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Measuring social support in psychiatric patients and controls: Validation and reliability of the shortened Close Persons Questionnaire

Denise J.C. Hanssen[a,*], Inge M. Rabeling-Keus[b], Peter L.B.J. Lucassen[c], Paul Naarding[d], Rob H.S. van den Brink[a], Hannie C. Comijs[e], Brenda W.J.H. Penninx[e], Richard C. Oude Voshaar[a]

[a] University of Groningen, University Medical Center Groningen, Department of Psychiatry, Groningen, the Netherlands
[b] Radboud University Nijmegen, School of Psychology and Artificial Intelligence, Nijmegen, the Netherlands
[c] Radboud University Nijmegen Medical Centre, Department of Primary and Community Care, Radboud Institute for Health Sciences, Nijmegen, the Netherlands
[d] Department of Old-age Psychiatry, GGNet, Apeldoorn, the Netherlands
[e] Department of Psychiatry / EMGO Institute for Health and Care Research VU University Medical Center / GGZinGeest, Amsterdam, the Netherlands

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ABSTRACT

Although previous studies have underlined the protective role of social support for physical and psychological health, no self-report questionnaires are validated for measuring social support in large-scale psychiatric epidemiological studies. In the current study, we aim to validate the shortened version of the Close Persons Questionnaire (CPQ), a self-report questionnaire that is administered twice to measure social support received from the partner (CPQ-p) as well as from a close friend/family member (CPQ-f). Data of psychiatric patients (n = 1891) and controls (n = 1872) from three Dutch epidemiological studies that assessed determinants of psychopathology were used to validate the shortened CPQ. This included determining factor structure and reliability for the different scales. Using multigroup confirmatory factor analyses, a four-factor model proved to be the best fitting model for both the CPQ-p and CPQ-f. The resulting subscales -emotional support, practical support, negative support experiences, inadequacy of support-showed moderate to good reliability for both the CPQ-p and the CPQ-f, and were all correlated with other social measures in the expected directions. The shortened version of the CPQ proves to be a valid and reliable measure of social support for both psychiatric patients and controls. Further research is needed to assess usability of the shortened version of the CPQ for clinical practice.

Introduction

Many studies have underlined a protective role of social support for physical health outcomes, such as fatigue (Kwag et al., 2011), diabetes and hypertension (Tomaka et al., 2006), coronary heart disease and heart failure (Lett et al., 2005; Luttik et al., 2005), and mortality (Lyyra and Heikkinen, 2006; Holt-Lunstad et al., 2010). Also, higher levels of social support are associated with positive psychological outcomes, like fewer symptoms of depression and anxiety (George et al., 1989; Moak and Agrawal, 2009; Leavy, 1983), lower severity of posttraumatic stress disorder (Schumm et al., 2006), and fewer suicide attempts (Kleiman and Liu, 2013). The association between social support and health seems to be complex and reciprocal, as social support is a protective factor for health (e.g. Kwag et al., 2011; Tomaka et al., 2006), but at the same time good health is a precondition for maintaining social relationships (van Tilburg and Broese van Groenou, 2002). Given the important role of social support for (mental) health, valid and reliable measures of social support are necessary.

Throughout the years, many definitions of social support have been proposed. Researchers have distinguished practical or instrumental support from emotional support (House, 1981), and have suggested additional components of social support, such as informational support, appraisal support (House, 1981), and adequacy of support (Henderson et al., 1981), but so far no consensus has been reached regarding the definition of social support (Vangelisti, 2009; Langford et al., 1997; Thoits, 1982). Nonetheless, several self-report questionnaires are available for measuring social support for research purposes (e.g. Sarason et al., 1983; Sherbourne and Steward, 1991). The Close Persons Questionnaire (CPQ; Stansfeld and Marmot, 1992) has been developed as a measure for self-perceived social support, with good reliability

* Corresponding author. Interdisciplinary Center Psychopathology and Emotion regulation (ICPE), CC72, University Medical Center Groningen, PO box 30001, 9700, RB, Groningen, the Netherlands.
E-mail address: d.j.c.hanssen@umcg.nl (D.J.C. Hanssen).

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rates and moderate to good criterion and construct validity. Although the CPQ consists of three subscales -emotional support, instrumental support and negative aspects of social support- (Stansfeld and Marmot, 1992), the authors also found evidence for a fourth factor, namely 'inadequacy of support'. Previous studies have shown the relevance of measuring (in)adequacy of support in psychiatric patients (e.g. Cramer et al., 1996). More in general, evidence has been found that support from spouses might be stronger related to mental health than support from significant others (Gariepy et al., 2016). Therefore, social support was measured separately for partner and significant others in three Dutch psychiatric epidemiological studies (Penninx et al., 2008; Comijs et al., 2011; Hanssen et al., 2016), using a shortened version of the CPQ. This version is specifically intended for research settings that cover a large battery of tests, with the aim to capture a comprehensive range of aspects of social support with a limited number of questions. However, validity and reliability of this shortened CPQ are still unknown.

Therefore, in the current study, we aim to validate the shortened version of the CPQ and we aim to determine the reliability of the subscales of the CPQ in both psychiatric patients and a comparison group, using data from the Netherlands Study of Depression and Anxiety (NESDA; Penninx et al., 2008), the Netherlands Study of Depression in Older persons (NESDO; Comijs et al., 2011), and the Older Persons with medically Unexplained Symptoms study (OPUS; Hanssen et al., 2016). We will analyze data regarding social support received from the partner (CPQ-p) and from a close friend or family member (CPQ-f) separately.

Material and methods

In the current study, we used data from three Dutch prospective cohort studies about the course and determinants of depressive and anxiety disorder and medically unexplained symptoms (MUS). All three studies were carried out in accordance with the Declaration of Helsinki and were approved by local medical ethics committees. For all three studies informed consent of participants was obtained after the nature of the procedures had been fully explained.

Data sources

The Netherlands study of depression and anxiety (NESDA)

NESDA aims to study the clinical, biological, and psychosocial determinants and consequences of depressive and anxiety disorders in adults (18–65 years). In this multisite, longitudinal, naturalistic cohort study, 1701 participants with an anxiety and/or depressive disorder in the past six months, 907 participants with a life-time diagnosis of depressive and/or anxiety or subthreshold depressive and/or anxiety disorders, and 373 healthy controls with no history of anxiety or depressive disorder, were included from community, primary care, and mental health organizations. A more detailed description of the study sample and procedures can be found in Penninx et al. (2008).

The Netherlands study of depression in older persons (NESDO)

NESDO aims to study neurobiological, physical, and psychosocial determinants and the course of late-life depression in a multisite, naturalistic, prospective cohort study. The NESDO study sample consists of 378 older (> = 60 years) participants with a 6-months diagnosis of (major or minor) depression or dysthymia and 132 older (> = 60 years) participants without a history of depression (non-depressed controls). A more detailed description of the NESDO study can be found elsewhere (Comijs et al., 2011).

The Older Persons with medically unexplained symptoms (OPUS) study

The OPUS study aims to explore biopsychosocial determinants and the course of late-life MUS, using quantitative and qualitative research techniques. As part of this study, 118 older (> = 60 years) persons with MUS and 154 older (> = 60 years) persons with Medically Explained Symptoms (MES) were recruited via advertisements, general practices, and a specialized clinic for treating late-life MUS. A more detailed description of the study sample can be found elsewhere (Hanssen et al., 2016).

Sample of the current validation study

The data of the three previously described epidemiological studies were used to compose a total study sample. To explore the possible impact of a current psychiatric disorder on the factor structure and reliability of the CPQ, the sample was split into 1891 participants with a current (i.e. a past-month) diagnosis of depressive disorder, anxiety disorder, and/or MUS, and a comparison group consisting of 1872 persons without a current psychiatric diagnosis, some of whom suffered from psychiatric disorder in the past ('controls'). Since the CPQ is only relevant in case a partner or a close relative/friend is present, the number of eligible patients and controls decrease to respectively 1102 (58.3%) patients and 1227 (65.5%) controls for the CPQ-p, and 1281 (67.7%) patients and 1346 (71.9%) controls for the CPQ-f.

Measures

The shortened Close Persons Questionnaire: partner version (CPQ-p) and closest family member/friend version (CPQ-f)

The shortened version of the CPQ is a slightly adapted version of the original CPQ (Stansfeld and Marmot, 1992). The key changes compared to the original questionnaire concern 1) translation into Dutch language, 2) the number of items (2 x 15 items in the original questionnaire versus 2 x 10 items in the shortened CPQ, see Tables 2 and 3) the number of response alternatives (4 in the original list: *not at all, a little, quite a lot, a great deal* to 5 in the shortened CPQ: *never, seldom, sometimes, often, very often*), and 4) questions aimed at the two closest persons, regardless of the social relationship, in the original CPQ versus questions specifically aimed at the partner (CPQ-p) and the closest friend/family member (CPQ-f) in the shortened version of the CPQ. Whether or not the CPQ-p and CPQ-f are administered, is determined by asking respectively whether the participant is in a stable relationship at the time (yes/no) and whether the participant has an important friend or family member (yes/no). Copies of the shortened version of the CPQ-p and CPQ-f are available via www.rgoc.nl/downloads.

General and social characteristics

General measures were *age* (in years, at time of interview) and *sex*. The following measures were used to investigate construct validity:

Social network size is defined as the number of family members, friends, and close acquaintances (> =18 years) that one has frequent and important contact with, and was measured using a multiple-choice question with six response alternatives (*0–1*, *2–5*, *6–10*, *11–15*, *16–20*, and *more than 20*).

Loneliness was measured using the Loneliness Scale (De Jong-Gierveld and Kamphuis, 1985), an 11-item questionnaire with response alternatives *no* (score 0), *more or less* (score 1), and *yes* (score 1). The sum score (max. 11) was used as a measure of loneliness, with higher sum scores indicating higher levels of loneliness.

The 6-item version of the *Need for Affiliation* Scale (Van Tilburg, 1988) was administered as a measure of the participant's need for engaging in social relationships. Answering categories were *no* (score 0), *more or less* (score 1), and *yes* (score 1). A sum score (max. 6) was used as a measure of the need for affiliation, with higher scores indicating a higher need for social affiliation.

Data-analyses

All skew and kurtosis values were < 2 (skew) and < 7(kurtosis), indicating acceptable normality (Curran et al., 1996). We hypothesized that the shortened version of the CPQ would consist of three or four

Table 1
General and social characteristics of psychiatric patients and controls presented by study.

				NESDA	NESDO	OPUS	P^a
General characteristics	Psychiatric patients		%(n)	49.0 (1460)	61.4 (313)	43.4 (118)	< .001
	Age	Total	M (SD)	41.86 (13.09)	70.57 (7.34)	72.17 (7.44)	< .001
		Psychiatric patients	M (SD)	41.92 (12.35)	70.50 (7.32)	70.54 (6.72)	
		Controls	M (SD)	41.81 (13.74)	70.69 (7.39)	73.42 (7.74)	
	Female	**Total**	**% (n)**	**66.4 (1979)**	**64.9 (331)**	**52.6 (143)**	**< .001**
		Psychiatric patients	% (n)	66.3 (968)	64.9 (203)	64.4 (76)	
		Controls	% (n)	66.5 (1011)	65.0 (128)	43.5 (67)	
	CPQ-p completed	**Total**	**% (n)**	**63.9 (1905)**	**51.8 (264)**	**58.8 (160)**	
		Psychiatric patients	% (n)	60.7 (886)	47.0 (147)	58.5 (69)	
		Controls	% (n)	67.0 (1019)	59.4 (117)	59.1 (91)	
	CPQ-f completed	**Total**	**% (n)**	**71.0 (2116)**	**62.4 (318)**	**71.0 (193)**	
		Psychiatric patients	% (n)	69.0 (1008)	65.2 (204)	58.5 (69)	
		Controls	% (n)	70.8 (1108)	57.9 (114)	80.5 (124)	
Social characteristics	**Social network size**	**Total**	**M (SD)**	**2.74 (1.13)**	**2.72 (1.24)**	**4.30 (1.61)**	**< .001**
		Psychiatric patients	M (SD)	2.49 (1.03)	2.41 (1.06)	3.99 (1.70)	
		Controls	M (SD)	2.97 (1.18)	3.22 (1.36)	4.51 (1.51)	
	Loneliness score	**Total**	**M (SD)**	**5.36 (3.70)**	**5.42 (3.80)**	**2.61 (2.96)**	**< .001**
		Psychiatric patients	M (SD)	5.98 (3.57)	6.88 (3.36)	3.19 (3.40)	
		Controls	M (SD)	2.93 (3.18)	3.18 (3.31)	2.20 (2.52)	
	Affiliation score	**Total**	**M (SD)**	**4.49 (1.63)**	**4.23 (1.66)**	**3.09 (1.78)**	**< .001**
		Psychiatric patients	M (SD)	4.26 (1.67)	4.16 (1.70)	3.21 (1.84)	
		Controls	M (SD)	4.69 (1.57)	4.35 (1.60)	3.01 (1.74)	

[a] Significance values derived from one-way ANOVAs and chi-square tests.

factors. For both the CPQ-p and CPQ-f, multigroup confirmatory factor analyses were conducted on the raw data using LISREL 8.80 (Jöreskog and Sörbom, 2006). First, configural invariance was tested to investigate whether the structure of social support can be conceptualized in the same way for the patient and control group (Steenkamp and Baumgartner, 1998). To this end, we tested whether the same pattern of fixed and free factor loadings would hold for the two groups.

Next, metric invariance and scalar invariance across the patient and control group were tested. Metric invariance and scalar invariance are necessary requirements if one wants to compare groups with respect to their mean scores on a measurement scale, such as comparing means of the social support subscales between a patient and a control group (Byrne et al., 1989; Ellis, 1993; Reise et al., 1993). When metric invariance holds, this is taken to indicate that the items measure the same latent constructs across different groups. Scalar invariance indicates that group differences in the means of the items can be attributed to group difference in the means of the underlying constructs (Steenkamp and Baumgartner, 1998). To test metric invariance, the factor loadings of the patient and control group were constrained to be equal in both groups. In order to test scalar invariance, in addition to the invariant factor loadings across groups, the intercepts of the items were constrained to be invariant across the patient and control group.[1]

For all factor analyses, maximum likelihood was used to estimate the parameters of the models. In order to define the metric of each latent scale, for each factor the loading of the first item expected to load on that factor was fixed to 1 in each group. The loadings of the other items expected to load on a specific factor were allowed to be free. Each item was allowed to load on only one factor and its loadings on the remaining factors were fixed to zero.

Factor variances, covariances between the factors, and the error variances of the items were all allowed to be free. The error covariances between the items were all fixed to zero. In addition, to be able to test scalar invariance, the factor means in the patient group were fixed to zero and the factor means in the control group were allowed to be free (e.g., see Reise et al., 1993).

Chi-square tests were performed to test the overall fit of the different models. In addition, the fit of the configural invariance model was compared to the fit of the more restrictive metric invariance model and the fit of the metric invariance model was compared to the fit of the more restrictive scalar invariance model. To this end, for each model comparison, we performed chi-square difference tests by computing the difference between the chi-squares and degrees of freedom of both models (Byrne et al., 1989; Reise et al., 1993; Steenkamp and Baumgartner, 1998). Because both the overall chi-square tests and the chi-square difference tests have been shown to be too strict with large sample sizes (e.g., even minor violations of a model will be significant when the sample is large enough), it is generally recommended to use two or more 'practical' goodness-of-fit indexes to evaluate a model in addition to the chi-square goodness-of-fit index (Bentler and Bonett, 1980; Browne and Cudeck, 1992). We therefore used three practical goodness-of-fit-indexes to evaluate the different models: the root mean square error of approximation (RMSEA; Steiger, 1990), the nonnormed fit index (NNFI; Bentler and Bonett, 1980), and the comparative fit index (CFI; Bentler, 1990). RMSEA values equal to or smaller than 0.05 indicate good model fit, values between 0.05 and 0.08 indicate acceptable fit and values higher than 0.08 indicate poor fit (Browne and Cudeck, 1992). For the NNFI and the CFI, values higher than 0.95 indicate good fit of a model, values ranging from 0.90 to 0.95 indicate acceptable fit, and values lower than 0.90 are considered to be indicative of poor fit (Hu and Bentler, 1999).

Based on the results of the factor analyses, subscales were constructed to measure the different aspects of social support. Next, reliability analyses were performed to determine the reliability (Cronbach's Alpha) for each subscale. Following the discussion on the interpretation of Cronbach's alpha values by Taber (2018), and keeping the limited number of items per subscale in mind, for our subscales we will consider Cronbach's alpha's values between .50 and .60 to indicate *moderate* reliability, values between .60 and .75 to indicate *acceptable* reliability, and values higher than .75 to indicate *good* reliability. As a last step, correlations between the newly developed subscales and social network size (ordinal, hence Spearman's correlation), loneliness

[1] Ideally, subpopulation invariance should hold for any possible division of the population into mutually exclusive subpopulations (e.g. see Ellis, 1993). However, in practice it is not realistic to test subpopulation invariance for every possible division. Given the planned future applications of the two scales in medical research, the comparison between patients and controls with respect to social support is one of major importance. We therefore choose to report the results of the multigroup confirmatory factor analyses based on a patient group and a control group. In addition, we also tested subpopulation invariance for groups based on sex and for groups based on age (age < 60 years versus age ≥ 60 years).

Table 2
Completely standardized factor loadings of the 10 items of the CPQ-p on the factors *Emotional support*, *Practical support*, *Negative experiences*, and *Inadequacy of support* for the patient and control group based on the scalar invariance model.

Items[b]	*Patients*				*Controls*			
	Emotional support	*Practical support*	*Negative experiences*	*Inadequacy of support*	*Emotional support*	*Practical support*	*Negative experiences*	*Inadequacy of support*
1. How often did he/she make you feel good about yourself?	.78	-	-	-	.71	-	-	-
2. How often do you share hobbies or other pleasant things together?	.61	-	-	-	.57	-	-	-
3. How often did he/she give you stress or worries?	-	-	.63	-	-	-	.61	-
4. How often do you trust him/her with your most private problems?	.66	-	-	-	.62	-	-	-
5. How often would you have liked to confide in him/her more?	-	-	-	.58	-	-	-	.58
6. How often did you feel bad after talking with him/her?	-	-	.78	-	-	-	.82	-
7. How often did he/she share personal problems with you?	.61	-	-	-	.58	-	-	-
8. How often did you need his/her practical assistance with important matters?	-	.66	-	-	-	.67	-	-
9. How often did you actually receive this practical assistance with important matters from him/her?	-	.97	-	-	-	.90	-	-
10. How often did you want more practical assistance from him/her?	-	-	-	.69	-	-	-	.73

[a]Note that the constraints of equal factor loadings in the metric invariance model and the scalar variance model were made on the unstandardized factor loadings. Because the groups differ with respect to the variances of the factors and the variances of the items, the completely standardized factor loadings are not exactly the same for both groups.
[b] Items are translated from Dutch to improve readability.

Table 3
Correlations between the factors *Emotional support*, *Practical support*, *Negative experiences* and *Inadequacy of support* of the CPQ-p based on the scalar invariance model. Below the diagonal the correlations for the patient group are given, above the diagonal are the correlations for the control group.

	Emotional support	*Practical support*	*Negative experiences*	*Inadequacy of support*
Emotional support	-	.29	-.62	-.36
Practical support	.50	-	-.11	.05*
Negative experiences	-.69	-.31	-	.48
Inadequacy of support	-.41	-.08	.49	-

* Not significant at the .01 level; all other correlations were significant at the .01 level.

(continuous, hence Pearson's correlation), and need for affiliation scores (continuous, hence Pearson's correlation) were calculated to examine the construct validity of the subscales.

Results

Sample characteristics

Table 1 shows general and social characteristics for each study (NESDA/NESDO/OPUS), and separately for patients with a current psychiatric diagnosis and controls.

Construct validity: internal structure

The three-factor structure of the CPQ

Our findings suggest that, for the CPQ-p, the same three-factor model holds across both groups (patients and controls) and that both metric invariance and scalar invariance across groups can be reasonably assumed.[2] Correlations between the factors were significant smaller (i.e., less positive or less negative) for the control group than for the patient group (all p's $< .001$). Please see supplementary file 1 for a detailed description of these results.

For the CPQ-f, however, metric invariance and scalar invariance were not supported. In fact, even the assumption of the same structure of fixed and free factor loadings across groups could be doubted, since the configural invariance model was no more than acceptable according to two practical fit indexes and even unacceptable according to the third fit index.

Please see supplementary file 1 for a more detailed description of these results.

Testing the alternative model: the four-factor structure of social support

Since the three-factor model did not fit the data well, all analyses were repeated for the four-factor solution.

CPQ-p: The fit of the configural invariance model was satisfactory (χ^2 (58) = 225.65, $p < .001$), with practical fit indexes indicating good fit of the model (RMSEA = 0.050, NNFI = 0.97, and CFI = 0.98). Constraining the factor loadings to be invariant across groups did significantly lower the fit of the model ($\Delta\chi^2$ (6) = 13.19, p = .04), however the practical fit indexes remained the same or improved slightly. Overall, the metric invariance model was considered satisfactory (χ^2 (64) = 238.84, $p < .001$; RMSEA = 0.048, NNFI = 0.97, and

[2] The results of the multigroup confirmatory factor analyses based on sex and age showed similar results to the ones described for the patient and control group. For both sex and age, the fit of the scalar invariance model could be considered acceptable to good (for sex: χ^2 (78) = 363.98, $p < .001$, RMSEA = 0.056, NNFI = 0.96, CFI = 0.97; and for age: χ^2 (78) = 327.14, $p < .001$, RMSEA = 0.052, NNFI = 0.97, CFI = 0.97).

CFI = 0.98). Although constraining the intercepts across groups to be equal lowered the fit of the model significantly ($\Delta\chi^2$ (6) = 68.85, p < .001), the practical fit indexes of the overall scalar invariance model indicated an acceptable to good fit of the scalar invariance model (RMSEA = 0.054, NNFI = 0.96, and CFI = 0.97; overall statistical fit of the model: χ^2 (70) = 307.69, p < .001).[3] Given these results, metric invariance and scalar invariance across the patient and control group for the four-factor model can be considered plausible.[4]

In Table 2, the completely standardized factor loadings are given for the scalar invariance model. All factor loadings were significantly different from zero (all p's < .001), and all completely standardized factor loadings were higher than 0.50. In Table 3, the correlations between the factors are shown for each group separately.

CPQ-f: For the configural invariance model, the statistical fit index was significant (χ^2 (58) = 367.39, p < .001) and practical fit indexes indicated acceptable fit of the model (RMSEA = 0.064, NNFI = 0.90, and CFI = 0.94). The fit of the metric invariance model was significantly worse than the fit of the configural invariance model ($\Delta\chi^2$ (6) = 21.12, p = .002), but the practical fit indexes changed only slightly. The overall metric invariance model was still satisfactory (χ^2 (64) = 388.51, p < .001), with practical fit indexes indicating acceptable fit (RMSEA = 0.062, NNFI = 0.91, and CFI = 0.93). The fit of the scale invariance model was significantly worse than that of the metric invariance model ($\Delta\chi^2$ (6) = 61.38, p < .001); the practical fit indexes barely changed. Consequently, also the fit of the scalar invariance model was considered acceptable (χ^2 (70) = 449.89, p < .001), with practical fit indexes indicating acceptable fit (RMSEA = 0.064, NNFI = 0.90, and CFI = 0.92).[5] Given these results, metric invariance and scalar invariance across the patient and control group for the four-factor model can be considered plausible.[6]

In Table 4, the completely standardized factor loadings are given for the scalar invariance model. All factor loadings were significantly different from zero (all p's < .001) and most completely standardized factor loadings were higher than 0.50 (15 out of 20, minimum loading 0.45). The correlations between the factors are given in Table 5.

Reliability analyses

Based on the analyses above, we recommend constructing four different subscales for both the CPQ-p and the CPQ-f, by summing the subscale items (see Appendix). For percentile scores, please see supplementary file 2. For each of these subscales, reliability analyses were conducted for the total group and separately for the patient and the control group. The reliabilities (Cronbach's alpha) for the subscales of the CPQ-p ranged from .571 to .788; for the CPQ-f, these rates ranged from .519 to .845 (see Table 6).

Construct validity: relationships to other measures

When compared to controls, psychiatric patients scored significantly lower on the *Emotional* support scales of the CPQ-p and CPQ-f, but significantly higher on the *Negative experiences* scales and *Inadequacy of* support scales. No significant between-group differences were found for the *Practical* support scales of the CPQ-p and CPQ-f (Table 6). In Table 7, an overview of the correlations between the CPQ subscales and social characteristics is given.

Discussion

Structure of the shortened CPQ

The current validation study supports the construct validity of the CPQ to measure social support from the partner (CPQ-p) and from a close friend or family member (CPQ-f) in psychiatric patients as well as controls.

Results of the multigroup confirmatory factor analyses indicated that the CPQ can best be seen as a scale consisting of four subscales. In line with the literature on social support (Henderson et al., 1981; Stansfeld and Marmot, 1992), each subscale is taken to measure a different aspect of social support. The first subscale is taken to measure *Emotional* support, with higher scores indicating more feelings of understanding from the support giver. The second subscale measures *Practical* support, with higher scores indicating more instrumental help (e.g., help with household activities) from the support giver. The subscale *Negative Experiences* measures the degree to which one has experienced negative consequences as a result of contact with the person, with higher scores indicating more negative support experiences. Finally, the subscale *Inadequacy of* Support refers to the question whether more support is desired, with higher scores indicating that the participant perceives the amount of social support as more inadequate. As described before, this four-factor solution matches the factor solution of the original CPQ (Stansfeld and Marmot, 1992).

The results of the reliability analyses for the CPQ-p and CPQ-f demonstrated acceptable to good reliability rates for the subscales *Emotional* and *Practical* support and moderate to acceptable reliability rates for the subscales *Negative experiences* and *Inadequacy of* support. Reliability rates of the CPQ-p subscales are in general slightly higher than those of the CPQ-f subscales.

The reliabilities of most of the CPQ subscales are lower than the internal consistency reliabilities of the subscales of the original CPQ (0.63–0.85; Stansfeld and Marmot, 1992). Nonetheless, considering the small numbers of items included in the different subscales, the

[3] To further check the robustness of measurement invariance for the CPQ-P, we also studied the effects of releasing single item equality constraints on the factor means. For this, we compared the outcomes based on the full scalar invariance model with a "less strict" scalar invariance model in which, for one item at the time, either the factor loading or the intercept was allowed to vary freely instead of being equal for the two groups (for a similar approach, see Fischer et al., 2018). Freeing single item intercepts or factor loadings led to a significantly better fit in only 8 out of the 20 comparisons (minimum significant better fit $\Delta\chi^2$ (1) = 4.64; maximum significant better fit $\Delta\chi^2$ (1) = 50.54). Factor means remained similar in 15 out of the 20 comparisons (changes of 0.03 or less, while the standard errors of the means were around 0.04), except in 5 cases in which for *Practical support* and *Inadequacy of social support* the factor mean changed more when releasing the factor loading or intercept of the item associated with that factor (range of change: −0.09 to 0.33). However, these changes in factor means did approximately cancel each other out within a scale.

[4] Based on the subpopulations male and female, the fit of the scalar invariance model is acceptable (RMSEA = 0.055) to good (NNFI = 0.96; CFI = 0.97; χ^2 (71) = 323.87, p < .001). Also the multigroup confirmatory factor analyses based on age groups showed an acceptable (RMSEA = 0.052) to good fit (NNFI = 0.97; CFI = 0.97; χ^2 (72) = 296.58, p < .001) for the scalar invariance model. The pattern of completely standardized factor loadings and correlations between the factors for the separate groups (male versus female and young versus old) were fairly similar to the loadings and correlations in the patient and control group.

[5] Releasing factor loadings or intercepts of one item at a time led to a significantly better fit in 10 out of the 20 comparisons (minimum significant better fit $\Delta\chi^2$ (1) = 4.62; maximum significant better fit $\Delta\chi^2$ (1) = 27.47). Freeing these single item parameters did not change the factor means for *Emotional support* and *Negative experiences* (changes of 0.02 or less, while the standard errors of the means were around 0.04). For *Practical support* and *Inadequacy of social support,* factor means changed more than 0.04 in 5 out of the 20 comparisons (range of change: −0.13 to 0.17), although these changes in factor means did cancel each other out within a scale.

[6] The fit of the scalar invariance model across the different age groups is acceptable (RMSEA = 0.069, NNFI = 0.89; CFI = 0.91; χ^2 (70) = 510.34, p < .001). Also the fit of the scalar invariance model based on sex showed an acceptable fit (RMSEA = 0.064, NNFI = 0.91; CFI = 0.93; χ^2 (70) = 440.79, p < .001).

(*footnote continued*)

Table 4
Completely standardized factor loadings of the 10 items of the CPQ-f on the factors *Emotional support*, *Practical support*, *Negative experiences*, and *Inadequacy of support* for the patient and control group based on the scalar invariance model.

Item	*Patients*				*Controls*			
	Emotional support	*Practical support*	*Negative experiences*	*Inadequacy of support*	*Emotional support*	*Practical support*	*Negative experiences*	*Inadequacy of support*
1. How often did he/she make you feel good about yourself?	.57	-	-	-	.57	-	-	-
2. How often do you share hobbies or other pleasant things together?	.47	-	-	-	.46	-	-	-
3. How often did he/she give you stress or worries?	-	-	.49	-	-	-	.45	-
4. How often do you trust him/her with your most private problems?	.60	-	-	-	.60	-	-	-
5. How often would you have liked to confide in him/her more?	-	-	-	.49	-	-	-	.54
6. How often did you feel bad after talking with him/her?	-	-	.91	-	-	-	.90	-
7. How often did he/she share personal problems with you?	.54	-	-	-	.56	-	-	-
8. How often did you need his/her practical assistance with important matters?	-	.89	-	-	-	.90	-	-
9. How often did you actually receive this practical assistance with important matters from him/her?	-	.82	-	-	-	.77	-	-
10. How often did you want more practical assistance from him/her?	-	-	-	.75	-	-	-	.87

Table 5
Correlations between the factors *Emotional support*, *Practical support*, *Negative experiences* and *Inadequacy of support* of the CPQ-f based on the scalar invariance model. Below the diagonal the correlations for the patient group are given, above the diagonal are the correlations for the control group.

	Emotional support	*Practical support*	*Negative experiences*	*Inadequacy of support*
Emotional support	-	.29	-.23	-.03 *
Practical support	.20	-	.00 *	.29
Negative experiences	-.35	.08	-	.25
Inadequacy of support	-.07 *	.29	.25	-

* Not significant at the .01 level; all other correlations were significant at the .01 level.

reliability rates are still considered acceptable.

Construct validity and comparison to previous research

In validating the social support scales, we also studied the relations between the subscales of the CPQ and other social measures. Results of these analyses showed that the social network size was positively correlated with the amount of emotional support, and negatively correlated with negative support experiences and inadequacy of support. These findings are in line with previous suggestions by Antonucci et al. (1997) that quantitative and qualitative measures of social functioning are correlated. A study focusing on late-life depressive symptoms in the community (Sonnenberg et al., 2013) found a positive association between network size and the amount of social support, but only in women. Interestingly, the authors suggest that because of this larger network size, the probability of these social relationships also having negative impact increases, which is opposite to our findings of negative correlations between social network size and negative support experiences/inadequacy of support.

Furthermore, our results show that less emotional support, more negative experiences with support, and more inadequate support are associated with higher levels of loneliness. These results are in line with the results of previous studies, which show that social support and loneliness are related in patient groups (e.g. Stokes, 1985; Jylha and Jokela, 1990). In line with Cacioppo et al. (2010) loneliness may even be considered a general evaluation of social contacts as being inadequate, which in the current study is underscored by the positive correlations between loneliness and inadequacy of support. Finally, no or small correlations were found between CPQ subscales and the levels of need for affiliation. As far as we know, no research has directly studied the relationship between social support and need for affiliation. Overall, the correlations between the CPQ subscales and other social measures were (nearly) all in the expected directions, providing support for the construct validity of the shortened version of the CPQ.

In addition, construct validity of the shortened CPQ was further supported by the observed between-group differences on the CPQ subscales. For both the CPQ-p and CPQ-f, psychiatric patients reported less emotional support, more negative support experiences and more inadequacy of social support than controls without current psychiatric problems. These results are in line with previous research about psychiatric patients and social support, such as the work from Furukawa et al. (1999) and Ritsner et al. (2000).

Strengths and limitations of the shortened CPQ

As the shortened CPQ is able to measure different aspects of social support, it acknowledges the multidimensionality of the concept 'social support'. Also, the shortened CPQ seems to be a suitable measure of social support for large-scale studies, because the relatively few items

Table 6
Mean scores and Cronbach's Alpha values of the four subscales of the CPQ-p and the CPQ-f, for the total group and separately for the patient and control group.

	Subscales		Mean (SD)	Cronbach's Alpha
CPQ-p	Emotional support	Total	15.26 (2.87)*	.749
		Psychiatric patients	14.65 (3.09)	.758
		Controls	15.81 (2.53)	.714
	Practical support	**Total**	**6.58 (2.30)**	**.768**
		Psychiatric patients	6.66 (2.33)	.788
		Controls	6.50 (2.28)	.757
	Negative experiences	**Total**	**4.45 (1.74)***	**.668**
		Psychiatric patients	4.80 (1.85)	.651
		Controls	4.14 (1.56)	.662
	Inadequacy of support	**Total**	**4.87 (2.03)***	**.598**
		Psychiatric patients	5.34 (2.07)	.571
		Controls	4.45 (1.90)	.587
CPQ-f	**Emotional support**	**Total**	**15.11 (2.45)***	**.624**
		Psychiatric patients	14.97 (2.50)	.621
		Controls	15.23 (2.41)	.626
	Practical support	**Total**	**5.62 (2.52)**	**.827**
		Psychiatric patients	5.73 (2.54)	.845
		Controls	5.52 (2.50)	.811
	Negative experiences	**Total**	**3.49 (1.45)***	**.595**
		Psychiatric patients	3.66 (1.55)	.611
		Controls	3.32 (1.33)	.563
	Inadequacy of support	**Total**	**4.27 (1.12)***	**.580**
		Psychiatric patients	4.60 (1.86)	.519
		Controls	3.95 (1.72)	.622

* Group differences between patients and controls: $p < .01$.

Table 7
Correlations between the *Emotional support*, *Practical support*, *Negative experiences* and *Inadequacy of suppor*t subscales and Social network size, Loneliness scores and Need for affiliation scores.

	Social network size[a]	Loneliness[b]	Need for affiliation[b]
Partner			
Emotional support	.21[c]	-.40[c]	.15[c]
Practical support	.03	-.08[c]	.07[c]
Negative experiences	-.15[c]	.36[c]	.03
Inadequacy of support	-.24[c]	.36[c]	.00
Closest friend/family member			
Emotional support	.10[c]	-.24[c]	.17[c]
Practical support	.03	.01	.04
Negative experiences	-.12[c]	.19[c]	.03
Inadequacy of support	-.21[c]	.29[c]	.01

[a] Spearman's rho.
[b] Pearson's r.
[c] Correlation is significant at the .01 level.

require limited amount of time to evaluate different aspects of social support. Most important, in the current study, we showed that the CPQ is appropriate for measuring social support in epidemiological studies with psychiatric samples, as the presented four-factor model was tenable for both a sample of psychiatric patients and a sample of controls without a current psychiatric diagnosis.

However, several limitations of the CPQ-scales should be mentioned. We use a relatively small amount of items to measure a complex and multidimensional concept. As a consequence, we have to accept the relatively low reliability rates for some of the scales, especially the *Inadequacy of* support scale. Also, as we only measured social support given by the patient's partner or closest friend/family member, social support is not measured when one or both of these close persons are absent. Therefore, the presented social support levels in this paper are restricted to patients that have a partner and/or other close person. One the other hand, persons who cannot name any close person probably have negligible levels of social support. Finally, since we did not give clear definitions of a *stable relationship* and *close person*, the interpretation of having a partner or close person may have varied between respondents.

The current study is a first step in understanding the association between social support and psychiatric disorder. Using the CPQ-p and CPQ-f, associations between social support, psychiatric disorder, and other relevant variables should be studied in more depth. One of these might be gender, since spousal support seems more important for men than women (Fuhrer and Stansfeld, 2002). Although our results support the presence of social support problems in patients suffering from psychiatric disorder, differences between patients and controls seem relatively small. This effect size, however, might be an underestimate due to socially desirable answers or participation bias. The proportion of patients and controls having a partner hardly differed in our sample, suggesting that perhaps merely patients with a relatively strong social network have participated in our studies.

In light of our promising results, however, we advocate the use of the CPQ in clinical settings. Not only to explore current social care needs of (psychiatric) patients, but especially to monitor improvements in social support, as social support may mitigate many negative health outcomes.

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Disclosures

The authors declare no conflict of interests.

Appendix A

Instruction for scoring:

- Emotional support: sum of items 1, 2, 4, 7
- Practical support: sum of items 8 and 9
- Negative experiences: sum of items 3 and 6
- Inadequacy of social support: sum of items 5 and 10

Higher scores on the subscales mean:

- more emotional support
- more practical support
- more negative experiences
- more inadequacy of social support

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2019.06.006.

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