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*Published in:*  
Scandinavian Journal of Caring Sciences

*DOI:*  
[10.1111/scs.12366](https://doi.org/10.1111/scs.12366)

2017

*Document Version:*  
Peer reviewed version (aka post-print)

[Link to publication](#)

*Citation for published version (APA):*  
Selan, D., Jakobsson, U., & Condelius, A. (2017). The Swedish P-CAT: modification and exploration of psychometric properties of two different versions. *Scandinavian Journal of Caring Sciences*, 31(3), 527-535. <https://doi.org/10.1111/scs.12366>

*Total number of authors:*  
3

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# **The Swedish P-CAT: Modification and exploration of psychometric properties of two different versions**

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## ABSTRACT

The aim of this study was to further investigate the psychometric properties (with focus on construct validity and scale function) of the Swedish version of the Person-Centred Care Assessment Tool (P-CAT) in a sample consisting of staff working in elderly care units (N=142). The aim was also to further develop and psychometrically test a modified, non-context specific, version of the instrument (mP-CAT) in a sample consisting of staff working in primary health care or within home care for older people (N=182). Principal component analysis with varimax rotation initially suggested a three factor solution for the P-CAT, explaining 55.96% of variance. Item 13 solely represented one factor wherefore this solution was rejected. A final 2-factor solution, without item 13, had a cumulative explained variance of 50.03%. All communalities were satisfactory ( $>0.3$ ) and alpha values for both first factor (items 1-6, 11) and second factor (items 7-10, 12) were found to be acceptable. Principal component analysis with varimax rotation suggested a final 2-factor solution for the mP-CAT explaining 46.15% of the total variance with communalities ranging from 0.263 to 0.712. Cronbach's  $\alpha$  for both factors was found to be acceptable ( $>0.7$ ). This study suggests a 2-factor structure for the P-CAT and an exclusion of item 13. The results indicated that the modified non-context specific version, mP-CAT, seems to be a valid measure. Further psychometric testing of the mP-CAT is however needed in order to establish the instrument's validity and reliability in various contexts.

**Key words:** Home care services, Validations studies, Primary health care, Geriatric nursing, Person-centered care

## INTRODUCTION

A successful implementation and sustainability of person-centred care (PCC) requires continuous evaluations and valid measurements to establish to what extent this goal has been achieved (1). Some instruments measuring PCC have been developed over the years, but there are no developed measures that are applicable in many different settings. This means that there are situations where no valid PCC measures may be available. However, a non-context specific instrument measuring PCC in more general terms might solve this problem.

The Person-centred Care Assessment Tool (P-CAT) (2) is a self-assessment questionnaire that is often referred to in medical literature and is one of the most used tools measuring the broad concept of PCC (3, 4). P-CAT was initially constructed and developed in elderly care in Australia (2) and it measures the extent of PCC in residential aged care settings, rated by the staff employees. The instrument contains 13 items divided into three subscales. The first subscale, “Extent of personalising care”, consisting of items 1-6 and 11, represents elements describing PCC as *treating people as individuals, looking at the world from the person’s perspective, maintaining personhood, taking the patient’s standpoint, acknowledging personal experience*. The second subscale, “Amount of organisational support” (items 7-10) represents elements as *valuing staff and social environment as a therapeutic agent creating positive social environment*. The third subscale (items 12 &13) “Degree of environmental accessibility” represents elements as *creating positive social environment and social environment as a therapeutic agent*. The 3-factor structure was suggested based on an explorative factor analysis and the three subscales explained 55.9% of the total variance. The first subscale explained 35.7%; the second subscale 11.7% and the third subscale 8.4% of the

total variance (2). The internal consistency has been shown to be satisfactory with a Cronbach's alpha of 0.81 for subscale 1 and 0.77 for subscale 2. However, the subscale 3 containing items 12 and 13 had a Cronbach's alpha as low as 0.31. Item-total correlation for the total scale ranged from 0.41-0.84 where item 13 had an item-total correlation of 0.4. The range for the remaining items (1-12) was 0.82-0.84 (2). Furthermore, corrected item-total correlation ranged from 0.31-0.63 where items 4 (0.31), 12 (0.33) and 13 (0.35) had the lowest value. Thus, the initial development and psychometric testing of the P-CAT showed a rather logical 3-factor structure but the homogeneity of each subscale is not really convincing. Thus, more research is needed regarding the psychometric properties of the instrument.

In recent years, three more versions of the instrument have been developed (i.e. translated into three languages) (5-7). The three versions are in Chinese, Norwegian and Swedish. Both the Swedish and Norwegian versions have 13 items while the Chinese version has 15 items. In the psychometric evaluation of the Chinese version confirmatory factor analyses were conducted (with a total of 24 items at start, subsequently condensed into 15 items) resulting in a 3-factor solution with acceptable construct validity, criterion validity and reliability (i.e. homogeneity) (5). For the Norwegian version, construct validity (i.e. factor structure) and reliability (i.e. test-retest & homogeneity) were assessed (6). The results showed a two factor solution (mostly in line with the English version but items 1-7 and 13 were connected to the first subscale while items 8-12 were connected to the second subscale). Sjögren et al. (7) performed both an explorative and a confirmatory factor analysis and found that two subscales ("Extent of personalising care" and "Amount of organisational and environmental support") were the most appropriate for the Swedish version of P-CAT. The results showed acceptable reliability (test-retest and homogeneity). However, the exploratory factor analysis

showed rather low communalities for items 4 (0.26), 12 (0.20) and 13 (0.20), indicating that these items perhaps should be revised or deleted. Sjögren et al. (7) also reported low corrected item-total correlation for items 2, 4 and 12. Item 13 had a value of 0.31, just above the cut-off point ( $> 0.3$ ). In addition, in the discussion Sjögren and colleagues highlighted the need of further cross-validation of the instrument in various settings and samples. Hence, there is no firm consensus regarding the factor structure and psychometric properties indicating an explicit need for further psychometric evaluation of the P-CAT instrument.

It has been argued that the care environment is of importance for PCC (8-11), and in line with this various instruments measuring PCC have been developed for specific contexts (3). However, these measures are in general not validated beyond this context (4) leading to a limitation in its applicability. The P-CAT instrument is no exception from this, since it was developed and has only been validated for residential aged care setting. A less context specific questionnaire is needed in order to extend the instrument's ability to measure PCC in a broader context.

The purpose of this study was to further investigate the construct validity and scale function of the Swedish version of the P-CAT instrument, for measuring PCC in a residential care setting. Furthermore, the purpose was to develop and psychometrically evaluate (with focus on construct validity and scale function) a modified non-context specific version of the instrument and to explore its psychometric properties in a primary care/home care sample.

## METHOD

### Measurement

#### *P-CAT – Swedish version*

The P-CAT instrument (7) measures the extent to which staff employees at aged care unit rate the care as being person centred. It is comprised of 13 items phrased as statements and response alternatives ranging from “*Disagree completely*” to “*Agree completely*” scoring 1 to 5 on a Likert-scale. Five items (item 7, 8, 9, 10 & 12) of the P-CAT are negatively worded and hence need to be reversed before analysing data and calculating a total score. The range of the total score is 13 to 65. A higher score indicates a higher extent of person centeredness. There are two subscales in the P-CAT (7) of which the first subscale represents the dimension “Extent of personalising care” (Cronbach’s  $\alpha = 0.73$ ) consisting of items number 1 – 6, 11 and 13 (7). The second subscale represents the dimension “Amount of organisational and environmental support” (Cronbach’s  $\alpha = 0.72$ ) consisting of items number 7 – 10 and 12. Internal consistency for the whole scale has been shown to be satisfactory with an alpha value of 0.75 and Cronbach’s alpha, if item deleted, ranged from 0.69 to 0.75 (7). Test-retest reliability for the total score and the subscales have been tested (with e.g. intra-class correlations) and showed good test-retest reliability (ICC for total scale: 0.75 and 0.64-0.69 for the two subscales) (7).

#### *Modification of P-CAT (mP-CAT)*

The modification of P-CAT (mP-CAT) was a collaboration initiated between the third author (A.C) in this paper and one of the founders (D. Edvardsson) of the English version of P-CAT (2). The collaboration aimed at developing a new, less context specific, version of the P-CAT. P-CAT was constructed to measure person-centred care in nursing homes and with respect to



factors of significance for good care of people with dementia. Thus, the importance of an environment that is adapted to a person with dementia is emphasised in some of the items i.e. that the person is not exposed to sensory overload and chaos (item 8), that the environment is homelike (item 9), facilitates orientation (item 11) and that meaningful daily activities and outdoor activities are offered and facilitated (item 6 and 13) (7). To be suitable in other healthcare settings and in the care of people without dementia the items were discussed and rephrased.

Initially the wording “the resident” was changed to “the individual”. Item 6 was rephrased from “Residents are offered the opportunity to be involved in individualised everyday activities” to “The care is based on individual needs”. The intention was to preserve the core of the item i.e. the extent of individualised care but with recognition of that daily activities are not offered or relevant in all health care settings. Item 8 was rephrased from “The environment feels chaotic” to “The environment prevents me from providing person-centred care”. Consequently the item was made more similar to item 10 (“The organisation prevents me from providing person-centred care) but with a distinct focus on the environment as an obstacle to person-centred care in general, without regard to the specific needs of a person with dementia. Item 9 “We have to get the work done before we can worry about a homelike environment” was rephrased to be applicable in other healthcare settings to “We have to get the work done before we can worry about creating an environment based on individual needs”. Since daily assessments are not practicable in all health care settings item 11 was rephrased from “Assessment of residents’ needs is undertaken on a daily basis” to “Assessment of the individual needs is undertaken at every encounter”. Item 12 was rephrased from “It is hard for residents in the facility to find their way around” to “It is hard for the individual to move in the environment”. Thus, the item retains its focus on the degree of

environmental accessibility but without regard to the specific needs of a person with dementia. Item 13 “Residents are able to access outside space as they wish” was rephrased to “We take into consideration the individuals’ desires of the care provided”. Previous research has indicated that there are problems with this item regarding its belonging in the factor structure of P-CAT (7). The intention was to solve this problem by putting a more evident emphasis on the actions among staff in relation to the desires of the individual than previously. The ambition was also to make the item suitable in healthcare settings where access to outside space is not relevant.

Since the modified version of P-CAT was going to be tested among staff working in two different contexts (health care centres, home care) the concept “environment” was defined in the introduction section as “your work environment i.e. the health care centre or the individuals’ homes”. The concept “the individual” was defined as “the patient or the care recipient”. The final modified version of P-CAT was reviewed in terms of face validity by six district nurses in primary health care and home care prior to distribution. The questions in the modified version of P-CAT were considered easy to understand. The modified version of P-CAT is denominated further on in this article as mP-CAT.

## Sample and data collection

The sample in this study consists of clinical staff employees who responded to a questionnaire in a survey carried out in five municipalities in Skåne, southern Sweden. The clinical staff employees, enrolled in this study, were employed at residential aged care units (N=142), health care centres, home care centres and social services (N=182). Residential aged care units and home care in this study were represented both by public - and private stakeholders.

Questionnaires comprising background questions concerning gender, profession, hours of work and work experience and the P-CAT instrument were distributed to residential aged care units. Questionnaires with background questions and mP-CAT were distributed to primary health care centres and home care centres. Respondents were asked to fill out the questionnaire and send it back to the authors in a prepaid envelope. Reminders of the study were delivered to the respondents via a contact person at each working place. The data collection was performed during a three month period.

## Statistical analysis

Data was analysed with IBM SPSS Statistics version 22. The following analyses were performed for the P-CAT as well as the mP-CAT. Scores of item 7, 8, 9, 10 and 12 were reversed prior to calculation due to the negatively phrased sentences. No imputation for missing values was made, due to rather low internal missing. However, data were analysed using the excluded missing values pairwise function in SPSS, in order to preserve as much data as possible. Construct validity was analysed in terms of factor structure and convergent validity, while scale function in terms of descriptive statistics (e.g. completeness of data) as well as floor- and ceiling effects.

The factor structure was investigated through exploratory factor analyses (i.e. principal component analysis [PCA]) with varimax (orthogonal) rotation. Explorative factor analysis was chosen due to two reasons; the factor structure of the original instrument is still somewhat uncertain for the P-CAT (not established at all for the mP-CAT) and thus needs further investigations in different samples, and secondly the number of respondents in this study was too few in order to use a confirmatory factor analysis. Bartlett's test of Sphericity (12) and

Kaiser-Meyer-Olkin test (13) were used to evaluate the prerequisite for the factor analyse.

Kaisers eigenvalue criterion (Eigenvalue >1.0), Scree plot test and parallel analysis (14) were used to determine the number of factors extracted.

Convergent validity was assessed to determine, on the one hand to what extent the items represent the different factors/subscales (extracted in the factor analyses) respectively, and on the other hand the subscales association to external construct. A corrected item-total correlation (i.e., the correlation between each item and the total score of the remaining items in the hypothesized scale) of 0.30 or greater, this is considered acceptable and interpreted as evidence supporting convergent validity. Spearman's rank order correlation was used to analyse the association between subscales and two control questions "The care here is person-centred" and "We work from the individual's self-perceived needs" scoring 1 to 5 on a Likert-scale (15, 16). These single items should not be seen as gold standard since they are not validated questions/measures, but can be seen as crude measures of person-centred care (i.e. external constructs) giving an indication of the instruments ability to measure PCC. Higher correlation indicates a higher degree of convergent validity.

Cronbach's  $\alpha$  were calculated to investigate reliability/homogeneity of the subscales and total scale, which should be  $\geq 0.7$  to be considered as acceptable. Distribution of the total scores (subscales extracted in the factor analyses) were investigated by assessment of Q-Q plots and histogram. Scale function was investigated in terms of median, mean, standard deviation, min-max score and internal missing data (completeness of data). The floor and ceiling effect was investigated for the total score. Floor - and/or ceiling effect were considered to be present when >15% responded the lowest or the highest value (17, 18).

## RESULTS

A total of 301 clinical staff employees responded to the questionnaires, giving an overall response rate of 92.9%. Of the respondents, 92.3% were women and the most common profession was enrolled nurse (54.3 %) (Table 1). The second most common profession was registered nurse (15.1 %). Almost half (49.7%) of the respondents had secondary school education and 23.1% of the respondents had college or university education, while approximately 4% only had primary school education. However, the sample characteristics differed between the P-CAT sample and the mP-CAT sample. Physicians, psychologists and welfare officers were only represented in the mP-CAT sample.

### P-CAT

The response rate was 92.3% (n=142) and the internal missing was low (range 0.7% - 3.5%) (Table 2). Assessment of Q-Q plot and histogram of the total score indicated normally distributed data (skewness -0.183) and there were no floor- or ceiling effect (Figure 1). Mean value for the total score was 48.1 (SD±8.0). Corrected item-total correlation was satisfactory ( $\geq 0.3$ ) for all items except for item number 4 which was low (0.05) (Table 2). Cronbach's alpha, if item deleted, was stable and ranged from 0.73 – 0.79 (Table 2). Bartlett's test of Sphericity ( $p < 0.001$ ) and Kaiser-Meyer-Olkin test (KMO)(0.781) was satisfactory. Principal component analysis (PCA) and varimax rotation with eigenvalue  $> 1.0$  was chosen. A three factor solution was initially suggested, explaining 55.96% of variance with communalities ranging from 0.376 to 0.824. However, since item 13 was solely representing one factor this factor structure was unacceptable. A scree plot test and a parallel analysis were then also

performed, which both suggested a 2-factor solution instead. A PCA with varimax rotation (a fixed 2-factor extraction) was performed, and the two factors extracted together explained 47.22% of variance with communality range of 0.141 – 0.755 (Table 3). Item 13 showed low loadings on both factors (factor 1 = 0.221; factor 2 = 0.285) with low communality of 0.141 and a decision was made to exclude item 13 in further analysis. Thus, new PCA with varimax rotation was performed with a fixed 2-factor extraction but without item 13. This 2-factor solution had a cumulative explained variance of 50.03. All communalities were satisfactory ( $>0.3$ ) and alpha values for both first factor (items 1-6, 11) and second factor (items 7-10, 12) were found to be acceptable (Table 3). Convergent validity was examined by calculating Spearman's rho correlation between factors (F1 and F2) and control questions. There was a moderate positive correlation between F1 and the control questions and low positive correlation between F2 and control questions (Table 4).

## mP-CAT

The response rate was slightly higher (94.0%) in this sample compared to the P-CAT sample. The total score was normally distributed with no floor- or ceiling effects (Figure 1). Mean value for the total score was 48.7 ( $SD \pm 7.79$ ) and mean values for each respective item ranged between 3.42 and 4.26 (Table 5). The internal missing was low for all items, ranging from 1.1% to 3.3%. Corrected item-total correlation was satisfactory ( $\geq 0.3$ ) for all items except for item number 4 and 12 which had values between 0.2- 0.3 (Table 5). Cronbach's  $\alpha$  for the whole scale was 0.80 and Cronbach's alpha, if item deleted, was satisfactory for all items (range 0.76 – 0.80) except for item number 3 which had a rather low alpha value (Table 5).

Bartlett's test of Sphericity ( $p < 0.001$ ) and Kaiser-Meyer-Olkin test (KMO) (0.781) were satisfactory. PCA was thereby conducted with orthogonal rotation (varimax) and eigenvalue  $> 1.0$  was chosen as an initial extraction method. Four factors were extracted explaining 62.9% of the variance. Factor 1 consisted of items 1, 2, 3 and 4 with eigenvalue 2.062 and Cronbach's  $\alpha = 0.688$ ; Factor 3 consisted of items 7, 8, 9, 10 and 12 with eigenvalue 2.790 and Cronbach's  $\alpha = 0.789$ . Factor 2 consisted of items 5 and 6, while factor 4 consisted of items 11 and 13. Factor 2 had an eigenvalue 1.619 and alpha value 0.710 while factor 4 had an eigenvalue of 1.706 and an alpha value 0.632. This solution was considered not acceptable, as a result of factors 2 and 4 being only comprised of two items, and was therefore rejected. The scree plot test suggested a 3-factor or a 2-factor solution. Thus, a fixed 3-factor extraction with PCA and varimax rotation was performed. This solution explained 54.9% of variance but was rejected as a result of cross-loadings for items 5 and 6, while factor 3 only consisted of items 11 and 13. A fixed 2-factor extraction was thereafter performed with PCA and varimax rotation (Table 6). No cross-loadings were found. This 2-factor solution explained 46.15% of the total variance with communalities ranging from 0.263 to 0.712. Cronbach's  $\alpha$  for both factors was found to be acceptable ( $> 0.7$ ) (Table 6). Calculation of Spearman's rho correlation coefficient suggested a moderate positive correlation between factor 1 and the control questions (Table 4). Factor 2 had a low positive correlation to the control questions.

## DISCUSSION

This study aimed to explore the psychometric properties of the Swedish P-CAT; to develop and psychometrically evaluate a modified version of the Swedish version of P-CAT for different settings. The results in this study suggest a 2-factor solution for the Swedish version of P-CAT, and the factor structure was in concordance with previous studies. However, item

13, “Residents are able to access outside space as they wish” did not seem to correspond with the P-CAT instrument in this sample. Such problems with item 13 have also been found in previous research. For example, Sjögrens et al. (7) reported a 2-factor solution with factor 1 consisting of items 1-6, 11, 13 and factor 2 consisting of items 7-10, 12 with low communality ( $=0.20$ ) for item 13. The Norwegian study (6), which also suggested a 2-factor structure for the P-CAT, also found a low communality ( $=0.273$ ) for item 13. Thus, item 13 does not appear to belong to either of the two factors, and this may be explained by how the statement of item 13 is formulated. Firstly, the formulation “Residents are able to access outside space as they wish” which refers to the residents’ wishes, which can be hard to assess fully (e.g. if the residents are too ill/frail and/or have cognitive decline which is common in nursing homes). Secondly, the statement could also be interpreted as that the physical environment contributes or hinders the resident to access outside, which make the item unclear regarding its belonging in the factor structure. In the modified version of P-CAT (mP-CAT) item 13 did not have such a problem since it was rephrased into “We take into consideration the individuals’ desires of the care provided” which refers more directly to the staff approach to the individuals’ desires and hence the item is loading on factor 1 “Extent of personalised care”.

The overall psychometric properties of the modified version of P-CAT (mP-CAT) support the use of mP-CAT in Swedish primary care and home care. The modification process of the mP-CAT aimed to retain the content in the items as much as possible relative to the P-CAT and omit possible contextual influences. The result of the factor analysis suggested a 2-factor solution, explaining 46.21% of the variance. The factor structure was fully in line with the original version of the P-CAT (6, 7); there factor 1 consisted of items 1-6, 11 and 13 and



factor 2 consisted of items 7-10 and 12 (Table 3). The result indicated in general acceptable communalities (except for item 11) and the homogeneity of the items were also, with some minor exceptions, acceptable. Furthermore, the scaling assumptions showed acceptable properties for all 13 items, with homoscedasticity and no floor- or ceiling effects. Thus, the new mP-CAT instrument seems to be valid and reliable. However, more psychometric testing of the mP-CAT is needed in order to fully establish the instrument's validity and reliability. Further research should then also, if possible, include evaluation of content validity and test-retest reliability.

As an evaluation of the instrument's possibility to measure person-centredness, correlation with external measures (two single items) was performed (Table 4). The results showed significant correlation with factor 1 ("Extent of personalised care") but non-significant correlation with factor 2 ("Amount of organisational support and environmental support"), for both the P-CAT and the mP-CAT. On the one hand this strengthens the assumptions of the two factor structure and indicates that its only factor 1 that measures person-centredness per se, while factor two only measures the prerequisites for working person-centred.

The aim was to develop and evaluate a non-context specific measure of person-centred care. The first step to change the P-CAT to be less context-specific was to rephrase several of the items. Then the instrument was reviewed by both researchers and nurses (specialisation in primary care) who found it to be acceptable in general. Thus, face validity (and an overall content validity) was established. However, the content validity was not firmly evaluated and further research needs to address this topic more for the mP-CAT.

## Strengths and limitations

The sample in the psychometric testing of the mP-CAT consisted only of staff employees in primary care, home care and social services. The results in this study indicate that mP-CAT is suitable only in these contexts and should therefore be interpreted as a starting point for further testing of the mP-CAT in other contexts. Furthermore, to fully establish the “generic properties” (i.e. that the mP-CAT can be used in all settings) this instrument should be handed out to both samples. However, this was not possible since the original version of P-CAT was already handed out to the staff in the nursing homes. To send out two similar questionnaires would probably only cause confusion for the respondents. Thus, it is important to only interpret the results of the validation of the mP-CAT for primary care and home care setting, while the original version for use in nursing homes.

## CONCLUSIONS

This study suggests a 2 factor structure for the Swedish version of P-CAT. However, item 13 fits poorly in the P-CAT instrument and exclusion of item 13 is therefore suggested. The modified non-context specific version, mP-CAT, give some indications of validity and reliability in primary- and home care settings. However, it is recommended to further explore the psychometric properties of the mP-CAT with larger samples and in various contexts.

## **Acknowledgements**

The authors wish to thank all the respondents for participating in the study and the contact nurses for their help in the data collection. We are also most grateful to David Edvardsson for the collaboration regarding the modification of the instrument and to Patrick Reilly for revising the language.

## **Author contribution**

DS has been involved in the design of the study, in data collection, performed the data analyses and has drafted the manuscript. UJ has been involved in the design of the study, provided with statistical expertise in the analyses process and revised the manuscript critically for important intellectual content. AC has been involved in the design of the study, data collection, supervised in the realisation of the study and revised the manuscript critically for research questions and for important intellectual content.

## **Funding**

This study was supported by grants from The Vårdal Institute, Swedish Institute For Health Sciences.

## **Ethical approval**

The study was approved by the Regional Ethical Review Board in Lund, Sweden (Dnr: 2013/549).

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**Table 1.** Sample characteristics of P-CAT (n = 142) and mP-CAT (n = 182)

	<b>P-CAT</b>	<b>mP-CAT</b>
<b>Gender</b> n (%)		
Women	138 (97.2)	161 (88.5)
<b>Professions</b> n (%)		
Physicians	-	16 (8.8)
Registered nurses	8 (5.6) <sup>a</sup>	41 (22.5) <sup>b</sup>
Enrolled nurses	118 (83.1)	58 (31.9)
Nurse's assistants	13 (9.2)	10 (5.5)
Physiotherapists	2 (1.4)	24 (13.2)
Occupational therapists	1 (0.7)	20 (11.0)
Psychologists	-	4 (2.2)
Welfare officers	-	1 (0.5)
Others	-	7 (3.8)
<b>Years of employment at this facility</b> mean (SD)	11.7 (8.9)	8.8 (8.7)
<b>Part-time</b> ( $\leq 75\%$ ) n (%)	76 (54.7)	135 (75.8)
<b>Full-time</b> ( $\geq 76\%$ ) n (%)	63 (45.3)	43 (24.2)
<b>Education</b> n (%)		
Primary school	9 (6.3)	3 (1.6)
Secondary school	101 (71.1)	60 (33.0)
College/University	20 (14.1)	55 (30.2)

<sup>a</sup> Public health nurses included<sup>b</sup> Public health nurses and midwives included



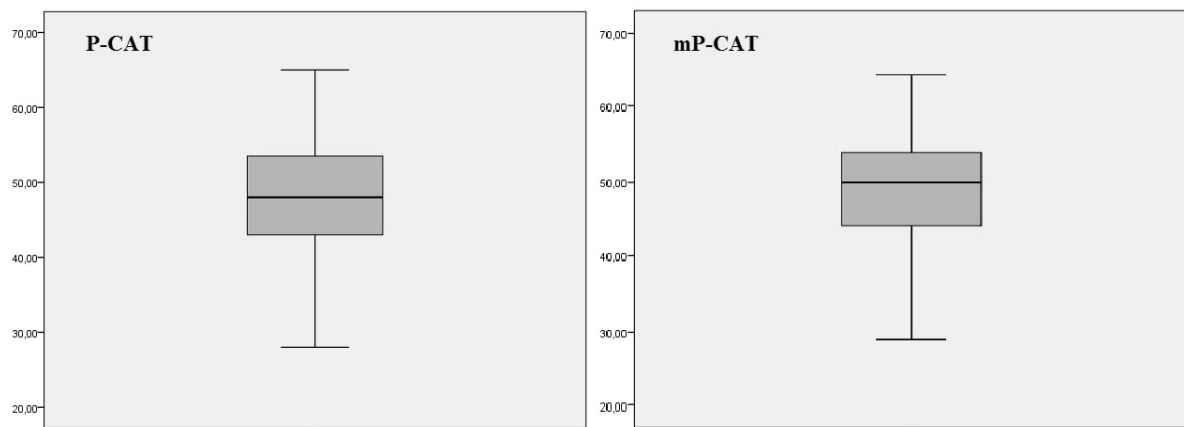
**Table 2.** Item characteristics for P-CAT (n = 142)

<b>Item</b>	<b>Median</b>	<b>Mean</b>	<b>SD</b>	<b>Missing (%)</b>	<b>Floor-/Ceiling effects (%)</b>	<b>Corrected Item – Total Correlation</b>	<b>Cronbach's <math>\alpha</math> if Item Deleted</b>
<b>1</b>	5	4.50	0.68	0.7	3.5/58.9	0.44	0.76
<b>2</b>	4	4.16	1.11	0.7	5.0/49.6	0.41	0.76
<b>3</b>	4	4.09	0.92	0.7	1.4/39.0	0.28	0.77
<b>4</b>	4	3.89	0.92	2.8	0.7/28.3	0.05	0.79
<b>5</b>	4	4.02	0.87	1.4	1.4/28.6	0.40	0.76
<b>6</b>	4	3.98	1.09	1.4	3.6/37.1	0.47	0.76
<b>7</b>	3	3.19	1.28	1.4	7.9/20.7	0.40	0.76
<b>8</b>	3	3.37	1.42	1.4	10.7/30.0	0.57	0.74
<b>9</b>	3	2.95	1.34	2.1	14.4/18.7	0.56	0.75
<b>10</b>	4	3.45	1.44	2.1	9.4/35.3	0.64	0.73
<b>11</b>	4	3.52	1.26	3.5	8.0/28.5	0.42	0.76
<b>12</b>	4	3.60	1.31	3.5	5.8/32.1	0.34	0.77
<b>13</b>	4	3.37	1.41	2.8	14.5/25.4	0.28	0.78

Missing=11



Figure 1. The distribution of total score of P-CAT (n = 142) and mP-CAT (n = 182)



**Table 3.** Principal component analysis with varimax rotation for P-CAT, with and without item 13(n = 142)  
(Fixed 2 factor solution)

Item	Content	Factor loading			Factor loading*		
		F1	F2	Communalities	F1	F2	Communalities
1	“We often discuss how to give person-centred care”	<b>0.551</b>	0.261	0.371	<b>0.569</b>	0.274	0.399
2	“We have formal team meetings to discuss residents’ care”	<b>0.682</b>	0.079	0.471	<b>0.683</b>	0.074	0.471
3	“The life history of the residents is formally used in the care plans we use”	<b>0.747</b>	-0.177	0.590	<b>0.754</b>	-0.174	0.599
4	“The quality of the interaction between staff and residents is more important than getting the tasks done”	<b>0.506</b>	-0.356	0.383	<b>0.506</b>	-0.357	0.384
5	“We are free to alter work routines based on residents’ preferences”	<b>0.615</b>	0.171	0.408	<b>0.619</b>	0.169	0.411
6	“Residents are offered the opportunity to be involved in individualized everyday activities”	<b>0.712</b>	0.142	0.527	<b>0.700</b>	0.123	0.506
11	“Assessment of residents’ needs is undertaken on a daily basis”	<b>0.533</b>	0.219	0.332	<b>0.528</b>	0.209	0.322
13	“Residents are able to access outside space as they wish”	0.245	0.285	0.141	_*	_*	_*
7	“I simply do not have the time to provide person-centred care”	0.041	<b>0.674</b>	0.456	0.055	<b>0.684</b>	0.471
8	“The environment feels chaotic”	0.196	<b>0.750</b>	0.601	0.202	<b>0.748</b>	0.600
9	“We have to get the work done before we can worry about a homelike environment”	0.089	<b>0.832</b>	0.701	0.104	<b>0.840</b>	0.717
10	“The organization prevents me from providing person-centred care”	0.181	<b>0.827</b>	0.717	0.186	<b>0.825</b>	0.715
12	“It is hard for residents in the facility to find their way around”	-0.034	<b>0.642</b>	0.413	-0.032	<b>0.638</b>	0.408
Eigenvalues after rotation		2.893	3.217		2.858	3.146	
Explained variance (%)		22.26	24.75		23.81	26.22	
Cumulative (%)		22.26	47.00		23.81	50.03	
Cronbach’s alpha					0.74	0.83	

\* Item 13 excluded.

Missing=11

**Table 4.** Spearman's rho correlation and shared variance between factors and control questions

Control question	P-CAT <sup>a</sup>		mPCAT	
	F1	F2	F1	F2
The care here is person-centred (%)	<b>0.527</b> (27.8)	0.395 (15.6)	<b>0.582</b> (33.9)	0.303 (9.2)
We work from the individual's self-perceived needs (%)	<b>0.552</b> (30.5)	0.318 (10.1)	<b>0.570</b> (32.5)	0.427 (18.2)

All are significant at the 0.01 level (2-tailed)

<sup>a</sup>Item 13 excluded

**Table 5.** Item characteristics for mP-CAT (n = 182)

<b>Item</b>	<b>Median</b>	<b>Mean</b>	<b>SD</b>	<b>Missing (%)</b>	<b>Floor-/Ceiling effects (%)</b>	<b>Corrected Item – Total Correlation</b>	<b>Cronbach's <math>\alpha</math> if Item Deleted</b>
<b>1</b>	4	4.19	0.94	1.1	2.2/44.4	0.42	0.79
<b>2</b>	4	3.64	1.38	2.2	11.8/34.3	0.40	0.79
<b>3</b>	4	3.68	1.08	2.7	6.2/20.9	0.45	0.49
<b>4</b>	3	3.42	0.93	1.6	3.4/10.6	0.22	0.80
<b>5</b>	4	3.59	1.05	1.6	5.0/17.9	0.44	0.79
<b>6</b>	4	3.91	0.94	2.2	1.7/27.5	0.57	0.78
<b>7</b>	4	3.52	1.24	2.2	3.4/27.5	0.48	0.78
<b>8</b>	4	3.59	1.17	1.6	3.4/27.4	0.50	0.78
<b>9</b>	4	3.57	1.25	1.6	6.1/30.7	0.44	0.79
<b>10</b>	4	3.71	1.28	2.7	4.5/38.4	0.67	0.76
<b>11</b>	4	3.91	1.11	2.2	4.5/36.0	0.33	0.80
<b>12</b>	4	3.65	1.06	3.3	1.1/27.3	0.23	0.80
<b>13</b>	4	4.26	0.77	2.2	1.1/42.1	0.53	0.78

Missing=12

**Table 6.** Principal component analysis with varimax rotation for mP-CAT  
(n = 182) (Fixed 2 factor solution)

Item	Content	Factor loading		Communalities
		F1	F2	
1	“We often discuss how to give person-centred care”	<b>0.587</b>	0.133	0.362
2	“We have formal team meetings to discuss individuals’ care”	<b>0.688</b>	-0.002	0.473
3	“The life history of the individuals is formally used in the care plans we use”	<b>0.776</b>	-0.043	0.604
4	“The quality of the interaction between staff and the individuals is more important than getting the tasks done”	<b>0.528</b>	-0.160	0.304
5	“We are free to alter work routines based on individuals’ needs”	<b>0.478</b>	0.308	0.324
6	“The care is based on individual needs”	<b>0.629</b>	0.324	0.501
11	“Assessment of individual needs is undertaken at every encounter”	<b>0.465</b>	0.165	0.244
13	“We take into consideration the individuals’ desires of the care provided”	<b>0.643</b>	0.230	0.467
7	“I simply do not have the time to provide person-centred care”	0.118	<b>0.771</b>	0.609
8	“The environment prevents me from providing person-centred care”	0.109	<b>0.767</b>	0.601
9	“We have to get the work done before we can worry about creating an environment based on individual needs”	0.111	<b>0.709</b>	0.516
10	“The organisation prevents me from providing person-centred care”	0.347	<b>0.762</b>	0.700
12	“It is hard for the individual to move in the environment”	-0.076	<b>0.546</b>	0.303
Eigenvalues after rotation		3.117	2.890	
Explained variance (%)		23.98	22.23	
Cumulative (%)		23.98	46.21	
Cronbach’s alpha		0.757	0.789	

Missing=12