A two-stepped screening tool to detect neurotic disorders in primary care.

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Abstract:

Introduction: Neurotic disorders often remain unrecognized by general practitioners in primary care. By creating a two-stepped screening tool non-recognition is counteracted. The first step consists of a prediction rule derived from a logistic regression model. Whereas the second step of screening uses the variable perceived support and focuses on the high risk group, screened in step one.

Method: A total of 3791 participants, aged 19-89, were included from general practitioners centers in Leidsche Rijn. Neurotic disorders were assessed in five year follow up with the ICPC-P coding system. Predictor variables for the first step of screening are gender, age, educational level, alcohol problems, works status, ethnicity, amount of somatic complains, and BMI. The second step of screening assesses the perceived support of patients.

Results: The first step of the screening tool was a multivariable logistic regression model including only easily obtainable characteristics had a fair discriminative value. The Area Under the Receiver Operating Characteristic Curve (C-statistic) was found to be 0.650 (95%CI: .630-.670). The prediction rule derived from the model had a sensitivity of 50.1%, specificity of 69.8%., positive predictive value (PPV) 38.3% and negative predictive value (NPV) of 78.9%. The second step of screening, the assessment of perceived support in the high risk group, improved the discriminative value of the screening tool to a sensitivity of 17.4%, a specificity of 95.9%, a PPV of 58.8% and a NPV 77.5%.

Discussion: The two-stepped screening model identifies patients as having a predispositioned high risk for obtaining a neurotic disorders, this group can be monitored by the GP to improve detection.

Introduction

Aim of the study

Health organizations raise the alarm, and report that psychiatric disorders will be the second most disabling condition after cardiovascular disease by the year 2020 (Nemeroff & Owens, 2002; Serrano-Blanco et al., 2009; Zuithoff et al., 2009). Neurotic disorders, which account for the most of psychiatric disorders, are at the top of mortality rates. Neurotic disorders are, next to psychological suffering, an important cause in the loss of productivity and are therefore expensive (Nemeroff & Owens, 2002). If not treated, neurotic disorders have a major impact on quality of life and healthcare costs (Marciniak et al., 2005). Therefore detection of these neurotic disorders is an important step in improving patients' prognosis and reducing healthcare costs (Brown & Barlow, 2009; Pini, Perkonnig, Tansella, Wittchen, & Psich, 1999; Schulberg, McClelland, & Gooding, 1987). Recent studies show that mood and anxiety disorders aren't well recognized in primary care, consequently 50% of the cases go undetected by the general practitioner (GP) (Bijl et al., 2003; Bushnell, 2004; Kessler, Lloyd, Lewis, & Gray, 1999; Nemeroff & Owens, 2002; Terluin et al., 2009; Zuithoff et al., 2009).

Neurotic disorders

Neurotic disorders cluster the psychopathologies of the mood and anxiety disorders. Mood and anxiety disorders show great comorbidity and are often seen as intertwined; an anxiety disorder can sometimes lead to a depression and conversely (Andrews, Stewart, Allen, & Henderson, 1990; Brunello et al., 2003; Lewis et al., 2003; Mineka, Watson, & Clark, 1998; Watson, 2005). Also, the risks for developing a depression or anxiety disorder seem to overlap to a great extent (Brown & Barlow, 2009; Clark & Watson, 1991; Krueger, McGue, & Iacono, 2001; Lewinsohn, Zinbarg, Seeley, Lewinsohn, & Sack, 1997; Salokangas & Poutanen, 1998; Terluin et al., 2009; Watson, 2005). Besides comorbidity, research showed that the same neural pathways play a similar role in both disorders, making the same pharmacotherapy useable for both spectra of disorders (Brunello et al., 2003). Although a lot of research in the past decades cannot interpret the relationship between the two forms of psychopathology to a full extent, the overlap of the pathologies in the mood and anxiety spectrum makes it easy to classify them as neurotic disorders (Bijl et al., 2003; Henkel, Mergl, Kohnen, Maier, & Möller, 2003; Kessler et al., 2012; Serrano-Blanco et al., 2009). Neurotic disorders have a great

prevalence, anxiety disorders show a 28.8% lifetime prevalence whereas mood disorders have a lifetime prevalence of 20.8% (Kessler et al., 2012).

Primary care in the Netherlands.

To improve detection of neurotic disorders, it's important to take a close look at the Dutch healthcare system. A visit to the GP is the first step patients take when they are ill. This means that groups of patients suffering from a (subclinical form of) psychiatric disorder first see their GP prior to a consultation with a second line healthcare provider (Klinkman, 1997; Ormel et al., 1990; Salokangas & Poutanen, 1998; Terluin et al., 2009; Zuithoff et al., 2009). This first contact with the GP is therefore extremely important in detecting and diagnosing the problems of the patient (Katon & Schulberg, 1992; Kroenke, Spitzer, Williams, Monahan, & Lowe, 2007; Salokangas & Poutanen, 1998; Zuithoff et al., 2009). Over a third of the visiting patients of a GP show substantial levels of mental distress (15-25%) and can be diagnosed with a specific neurotic disorder (Kessler et al., 2012; Ormel et al., 1990). An even larger amount of primary care patients shows a subclinical form of neurotic disorder (Pini et al., 1999).

Recognition.

Non-recognition of psychiatric disorders in primary care can deprive a large group of patients of an appropriate treatment (Ormel et al., 1990). Consequences of non-detection can be great and very harmful; non-detection shows worse outcomes in terms of both psychopathology and social functioning (Bushnell, 2004; Ormel et al., 1990). Besides the negative effects of non-detection, detection improves the course of a neurotic disorder (Henkel et al., 2003; Zuithoff et al., 2009). For example; the acknowledgement of having a serious mental disorder improves the outcome of the following therapy (Ormel et al., 1990). Social support, as a result of the recognition, improves the effect of further therapy outcome (Ormel et al., 1990; Schulberg et al., 1987). Besides having a better prognosis, early recognition of neurotic disorders can reduce the amount of healthcare consumption in contrast to late diagnoses. Hence, earlier diagnoses may decreases health costs (Jackson, Houston, Hanling, Terhaar, & Yun, 2001; Terluin et al., 2009; Zuithoff et al., 2009).

Reasons for non-recognition.

When considering the most common psychiatric disorders - neurotic disorders - 50% of the cases are undetected by the GP (Bijl et al., 2003; Bushnell, 2004; Kessler, Lloyd, Lewis, &

Gray, 1999; Nemeroff & Owens, 2002; Terluin et al., 2009; Zuithoff et al., 2009). Despite the availability of several screening tools, neurotic disorders frequently remain undiagnosed. A problem arises because screening for psychiatric disorders in all outpatients has not been shown to be cost-effective or feasible (Jackson et al., 2001).

Proper detection of psychiatric disorders is therefore an important task for the GP. The limited time in which the GP and their patients have contact makes it crucial for a GP to make an accurate judgment concerning the patients' physical and psychological health.

There are various reasons detection of neurotic disorders is lacking quality. One known explanation is the limited time for each individual patient in general practice. Most primary care visits are completed in less than 15 minutes (Jackson et al., 2001). The GP has to make an assessment of the physical, psychosocial and psychological health of the patient. Working with these competing demands is a heavy burden and leads to loss of quality in patient care (Terluin et al., 2009). Another important reason is that complains are often misinterpreted. Somatic complains are not often recognized as a psychological problem. Complains like nervous feelings, sleeping problems, stress related problems, which are easily identified as problematic are most of the time labeled as 'life stress' and the discussion and attribution of these problems therefore remains superficial and does not address possible deeper psychiatric problems (Kessler et al., 1999; Terluin et al., 2009). Contiguous hereto, visits in primary care are initiated by the patients themselves. Consequently, the patients' view on their own illness influences the manner of expressing themselves and their problems in a visit to the GP. People tend to see themselves more often physically ill, instead attribute the complains to a somatic representation of psychiatric disorder (D. Kessler et al., 1999). Another important reason for non-detection is the appearance of the psychiatric disorders in primary care. In primary care the bulk of psychiatric disorders have a modest form of distress and pathology(Jackson et al., 2001; Van Weel-Baumgarten, Van Den Bosch, Van Den Hoogen, & Zitman, 2000). These disorders are not as clear-cut disabling as some of the disorders in second line healthcare. The expression of complains remain superficial and subclinical and are therefore hard to label as clues for neurotic disorders. These issues make it harder to detect psychiatric disorders in primary care, especially for less experienced GPs (Kessler et al., 1999; Terluin et al., 2009).

Epidemiologic research and the prediction rule.

Several attempts have been made by contemporary research to improve detection of psychiatric disorders in primary care. Shortages in these studies are often related to the limited amount of the disorders that were taken into account (Klinkman, Coyne, Gallo, & Schwenk, 2012; Salokangas & Poutanen, 1998; Zuithoff et al., 2009). This narrow scope of disorders is theoretically very interesting but lacks clinical value. Other studies created strong screening questionnaires with a good detecting power, however these questionnaires were often time-consuming and therefore not very practical (Katon & Schulberg, 1992; Salokangas & Poutanen, 1998; Schulberg et al., 1987; Terluin et al., 2009).

To improve the detection of neurotic disorders by GP's this study tries to create a two-stepped screening tool that uses a prediction rule, as a first step, to categorize the population of the GP in primary care into a group of high and low risk for developing a neurotic disorder. As a second step, social support is assessed of the high risk group to create a small group of overall high risk patients for developing a neurotic disorder. The basis for this screening tool is the large epidemiological research of the Universitair Medisch Centrum Utrecht, Utrecht Health Project (UHP). The UHP examines risk factors of a large collection of variables on the origination of psychiatric disorders in five year follow-up.

The UHP tries to bridge the problems mentioned above and therefore aims at combining clinical value by screening for a wide spectrum of disorders, the neurotic disorders, but also secure its clinical applicability by limiting the time needed for the screening process. To achieve this goal we try to create, in the first step of the screening tool, a prediction rule that can divide the GP's population into a high- and low risk group. To ensure the practical use of the screening tool, easily obtainable characteristics are used to minimize the effort of screening a new patient. The challenge hereby is to create a screening tool that is sensitive and specific enough to make a screening for neurotic disorders that is clinically relevant. The easily obtainable variables that are used in the prediction rule represent the socio-demographic and physical characteristics of the patients. The selection of the variables used in the first step of screening is based on the available literature and clinical reasoning. *Gender, age, educational level, alcohol problems, works status, ethnicity, amount of somatic complains,* and *BMI* are explored as possible risk factors for obtaining a mood or anxiety disorder. Being female, of older age, or of low educational level, as well as severe alcohol problems,

unemployment, being non-Dutch, having a lot of somatic complains, and a BMI over 25 are seen as risk factors for developing neurotic disorders (Dohrenwend, 1975; Fryers, Melzer, & Jenkins, 2003; Jackson et al., 2001; Petry, Barry, Pietrzak, & Wagner, 2008; Serrano-Blanco et al., 2009; Simon et al., 2006; Zuithoff et al., 2009).

Social support

The large dataset gives the opportunity to broaden the scope of this article. Besides screening for neurotic disorders in primary care the role of social support is taken into account, more specifically, the role of social support in people with a high risk for obtaining neurotic disorders. The assessment of social support is used as a second step of our screening tool. Social support is, since a couple of decades, a widely researched concept in relation to mental health (Borja, Callahan, & Rambo, 2009; Boscarino, 1995; Bovier, Chamot, & Perneger, 2004; Bruce, 2002; Cohen & Wills, 1985; J C Coyne & Downey, 1991; James C Coyne & Downey, 1991; Deanm & Lin, 1997; Dohrenwend, 1975; Fryers et al., 2003; George, Blazer, Hughes, & Fowler, 1989; Gilman et al., 2013; Huurre, Eerola, Rahkonen, & Aro, 2007; Ibarra-Rovillard & Kuiper, 2011; Kaniasty & Norris, 2000; Lin et al., 2013; Linden & Vodermaier, 2012; Lynch et al., 1999; Muntaner, Eaton, Diala, Kessler, & Sorlie, 1998; Procidano & Heller, 1983; Tyler, 2006) However, the relationship of social support with mental health and the role in obtaining, alleviating, protecting from or aggravating psychiatric disorders is still not clear. Several models and relationships have been posed over the years (Bovier et al., 2004; J C Coyne & Downey, 1991; Procidano & Heller, 1983). Still, there is no overarching model that explains the whole concept of social support, and the role it plays in mental well-being. The large dataset and the prediction rule posed earlier give us the opportunity to enlarge the knowledge of the concept of social support, and to explore the possibilities of the predictive value of social support as a screening method for neurotic disorders.

Contemporary research considering the effects of social support on mental health shows two main explanatory models. The main effect model on one hand and the buffer model on the other. Evidence is found for both models (Borja et al., 2009; Boscarino, 1995; George et al., 1989; Kaniasty & Norris, 2000; Lin et al., 2013). The main effect model postulates the idea that support has a direct and positive effect on psychological health. This effect is independent of stress, or circumstantial variables (Kaniasty & Norris, 2000; Norris & Murrell, 2013; Russell & Cutrona, 1991). The buffer hypothesis suggests that social support is mainly beneficial in

times of stress (Cobb, 1979). The social support network of an individual is a predictor of how well someone copes with life events and stressors. People with better social networks experience reduced effects compared to those with a smaller social support network (Lin & Dean, 1984; Tyler & Hoyt, 2000). Social support improves protective elements and can reduce negative impact of a stressful event. For example; social support can alter the perception negative events, improve coping resources or facilitate health behavior (Wills& Shinar, 2000).

Both models cannot explain the whole concept of social support, and it's therefore important to clarify the concept of social support, because, although the research has been expanding since decades, the concept of social support is sometimes vague (Borja et al., 2009; Ibarra-Rovillard & Kuiper, 2011; Linden & Vodermaier, 2012). In this article the following definition of social support is used: support accessible to an individual through social ties to other individuals, groups, and the larger community (Lin et al., 2013). This is the most abstract definition. The most common forms of support are instrumental support, emotional support, feedback, and informational support. When considering the different kind of support it becomes clearer that not all the social support is beneficial. Informational support provided when a close relative has passed away isn't as beneficial as emotional support in that given moment, whereas informational support can be more of help when faced with legal problems. This example clearly shows that, in order to be beneficial, social support should meet the demands of the individual's stressful situation (Bovier et al., 2004; Ibarra-Rovillard & Kuiper, 2011; Linden & Vodermaier, 2012; Lynch et al., 1999; Tyler, 2006).

To test the predictive value of social support in screening for neurotic disorders, it is important to specify the social support in terms of more measurable variables. Most of contemporary research distinguishes three elements when social support is studied; social integration, received social support, and perceived social support (Cohen & Wills, 1985; Ibarra-Rovillard & Kuiper, 2011; Lin et al., 2013; Russell & Cutrona, 1991; Tyler, 2006). The term social integration can be seen as an absolute number of social contacts someone has and/or to what extent someone is involved in social activities (Ibarra-Rovillard & Kuiper, 2011). The use of social integration as an indicator for social support is somewhat difficult. It assumes that every social contact is positive and satisfying; research shows that this isn't the case. In fact, social contacts consisting of criticism or rejections can be harmful for well-being

(Lepore, 1992; Lepore, Evans, & Schneider, 1991). Received support is determined as the amount of specific supportive behavior that has occurred in a given period of time (Ibarra-Rovillard & Kuiper, 2011). Perceived support is somewhat similar to received support, but focuses on the anticipating help in times of need (Schwarzer & Knoll, 2007). The main difference between received and perceived support is that perceived support directly refers to the anticipation of support in times when support is needed, where received support is the recall of the amount of support in a given period of time (Ibarra-Rovillard & Kuiper, 2011; Schwarzer & Knoll, 2007). Received and perceived support are more subjective and qualitative measures of the concept social support instead of the more quantitative measure of social integration Perceived support, as an indication of social support, is the characteristic that is most consistently associated with mental well-being (Bovier et al., 2004; Ibarra-Rovillard & Kuiper, 2011; Linden & Vodermaier, 2012; Lynch et al., 1999; Procidano & Heller, 1983; Schwarzer & Knoll, 2007; Tyler, 2006).

Considering the fact that social support should meet certain demands to be beneficial, it's logical to state that social support can be harmful if it doesn't meet these demands. Literature suggests that difficulties in social support are associated with a major deterrent in well-being, this happens when support, for example, turns into the hinder of instrumental goals, criticism or anger and dislike; the negative effect is called social negativity (Lepore, 1992; Schwarzer & Knoll, 2007; Vinokur & van Ryn, 1993).

The main effect and buffer model don't explain how the negative consequences of bad social support can influence mental well-being. Therefore, Sol Ibarra-Rovillard and Kuiper (2011) proposed a model that focuses on the perceived support and its role in mental well-being. It takes into account how well the needs for social support are met, and what the consequences are on overall well-being. The model suggests that social support can improve mental health on the condition that the perceived support meets the demands and that the needs are fulfilled. When this is not the case, social support can reduce mental well-being (Ibarra-Rovillard & Kuiper, 2011).

With this in mind, perceived support is used as a second step in the screening process of neurotic disorders in primary care. The first step of screening uses easily obtainable characteristics to create a prediction rule that can divide patients in primary care into high

and low risk for obtaining neurotic disorders. The prediction rule is thought to be a good screening tool, however, the group of patients labeled as high risk is expected to be too large to be monitored by the GP without increasing the already heavy burden of workload. Therefor after the first step of screening, perceived support is used as a second step of screening in the high risk group. The addition of perceived support to the screening tool should overcome the possibility of a too large group to be monitored by the GP.

We propose a two-step screening, with the prediction rule as a first step, wherein perceived support can be assessed as a second step of screening to distillate a small group of high overall high risk patients. This group of overall high risk patients should be carefully monitored by the GP, because this group lacks the buffering and compensating effects of perceived support while having a predispositioned risk for developing a neurotic disorder. Beside the role as second step of screening perceived support is also studied as a sole contributor to mental well-being.

Methods

Study Population

To test our predictions we used the data of the Utrecht Health Project (UHP). The UHP is an ongoing longitudinal study, which started in 2000. The UHP reaches out to the entire newly-build neighborhood, Leidsche Rijn, in the local authority of Utrecht. Every new citizen of Leidsche Rijn was asked to participate in the UHP when signing in for a new GP. Data of new participants were recorded in a unique Individual Health Profile (IHP); the basis of the UHP database. The IHP consists of several questionnaires that obtained demographic factors, lifestyle factors, current health status, quality of life, psychopathology (SCL-90 questionnaire) and disability. The IHP also includes information of physical examinations and a number of tests (for example blood tests, spirometry, ECG).

The data of five year follow-up was collected from the automated registry of the GP's. The registration of the participants was in line with the International Classification of Primary Care (ICPC). During the five year follow-up several alterations were made to the content of the IHP. New questionnaires were included like a questionnaire concerning perceived support and several other variables. The UHP was approved by the Medical Ethics Committee of the University Medical Center Utrecht.

Outcome Variables; diagnosis of neurotic psychological disorders

In five years follow-up, the diagnosis of neurotic disorders was assessed in all participants according to the ICPC-P codes ("psychological-category") by the GP. The "psychological-category" of the ICPC is a very broad and unspecific cluster of disorders. In this article the focus lies on the neurotic disorders and all psychiatric disorders inherent to or as a consequence of this spectrum of disorders.

Predictor Variables

To select the predictors that influence the origination of neurotic disorders was based on contemporary literature and clinical reasoning. The predictors were collected in the baseline questionnaire and medical records of the GP.

To create a practical screening tool we used easily obtainable characteristics such as demographic variables. After screening for a high risk group within the population the effect of the variable perceived support (PS) is evaluated as a post hoc test in this high risk group. This variable is more time-consuming to obtain, but is used to provide a more deep

understanding of the effect of perceived support on risk patients assed by the first step in our screening tool.

The first step screening contains the following predictors: *gender, age, educational level, alcohol problems, works status, ethnicity, amount of somatic complains, and BMI.* All these variables are considered predictors of neurotic disorders by contemporary research (Altman & Bland, 1994; Henkel et al., 2003; Jackson et al., 2001; Petry et al., 2008; Salokangas & Poutanen, 1998; Serrano-Blanco et al., 2009; Simon et al., 2006; Terluin et al., 2009; Zuithoff et al., 2009)

The predictor *age* was set as a continuous variable, where the rest of the variables were dichotomized or categorized.

The predictor *educational level* was dichotomized into a high and low educational level. Low educational level was set as everything below the level of a college educational level. The education at a college or university was set as a high educational level.

Alcohol problems were transformed from a categorical variable into a dichotomous variable. Alcohol problems were assessed as drinking more often than once a month more than 6 glasses of alcohol.

Work status was classified as either employed or unemployed. Scholars were set as employed.

The predictor *ethnicity* was also analysed as a dichotomous variable in which the Dutch ethnicity was compared to all other ethnicities.

The predictor *somatic complains* was categorized into three categories. Somatic complains was divided into participants with zero, one, two or more somatic complains. *BMI* was analysed as a dichotomous variable, where participants with a BMI up to 25 were seen as healthy and participants with a BMI above 25 were seen as unhealthy.

For the post hoc analysis *perceived social support* was studied. The variable is dichotomised into high and low perceived support. Perceived support is assessed with a self-made questionnaire that focuses on the subjective experience of patients' perceived support. The cut-off point was set, 25% of a cumulative cut in the normal distribution of perceived

support. 25% of the population was classified as having perceived support that doesn't match the demands of the situation, simply put a low perceived support.

Design

The main purpose of this article is to create an easy and useful two-stepped screening tool for GP's to reduce non recognition of neurotic disorders in primary care. Using easily obtainable characteristics a regression model is made which can be used to create a prediction rule. This prediction rule can be used by a GP to screen patients, during an intake, into high and low risk for obtaining neurotic disorders. For all this steps we use the 2000-cohort. In order to achieve this prediction rule is created via a binary logistic regression with the associated C-statistic. Subsequently sensitivity, specificity, positive and negative predictive values are computed.

After modeling a prediction rule we are going to study the influence, as a post hoc test, of perceived support of patients in the high risk group. Because the addition of PS later on in the research a separate cohort is used to analyze this variable: the 2005-cohort. To examine the influence of a perceived support the 2005-cohort is screened on basis of the prediction rule, and is divided into a high and low category. Via the different dichotomized variables of perceived support the positive and negative predictive value is studied.

Analyzing methods

To give a first impression of the effects of different predictor variables univariate analyses were performed on all the chosen predictor variables. Chi-square statistics were used to analyse the risk factor for each predictor on the outcome variable. The continuous variables were analysed with an independent t-test.

To test the variety of predictor variables in a model a backward stepwise selection in multivariable logistic regression was used in the 2000-cohort. We selected a liberal stopping rule of p> 0.10 based on the log likelihood ratio. After selection of significant variables (medication, somatic complains, gender, and ethnicity), the variables were put in a normal binary logistic regression to create a model for prediction of neurotic psychological disorders.

The prediction value of the overall model is tested with a Reciever Operating Characteristic Curve (ROC-Curve). The ROC-curve is mostly used in signal-detection theory. It's a way to

visualise the performance of, in this case, a detection method. It visualises the sensitivity as a function of the aspecificity (1-specificity) of a binary classifier (Bradley, 1997). Then, as a validation the model is tested in the 2005-cohort and the ROC-statistic is measured.

The regression coefficients of the predictors in this model were transformed into a prediction rule by dividing each number by the smallest regression coefficient in line, multiply it by ten and rounded to the nearest integer. With a cut-off score these prediction points make a simple instrument, useable as screening tool for daily practice.

Different cut-off scores of the prediction rule were analysed, the best cut-off score for the prediction rule was chosen on grounds of clinical reasoning and the corresponding positive predictive value, negative predictive value, the specificity and the sensitivity were computed.

As a post hoc test the influence of perceived support was examined in patients labelled as high risk for obtaining a neurotic disorder. After selecting a group of patients with high predispositoned risk factors with low perceived support this group is plotted against the groups with an overall lower risk for developing neurotic disorders (low predispositoned risk factors, or high perceived support). By dichotomising the variable perceived support at a cut-off points the trade-off between the positive and negative predictive value of this extra variable was studied.

Results

Descriptive statistics.

The number of participants in this is study is 3791, divided into a 2000-sample and 2005-sample. The dataset had 126 missing values which were excluded from the data analyses. The mean age of the participants was 40 years (SD=12,3 ;range 19-89), of which 2124 were female and 1667 were male. The educational level of the participants was overall at a low level. In the 2005-group it was equally distributed with a 49,3 percent of low level education. The number of somatic complains are not normally distributed in the 2000 group and the 2005 group, the participants with zero complains accounted for around 50-60 percent of the population, one complain around 27 %, 2 complains or more around 17% of the population. The percent of non-Dutch participants accounted for 22% in the population. This is somewhat more than the average in the Netherlands due to the braod definition of non-Dutch. Alcohol abuse was found in 11-12% of the population and consistent over both groups. Medication use was also consistent over the 2000 group and 2005 at a level of 20%. The unemployment rate was somewhat lower in the group included in 2005, 3-4% lower than the level of 21,4% in 2000. In the whole population 2279 people had a unhealthy Body-Mass-Index, this was 50,1% of the population, this percentage was lower in 2005 (45,1%). At follow-up 1228 participants in the whole population were diagnosed with an ICPC-P code by their GP.

To test the use of our descriptive characteristics, they were univariably associated with the outcome variable neurotic disorders (table 2). The predictor female gender was significantly associated with a higher risk of being diagnosed with an ICPC-P code by the GP. The other variables that were significantly associated with the outcome variable were the educational level, number of somatic complains, ethnicity, medication use, unemployment, perceived support.

Table 1 Characteristics of 3791 primary care patients

Characteristics	n(%)total	n(%)2000	n(%)2005
Descriptive characteristics			
Female gender	2543 (55,9)	2124 (56)	419 (55)
Age, years [1]	39,6 (12,3)	39,8 (12,4)	38,7 (11,6)
educational level, low level	2714 (59,6)	2338 (61,7)	376 (49,3)
Number of somatic complains			
0	2527 (55,5)	2076 (54,8)	451 (59,2)
1	1236 (27,1)	1044 (27,5)	192 (25,2)
2	790 (17,4)	617 (17,7)	119 (15,6)
Ethnicity, non-Dutch	996 (21,9)	836, (22,1)	160 (21,0)
Alcohol abuse	539 (11,8)	444 (11,7)	95 (12,5)
Medication use	928 (20.4)	761 (20,1)	167 (21,9)
Unemployment	942 (20,7)	811 (21,4)	131 (17,2)
BMI Overweight	2279 (50,1)	1935 (51,0)	344 (45,1)
Perceived support [2]	44,8 (6,9)	xxxxx	44,8 (6,9)
Outcome variables			
ICPC-P code at follow-up	1228 (27,0)	1036 (27,3)	192 (25,2)
Values are N(%) unless stated otherwise			
[1] Mean (SD)			
[2] Mean (SD)			

Table 2 Univariate analyses of the predictor variables on the dependent variable ICPC-P code.

Predictor variables	ICPC-P				
	Yes	No	Odds ratio (C I 95%)	Beta	P-Value
Female gender	837 (68,2)	1706 (51,8)	2,031 (1,770-2,332)	0,709	0,000
Age, years [1]			1,007 (1,001-1,012)	0,007	0,013
educational level, low level	817 (69,1)	1897 (59,0)	1,556 (1,350-1,794)	0,442	0,000
Number of somatic complains					
0	546 (44,5)	1981 (59,6)	[2]	[2]	[2]
1	378 (30,8)	858 (25,8)	1,598 (1,371-1,864)	0,469	0,000
2	304(24,8)	486 (14,6)	2,269 (1,911-2,695)	0,820	0,000
Ethnicity, non-Dutch	306 (25,0)	690 (20,8)	1,267 (1,086-1,478)	0,236	0,003
Alcohol abuse	131 (13,6)	408 (14,5)	1,083 (,876-1,338)	0,079	0,463
Medication use	351 (28,6)	577 (17,4)	1,906 (1,636-2,221)	0,645	0,000
Unemployment	328 (27,2)	614 (18,6)	1,629 (1,397-1,901)	0,488	0,000
BMI Overweight	1632 (49,5)	647 (52,9)	1,147 (1,005-1,308)	0,137	0,410
Perceived support [3]	42,3 (8,1)	37,6 (7,4)	,933 (,911-957)	-0,069	0,000

Values are N(%) unless stated otherwise

[1] Mean (SD)

[2] Reference group

[3] Mean (SD) in 2005 population

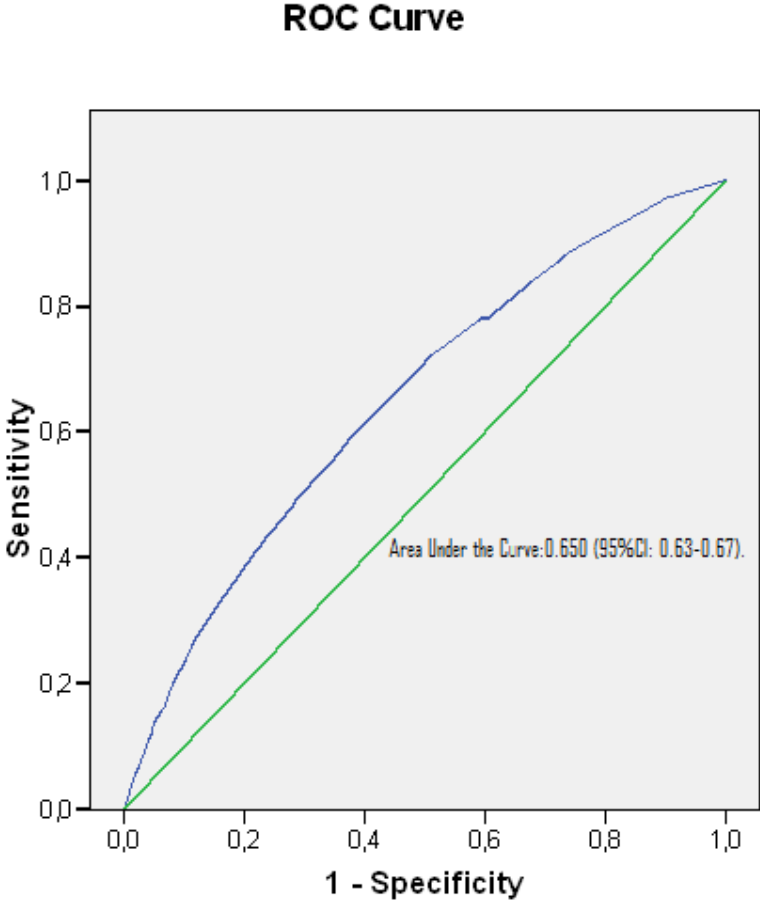## Step one; Multivariate logistic regression modelling.

The significant predictors were used in a stepped backward binary logistic regression to create a model that can screen for neurotic disorders. The results show that only medication use, somatic complains, gender, ethnicity and educational level were significant predictors for acquiring an ICPC-P code from the GP. To double check the model the predictors were put in a normal binary logistic regression to test the overall model in the 2000-cohort. (see table 3). After this a C-statistic was made of the model. The C-statistic was found to be 0.650 (95%CI: .630-.670). This means that the four easily obtainable characteristics predict 65% of

the risk to get a neurotic disorder. As a validation the model was tested in the 2005-cohort, the Receiver Operating Characteristic of the model was found to be .631 (95%CI: .584-.678).

Table 3: Multivariable logistic regression models for the diagnosis of ICPC-P by GP's (2000 cohort)

	Screening Tool step 1	
	Odds Ratio (95% CI)	Beta (P-value)
Female gender	1,825 (1,559-2,134)	0,601 (.000)
educational level, low level	1,425 (1,211-1,677)	0,354 (.000)
Number of somatic complains		
0	1	1
1	1,567(1,318-1,864)	,449 (.000)
2	1,825 (1,495-2,227)	,633 (.000)
Ethnicity, non-Dutch	1,261 (1,058-1,504)	0,234 (.009)
Medication use	1,671 (1,400-1,995)	0,513 (.000)

1 reference category		

Figure 1; Receiver Operating Characteristic of the Multivariable logistic regression model for the diagnosis of ICPC-P by GP's (2000 cohort). The C-statistic was found to be 0.650 (95%CI: 0.63-0.67).

ROC Curve

Area Under the Curve:0.650 (95%CI: 0.63-0.67).

Prediction rule.

Next in our data analysis was the construction of the prediction rule derived from the beta-values of the multivariable logistic regression model. The regression coefficients of the predictors in the model were transformed into prediction values by dividing each number by the smallest regression coefficient in line, and then multiply it by ten and rounded to the nearest integer.

Table 4: A clinical prediction rule for detecting neurotic psychiatric disorder in primary care

Prediction points	0	10	15	19	20	21	22	23	26	27
Medication use							Med			
Educational level	High		Low							
Number of somatic complains (1)				X						
Number of somatic complains (2)										X
Gender	M								F	
Ethnicity [1]	D	ND								

[1] Ethnicity: D=Dutch, ND=Non-Dutch

To define a threshold values for 'high risk for obtaining a neurotic disorder a cut-off point is set. Such threshold values are assessed in a decision analyses that weighs the pros and cons of further diagnostic workup. After evaluation of the trade-off between the different cut-off scores, a cut-off of 43 was chosen. Table 5 shows the sensitivity, specificity, NPV and PPV belonging to a cut-off point of 43. For the analysis of social support the prediction rule is also tested, as a validation, in the 2005 cohort.

Table 5 shows the sensitivity, specificity, positive predictive value and negative predictive value as a result of the prediction rule with a cut-off of 46.

Cohor 2000				Cohort 2005			
Neurotic disorder				Neurotic disorders			
Cut-off	No	Yes	Total	**Cut-off**	No	Yes	Total
<43	1861	499	2360	**<43**	366	89	455
>43	806	502	1308	**>43**	145	83	228
Total	2667	1001	3668	Total	511	172	730
Sensitiviteit =.501				Sensitiviteit =.483			
Specificiteit =.698				Specificiteit =.716			
PPV=.383				PPV= 364			
NPV=.789				NPV=.804			

In the 2000-chohort a cut-off 43 the screening tool has a sensitivity of 50.1% and a specificity of 69.8%. In other words, 50.1% of the patients with a neurotic disorder will be screened as having one with a score of 43 or more, on the other hand 69.8% of the patients without a neurotic disorder will be correctly screened as not having a disorder. The positive predictive value of the screening tool in the 2000 cohort was 38.3% whereas the negative predictive value was found to be 78.9%

The 2005-cohort showed similarities in performance of the classification test: sensitivity was found to be 48.3%, specificity 71.6%, PPV 36.4% and NPV 80.4%.

To compute the positive and negative predictive values one must assure that the ratio of number of patients having a neurotic disorder or not is equivalent to the prevalence in the studied country. The prevalence of neurotic complains in the Netherlands is 164 per 1000, which is similar to our test results.

Step two; perceived support.
After labeling patients in high and low risk groups, as a post hoc test, the influence of the variable perceived support was studied as an extra predictor of neurotic disorders in patients labeled as high risk. Descriptive statistics of perceived support are showed in table 6.

Table 6. Descriptive characteristics of the variable social support. N is given for every predictor variable with the corresponding percentage within the variable perceived support.

Descriptive characteristics	Perceived Support	
	Low	High
Female Gender	75 (60.5)	314 (53.6)
Age, years [1]	40,46(12,164)	36,69 (10,676)
educational level, low level	74 (63.2)	278 (49.1)
Number of somatic complains		
0	71 (57.3)	345 (58.9)
1	19 (15.3)	162 (27.6)
2	34 (27.4)	79 (13.5)
Ethnicity, non-Dutch	45 (36.6)	93 (15.9)
Medication use	33 (26.6)	126 (21.5)
Unemployment	32 (26.0)	89 (15.3)
BMI Overweight	69 (56.6)	254 (43.9)
Values are N(%) unless stated otherwise		
[1] Mean (SD)		

Adding perceived support as an extra predictor in the high risk group creates a second step for screening (table 7). Herein the group with less than 43 prediction points and the group with more than 43 points but with a good perceived support were taken together as an overall low risk group for developing a neurotic disorder. This group was compared with the high risk group patients, which had a score higher than 43 in the screening in the prediction rule and in addition bad perceived support. This group had an overall high risk for developing a neurotic disorder. Dividing high risk patients in an new and more specified risk group creates a screening tool with improved statistical measures of performance: sensitivity is 17.4%, specificity is 95,9% whereas the PPV is 58.8% and NPV is 77.5% (table 8).

Table 7, The cut-off point for the influence of perceived support (PS) for detecting neurotic disorders, with corresponding sensitivity, specificity, positive predictive values (PPV), and negative predictive(NPV) values.

Cutoff 43	Perceived Support (PS)	Neurotic disorder		
		No	Yes	Total
<43	High/Low PS	366	89	455
>43	High PS	124	53	177
>43	Low PS	21	30	51
	Total	511	172	683

Table 8. A 2x2 table is created as a binary classification system that is a follow up of the previous first step screening and divides risk in high and low. Low risk consists of patients scoring below the cut-off of 43 in the first step of screening and people with a score higher than 43 but with a high perceived support. High risk consists of patients with a score above the 43 cut-off and a low perceived support.

Cohort 2005

Risk	Neurotic disorder		
	No	Yes	Total
Low	490	142	632
High	21	30	51
Total	511	172	683

Sensitivity	.174
Specificity	.959
PPV	.588
NPV	.775

Discussion:

The main goal of this article was to create a two-stepped screening tool for the detection of neurotic disorders in primary care. A clinical prediction rule is developed, as a first step, to screen new patients of general practitioners in having a high or low risk for developing a neurotic disorder. The prediction rule contained easily obtainable characteristics and is little time consuming, which guarantees its clinical applicability (Jackson et al., 2001; Zuithoff et al., 2009). The prediction rule is extended by the variable perceived support as an extra step of screening in the group of patients labeled, by the prediction rule, as high risk. This extension improves the discriminative ability, and improves the screening for neurotic disorders. Because of the second step of screening a small group of high risk patients is labeled that can be monitored by the GP.

In the first step of screening, the model, derived from the multiple logistic regression analysis (table 3), shows that the easily obtainable characteristics *gender, educational level, somatic complains, ethnicity* and *medication use* can identify 65% (95%CI: 0.63-0.67) of the patients in primary care having a neurotic disorder in five years follow-up. From these characteristics *gender, the amount of somatic complains* and *medication use* were responsible for the biggest part of the model.

The variables *age, unemployment, alcohol abuse* and *BMI* weren't significant predictors for identifying neurotic disorders. On itself, the predictors were significantly associated with the identification of neurotic disorders; the distinctiveness compared to the other predictor variables was too low, therefore they were excluded.

By deriving prediction points from the beta values of the regression coefficients we offer a simple translation from a scientifically based model to a clinically implementable prediction rule that is clear cut, easy to use and practical for GP's in primary care (Altman & Bland, 1994; Bradley, 1997; M. S. Klinkman et al., 2012; Van Weel-Baumgarten et al., 2000). To screen if a person has a high risk for obtaining a neurotic disorder in five year follow-up, and hereby alerting the GP for this high risk, the prediction rule can be facilitated by a computer program using the data of the intake documentation. For example; a foreign man (10 points) with no educational background (15 points) and severe somatic complains (23 points) the

past year consults the GP. This patient will be categorized as high risk for obtaining a neurotic disorder in five year follow-up because the sum of the prediction points *48* exceeds the cut-off point of *43*. It's important to monitor this patient, and to have in mind his predispositioned risk for obtaining a neurotic disorder. Diffuse complains, stress, nervous feelings, sleeping problems and complains often labeled as life stress can now be evaluated in the light of a neurotic disorder (Henkel et al., 2003; Ormel et al., 1990; Salokangas & Poutanen, 1998; Serrano-Blanco et al., 2009; Terluin et al., 2009).

The choice for the cut-off point of 43 was based on the clinical analysis and the assessment of the sensitivity, specificity, negative and positive predictive values different cut-off scores had. The extra time used for the screening should be limited for the GP, therefore it was important to choose a cut-off point that accurately selected a great part of the population as low risk for obtaining a neurotic disorder. Besides, a high NPV ensures that patient don't unnecessarily become frightened by the label "high risk". Following the prediction rule we created a negative predictive value of .789 (78.9%) The positive predictive value, on the other hand, is .383 (38.3%). This is a somewhat low PPV, but because of the relative low prevalence of neurotic disorders this can be explained. The sensitivity of the cut-off is .501; 50.1% of the patients who will obtain a neurotic disorder are labeled as high risk, whereas the specificity of the cut-off ensures that 69.8% are true negatives. The first step of the two-stepped screening tool provides a good screening of the patients in primary care, solely with the use of already available variables. However, the practical use of the prediction rule as a sole screening tool is not recommended; the tool is not specific enough to select a small group of patients that can be monitored. Without a higher specificity the GP's workload is being too much burdened. This increases the competing demands the GP works with, and reduces quality of healthcare (Henkel et al., 2003; S. Klinkman, 1997; Salokangas & Poutanen, 1998). A second step of screening is recommended to improve the specification of the screening tool and thereby reducing the group of high risk patients which can be monitored.

Concerning a second step of screening, this study has expanded its scope to the examination of the perceived support in patients with a high risk for obtaining a neurotic disorder. The main question posed in the introduction; can the prediction rule, consisting of easily obtainable characteristics, be improved by using the variable perceived support as an

additive variable to screen the high risk group derived from the prediction rule for an all high risk for developing a neurotic disorder.

The use of perceived support, as an extra step of screening, in the high risk group, clearly improves the discriminative ability of the prediction rule and thereby the statistical measures of performance. The results support the use of a two-stepped screening in primary care. A two-stepped screening selects a group (51 out of 638 patients) that can be monitored. This leads to an improved specificity of .959 (95.9%) and positive predictive value of .588 (58.8%). The negative predictive value is almost unharmed, .775 (77.5%). However, the sensitivity is deteriorated to .174 (17.4%). The high specificity was essential in the second step of screening, to create a small group that can be monitored without being too much extra work pressure for the GP. The second step of screening becomes important to create a small and controllable group that can be monitored by the GP. This was an important demand in the clinical relevance of the screening tool.

Besides the use of perceived support in the two-stepped screening, the role of low perceived support is studied as sole contributor to the diminishing of mental well-being, the idea proposed by Sol Ibarra-Rovillard and Kuiper. The results partly overlap with the two stepped screening, but are nonetheless worthy to discuss. Results show that perceived support has a univariable association with the outcome variable neurotic disorder; low perceived support is a predictor for neurotic disorder. This result supports the idea that social support should meet the demands of a given stressful situation. And that, when these demands, are not met it can harm mental well-being (Ibarra-Rovillard & Kuiper, 2011; Linden & Vodermaier, 2012; Lynch et al., 1999; Procidano & Heller, 1983).

On the other hand, the descriptive statistics of perceived support and the other variables suggest a more complex relationship. Descriptive statistics show that the patients with low perceived support were more associated with the predictor variables used to create the multivariable logistic regression model: patients with low perceived support were more often unemployed, visited the GP more often, had a higher BMI, used more medication, were more often non-Dutch, and had a lower level of education. These findings, although not found to be significant due to the lack of significance testing, are in line with the

buffering and coping effects of perceived support on circumstantial characteristics in patients' lives (Cohen & Wills, 1985; Deanm & Lin, 1997; Lepore, 1992).

As mentioned earlier, the results don't offer clear conclusions on the subject of the role of perceived support.

In conclusion: the prediction rule can be used, as a first step, to label the whole patients group into a high and low risk for obtaining neurotic disorders, and alert the GP to patients during his consult having a high risk. Because this screening is solely based on characteristics already known by the GP it is an absolute improvement of current affairs, where these characteristics aren't even considered in the diagnostic phase of a consult. When patients are labeled as high risk the GP can assess the perceived support of patients in one of their consults. When the perceived support is indicated as being low and insufficient the GP can start monitoring this patient more intensive. The role of perceived support and its impact on mental well-being still isn't a hundred percent clear.

In the introduction the underlying reasons for non-recognition are discussed. The most important factors contributing to the non-recognition were the time-consuming costs for a GP, the somatization of psychological complains, the diffuse appearance of the complains, and superficial labeling of deeper psychological problems (Bushnell, 2004; Henkel et al., 2003; Salokangas & Poutanen, 1998; Serrano-Blanco et al., 2009; Zuithoff et al., 2009). To tackle these causes the two-stepped screening tool, posed in this article, is a first step. The easily obtainable characteristics ensure no extra time consumption, whereas the extra information concerning ones predisposition can help in breaking through the superficial view on somatic problems and helps labeling diffuse problems as (possible) psychological funded. The improvement of recognition of neurotic disorders in primary care can improve the outcomes in terms of both psychopathology and social functioning due to better prognosis with earlier recognition. As a result, early recognition reduces healthcare costs by reducing the healthcare consumption.

Limitation

There were some limitations in this study. First, a limitation which reduced the power of the model was the broad selection of psychiatric disorders we chose to screen for. Because of the

wide definition of "neurotic disorders" several predictors lost power. This was foreseen but still important to mention as an important limitation. A second limitation is the sole focus on the high risk group when exploring the role of the perceived support. The reason for this sole focus is mainly clinical merit. By focusing on the high risk group we tried to give a more in-dept understanding of the role of perceived support in patients with a high predisposition for obtaining neurotic disorders. A third limitation is the use of ICPC-P coding instead of the DSM-IV classification system as validation of the GP's diagnosis. Because we used data derived from the records of GP's DMS-IV criteria weren't available. The sole use of ICPC-P codes is somewhat doubtful, DSM-IV classification and diagnosis of a professional psychologist/psychiatrist could offer a more accurate image of the neurotic disorders.

Further research

With this research we hope to have laid a fundament for feature research concerning the detection and screening of psychiatric disorders in primary care. As mentioned in the introduction, the importance of good detection, screening and diagnosis is essential in cutting back healthcare costs and improving prognosis, and outcome of a psychiatric disorder (Bushnell, 2004; Ormel et al., 1990; Zuithoff et al., 2009). We suggest that others pick up where we left of, and try to improve the screening tool proposed in this article by adding more easily obtainable characteristics. Besides studying other predictor variables it can be interesting to look into the broad definition of neurotic disorders, and maybe attempt to create a screening tool containing even more psychiatric disorders recognized by the DSM-IV (e.g. schizophrenia, substance abuse, personality disorders). Another interesting opportunity, derived from this article is the exploration of possibilities on the practical implementation of such a screening tool in primary care.

In conclusion, we developed a prediction rule to improve detection of neurotic disorders in primary care. The earlier recognition of neurotic disorders can improve patients' outcome and prognosis. On the other hand early recognition reduces healthcare costs by reducing the healthcare consumption.

References

Altman, D. G., & Bland, J. M. (1994). Diagnostic tests 2: predictive values. *BMJ*, *309*(July), 16104.

Andrews, G., Stewart, G., Allen, R., & Henderson, A. S. (1990). The genetics of six neurotic disorders: a twin study. *Journal of affective disorders*, *19*(1), 23-9. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2140843

Bijl, R. V., de Graaf, R., Hiripi, E., Kessler, R. C., Kohn, R., Offord, D. R., Ustun, T. B.,. (2003). The Prevalence Of Treated And Untreated Mental Disorders In Five Countries. *Health Affairs*, *22*(3), 122-133. doi:10.1377/hlthaff.22.3.122

Borja, S. E., Callahan, J. L., & Rambo, P. L. (2009). Understanding negative outcomes following traumatic exposure: The roles of neuroticism and social support. *Psychological Trauma: Theory, Research, Practice, and Policy*, *1*(2), 118-129. doi:10.1037/a0016011

Boscarino, J. A. (1995). Post-traumatic stress and associated disorders among Vietnam veterans: the significance of combat exposure and social support. *Journal of traumatic stress*, *8*(2), 317-36. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/7627446

Bovier, P. A., Chamot, E., & Perneger, T. V. (2004). Perceived stress, internal resources, and social support as determinants of mental health among young adults. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*, *13*(1), 161-70. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15058797

Bradley, A. P. (1997). The use of the area under the ROC curve in the evaluation of machine learning algorithms. *Pattern Recognition*, *30*(7), 1145-1159. doi:10.1016/S0031-3203(96)00142-2

Brown, T. A, & Barlow, D. H. (2009). A proposal for a dimensional classification system based on the shared features of the DSM-IV anxiety and mood disorders: implications for assessment and treatment. *Psychological assessment*, *21*(3), 256-71. doi:10.1037/a0016608

Bruce, M. L. (2002). Psychosocial risk factors for depressive disorders in late life. *Biological psychiatry*, *52*(3), 175-84. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12182924

Brunello, N., Blier, P., Judd, L. L., Mendlewicz, J., Nelson, C. J., Souery, D., Zohar, J., et al. (2003). Noradrenaline in mood and anxiety disorders: basic and clinical studies. *International clinical psychopharmacology*, *18*(4), 191-202. doi:10.1097/01.yic.0000073880.93678.68

Bushnell, J. (2004). Frequency of consultations and general practitioner recognition of psychological symptoms. *The British journal of general practice : the journal of the Royal College of General Practitioners*, *54*(508), 838-43. Retrieved from

http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1324917&tool=pmcentrez&rendertype=abstract

Clark, L. a, & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of abnormal psychology*, *100*(3), 316-36. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/1918611

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological bulletin*, *98*(2), 310-57. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/22948789

Coyne, J. C., & Downey, G. (1991, January). Social factors and psychopathology: stress, social support, and coping processes. *Annual review of psychology*. doi:10.1146/annurev.ps.42.020191.002153

Coyne, J. C., & Downey, G. (1991). Social factors and Support , and Coping Processes. *Annual review of psychology*, *42*, 401-425.

Deanm, A., & Lin, N. (1997). Stress-buffering role of social support.pdf. *The journal of nervous and mental disease1*, *165*(6), 403-417.

Dohrenwend, B. P. (1975). Sociocultural and social-psychological factors in the genesis of mental disorders. *Journal of health and social behavior*, *16*(4), 365-2. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/765393

Fryers, T., Melzer, D., & Jenkins, R. (2003). Social inequalities and the common mental disorders: a systematic review of the evidence. *Social psychiatry and psychiatric epidemiology*, *38*(5), 229-37. doi:10.1007/s00127-003-0627-2

George, L. K., Blazer, D. G., Hughes, D. C., & Fowler, N. (1989). Social support and the outcome of major depression. *The British Journal of Psychiatry*, *154*(4), 478-485. doi:10.1192/bjp.154.4.478

Gilman, S. E., Bruce, M. L., Ten Have, T., Alexopoulos, G. S., Mulsant, B. H., Reynolds, C. F., & Cohen, A. (2013). Social inequalities in depression and suicidal ideation among older primary care patients. *Social psychiatry and psychiatric epidemiology*, *48*(1), 59-69. doi:10.1007/s00127-012-0575-9

Henkel, V., Mergl, R., Kohnen, R., Maier, W., & Möller, Jürgen, H.. (2003). BMJ Publishing Group Identifying Depression In Primary Care : A Comparison Of Different Methods In A Prospective Cohort Study Committee (JISC) in the UK . This content is also freely available on PubMed Central . in primary Identifying depression in a p. *British medical journal*, *326*(7382), 201-201.

Huurre, T., Eerola, M., Rahkonen, O., & Aro, H. (2007). Does social support affect the relationship between socioeconomic status and depression? A longitudinal study from

adolescence to adulthood. *Journal of affective disorders*, *100*, 55-64. doi:10.1016/j.jad.2006.09.019

Ibarra-Rovillard, M. S., & Kuiper, N. a. (2011). Social support and social negativity findings in depression: perceived responsiveness to basic psychological needs. *Clinical psychology review*, *31*(3), 342-52. Elsevier Ltd. doi:10.1016/j.cpr.2011.01.005

Jackson, J. L., Houston, J. S., Hanling, S. R., Terhaar, K. a, & Yun, J. S. (2001). Clinical predictors of mental disorders among medical outpatients. *Archives of internal medicine*, *161*(6), 875-9. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11268232

Kaniasty, K., & Norris, F. H. (2000). Help-seeking comfort and receiving social support: the role of ethnicity and context of need. *American journal of community psychology*, *28*(4), 545-81. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10965390

Katon, W., & Schulberg, H. (1992). Epidemiology of depression in primary care. *General hospital psychiatry*, *14*(4), 237-47. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8588008

Kessler, D., Lloyd, K., Lewis, G., & Gray, D. P. (1999). General practice Cross sectional study of symptom attribution and. *BMJ*, *318*(February), 439-439.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2012). Lifetime Prevalence and Age-of-Onset Distributions of.

Klinkman, M. S., Coyne, J. C., Gallo, S., & Schwenk, T. L. (2012). False positives, false negatives, and the validity of the diagnosis of major depression in primary care. *Archives of family medicine*, *7*(5), 451-61. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9755738

Klinkman, S. (1997). Competing Demands in Psychosocial Care A Model for the Identification Disorders in Primary Care, 98-111.

Kroenke, K., Spitzer, R., Williams, J. B. W., Monahan, P. O., & Lowe, B. (2007). Anxiety Disorders in Primary Care: Prevalence, Impairment, Comorbidity, and Detection. *Annals of Internal Medicine Article*, *146*, 317-326.

Krueger, R. F., McGue, M., & Iacono, W. G. (2001). The higher-order structure of common DSM mental disorders: internalization, externalization, and their connections to personality. *Personality and Individual Differences*, *30*(7), 1245-1259. doi:10.1016/S0191-8869(00)00106-9

Lepore, S. J. (1992). Social conflict, social support, and psychological distress: evidence of cross-domain buffering effects. *Journal of personality and social psychology*, *63*(5), 857-67. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/1447698

Lepore, S. J., Evans, G. W., & Schneider, M. L. (1991). Dynamic role of social support in the link between chronic stress and psychological distress. *Journal of personality and social psychology*, *61*(6), 899-909. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/1774628

Lewinsohn, P. M., Zinbarg, R., Seeley, J. R., Lewinsohn, M., & Sack, W. H. (1997). Lifetime comorbidity among anxiety disorders and between anxiety disorders and other mental disorders in adolescents. *Journal of anxiety disorders*, *11*(4), 377-94. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9276783

Lewis, G., Bebbington, P., Brugha, T., Farrell, M., Gill, B., Jenkins, R., & Meltzer, H. (2003). Socio-economic status, standard of living, and neurotic disorder. *International review of psychiatry (Abingdon, England)*, *15*(1-2), 91-6. doi:10.1080/0954026021000045994

Lin, N., Ensel, W. M., Simeone, R. S., Kuo, W., Howard, A., Langner, T., Michael, S., et al. (2013). studies and Illness : A Model and Life Events , Stressful Social Support , Test an Empirical. *Journal of health and social behavior*, *20*(2), 108-119.

Linden, W., & Vodermaier, A. (2012). Mismatch of desired versus perceived social support and associated levels of anxiety and depression in newly diagnosed cancer patients. *Supportive care in cancer: official journal of the Multinational Association of Supportive Care in Cancer*, *20*(7), 1449-56. doi:10.1007/s00520-011-1228-3

Lynch, T. R., Mendelson, T., Robins, C. J., Krishnan, K. R., George, L. K., Johnson, C. S., & Blazer, D. G. (1999). Perceived social support among depressed elderly, middle-aged, and young-adult samples: cross-sectional and longitudinal analyses. *Journal of affective disorders*, *55*(2-3), 159-70. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10628885

Marciniak, M. D., Lage, M. J., Dunayevich, E., Russell, J. M., Bowman, L., Landbloom, R. P., & Levine, L. R. (2005). The cost of treating anxiety: the medical and demographic correlates that impact total medical costs. *Depression and anxiety*, *21*(4), 178-84. doi:10.1002/da.20074

Mineka, S., Watson, D., & Clark, L. a. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual review of psychology*, *49*, 377-412. doi:10.1146/annurev.psych.49.1.377

Muntaner, C., Eaton, W. W., Diala, C., Kessler, R. C., & Sorlie, P. D. (1998). SOCIAL CLASS , ASSETS , ORGANIZATIONAL CONTROL AND THE PREVALENCE OF COMMON GROUPS OF. *Social scientific medicine*, *47*(12), 2043-2053.

Nemeroff, C. B., & Owens, M. J. (2002). Treatment of mood disorders. *Nature neuroscience*, *5 Suppl*(november), 1068-70. doi:10.1038/nn943

Norris, F. H., & Murrell, S. A. (2013). Related to Life Events , of Resources Function Protective in Older Adults and Depression Global Stress ,, *25*(4), 424-437.

Ormel, J., Van Den Brink, W., Koeter, M. W., Giel, R., Van Der Meer, K., Van De Willige, G., & Wilmink, F. W. (1990). Recognition, management and outcome of psychological disorders in primary care: a naturalistic follow-up study. *Psychological medicine*, *20*(4), 909-23. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2284397

Petry, N. M., Barry, D., Pietrzak, R. H., & Wagner, J. A. (2008). Overweight and obesity are associated with psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychosomatic medicine*, *70*(3), 288-97. doi:10.1097/PSY.0b013e3181651651

Pini, S., Perkonnig, A., Tansella, M., Wittchen, H. U., & Psich, D. (1999). Prevalence and 12-month outcome of threshold and subthreshold mental disorders in primary care. *Journal of affective disorders*, *56*(1), 37-48. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10626778

Procidano, M. E., & Heller, K. (1983). Procidano, Mary E., Measures of Perceived Social Support From Friends and From Family: Three Validation Studies , American Journal of Community Psychology, 11:1 (1983:Feb.) p.1. *American Journal of community psychology*, *111*(1), 1.

Mergl, R., Seidscheck, I., Allgaier, A., Moller, H.,Hegerl, U., and Henkel, V. (2007). Depressive , anxiety, and somatoform disorders in primary care: prevalence and recognition.. *DEPRESSION AND ANXIETY*, *195*(August 2006), 185-195. doi:10.1002/da

Russell, D. W., & Cutrona, C. E. (1991). Social support, stress, and depressive symptoms among the elderly: Test of a process model. *Psychology and Aging*, *6*(2), 190-201. doi:10.1037//0882-7974.6.2.190

Salokangas, R. K., & Poutanen, O. (1998). Risk factors for depression in primary care. Findings of the TADEP project. *Journal of affective disorders*, *48*(2-3), 171-80. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9543207

Schulberg, H. C., McClelland, M., & Gooding, W. (1987). Six-month outcomes for medical patients with major depressive disorders. *Journal of general internal medicine*, *2*(5), 312-7. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3655957

Schwarzer, R., & Knoll, N. (2007). Functional roles of social support within the stress and coping process: A theoretical and empirical overview. *International Journal of Psychology*, *42*(4), 243-252. doi:10.1080/00207590701396641

Serrano-Blanco, A., Palao, D. J., Luciano, J. V., Pinto-Meza, A., Luján, L., Fernández, A., Roura, P., et al. (2009). Prevalence of mental disorders in primary care: results from the diagnosis and treatment of mental disorders in primary care study (DASMAP). *Social Psychiatry and Psychiatric Epidemiology*, *45*(2), 201-210. doi:10.1007/s00127-009-0056-y

Simon, G. E., Von Korff, M., Saunders, K., Miglioretti, D. L., Crane, P. K., van Belle, G., & Kessler, R. C. (2006). Association between obesity and psychiatric disorders in the US

adult population. *Archives of general psychiatry*, *63*(7), 824-30. doi:10.1001/archpsyc.63.7.824

Terluin, B., Brouwers, E. P. M., van Marwijk, H. W. J., Verhaak, P. F. M., & van der Horst, H. E. (2009). Detecting depressive and anxiety disorders in distressed patients in primary care; comparative diagnostic accuracy of the Four-Dimensional Symptom Questionnaire (4DSQ) and the Hospital Anxiety and Depression Scale (HADS). *BMC family practice*, *10*, 58. doi:10.1186/1471-2296-10-58

Tyler, K. A. (2006). The impact of support received and support provision on changes in perceived social support among older adults. *International journal of aging & human development*, *62*(1), 21-38. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/16454481

Van Weel-Baumgarten, E. M., Van Den Bosch, W. J., Van Den Hoogen, H. J., & Zitman, F. G. (2000). The validity of the diagnosis of depression in general practice: Is using criteria for diagnosis as a routine the answer? *British Journal of General Practice*, *50*(453), 284-287. Retrieved from http://www.scopus.com/inward/record.url?eid=2-s2.0-0034118063&partnerID=40&md5=0169f921e203a4c6c5c854ae084f06ff

Vinokur, A. D., & van Ryn, M. (1993, August). Social support and undermining in close relationships: their independent effects on the mental health of unemployed persons. *Journal of personality and social psychology*. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8366424

Watson, D. (2005). Rethinking the mood and anxiety disorders: a quantitative hierarchical model for DSM-V. *Journal of abnormal psychology*, *114*(4), 522-36. doi:10.1037/0021-843X.114.4.522

Zuithoff, N. P. A., Vergouwe, Y., King, M., Nazareth, I., Hak, E., Moons, K. G. M., & Geerlings, M. I. (2009). A clinical prediction rule for detecting major depressive disorder in primary care: the PREDICT-NL study. *Family practice*, *26*(4), 241-50. doi:10.1093/fampra/cmp036