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Original Article

Reliability and validity of a physiotherapist-doctor relationship scale

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Abstract

The present study focuses on the reliability and validity of the Physiotherapist-Doctor Relationship (PDR) scale. This PDR scale measures the affective attitude component in the relationship between physiotherapists and doctors. It contained 17 Likert-type statements that were to be responded to within a five-point range, from 'strongly agree' to 'strongly disagree.' A convenience sample of 144 out of 237 physiotherapy clinicians in Toyama Prefecture, Japan, participated in this study.The means by which the data were collected from the participants was by return of a mailed PDR questionnaire, and the rate of return for the total number of questionnaires sent was 61.2%. The reliability of the scale was assessed as homogeneity, and its validity as construct validity. The number of men and women respondents was 72 each. Fourteen out of the 17 statements were found to have significant item-to-total correlations. The Cronbach's alpha (a) coefficient for the scale was .76.Some evidence for construct validity was found in the four-factor solution, which explained 45.7% of the total variance. Factors derived from Spearman's rank correlation and factor analysis were 'understanding,' 'desire to learn,' 'collaboration,' and 'stand-in,' with the rate of contribution (Cronbach's a) being 24.39 % (.70), 10.96 % (.78), 5.54 % (.72), and 4.83 % (.69), respectively. Strong evidence for construct validity was demonstrated in the scale's ability to differentiate between individuals whose age ranged from 20 to 30 years old and those older than 40 years of age with mean scores of 51.2 vs. 46.7 (p<.05). Convergent validity, as a form of construct validity, was also supported for the scale. From the results of this current study group, this PDR scale can, therefore, be considered a reliable and valid measure of documenting trends of importance in regards to the relationship between physiotherapists and doctors.

Key words

Introduction

The objective of the healthcare professional is to restore a client's physical and psychological functions to their optimal condition. A number of healthcare professionals are required to accomplish this objective and they need to work in unison[1]. A client's expectation focuses on the expertise and competence of each healthcare professional. One factor that demonstrates whether the expertise offered by the professional benefits a client is the viable working relationship among them. This brings into question the current professional socialization process of physiotherapists during undergraduate training; a training in which conditions hardly prepare them adequately enough to play an effective role as a team member or, for that matter, have an appropriate relationship with doctors or other team members.

Studies on the physiotherapist-doctor relationship

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(PDR) in Japan have revealed that physiotherapists are discontented with the all too frequent inappropriate treatment policies prescribed by the referring doctors[2-3]. Multiple factors exist for this discontent, some of which are related to the personal background of the physiotherapists themselves and others to the inadequate education of doctors concerning physiotherapy. Considering these facts, this study on PDR was appropriate. According to Ross, et al., physiotherapists wish to strengthen their bond with physicians, but are often not satisfied with the performance of doctors as team leaders, consultants, and resource personnel[4]. They have also stated that the physician may not be the best suited or qualified to act as team leader in every situation, or for every aspect of medical treatment, for the care of every patient[4]. The questionnaire used in the Ross et al.'s study was translated into Japanese by Ogiwara, et al. in 2004, which culminated in the Japanese PDR scale[5].

It is a well-known fact that psychometric measures must possess high reliability and validity. In addition, precision instruments must be standardised and proven viable to enable evidence-based study of PDR. Although a study on the PDR using this scale has already been carried out in Japan by Ogiwara et al.[5], there has not, until now, been any verification on its reliability and validity. Hence, an attempt was made to test this and verify its use. This was accomplished through recruitment of physiotherapy clinicians in answer to a survey. Verification of the PDR scale obtained through this study would, therefore, be conducive to future research on the PDR.

Methodology

Instrumentation

The PDR scale was employed in the survey in the form of a questionnaire. The survey was a descriptive, cross-sectional study of the attitudes of physiotherapy clinicians towards the PDR. This method was chosen because it was the most practical way to accomplish the objective. The questionnaire consisted of 17 Likert-type statements concerning doctors' understanding of the physiotherapy profession, collaboration between physiotherapists and doctors on client care, and expectation on the part

of physiotherapists for in-service education by doctors (Table 1).

Included in the questionnaire was a column on demographic data that were used to collect information on the respondent's age, gender, marital status, years of clinical practice, professional status in their workplace, and treatment preference by the physiotherapist (ie. whether the respondents prefer to treat acute, subacute or chronic conditions of the client). Physiotherapists at the University of Kanazawa Hospital, Department of Physical Therapy critically examined the questionnaire for its wording and phrasing.

Scoring

The items were scored in such a way that a score of 5 indicated agreement and a score of 1 indicated disagreement with the statement. A neutral option with a score of 3 was explicitly provided. The scores for statements 8, 9, 10 and 16 were reversed because these statements had negative connotations concerning the PDR. Thus, the total score that could be obtained from the individual participant ranged from 17 to 85. If more than 10 per cent, or two out of the 17 items, were left blank on the questionnaire, that questionnaire was discarded.

Participants and procedures

Out of the total physiotherapy membership of 300 in Toyama Prefecture, 237 clinicians were selected from the year 2005 membership directory of the Toyama Physical Therapy Association. All the members included in the study were working in hospitals and clinics. The physiotherapists who were excluded from this study were as follows: 29 in nursing homes, 26 inactive members, 5 in teaching, and 3 in local government bureaux, respectively.

Surveys were mailed to the individual respondents with a letter of explanation concerning the purpose of the study, together with a stamped addressed envelope. The respondents would remain anonymous and were asked to return the questionnaire within two weeks of receiving it.

The instructions to respondents included a guarantee of confidentiality, the need to respond to every item and the absence of a right or wrong answer. The survey took approximately 15 minutes to complete.

Table 1. Spearman's rank correlation coefficients for the individual statements (*n=144*)

Statement	Main item content	R_S
1	Doctors, in general, understand what a physiotherapist can achieve, what physiotherapy is, and results of physiotherapeutic treatment for the clients. ··············	.644**
2	There is an adequate formal review of prescribed physiotherapeutic treatment, treatment actually carried out, and benefits to the client. ·····························	.605**
3	Doctors pay sufficient attention to available information concerning physiotherapeutic prescription, treatment and benefits from it. ··	.722**
4	Doctors generally consult with the physiotherapist about details of a client's condition. ·······························	.655**
5	Doctors, in general, are accessible for consultation. ······	.639**
6	Doctors, in general, understand the treatment carried out in occupational therapy and physiotherapy, and how the two work in liaison for the client's benefit. ···········	.669**
7	I am, in general, adequately informed about drugs the client is receiving, complications, and how these factors affect choice of treatment. ························	.571**
8	I sometimes have to act as an amateur social worker, or an amateur psychiatrist, while treating my clients. ········	.319**
9	I often have to explain things to the client that I think should have been clarified by the doctor. ········	.416**
10	Doctors should spend more time with physiotherapists in team conferences. ····································	.172*
11	Physiotherapists could give better care if they observed more surgical procedures. ······················	.052
12	I would like to have more lectures, clinics and short courses from doctors. ·································	.114
13	From my knowledge of the education of medical students, they are sufficiently taught about physiotherapy. ········	.490**
14	It would be worthwhile for medical students to spend time in the physiotherapy department observing treatment. ···	.050
15	In general, I feel like part of a medical team. ··············	.270**
16	Doctors, in general, treat me like a technician. ············	.464**
17	I am satisfied with the consideration doctors give to their clients' mental state (i.e., clients' anxiety about their conditions, depression). ······················	.576**

*$p<.05$; **$p<.01$

Statistics

Reliability was assessed as correlations between the scores for each item and the whole scale using Spearman's rank correlation coefficient. This was followed by the calculation of the Cronbach's alpha (a) reliability estimates to further verify the internal consistency of the scale. Two methods were used for this calculation; one utilizing all of the 17 items and the other excluding such items whose correlation coefficients were not statistically significant.

As for construct validity, the responses to all of the 17 items were submitted to a factor analysis; in this study it involved a principal component analysis with varimax rotation. The number of factors was determined by using the factor scree plot. The factors obtained from the first-order factor analysis were used as variables for a second-order factor analysis. This was followed by the calculation of the Cronbach's a in order to verify the internal consistency of each of the individual determined factors.

An attempt was also made to address convergent validity by using the stepwise multiple regression

analysis on the respondents' background as the independent variable and the PDR scale as the dependent variable. Thus, by using the two-tailed Mann-Whitney U test, the mean scores for these variables were calculated at a .05 alpha level.

The data were analysed with *the Statistical Package for the Social Sciences* and the computer software *Microsoft Excel for Windows 2000*.

Results

One hundred and forty-five questionnaires were collected without any reminder being necessary. However, one questionnaire had 4 items that were not answered, and 11 questionnaires were found to have multiple answers to the question concerning *treatment preference for the client's condition*. Accordingly, the sample for correlation coefficients and factor analysis consisted of 144 (60.8 %) respondents and that for multiple regression analysis 133 (56.1 %) respondents. The number of men and women were equal in number amongst the 144 respondents. Concerning the respondents' age, the number (percentage) in their twenties was 61 (25.7), thirties 58 (24.5), forties 22 (9.3) and fifties 3 (1.3), respectively. The number (percentage) of the respondents who preferred to treat clients with acute conditions was 62 43.1), subacute conditions 14 (9.7) and chronic conditions 57 (39.6), respectively.

Reliability

The homogeneity of the scale is displayed in Table 1 showing correlations between each item and the whole scale. The correlation coefficients for all but three of the 17 items were statistically significant at $p<.01$ or $p<.05$. The items with a correlation coefficient smaller than .4 were 8 and 15. The estimated Cronbach's a for the whole scale was .76, but when the non-significant statements 10, 11, 12, and 14 were excluded, it was .84.

Validity

The first-order factor analysis explained 45.7% of the total variance, thus, supporting construct validity to some degree, where the four factors, consisting of *understanding, desire to learn, collaboration*, and *stand-in*, could be interpreted in a meaningful way (Table 2). In the second-order factor analysis two factors were obtained that explained 15.5% of the variances. These factors consisted solely of Factor 3 (*collaboration*) and Factor 4 (*stand-in*) from the first-order factor analysis.

As for convergent validity, there was a linear relationship amongst the variables *age, marital status, years of clinical practice*, and *professional status*. Consequently, variables *marital status, years of clinical practice*, and *professional status* were eliminated by stepwise multiple regression analysis, which led to a further analysis focusing on

Table 2. Factor loadings after varimax rotation for the PDR scale (*n=144*)

Statement	Factor 1 (*Understanding*)	Factor 2 (*Desire to Learn*)	Factor 3 (*Collaboration*)	Factor 4 (*Stand-in*)
1	.816			
3	.725			
2	.679			
6	.656			
17	.434			
13	.406			
12		.863		
11		.740		
7			.619	
5			.595	
4			.516	
9				.789
8				.635
Contribution	24.39%	10.96%	5.54%	4.83%
Cronbach's a	.70	.78	.72	.69

the variables *age, gender*, and *treatment preference*. As a result, the coefficient of determination (R^2) for the above three variables was .102 with a p-value of .003 following the calculation by analysis of variance (ANOVA).

The mean score for the respondents in their 20's and 30's was significantly larger than that for those in their 40's and older (51.2 vs. 46.7; $p<.05$). Therefore, hypothesis one *the older a clinician becomes, the more he/she conducts him/herself on equal terms with the doctor* was rejected. It was also found that the mean score for the women was slightly smaller than that for men, but there was no significant difference between them (49.8 vs. 51.2). Therefore, hypothesis two *women respondents would score less than men respondents* was rejected. Further, there was no significant difference in the mean score of the respondents who preferred treating clients with acute and/or subacute conditions and those who preferred treating clients with chronic conditions (49.7 vs. 52.0). This led to rejection of hypothesis three *respondents who prefer treating clients with acute and/or subacute conditions would score less than those who prefer treating clients with chronic conditions*. Normality was recognized for hypotheses two and three, which led to a further analysis using the Student's t test, resulting in p-values of .26 and .097, respectively.

Discussion

Concerning correlation between the individual statements and the whole scale, statements 8, 10 and 15 showed a weak correlation, whereas statements 11, 12 and 14 showed no correlation. Amongst these statements, statements 8 and 10 had negative connotations. Statements 11 and 12 were those related to a physiotherapists' desire to learn from doctors as part of their in-service education, which demonstrated that the level of desire to learn was irrelevant to the PDR. Because of the relatively strong correlation for statement 13 and weak correlation for statement 14, the respondents may have perceived that there was no necessity for medical students to spend time in the physiotherapy department observing treatment if they were already well informed about physiotherapy. Statement 15 implied that they considered themselves

as a member of the healthcare team, but that the PDR may not have had much influence on their level of such a perception.

Statements with a coefficient of correlation above .5 were 1, 2, 3, 4, 5, 6, 7 and 17. Of these, statements 1, 2, 3 and 6 concerned the doctors' understanding of physiotherapy treatment, and statements 4, 5 and 7 about collaboration between physiotherapists and doctors. The results suggest that the higher the doctors' understanding and support of physiotherapy and better the collaboration between physiotherapists and doctors is, the better the PDR can be. Because the correlation coefficient for statement 17 was relatively high, this may reflect dissatisfaction amongst physiotherapists with the doctors because they feel that they lack consideration of their clients' mental state.

Internal consistency is considered to be sufficient if the a reliability coefficient is larger than .7, and this study achieved a score of .76. Therefore, this PDR scale can be judged to contain a group of statements that can measure its attributes without excluding those with weak correlation. Thus, the authors determined that the reliability of the scale was satisfactory for the current study group.

Four factors derived from the factor analysis in this study reflected the positive and negative aspects of the PDR. Factors one, two and three showed strong correlation only with the positive aspects, which were labelled as *understanding, desire to learn* and *collaboration*, respectively. Because the Cronbach's a for the aforementioned factors were beyond .7, which demonstrated a sufficient internal consistency (Table 2), the statements for these factors were considered of value, for they were representative of each of these factors. Contrary, Factor four showed a strong correlation only with the negative aspect of the PDR, which was labelled as *stand-in* (ie. as an amateur social worker or an amateur psychiatrist). The Cronbach's a for this factor was .69, which was very close to .7. It is important to note that some of the respondents commented that the meaning of the statements concerning Factor 4 was hard to understand. So, for future research, sufficient internal consistency in the scale could be achieved by improving the form of this statement.

Table 3. Multiple regression analysis of the scores for the PDR scale (*n=133*)

Explanatory variables	Standardised coefficients	p
Age	-.263	.002
Treatment preference	.130	.126
Gender	-.128	.134

Overall, the four factors explained 45.7% of the total variance. In other words, approximately half of the variance of the responses for the statements could be explained by these four factors, together with an additional two factors that strongly correlated with *collaboration* and *stand-in*. Consequently, when collaboration with the doctor is lacking, perception towards, and understanding of, the roles of one another may suffer. As a result, the role of each of the professionals cannot be exercised appropriately, consequently leading to mutual discontent with their counterpart.

As for convergent validity, the *p*-value following calculation by ANOVA was small with a relatively low R^2. Amongst the three variables only *age* yielded a statistical significance in this study (Table 3). However, statistically speaking, if the study had been conducted elsewhere or if the sample size had been larger, the other two variables (ie. *treatment preference* and *gender*) may have been significant. In this study the *p*-values for these two variables were near enough to be significant (ie. *.126* and *.134*), so that they could not be entirely ignored as predictors. Further, to a certain extent, the total score of the scale was found to be predictable according to the respondents' age, which was proven from an earlier result obtained from the Mann-Whitney *U* test in this study. Thus, convergent validity was also supported for this scale. The holding of a senior or executive position was chosen not to be adopted as a variable in this study, though it has been proven that the degree of satisfaction differs significantly in the doctor-nurse relationship depending on the professional status of nurses within the work settings[1), 6)]. The reason for this may be that promotion to a senior or executive position usually parallels with ageing. The same reason can also be applied for the rejection of marital status and years of professional practice as variables in this study.

The fact that the total score for the respondents in

their 40's and over was significantly lower than that for those in their 20's and 30's may be because, as one becomes older, one's perception as being a member of the healthcare team increases. Paradoxically, as a result, this may lead to discontent with the doctor in the older age groups if he/she is a poor leader.

Variable *gender* did not yield a significant difference in the total score, so that it cannot be considered as a suitable indicator for prediction of the score. Variable *treatment preference* did not yield any difference in the overall score (*p<.097*) due to a relatively small sample size in this study. Therefore, the authors could not verify specific factors concerning the differential needs for case conferences in the acute and chronic treatment settings and contribution given by such a system of team caring in the subacute setting[7)]. In addition to our prior discussion on variable *gender*, *treatment preference* as a variable was found not to be suitable for use in this study for prediction of the total score due to its small R^2 and also to the individual variability of physiotherapists and doctors.

In conclusion, the authors believe that the PDR scale has been proven to be a reliable instrument for a group-level comparison in the current study population. Construct validity, including convergent validity, was also supported for the scale. The PDR scale can, therefore, be used for cross-sectional as well as longitudinal studies of PDR.

The complete questionnaire in Japanese is available from the authors upon request.

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「理学療法士・医師関係」尺度の信頼性と妥当性

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要　　旨

理学療法士・医師関係(PDR)尺度の信頼性と妥当性を検証した．17項目の主張から成るPDR尺度は理学療法士の医師に対する態度の感情的成分を測るものであり，肯定的・否定的感情の両者が含まれている．各主張に対応する応答区分は「その通りです」から「そうではありません」までの5段階であり、それぞれに5点から1点を配点した．本研究参加者の便宜的標本として富山県理学療法士144名を抽出し，郵送調査法を用いてデータを収集した．本尺度の信頼性を均質性として，また妥当性を構成妥当性として評定した．回収率は61.2％（145票）であり，回答者は男女ともに72名ずつであった．3種の主張を除いたすべてにおいて項目・全尺度相関が有意に認められた．尺度全体のクロンバックアルファ（a）信頼性係数は.76であった．因子分析において構成妥当性の根拠がかなり見出され，総分散の45.7％が明らかにされた．スピアマン順位相関と因子分析によってもたらされた因子構造は「理解」，「教育願望」，「連携」，「代役」であり，寄与率（a信頼性係数）はそれぞれ24.39％（.70），10.96％（.78），5.54％（.72），4.83％（.69）であった．重回帰分析の結果, 20～30歳代の回答者と40歳代以上の回答者を有意に識別できた．結論として，PDR尺度は，本研究の対象者に関するかぎり，医師と理学療法士のより良き関係の構築についての実証においてかなりの信頼性と妥当性を有する．構成妥当性の一環としての収束妥当性も本尺度を支持した。