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Psychosocial Screening for Patients with Prostate Cancer: the Development and Validation of the Psychosocial Distress Questionnaire-Prostate Cancer (PDQ-PC)

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Abstract

We describe the Psychosocial Distress Questionnaire-Prostate Cancer (PDQ-PC), a psychosocial screening list developed and validated specifically for prostate cancer patients. An existing screening list, the Psychosocial Distress Questionnaire-Breast Cancer (PDQ-BC), was used as a starting point. Two focus groups were then implemented to investigate which items of the PDQ-BC were relevant for the PDQ-PC and which new items were needed. Validity and reliability of the questionnaire were assessed on 278 prostate cancer patients. Factor analysis showed that the 36-item PDQ-PC comprises eight subscales, for which the internal consistency ranged from α=0.48 to α=0.88. Moreover, moderate to high convergent validity was found.

Keywords: prostate cancer, psychosocial screening

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INTRODUCTION

Cancer is the second major cause of death in the Netherlands (National Institute for Public Health and the Environment, 2012). In 2009, the incidence for men was 4.9 and for women 4.0 per 1,000 inhabitants (standardised for age according to the European standard population). Among men, prostate cancer is the most common type of cancer. The incidence of prostate cancer in the Netherlands in 2009 was 1.24 per 1,000 men (National Public Health Compass, 2012). Approximately 70% of men with prostate cancer is 65 years or older (Dutch Cancer Society, 2012).

When prostate cancer is diagnosed, various treatment methods are available: Radical prostatectomy (RP), brachytherapy (BR) or external radiotherapy (ER), hormone therapy (HT), chemotherapy (CT), and a 'wait and see' policy (WS). The consequences of prostate cancer and its treatment vary from 'no symptoms' to pain, fatigue, insomnia, incontinence, bowel problems and, very often, sexual problems (Litwin, 2003; Litwin et al., 2007; Penson, Litwin, & Aaronson, 2003).

Even though the incidence of cancer increases, the number of people dying from it decreases (National Public Health Compass, 2012). For instance, 80% of prostate cancer patients is still alive after 5 years (Dutch Cancer Society, 2012). Carlson and Bultz (2004) stressed that because of this increase, psychosocial care for cancer patients is becoming more and more important, also to reduce health care costs. The Dutch National Cancer Control Programme (2010) emphasized the importance of psychosocial screening and indicated that the first priority is to detect the need for

psychosocial care. It stated that screening for psychosocial problems ought to be integrated in the national guidelines for oncological care.

Most studies among prostate cancer patients report physical ailments, such as urinary problems, bowel problems, and hormonal problems (Eton & Lepore, 2002; Penson, 2007; Sanda et al., 2008; Wei et al., 2002). Men suffering from prostate cancer also often report psychosocial problems related to their illness (Litwin, Lubeck, Spitalny, Henning, & Carroll, 2002; Mehnert, Lehmann, Graefen, Huland, & Koch, 2010). Studies examining psychosocial problems of prostate cancer patients showed conditions like anxiety, depression, traumatic stress disorder, insomnia, masculinity problems, and sexual problems (Bisson et al., 2002; Cliff & Macdonagh, 2000; Couper et al., 2006; Eller et al., 2006; Esper et al., 1997; Eton, Lepore, & Helgeson, 2001; Hervouet et al., 2005; Kiss & Meryn, 2001; Kunkel, Bakker, Myers, Oyesanmi, & Gomella, 2000; Lintz et al., 2003; Litwin, Lubeck, Spitalny, Henning, & Carroll, 2002; Northouse et al., 2007; Pirl, Greer, Goode, & Smith, 2008; Sharpley & Christie, 2007; Voerman et al., 2004; Voerman et al., 2006). Despite the prevalence of psychosocial problems, screening instruments developed specifically for prostate cancer primarily focus on physical problems. Only a few recent screening instruments include items regarding psychosocial aspects (Fujimura et al., 2009; Nelson, Balk, & Roth, 2010; Roth et al., 2006; Van Andel et al., 2008). However, none of these instruments comprehensively screen for the range of psychosocial problems reported in the literature.

The recent development of the Psychosocial Distress Questionnaire-Breast Cancer (PDQ-BC) showed that a 35-item screening is sufficient for detecting psychosocial problems among women suffering from breast cancer (Bogaarts et al., 2010). The PDQ-BC is specifically developed to assess all psychosocial problems for

breast cancer patients, and has shown good validity and reliability (Bogaarts et al., 2010). The aim of the present study was to develop and validate a similar screening measure for prostate cancer, the Psychosocial Distress Questionnaire-Prostate Cancer (PDQ-PC). Because existing studies (Kiss & Meryn, 2001; Wallace & Storms, 2007) found many similarities between prostate cancer patients and breast cancer patients with regard to psychosocial problems they report, we used the PDQ-BC as a starting point.

To examine the convergent construct validity of the PDQ-PC we applied the existing Distress Thermometer (DT), CES-D, STAI, and WHOQOL-Bref scales for psychosocial problems. Based on the existing literature on the PDQ-BC we expected high correlations between the PDQ-PC subscales Trait Anxiety, State Anxiety, and Depressive Symptoms with the STAI scales and the CES-D, whereby the correlations is highest between the corresponding scales. We also expected the PDQ-PC subscales Physical Problems to be highly correlated with the corresponding DT and WHOQOL-Bref scales. PDQ-PC Financial Problems was hypothesized to be highly correlated with the DT and WHOQOL-Bref scales about financial problems. For the PDQ-PC Social Problems high correlations were expected with the WHOQOL-Bref (Social Relationships, Personal Relationships) and the DT (Social Problems). Concerning the subscale Masculinity Problems of the PDQ-PC high correlations were expected with the scales or items concerning sexuality/sex of the DT and the WHOQOL-Bref. Finally, no significant correlations were expected between the PDQ-PC Hormonal Problems and any of the other measures, since these other questionnaires do not measure hormonal problems.

METHODS

The development and subsequent testing of the PDQ-PC consisted of several stages, using the the PDQ-BC as a starting point. Focus groups were conducted with patients to discuss the problems they experienced. Based on the analyses of the focus groups, the PDQ-BC was adapted into the PDQ-PC. Next, a validation study was held with patients from the urology outpatient clinic of the Jeroen Bosch Hospital (n=278). Explorative factor analyses were conducted on every multi-item subscale. Next, confirmatory factor analysis was performed to examine the structure of the PDQ-PC. Correlations between subscales and their reliability were assessed. Finally, the convergent construct validity of the PDQ-PC was examined by means of other scales for psychosocial problems. The development and testing of the PDQ-PC was done, as with the PDQ-BC, in Dutch. The questions of the instrument are translated for the purpose of this publication.

Development of the PDQ-PC

We organized focus groups with prostate cancer patients. A focus group is a group interview in which the communication between the participants about a specified subject is the aim (Kitzinger, 2006). The number of focus groups is dependent on the information resulting from the first two groups. No additional focus groups are needed once saturation of information is reached, i.e., if the last focus group did not reveal any new information (Barbour, 2007). The selection of patients for the focus groups was based on a variation in age, treatment received, time since diagnosis, and severity of illness. We arrived at two focus groups (group 1 consisted of eight patients, group 2 of six patients), both consisting of patients from the urology outpatient clinic of the Jeroen Bosch Hospital in the Netherlands. The patients varied in age, ranging from 61 to 78 years old, and with regard to received type of treatment (4 patients with RP, 4

with BR, 1 with RT, 3 with HT, 2 with a combined RT and HT, and 1 with a combined RP and RT). Two group moderators were present and during the focus group sessions one of them used a flip-over to register items of discussion.The sessions were audio recorded with permission from the patients. We used similar procedures during both focus groups, i.e., patients could freely discuss the problems they experienced following the diagnosis and/or treatment of prostate cancer. Subsequently, the moderators used a list of items reported in the literature to check if all these known problems were discussed and, if necessary, pointed out a missing item to discuss. The interview ended with a discussion about the PDQ-BC. Following the second focus group, it appeared that no new items had emerged and thus no additional focus group was needed.

The analyses of the focus groups consisted of scanning the notes on the flip-overs, the comments on the PDQ-BC, and the audiotapes for items concerning psychosocial problems. When an item was mentioned in both focus groups and by several participants in each group, it was deemed important. When items were perceived as concerning one theme by the authors when analysing the data, the items were combined into one cluster. To cluster the items, we took the PDQ-BC subscale structure as a starting point and added additional subscales clustered by items with a common theme.Based on the results from the focus groups, the PDQ-BC was adapted to fit the prostate cancer population; one item was deleted and four new ones were added. The item “I find it hard to see myself naked” of the PDQ-BC was mentioned in both focus groups as not being relevant.. Therefore, this item was excluded from the new screening list. Hormonal problems were very frequently mentioned. Consequently, we added the following two items; “I experience problems in my hormonal regulation” and “I am more emotional as a consequence of my treatment”.

Another new item was “I experience problems in masculinity”. The fourth and final added item, very frequently mentioned as being a substantial physical problem, was “I suffer from insomnia because of my urinary problems”. Hence, the PDQ-PC initially consisted of 38 items (see Table 1).

Similar to the PDQ-BC, we expected the PDQ-PC to cover the subscales trait anxiety (10 questions, e.g. “I feel nervous and restless”), state anxiety (6 questions, e.g. “I feel relaxed”), depressive symptoms (7 questions, e.g. “I felt depressed”), social problems (3 questions, e.g. “There are practical problems with regard to my work”), social support (1 question, i.e. “I receive enough support from people around me”), body image (1 question, i.e. “I feel physically less attractive as a result of my disease or treatment”), physical problems (5 questions, including the new item “I suffer from insomnia because of my urinary problems”), sexual problems (1 question “I have problems with my sexual life”), and financial problems (1 question “I worry about money”). On face validity we expected a new subscale for hormonal problems, consisting of the two new items on this matter. The item “I experience problems in masculinity” was expected to constitute a single item subscale masculinity. Hence, based on the PDQ-BC and face validity, we expected the PDQ-PC to consist of the clusters pre-determined by the PDQ-BC and two additional subscales for hormonal problems and masculinity. The hypothesized clusters and items are listed in Table 1.

Table 1

Patients

Five hundred patients from the Jeroen Bosch Hospital Urology outpatient clinic database were asked to participate in the validation study. These patients were currently treated or had received treatment for prostate cancer up to 3 years ago. All were known with a positive biopsy of the prostate by the pathology lab, i.e. a Gleason score of at least 4. The inclusion criteria were age 18 years or older and sufficient knowledge of the Dutch language. Patients suffering from dementia or severe cognitive impairments (known or noticed at the time of participation) were excluded. In addition, patients with all different kinds of treatment (RP, RPR, BR, RT, HT, CT, WS) and various stages of the illness were included. Three patients died shortly before inviting them to participate, thus 497 were actually invited to participate in the study. All patients received an information letter, informed consent form, and questionnaires by regular mail and were asked to respond. This study was approved by the local Medical Ethics Committee and all patients gave written informed consent. The data were collected from October till December 2010.

Questionnaires used for validation

CES-D

The Center for Epidemiologic Studies Depression Scale (CES-D) (Hann, Winter, & Jacobsen, 1999; Radloff, 1977) is a self-report questionnaire consisting of 20 items to assess and evaluate the degree of depressive symptoms. The CES-D has a good reliability and validity (Evers, Braak, Frima, & Van Vliet-Mulder, 2011).

STAI

The State Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970) consists of 40 items and makes a distinction between how one generally feels, trait anxiety, and how one feels at the moment, state anxiety, i.e. measures enduring and

transient levels of anxiety. The questionnaire is known to have good reliability and validity (Fountoulakis et al., 2006).

WHOQOL-BREF

The World Health Organization Quality of Life Scale BREF Version (WHOQOL-BREF) (WHOQOL Group, 1998) has 26 items assessing quality of life in four domains (i.e., physical health, psychological health, social relationships and environment) and two items for overall quality of life and general health. Each item is measured with a five-point Likert scale. The WHOQOL-BREF has strong psychometric properties (O'Carroll, Smith, Couston, Cossar, & Hayes, 2000; WHOQOL Group, 1998).

Distress Thermometer

The validated Dutch version of the Distress Thermometer (DT) (Tuinman, Gazendam-Donofrio, & Hoekstra-Weebers, 2008) is a self-report screening on emotional distress in cancer patients. It consists of a visual analog scale, a thermometer ranged from 0 to 10, and is accompanied by a Problem List (PL) made up of 47 dichotomous yes/no items. These items are divided into 5 subscales (practical, family/social, emotional, spiritual, and physical problems) with a good validity, reliability, sensitivity, and specificity. Using a cut-off score of 5, the DT has a high specificity and sensitivity. The total PL has a good reliability and internal consistency and the correlation between the DT and total PL is high (Tuinman et al., 2008).

Statistical procedure

As mentioned before, based on the PDQ-BC and face-validity, we initially expected the PDQ-PC to consist of 11 subscales, namely trait anxiety, state anxiety, depressive symptoms, body image, social problems, physical problems, financial problems,

sexual problems, masculinity problems, hormonal problems, and social support (see Table 1).

To test whether each subscale constitutes one factor, explorative factor analysis was conducted on the six subscales that consisted of more than one item. Next, to examine the a priori structure of the PDQ-PC, a confirmatory factor analysis was performed. Measures of goodness of fit used were the comparative fit index (CFI), the non-normed fit index (NNFI) (Hu & Bentler, 1999) and the root mean square error of approximation (RMSEA) (Browne & Cudeck, 1992). Values of CFI and NNFI close to 1.0 indicate a very good fit and a value close to 0.95 has been suggested as cutoff criteria (Hu & Bentler, 1999). The value of the RMSEA should not exceed 0.1, whereas values of 0.08 or less indicate a reasonable error of approximation and values of about 0.05 or less indicate a close fit of the model in relation to the degrees of freedom (Browne & Cudeck, 1992). The reliability of the subscales was measured using Cronbach's alpha, in which a value of 0.70 or greater was considered adequate (Field, 2006).

The convergent construct validity was studied using Pearson correlations between the subscales of the PDQ-PC and the other questionnaires. An ANOVA was conducted to assess differences in scores on the PDQ-PC between patients with different treatments for prostate cancer. In this analysis, statistical significance was set at $p< 0.01$. For subscales with multiple items, scale scores were computed as the average score. With regard to the treatment of missing values, for patients with a maximum of one missing value on the items of a subscale, the scale score was computed as the average score on the other items of the subscale. SPSS was used to perform the analyses, with SPSS Amos for the confirmatory factor analysis.

RESULTS

Patients characteristics

Of the 497 patients who were invited to participate, 278 (55.9%) returned completed questionnaires. Patient characteristics are shown in Table 2. Participants were elderly men (mean=67.1 years old), of which 60% was aged 65 or older (see Table 2).

Table 2

Internal structure

Subscales

Exploratory factor analysis (EFA) of each of the six PDQ-PC subscales that consisted of multiple items (depressive symptoms, social problems, state anxiety, trait anxiety, physical problems and hormonal problems) showed that two of these subscales (depressive symptoms, social problems) consisted of one factor with an Eigenvalue above 1.0 (with 49.8% explained variance for depressive symptoms and 49.7% for social problems). The state anxiety subscale as well as the trait anxiety subscale consisted of two factors, but this is due to the fact that both subscales were measured by means of positively and negatively formulated items. When taking into account a method or style factor that measures the acquiescence response style (Billiet & McClendon, 2000), only one content factor for each subscale remained. Hence, also trait anxiety and state anxiety each consist of one content factor.

Exploratory factor analyses showed that the subscale physical problems consisted of two factors with an Eigenvalue > 1. Two of the five items refer to sleeping problems and they loaded on the second factor. However, the explained variance for factor 2 (23.4%) was relatively low compared to the explained variance for factor 1 (43.3%) and visual inspection of the scree plot indicated one substantial factor. Hence, we regarded this second factor as less relevant and choose not to make a distinction between sleeping problems and other physical problems. The item "I am satisfied with my level of energy" was dropped from the subscale physical problems due to low item-rest correlation. Removing this item led to a substantial increase in Cronbach's alpha from 0.52 to 0.69. Thus, the final subscale physical problems consisted of four items that cover physical problems related to pain and sleeping problems (explained variance 52.8%).

The two items from the subscale hormonal problems were only moderately correlated (r=0.33) while one of the items ("I am more emotional as a consequence of my treatment") was highly correlated with the items of the depressive symptoms subscale (item-rest correlation =0.62) Thus, this item was moved to the subscale depressive symptoms. Hence, the subscale for hormonal problems consisted of one general item, "I experience problems in my hormonal regulation". Compared with the 7-item depressive symptoms subscale of the PDQ-BC, the PDQ-PC subscale thus consisted of eight items, including the aforementioned additional item ("I am more emotional as a consequence of my treatment").

The items concerning body image ("I find myself less attractive due to my illness or treatment") and sexual problems ("I have problems with my sexual life") showed a moderate correlation (r=0.44). An exploratory factor analysis of these two items and the additional item referring to masculinity ("I experience problems in

masculinity") revealed one factor with an Eigenvalue above 1.0. Therefore, these three items formed a new subscale of the PDQ-PC, named masculinity problems. Finally, there were two single-item subscales for financial problems and social support.

Correlations between subscales

Correlations between the subscales are shown in Table 3. Most correlations were significant ($p< 0.001$), except for the correlation of financial problems with hormonal problems and most of the correlations of social support with other subscales. Social support was not related to six subscales (depressive symptoms, masculinity problems, hormonal problems, social problems, physical problems, and financial problems) and only weakly related to trait and state anxiety. Hence we decided to drop the subscale social support from the PDQ-PC. Note that patients overall reported a high level of social support (mean score 3.32 on a scale from 1 (not at all) to 4 (very much), s.d. 0.78). After removing the two aforementioned items – one item from the subscale physical problems and the single item subscale 'social support' – our PDQ-PC screening instrument consists of 36 items.

Table 3

Goodness of fit

Next, the internal structure of the PDQ-PC was examined by means of confirmatory factor analysis. The hypothesized model, consisting of eight subscales as depicted in figure 1, had a CFI of 0.91, a NNFI of 0.88 and a RMSEA of 0.113 (χ^2 (20) = 83.82, p < .001). Note that an alternative model that included social support as an additional ninth subscale had a significant worse model fit (difference in χ^2 (7) = 23.22, p = .002), which is is line with our decision to exclude social support from the PDQ-PC.

The largest modification index was found for the correlation between the error terms of trait anxiety and state anxiety. This is a plausible addition to the model since both subscales concern feelings of anxiety. When this correlation was added to the model, the goodness of fit improved considerable to a CFI of 0.98, a NNFI of 0.97, and a RMSEA of 0.060 (χ^2 (19) = 36.44, p < .01). Next, the correlation between the error terms of hormonal problems and masculinity problems – two aspects of psychosocial problems typically of prostate cancer – was added to further improve the model fit. This final model (figure 1) had a good model fit (χ^2 (18) = 23.48, p = .17) with a CFI of 0.99 and a NNFI of 0.99. The RMSEA was 0.035 and the test for the closeness of fit showed that this reflected a close fit (p=0.72) (Browne & Cudeck, 1992). Hence, the final PDQ-PC used for analyses consists of eight subscales with a total of 36 items (see Figure 1).

Figure 1

Scores on subscales

Patients had relatively high scores on the subscales for anxiety (trait and state anxiety), masculinity problems, and hormonal problems (see Table 4). The latter two scores

confirm the relevance of adding these subscales for prostate cancer patients. Financial problems apparently did not occur frequently in this population.

Table 4

Treatment effect

Subsequently the effect of type of prostate cancer treatment on patients' PDQ-PC scores was examined. The treatment groups consisted of hormone therapy (HT), wait and see policy (WS), radical prostatectomy (RP), radical prostatectomy by robot (RPR), radiotherapy (RT) existing of both brachytherapy and external radiotherapy, and a combination (C) of some of the aforenamed therapies. Differences were found on the subscales masculinity ($F=2.96$, $p<0.01$) and hormonal problems ($F=3.60$ ($p<0.01$). On the subscale masculinity the treatment groups HT (1.45) and WS (1.47) had a lower mean score compared with the treatment groups RP (1.78), RT (1.80), C (1.85) and RPR (1.97). Since the size of most treatment groups was small, except for the RPR group, only this latter group showed a significant difference with the HT and WS groups. With regard to the subscale hormonal problems the treatment groups RP (1.25), WS (1.31), and RPR (1.37) scored lower than the treatment group HT (1.70), RT (1.76), and C (1.85). Again, due to the small group size, only the C group scored significantly higher on hormonal problems compared to the RP, WS and RPR groups.

Reliability

The reliability of the different subscales of the PDQ-PC measured with Cronbach's alpha was for trait anxiety 0.86 (10 items), state anxiety 0.82 (6 items), depressive symptoms 0.88 (8 items), masculinity problems 0.76 (3 items), social problems 0.48 (3 items), and physical problems 0.69 (4 items). The reliability of all subscales was satisfactory, except for the social problems subscale. In the discussion section, we explain why we kept this subscale as part of the PDQ-PC.

Validity

The correlations of the different subscales of the PDQ-PC with subscales and individual items of the WHOQOL-BREF, the DT, the STAI, and the CES-D are presented in Table 5. High convergent validity was found for the subscales trait anxiety, state anxiety, depressive symptoms, masculinity problems (moderate to high), physical problems, and financial problems. Moderate convergent validity was found for social problems. As expected, we found only weak or moderate correlations for the subscale hormonal problems as none of the other questionnaires included such a specific scale or item.

Table 5

DISCUSSION

The aim of the present study was to develop a psychosocial screening instrument specifically for prostate cancer patients, the PDQ-PC, and to investigate the psychometric properties of this questionnaire. The PDQ-PC is a 36-item screening list

with good psychometric properties and a good model fit. Except for the social problems subscale, which consists of only three items, all subscales have a satisfactory reliability. This result is similar to the PDQ-BC (Bogaarts et al., 2010). An explanation for these results is that the subscale social problems consists of a wide variety of items (Bogaarts et al., 2010). Moreover, subscales consisting of fewer than four items are known to have a lower reliability (Cohen, 1988).

The newly constructed subscale masculinity (3 items) has a good internal consistency. These items appear to be more homogeneous as attractiveness and sexual problems are strongly related to masculinity. This is confirmed in the literature where loss of sexuality in prostate cancer patients undermines their feeling of masculinity (Bokhour, Clark, Inui, Silliman, & Talcott, 2001). Reduction of penis size, as a possible consequence of a prostatectomy, is also expected to influence feelings of masculinity (Oliffe, 2005).

Compared with the PDQ-BC (Bogaarts et al., 2010), the item "I am satisfied with my level of energy" didn't contribute to a better reliability of the new subscale "physical problems" and was, therefore, deleted from the scale. A possible explanation is the fact that a new item "I suffer from insomnia because of my urinary problems" was added to this scale. Through adding this new item, physical problems now consisted of two items specifically referring to sleep problems and two items referring to pain problems. The general item regarding the level of energy seems to tap into another part of physical problems.

Initially, based on the PDQ-BC, we included a subscale for social support. However, this was not or hardly related to other subscales. Consequently, this subscale was dropped. Thus, the PDQ-PC consists of eight subscales that together assess psychosocial problems of prostate cancer patients.

Examining differences in PDQ-PC scores for the different treatment groups revealed significant differences on the subscales masculinity problems and hormonal problems. This underlines the idea of the importance of a tailor-made screening instrument for the prostate cancer population, since it discriminates exactly on the two unique subscales constructed in this study. For the masculinity problems subscale, the significant lower mean score of the WS treatment group is not surprising as no treatment is yet conducted causing change in the physical condition of the patients. However, the low mean score of the HT treatment group is surprising, since physical and emotional change as a result of hormonal changes can affect sexuality, body image and masculinity (Walker & Robinson, 2010). These results may be explained by the age of this patient group. In the southern part of the Netherlands, where the Jeroen Bosch Hospital is situated, hormone therapy is the main treatment for prostate cancer of men aged over 70 years (Houterman, Janssen-Heijnen, Hendrikx, Van den Berg, & Coebergh, 2006). In our study, the mean age of the HT treatment group is 77, which is relatively high compared to the average age of 67 years. In this age range, sexual activity decreases with age due to a decline in androgen levels and (prostate cancer and other) medical problems (Hyde et al., 2010). This does not imply that elderly men attach little importance to sexuality, but since they were already familiar with these circumstances they may report relatively few masculinity problems.

The higher prevalence of masculinity problems among the RP, RT and RPR treatment group are as expected. These treatments can (for the RT treatment group on the longer term) cause impotence which affects their sexual activity and also feelings of masculinity. For the subscale hormonal problems, besides the mean score of the RT treatment group, all results are as expected and similar to results in earlier research

(Sanda et al., 2008). The higher mean scores of the C treatment group on both masculinity and hormonal problems are also expected.

Similar to the results of the PDQ-BC (Bogaarts et al., 2010), the constructed model for PDQ-PC appears to have a good fit, which means the questionnaire is well tailored to the target population. The convergent validity of the PDQ-PC is also satisfactory as most subscales show high correlations with corresponding subscales of domains of different questionnaires. An explanation for the moderate convergent validity of the social problems subscale, as well as its moderate reliability, is the heterogeneity of the items of this subscale.

Finally, this study was based on the PDQ-BC (Bogaarts et al., 2010), a reliable and well validated screening list with a proper referral system which strengthens our study. The Dutch national health council recommends monitoring of psychosocial problems. Currently, they recommend the application of the DT questionnaire, a generic cancer questionnaire. The PDQ-PC is specifically developed for use in prostate cancer patients. Comparing the different subscales of the PDQ-PC with the total Problem List (PL) of the DT indicates that both instruments assess the more general cancer related psychosocial subscales trait anxiety, state anxiety, depressive symptoms, social problems and physical problems. However, for the psychosocial problems specifically for prostate cancer – hormonal problems and masculinity problems – the correlations are lower. In addition, the response format of the PDQ-PC provides patients with the opportunity to indicate the extent to which they experience the problems - something which is not the case with the dichotomous (yes/no) answer format of the DT.

There are also some limitations. Only 56% of the selected population participated in the study. However, analysis of the demographics shows us that the

population in this research does consist of elderly men, with 60% of age 65 or older. This is consistent with the fact that 70% of the prostate cancer population is older than 65 years (Dutch Cancer Society, 2012). Another limitation is that no results are available on the test-retest reliability and sensitivity to change of the PDQ-PC. Future studies will be performed to investigate these measures. Also, a referral system will be constructed, as previous work shows that it adds clinical value to this kind of screening instrument (Bogaarts et al., 2010). As stated, the development of the PDQ-PC was based on the PDQ-BC for breast cancer patients. Bogaarts and colleagues (2010) examined the referral advice based on the PDQ-BC and concluded that referrals based on the PDQ-BC to the various psychosocial care providers were justified.

In conclusion, we have developed a useful prostate cancer specific easy to complete psychosocial screening list (PDQ-PC) which has good psychometric properties.

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Table 1. Overview of hypothesized clusters and items

Cluster	No. of items	Items
Trait anxiety	10	Generally: 'I feel nervous and restless'; 'I feel calm and collected'; 'I feel that difficulties are piling up so that I cannot overcome them'; 'I worry too much over things that really don't matter'; 'I am bothered by disturbing thoughts'; 'I feel secure'; 'I feel at ease'; 'I am a steady person'; 'There are thoughts that are difficult to put out of my mind'; 'I get in a state of tension or turmoil as I think over my recent concerns and interests'.
State anxiety	6	At this moment: 'I feel calm'; 'I am tense'; 'I feel confused'; 'I feel relaxed'; 'I feel satisfied'; 'I am worried'.
Depressive symptoms	7	Over the last week: 'I felt depressed'; 'I felt that I could not shake off the blues even with the help of my family or friends'; 'I felt everything I did was an effort'; 'I felt sad'; 'I was bothered by things that don't usually bother me'; 'I had trouble keeping my mind on what I was doing'; 'I felt fearful'.
Social problems	3	'There are practical problems with regard to my family as a result of the disease and treatment'; 'My disease and treatment has impeded my social relations'; 'There are practical problems with regard to my work'.
Social support	1	'I receive enough support from people around me'.
Body image	1	'I feel physically less attractive as a result of my disease or treatment'.
Physical problems	5	'I suffer physical pain'; 'I have difficulties with sleeping'; 'Physical pain prevents me from doing my daily activities'; 'I suffer from insomnia because of my urinary problems'; 'I am satisfied with the energy that I have'.
Sexual problems	1	'I have problems with my sexual life'
Financial problems	1	'I worry about money'.
Hormonal problems	2	'I experience problems in my hormonal regulation'; 'I am more emotional as a consequence of my treatment'.
Masculinity	1	'I experience problems in masculinity'.

Table 2. Characteristics of the prostate cancer patients (N=278)

	Number	% [1]
Partner [2]		
Partner	245	91
No partner	25	9
Living together [3]		
With a partner	229	87
Without partner	33	13
Children [4]		
Having children	244	91
Having children at home [5]	29	11
Having children, not at home [6]	213	84
No children	25	9
Status of employment		
Still working	50	18
Falling under Sickness Act	9	3
Unable to work	16	6
Retired	203	73
Treatment		
Radical Prostatectomy (RP)	19	7
Radical Prostatectomy by robot (RPR)	119	43
Hormone Therapy (HT)	21	8
Radiotherapy: Brachytherapy (BR) or External Radiotherapy (RT)	17	6
Wait and See policy (WS)	33	12
Combination therapy	65	23
Unknown	4	1
	mean	sd
Age range 43 - 88 yr	67.1	7.4

[1] Rounded to nearest whole number; [2] missing information for 8 patients; [3] missing information for 16 patients; [4] missing information for 9 patients; [5] missing information for 29 patients; [6] missing information for 25 patients.

Table 3. Correlations between the subscales of the PDQ-PC and social support.

	PDQ-PC Trait anxiety	PDQ-PC State anxiety	PDQ-PC Depressive symptoms	PDQ-PC Masculinity problems	PDQ-PC Hormonal problems	PDQ-PC Social problems	PDQ-PC Physical problems	PDQ-PC Financial problems
PDQ-PC State anxiety	0.734							
PDQ-PC Depressive symptoms	0.646	0.628						
PDQ-PC Masculinity problems	0.393	0.425	0.497					
PDQ-PC Hormonal problems	0.256	0.270	0.398	0.414				
PDQ-PC Social problems	0.441	0.477	0.636	0.450	0.278			
PDQ-PC Physical problems	0.340	0.352	0.428	0.240	0.241	0.429		
PDQ-PC Financial problems	0.308	0.358	0.356	0.264	0.099	0.330	0.238	
Social support	-0.234	-0.197	-0.051	-0.100	0.028	-0.090	-0.011	-0.072

Note: All correlations are significant ($p < 0.001$) except the correlation of Financial Problems with Hormonal Problems ($p > .10$), and the correlations of Social Support with respectively Depressive Symptoms, Masculinity, Hormonal Problems, Social Problems, Physical Problems, and with Financial Problems (all $p > .10$).

Table 4. Mean scores and standard deviations on the subscales[1] of the PDQ-PC.

	Mean	s.d.
Trait anxiety	1.68	.55
State anxiety	1.62	.55
Depressive symptoms	1.37	.47
Masculinity problems	1.82	.72
Hormonal problems	1.52	.79
Social problems	1.30	.45
Physical problems	1.44	.51
Financial problems	1.21	.52

[1] The subscales consist of questions with response options ranging from 1 (not at all) to 4 (very much). N for each subscale ranges from 261 to 266.

Table 5. Correlations between the subscales of the PDQ-PC and other scales for psychosocial problems.

	PDQ-PC Trait anxiety	PDQ-PC State anxiety	PDQ-PC Depressive symptoms	PDQ-PC Masculinity problems	PDQ-PC Hormonal problems	PDQ-PC Social problems	PDQ-PC Physical problems	PDQ-PC Financial problems
STAI Trait	**.75****	.79**	.74**	.44**	.26**	.49**	.48**	.39**
STAI state	.74**	**.79****	.66**	.40**	.22**	.46**	.43**	.33**
CES-D	.67**	.69**	**.66****	.42**	.19**	.50**	.51**	.42**
WHOQOL sexual life item [1]	-.34**	-.31**	-.35**	**-.68****	-.34**	-.29**	-.18**	-.22**
DT sexuality problems item [2]	.24**	.19**	.26**	**.59****	.33**	.25**	.08	.16**
WHOQOL physical appearance item [3]	-.36*	-.45**	-.41**	**-.34****	-.27**	-.37**	-.34**	-.16*
WHOQOL social relationships subscale	-.41**	-.39**	-.37**	-.60**	-.25**	**-.31****	-.19**	-.26**
WHOQOL personal relationships item [4]	-.34**	-.34**	-.31**	-.39**	-.06	**-.23****	-.08	-.24**
DT family/social subscale	.09	.16*	.10	.10	-.01	**.15***	-.04	.21**
WHOQOL physical subscale	-.49**	-.54**	-.47**	-.21**	-.17**	-.49**	**-.65****	-.23**
DT physical subscale	.34**	.40**	.42**	.24**	.21**	.42**	**.56****	.25**
WHOQOL financial item [5]	-.21**	-.27**	-.25**	-.23**	-.04	-.26**	-.26**	**-.55****
DT financial item [6]	.21**	.25**	.29**	.27**	.10	.31**	.15*	**.62****
WHOQOL environment subscale	-.48**	-.53**	-.42**	-.28**	-.10	-.46**	-.42**	-.38**
DT practical problems list	.24**	.31**	.41**	.17**	.05	.49**	.24**	.42**
DT religious or spiritual problems list	.15*	.13*	.11	.09	.07	.10	.20**	-.05

Note: Correlations we expected to be moderate to high, indicating convergent validity, are in bold.
** $p < .01$, * $p < .05$.
[1]A specific item of the WHOQOL social relationships subscale: satisfaction with sexual life.
[2]A specific item of the Distress physical problem list: sexuality.
[3]A specific item of the WHOQOL psychological health subscale: acceptance of physical appearance.
[4]A specific item of the WHOQOL social relationships subscale: satisfaction with personal relations.
[5]A specific item of the WHOQOL environment subscale: enough money to satisfy needs.
[6]A specific item of the Distress practical problem list: financial problems

Figure 1. Confirmatory factor model of the 8 subscales of the PDQ-PC