the more recent international studies are applicable in the Dutch situation, can of course be questioned, but the changes in awareness and treatment of depression are not typically Dutch (*Katon, Von Korff, Lin, Simon, Ludman, Russo et al., 2004; Neumeyer-Gromen, Lampert, Stark, & Kallischnigg, 2004*).

In addition to the previous point, the prediction of health care utilization is context dependent. Health care use is just partly based on individual need and propensity factors. The other part comes from how the system is organized, how the division between mental and general health care is made, how these subsystems are financed, how they refer to each other and how they communicate and cooperate with each other. These characteristics tend to evolve in time (the financing of the mental health care system changes almost yearly), but can also be locally different. This could mean that our findings are not only time dependent, but also dependent on local circumstances. In this respect the presence and quality of services that can support physicians – operating in primary care, secondary outpatient care or general hospitals - in treating patients with (comorbid) mental distress is of special importance and could make a difference. It a well known fact that such services, such as psychiatric consultation-liaison services within hospitals or outpatient clinics, are very differently organized and staffed (*Huyse, Herzog, Lobo, Malt, Opmeer, Stein et al., 2000*). It is unclear however, how much of a difference such services would make and what that would mean for the relations we have found. This implies that generalising our factual findings to a national level should be done with caution.

Despite these limitations, which are partly common to

all kind of studies that try to predict utilization, the mechanism and pathways that underlie the associations between mental distress and utilization can be considered more general and less time and system- dependent.

Conclusions

As previously stated, one general main finding was that mental distress is related to somatic health care utilization. This excess utilization of health care is not restricted to primary care services (as shown by other studies), but we also observed it in relation to the consultations of medical specialists, use of paramedic services and prescription drugs. We did not find a relation with hospital admissions or length of hospital stay.

A question that arises, is whether this can be considered as excess use, that could and should be avoided?
The additional use of somatic health care that can be related to mental distress can be considered excess use from a more descriptive, statistical point of view, meaning that in case of mental distress, the degree of use exceeds (on average) what can be expected given other clinical characteristics. The phrase 'excess use' contains, however, at least two connotations that go beyond a pure description. One connotation is that excess use implies avoidable use. The other one is that excess use refers to unfounded or unmotivated use, use that can be avoided and therefore should be avoided. The second implication clearly depends on the first one: if excess use is not avoidable it cannot be unmotivated. So the first question is: is excess use related to mental distress avoidable? To answer that question we have to go back to the pathways that relate mental distress with health care utilization.
Three main pathways can explain this relation.
Firstly, mental distress may lead to somatic morbidity and thus cause additional health care utilization.
Secondly, mental distress has an independent effect on health care utilization, apart from comorbid somatic morbidity or (as a third pathway) mental distress modifies the effect of physical symptoms and somatic morbidity on health care utilization.

As far as mental distress is effective following the first pathway, the effects of mental distress on utilization cannot be considered avoidable once somatic morbidity has arisen. If, for example, mental distress leads to unhealthy behaviour (smoking, drinking, overeating) resulting in a higher chance of contracting a disease, the additional utilization of health care that follows from that moment is not avoidable by actions of individual providers. The same reasoning applies when mental distress is reducing the effectiveness of the immune system thus raising the vulnerability to toxic stimuli. These consequences of mental distress can only be avoided by treating or preventing mental distress. In other words: this type of excess use can only be avoided (as far as technicalities allow) by measures initiated by other agencies than individual providers that are confronted with the consequences.
If mental distress has an independent effect on utilization, then theoretically this additional utilization is avoidable. Such is the case when patients present somatic symptoms while having an undiagnosed mental problem. A good example is patients with somatisation disorder (*Rost, Kashner, & Smith, 1994*). In practice, however, the possibility to avoid somatic health care utilization in these cases will very much depend on the skills of physicians and other health care personnel to recognize the signs and symptoms of mental distress. Screening might be a solution, which we will discuss later on. The availability of more appropriate treatment modalities is another factor that determines whether this inappropriate utilization can be avoided.

If mental distress moderates (i.e. enhances) the effect of physical symptoms and somatic morbidity on health care utilization, then this additional utilization can be considered avoidable too. However, it will be quite complicated to avoid such excess use in practice, as it concerns patients who will present primarily physical complaints or complaints that are ambiguous as to the underlying morbidity. This category therefore requires diagnostic and therapeutic skills that can only be organised through cooperation of different disciplines. It will require the development of multidisciplinary guidelines or protocols that are problem-oriented, not specialization-specific. In primary care progress has been made in treating patients with mental distress, especially depression, by developing such protocols (*Katon, Von Korff, Lin, & Simon, 2001; Katon, Von Korff, Lin, Simon, Ludman, Bush et al., 2003; Katon, Von Korff, Lin, Unutzer, Simon, Walker et al., 1997; Simon, 2002; Simon, Von Korff, & Lin, 2005; Simon, VonKorff, Rutter, & Wagner, 2000; Von Korff, Barlow, Cherkin, & Deyo, 1994; Von Korff, Katon, Bush, Lin, Simon, Saunders et al., 1998; Von Korff, Katon, Lin, Simon, Ludman, Oliver et al., 2005; Wells, 1999*). In secondary care these developments are going much slower. In some areas where these kinds of protocols were developed already, such as for lower back pain, the

results are positive (*Deyo & Weinstein, 2001*). Altogether this implies that to avoid the excess care utilization related to mental distress (as far as it is possible) requires considerable efforts and investments.

This brings us to the question, whether (psychological) interventions should be developed that aim to reduce excess utilization, because of a possible cost-offset effect. In earlier times, a possible cost-offset effect of psychological interventions in primary or general health care settings was often used as a seemingly valid reason for introducing such interventions (*Chiles, Lambert, & Hatch, 1999; Mumford & Schlesinger, 1987; Strain, 1989; Von Korff, Katon, Bush et al., 1998*). The same argument is often used to propagate treatment of alcohol or drug dependency (*Holder, 1987; Parthasarathy, Weisner, Hu, & Moore, 2001*). Although psychological interventions may have such an effect (which remains, however, an open question (*Coyne & Thompson, 2003*)), it cannot be considered the only valid reason for stimulating this type of intervention (*Sturm, 2001*). From a perspective of cost effectiveness, the question is not whether a psychological intervention will reduce costs in general health care, but should rather be whether the costs of introducing such an intervention can be justified by a better cost-effectiveness ratio. Such can be reached by lower total treatment costs or by better outcome (quality of life) of patients receiving such a treatment, or both. If there happens to be a cost reducing effect somewhere in the health care system, that will help to reach a better cost-effectiveness ratio. The same goes for more favourable treatment effectiveness. The chance that an effective treatment of mental problems goes hand in hand with reduced health care expenditures is probably quite high. There are examples that an effective treatment of a mental disorder, as seen in general health care, is both enhancing quality of life and social functioning, while reducing health care costs (*Hiller, Fichter, & Rief, 2003*).

Another question is whether screening of all patients in primary care (and other settings) to detect depression or mental distress, is to be recommended.
Although progress has been made, there is still a high rate of undetected mental problems in primary and general health care settings. That is one (perhaps the main) reason for undertreatment of mental problems. These findings underlie many recommendations to introduce routine screening procedures within primary and general health care settings (*McQuaid, Stein, Laffaye et al., 1999; Palmer & Coyne, 2003; Spitzer, Williams, Kroenke, Linzer, Degruy, Hahn et al., 1994*). Whether this is a wise strategy is, however, contradicted by many studies. The costs will be huge, and the effectiveness quite low, if such a strategy is introduced on a generic routine base (*Berg, Allen, Frame, Homer, Johnson, & al., 2002; Gilbody, House, & Sheldon, 2001; Mulrow, Williams, Gerety, Ramirez, Montiel, & Kerber, 1995; Valenstein, Vijan, Zeber, Boehm, & Buttar, 2001*). An important factor in getting a better cost-effectiveness is the availability of effective treatment modalities, a domain in which progress is already made and can be expected in the future (*Rost, Pyne, Dickinson, & LoSasso, 2005*). Other important factors are the prevalence of depression (or other mental problems) in a chosen setting and the rate of treatment initiation if screening leads to a positive result (*Henkel, Mergl, Kohnen, Allgaier, Moller, & Hegerl, 2004*). This implies that if the introduction of screening is considered, the target group should be selected carefully. In other words: case finding – in which diagnostic efforts are focused on patients who are at risk for depression or mental distress - will be a better strategy than screening (*Kroenke, 2001*). This focusing might be based on somatic morbidity or other factors that are related to high risks of depression or mental distress. One such factor is high health care utilization in comparison with patients who share the same clinical characteristics. Among high risk patient groups simple case finding instruments that are easy to administer, have high sensitivity (*Whooley, Avins, Miranda, & Browner, 1997; Williams, Mulrow, Kroenke, Dhanda, Badgett, Omori et al., 1999*). Low specificity is however a problem, but questionnaires, developed more recently, seem to perform better in this respect (*Furukawa, Kessler, Slade, & Andrews, 2003; Kessler, Andrews, Colpe, Hiripi, Mroczek, Normand et al., 2002*).
In any case, the usefulness of screening or case finding strategies can only be judged when combined with specific interventions. Cost effectiveness studies, in which no intervention (watchful waiting) is the reference, will therefore be necessary.

Recommendations

Recommendations for research

Our conclusion that the excess somatic health care use that is related to mental distress, can be partly avoided, was mainly based on an interpretation of our findings in combination with research findings from elsewhere. So these conclusions are more hypothetical than firmly grounded on empirical evidence collected in the Netherlands and should, therefore, be tested on new data.

As already stated in the Introduction, we have deliberately excluded variables related to evaluated need and the provision of health care. It is clear that in explaining health care use in general, but also excess health care use, these variables can be expected to be contributive. As to evaluated need, the focus of research has been on the recognition of mental distress (depression, anxiety, somatoform disorders) by primary care physicians (*Ormel & Tiemens, 1995; Simon & Von Korff, 1995; Stek, Gussekloo, Beekman, Van Tilburg, & Westendorp, 2004*), disregarding secondary outpatient care and hospital care largely. Research is needed to give us better estimates of prevalences of mental distress within somatic health care settings beyond primary care (outpatient clinics, general hospital) and to detect risk factors for mental distress in these settings. In addition, rates of detection of mental distress and the consequences of non-detection within these settings, should be further explored. These consequences might be related to outcomes (worse health status), or inefficient processes (unnecessary diagnostic procedures, inaccurate diagnoses, inappropriate interventions) or both (more resource use and worse outcomes).

As to health care provision we can assume that factors on this level are of importance in linking mental distress to utilization. Our findings from both literature reviews support these assumptions: there is a great diversity in study findings on a more specific level of health services use.

Both national and local differences in health care provision can play a part. On the national level, the 'division of labour' as we know it in the Netherlands (with a strong position of the GP as gatekeeper to higher levels of care and with specialty mental health care that is available in all regions), might be an interesting case to compare with other systems. Whether such system variables make a difference in prevalences of mental distress in general health care settings is not known, as far as we know.

On the local level, differences can exist between health care providers as to resources available for services that support physicians and other health care workers in managing patients with mental health problems. Organizing and funding a mental health service, such as a consultation-liaison psychiatry service, within a predominantly somatic oriented health care system, is traditionally problematic, not only in the Netherlands (*Bourgeois, Hilty, Klein, Koike, Servis, & Hales, 2003; Gask, 2005; Hall, Rundell, & Hirsch, 1994*). Apart from possible effects of differences in funding, an interesting area of research will be to examine outcomes and the cost-effectiveness of treatment protocols that integrate both somatic and mental health care, as undertaken in primary care (*Von Korff, Katon, Bush et al., 1998*), which are also necessary in secondary care. In fact, a growing interest for this level of care can already be noticed (*Van den Brink, Van Melle, Honig, Schene, Crijns, Lambert et al., 2002*).

Practical recommendations

The development of case finding methods and interventions for patients with mental distress in general health care facilities should be stimulated. Within primary care, the awareness of this priority has become quite general and has led to several nationally funded projects that support these developments. Within specialized (secondary) somatic care, such as outpatient clinics or general hospitals, these developments seem to be scarce, although there are some interesting initiatives (*De Jonge, Bauer, Huyse, & Latour, 2003; Huyse, Lyons, Stiefel, Slaets, de Jonge, Fink et al., 1999; Stiefel, de Jonge, Huyse, Guex, Slaets, Lyons et al., 1999*). Although several patient categories that are at risk for mental distress, due to their somatic morbidity, are seen in these facilities, the development of protocols, aiming at case finding and coordinated treatment programs, seem to be dependent on local initiatives that do not leave any trace in national research and development funding schemes. Stimulating the development of integrated protocols on this level should be focused on known risk groups. Without denying the necessity of further research on this topic (see above), it is already quite clear which categories are probable candidates: heart failure patients, diabetes patients, lung disease patients, somatising patients, back pain patients and patients with several chronic conditions (*Aydin & Ulusahin, 2001; de Groot, Anderson, Freedland, Clouse, & Lustman, 2001; Deyo & Weinstein, 2001; Hiller & Fichter, 2004; Katon, Simon, Russo, Von Korff, Lin, Ludman et al., 2004; Van Melle, de Jonge, Kuyper, Honig, Schene, Crijns et al., 2005*). It is to be expected that the introduction of treatment protocols that integrate the contributions of different disciplines in health care, will lead to care that is not only more effective, but also more cost-effective. Evidently, these expectations should be tested in practice. ■

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Samenvatting (Summary)

Centraal thema van deze dissertatie is de relatie tussen psychische klachten en somatisch zorggebruik, d.w.z. het gebruik van gezondheidszorgvoorzieningen buiten de GGZ. Daarbij gaat het met name om het gebruik van paramedische zorg, medisch-specialistische en poliklinische zorg, ziekenhuiszorg alsmede medicijngebruik. Het gebruik van diensten van de huisarts staat minder centraal gezien het (vanuit de dichotomie somatisch-psychisch) hybride karakter van deze zorg.

Dit thema is allereerst onderzocht door middel van twee literatuurstudies (reviews): de eerste op basis van studies verricht onder de open bevolking, de tweede op basis van klinische studies bij patiënten die in het algemeen ziekenhuis waren opgenomen. Bij beide literatuurstudies zijn alleen die studies in de review opgenomen waarvan de opzet prospectief was en waarbij gecorrigeerd werd voor het effect van mogelijke confounders, met name somatische morbiditeit. Wat psychische klachten betreft werden cognitieve stoornissen, psychotische stoornissen en verslavingen uitgesloten. Dit betekent, dat de facto studies gericht op klachten verwijzend naar affectieve en somatoforme stoornissen, zijn gereviewd.
De review van populatiestudies leidde tot de conclusie, dat psychische klachten gerelateerd zijn aan verhoogd zorggebruik, maar dat dit verhoogde zorggebruik niet consistent is terug te vinden bij een bepaalde soort zorg (zoals bijvoorbeeld medicijngebruik, paramedische zorg, o.i.d.). Op specifiek niveau is er veel variatie tussen de geanalyseerde studies.
Bij de review van studies bij patiënten die in het algemeen ziekenhuis waren opgenomen, kwam bij de categorie waarbij uitsluitend naar de opnameduur was gekeken, geen consistent beeld naar voren. Studies met een langere tijdshorizon lieten echter wel een vrij consistent beeld van verhoogd zorggebruik zien.

De empirische studies zijn alle gebaseerd op een steekproef (n=9428) van ziekenfondsverzekerden waarbij in 1993 een enquête is afgenomen met vragen over ondermeer de gezondheidstoestand en zorggebruik in het recente verleden. Van dezelfde steekproef is over een reeks van jaren (1992 en later) het zorggebruik bekend op basis van zgn. claimdata. Het betreft zorggebruik dat door het ziekenfonds werd betaald na indiening van een nota door de zorgverstrekker. Huisartsenzorg valt daar buiten, alsmede een groot deel van de AWBZ-gefinancierde zorg, zoals zorg geleverd door het RIAGG of psychiatrische ziekenhuizen.

De eerste empirische studie was gericht op de vraag welke van drie mogelijke maten voor psychische klachten (zoals opgenomen in de gezondheidsenquête), geschikt was om te gebruiken in studies naar de relatie psychische klachten en zorggebruik. De maten die beschikbaar waren betroffen: de negatieve items van de ABS (Affect Balance Scale) van Bradburn, de Nervositeitssubschaal van de VOEG van Dirken, en de enkelvoudige vraag naar depressieve klachten (letterlijk: “Hebt u aandoening nu of in laatste 5 jaar gehad: overspannen, depressie, ernstige nervositeit “), zoals die in de CBS Gezondheidsenquête wordt gebruikt. Uitgangspunt daarbij was, dat een geschikte maat enerzijds een goede voorspeller van ervaren (subjectieve) gezondheid zou moeten zijn, maar tegelijkertijd zo weinig mogelijk afhankelijk zou moeten zijn van somatische morbiditeit en fysiek functioneren. De maat ‘depressieve klachten’ was weliswaar minder sterk geassocieerd met ervaren gezondheid, maar bleek het minst gecontamineerd met somatische morbiditeit en fysiek functioneren. Deze maat geniet daarom de voorkeur binnen de context van de centrale onderzoeksvraag.

Een tweede empirische studie was gericht op de vraag of er verschillen bestaan tussen chronische aandoeningen wat betreft het effect ervan op psychische klachten en het gebruik van psychofarmaca, als ook op meer algemene gezondheidsklachten zoals vermoeidheid. Behalve naar de aard van de chronische aandoeningen is ook het verband onderzocht met het aantal chronische aandoeningen. Er waren weliswaar enige verschillen tussen enkele chronische aandoeningen, waarbij migraine met name opviel als zijnde een aandoening met effecten over een breed spectrum uitkomsten. Het aantal chronische aandoeningen was echter van groter belang dan het type aandoening. De effecten op vermoeidheid waren groter dan die op psychische klachten.

De relatie psychische klachten en zorggebruik staat centraal in drie empirische studies. Bij de eerste hierop gerichte studie werd een vergelijking gemaakt tussen depressieve klachten en chronische aandoeningen wat betreft hun relatie met ziektegedrag in het algemeen en zorggebruik (vooral in het recente verleden) in het bijzonder. Depressieve klachten bleken, meer dan enige andere chronische aandoening, verbonden te zijn met vermoeidheid, een slechte ervaren gezondheid en ziekteverzuim. Wat betreft zorggebruik in het recente verleden was er een duidelijke relatie met huisarts-consultaties. Consultaties van medisch specialisten in de voorafgaande 12 maanden kwamen over het algemeen

ook meer voor bij degenen met depressieve klachten. Alleen patiënten met diabetes en hartkwalen vertoonden een hogere consultfrequentie. Consultaties van medisch specialisten in de periode direct na de survey waren ook geassociëerd met psychische klachten, maar minder sterk.

Een tweede studie is gericht op de vraag of het (mogelijke) effect van psychische klachten op prospectief zorggebruik afhankelijk is van eventueel aanwezige somatische morbiditeit. Treden de effecten van psychische klachten en somatische aandoeningen onafhankelijk van elkaar op (en zijn ze dus additief) of wordt het effect van psychische klachten gemodificeerd door de aanwezigheid en de ernst van somatische morbiditeit? Er bleken duidelijk interactie-effecten aanwezig te zijn. Deze zijn echter niet versterkend, maar juist dempend. Dat wil zeggen, dat het effect van psychische klachten op zorggebruik afneemt naarmate de somatische morbiditeit ernstiger is.

Dat laatste zou kunnen betekenen, dat het effect van psychische klachten op prospectief zorggebruik het grootst is bij degenen die geen langdurige gezondheidsproblemen hebben. Uit analyses gericht op deze groep bleek er een relatie tussen psychische klachten en zorggebruik, maar de sterkte van deze relatie was niet sexe en leeftijdsafhankelijk is. Bij deze groep relatief gezonden waren psychische klachten een voorspeller voor later zorggebruik, vooral medicijngebruik en het gebruik van paramedische zorg (met name fysiotherapie), maar in geringe mate ook medisch specialistische zorg. Leeftijd en geslacht vertoonden beide een onafhankelijk verband met zorggebruik: bij vrouwen lag het gebruik hoger, evenals bij jongeren (in deze categorie).

Tot slot is een poging ondernomen tot een gedeeltelijke verklaring van de gevonden relaties. Het verschil in zorggebruik tussen mannen en vrouwen, zoals gevonden in hiervoor beschreven analyses als ook in vele andere studies, vormde daarbij het vertrekpunt. Dit werd nader uitgewerkt in een causaal model, waarin zowel somatische aandoeningen als psychische klachten langs een aantal paden met zorggebruik werden verbonden. Belangrijke intermediaire variabelen waren daarbij symptoomperceptie en subjectieve gezondheid. De verwachting was dat het verhoogde zorggebruik van vrouwen niet alleen te verklaren zou zijn doordat vrouwen meer psychische klachten ondervinden (en bovendien een sterkere consumptiegeneigdheid zouden hebben), maar ook door een sterker effect van psychische klachten bij vrouwen op symptoomperceptie en ervaren gezondheid. Dit laatste bleek niet het geval. Wel waren er de verwachte verschillen in somatische morbiditeit en psychische klachten: deze zijn bij vrouwen gemiddeld talrijker en leiden daardoor tot meer zorggebruik. Van een verhoogde consumptiegeneigdheid bleek geen sprake te zijn.

Geconcludeerd kan worden dat psychische klachten somatisch zorggebruik voorspellen. Dit betreft niet alleen een verhoogd gebruik van zorg van de huisarts, maar ook van paramedische zorg, medisch-specialistische zorg en geneesmiddelen.
Binnen de eerstelijnsgezondheidszorg krijgen patiënten met psychische klachten inmiddels meer aandacht en worden er protocollen ontwikkeld om somatisch en psychische zorg te integreren. Op het niveau van medisch specialistische zorg zijn deze ontwikkelingen nog nauwelijks begonnen, maar lijken wel noodzakelijk, zeker bij bepaalde risicogroepen, zoals patiënten met ernstige invaliderende aandoeningen. ■

Dankwoord (Acknowledgements)

Dit is een project van lange adem geweest, die ik gelukkig bleek te hebben, durf ik nu met enige opluchting te zeggen. Maar dat geldt natuurlijk niet alleen voor mezelf, ook voor mijn beide promotoren Marianne Donker en Frans Rutten, die beiden, soms met enig – begrijpelijk - ongeduld, ervoor gezorgd hebben dat ik de rit af kon maken.
Marianne wil ik daarbij allereerst bedanken voor haar serieuze betrokkenheid en de soms scherpe (maar niet onredelijke) vragen die ze tijdens besprekingen op mij afvuurde, die mij beslist hebben geholpen om problemen duidelijker te zien en keuzes explicieter te maken. Over het belang van beleidsrelevantie zullen we waarschijnlijk verschillend blijven denken, maar de relevantie van haar inbreng staat buiten kijf.
Frans wil ik vooral bedanken voor de ruimte die hij mij gaf om de ingeslagen weg te volgen, ook al kwam ik daarbij op een terrein dat voor hem deels ook onbekend was. Dat neemt niet weg, dat de kritiek die ik op stukken kreeg to the point en nuttig was. Bovendien werd die altijd op een ongedwongen manier gebracht, wat ik als een prettige manier van samenwerken heb ervaren.

Dit proefschrift was er nooit gekomen zonder Leida Lamers. Niet alleen omdat we samen het merendeel van de artikelen hebben geschreven, maar ook omdat zij voor mijn gevoel de gulle gever van een fraai databestand was, dat het mij mogelijk maakte om dit proefschift te schrijven. Ik was altijd benieuwd naar het commentaar dat ze op mijn eerste concepten had, want dat was – kort gekarakteriseerd – altijd 'streng doch rechtvaardig'. Voor een sloddervos als ik, geneigd tot te lange zinnen en een overdaad aan tabellen, een zeer welkome aanvulling. Hopelijk kunnen we samenwerking voortzetten in andere projecten.

Voor mijn gevoel was het Leida van wie ik de data kreeg, formeel was het de zorgverzekeraar Zorg en Zekerheid uit Leiden, die zo ruimhartig was om de gegevens beschikbaar te stellen, waarvoor mijn oprechte dank.

Voor de afronding van dit proefschrift is het heel belangrijk geweest, dat ik in het collegejaar 2003/04 was vrijgesteld van een aantal forse onderwijstaken. Formeel had ik die tijd weliswaar opgespaard (dankzij een mooie sabbatical regeling van de EUR die door het Erasmus MC helaas niet is overgenomen), maar dat neemt niet weg, dat in de praktijk een aantal collega's er tijdelijk onderwijstaken bij hebben gekregen om in dit geval mij vrij te spelen. Ik wil daarom met name Marleen Foets, Ken Redekop en nogmaals Leida bedanken voor hun bereidheid om werk van mij over te nemen, zodat ik vaart kon maken met mijn onderzoek.

Voor de uiteindelijke vorm van de teksten en het boekwerk zijn mijn buren Linda Cleary en Fernando Sanchez Marquez erg belangrijk geweest. Linda heeft mijn steenkool Engels vakkundig weten te verbeteren, met grote zorgvuldigheid en precisie, waarvoor ik haar erg dankbaar ben. Eventuele taalfouten, die ongetwijfeld nog in de tekst zullen zitten, komen overigens geheel voor mijn rekening, alleen al omdat ik sommige correcties weer heb teruggedraaid, omdat ik het (waarschijnlijk ten onrechte) beter meende te weten. Fernando heeft als vormgever een waar meesterwerk afgeleverd. Een buurman met perfectionistische trekjes kan soms lastig zijn, maar is werkelijk ideaal voor de verzorging van een proefschrift. Op de inhoud is vast en zeker kritiek te leveren, maar dat geldt beslist niet voor de vorm, die zeer fraai is geworden. Fernando, bedankt voor dit schitterende resultaat.

En verder wil ik natuurlijk al mijn vrienden, familieleden, kennissen en collega's bedanken die mij de afgelopen jaren tot steun zijn geweest (vragen over hoe ver ik nu was met mijn 'scriptie', even daargelaten) en - minstens zo belangrijk - voor de nodige afleiding hebben gezorgd. Ik prijs me gelukkig omringd te zijn door zovelen met wie ik mijn interesses, bekommernissen en vreugdes kan delen. ■

Curriculum Vitæ

Gerrit Koopmans (1950) was born in Sneek, where he graduated from the Magister Alvinus Gymnasium in 1969. He studied psychology at the University of Amsterdam, majoring in research methods, psychometrics and data analysis. During his study, he worked as a research-assistant at the Psychiatry department of the university hospital, which stimulated his interest in mental health care. He obtained his master's degree in 1976 and started his professional career as a research-psychologist in a mental hospital (Provinciaal Ziekenhuis Santpoort), which delivered solely inpatient mental health care for a population of about 1100 patients. This hospital was the first hospital in the Netherlands that was organised based on differentiated treatment programs. His main job was to develop evaluation procedures, in order to assess the effectiveness of these treatment programs.

In 1984, he left the hospital and became assistant professor at the Institute of Health Policy and Management of the Erasmus University in Rotterdam, which had started to develop a curriculum in health sciences. His first job at the university was to develop a course on policy research and to set up the organisation of the master thesis. From 1986 to 1990, he was responsible for the management of the teaching programs. Being more interested in content, he returned to teaching and research. Since then, he is teaching mainly research methods and data-analysis to students of programs of health policy and management. His research is mainly oriented on mental health and mental health care, service utilization, evaluation and outcome research. ■

This book aims to provide a better insight into the relation between mental distress and the use of somatic health care services.
It presents the results of two systematic reviews of the literature and a series of empirical studies, which were based on data from a health survey in combination with data from a claims database held by a health insurance provider.
Mental distress and somatic health care utilization are related in general, however with a wide variety across the reviewed studies as to type of health care.
Findings from the empirical studies show that chronic somatic conditions are a risk factor for mental distress, especially comorbid conditions.
The impact of mental distress (i.e. depressive complaints) on functioning and health care utilization can be compared with the impact of chronic medical conditions, such as diabetes or heart disease. Mental distress appeared to be related to the use of paramedic services, consultations of medical specialists and the use of prescription drugs, but not to hospital admissions.
Mechanisms that underlie these relations are probably based on symptom perception that is affected not only by physical conditions but also by mental distress. Among women, utilization of somatic health care can be related to mental distress, to a greater extent, but this is mainly due to the fact that mental distress is found more frequently among women than among men.

Gerrit Koopmans studied psychology (majoring research methods) at the University of Amsterdam and is now assistant professor at the department of Health Policy and Management of the Erasmus University Medical Center. His research interests are mainly related to mental health care, service utilization, evaluation and outcome research.