Possession of Assistive Devices Is Related to Improved Psychological Well-Being in Patients with Rheumatic Conditions

MARTINE VEEHOF, ERIK TAAL, JOHANNES RASKER, JOHANNES LOHMANN, and MART van de LAAR

ABSTRACT. **Objective.** To investigate the relationship between the possession of assistive devices and psychological well-being in patients with rheumatic conditions.

**Methods.** Patients with rheumatoid arthritis (RA) and psoriatic arthritis (PsA) were selected from rheumatology outpatient clinics in 2 adjacent regions in The Netherlands and Germany. A total of 142 patients completed a questionnaire on the possession of assistive devices and psychological well-being. Questions on sociodemographics, clinical status, and health status were included. Hierarchical multiple linear regression analysis was used to determine the unique association between the number of assistive devices per patient and psychological well-being, controlling for confounding variables.

**Results.** Univariately, the number of assistive devices per patient was negatively associated with psychological well-being. Multivariately, the number of assistive devices per patient was positively associated with psychological well-being. Functional status was a negative confounder of the relationship between the possession of assistive devices and psychological well-being.

**Conclusion.** The possession of assistive devices was positively related to psychological well-being of patients with rheumatic diseases, after controlling for differences in functional status. (J Rheumatol 2006;33:1679–83)

Key Indexing Terms:

ASSISTIVE DEVICES

RHEUMATOID ARTHRITIS

PSYCHOLOGICAL WELL-BEING

PSORIATIC ARTHRITIS

Rheumatologists and healthcare professionals (e.g., occupational and physical therapists) frequently recommend assistive devices to patients with rheumatic conditions. Obviously their primary objective is to improve the patient’s functionality in daily activities. The secondary goal is to maintain independence. Moreover, improving functionality and independence might positively affect quality of life (QOL). To justify the prescription of assistive devices from healthcare and health economic points of view, evidence on the effects of assistive devices is of great importance.

Most studies on assistive devices among patients with rheumatic conditions have focused on the possession and/or use of assistive devices. A few studies have been performed to examine the effects of assistive devices on physical functioning. Nordenskiöld, et al., and Thyberg, et al. investigated the effects of assistive devices on perceived difficulty with the performance of activities of daily living (ADL) in patients with rheumatoid arthritis (RA). Both studies reported a reduction of perceived difficulty with daily activities, measured with the self-administered Evaluation of Daily Activity Questionnaire (EDAQ). Nordenskiöld, et al also reported a relief of pain when patients used assistive devices. To our knowledge, no attention has been given to the psychological and social effects of assistive devices among patients with arthritic conditions. This is striking, given the increasing interest in the assessment of QOL as an outcome measure of the effectiveness of therapeutic interventions.

Studies have shown that assistive devices contribute to improved physical functioning. Moreover, functionality is related to psychological well-being. Our hypothesis was that psychological well-being among disabled patients would be improved if patients had assistive devices. We investigated the relationship between psychological well-being and the possession of assistive devices in patients with rheumatic conditions.

MATERIALS AND METHODS

**Patients.** We performed a cross-sectional study among adult patients with either RA, according to the 1987 American College of Rheumatology (ACR) criteria, or psoriatic arthritis (PsA), according to the clinical experience of the attending rheumatologist. Patients were randomly selected from the archive of charts of rheumatology outpatient clinics in 2 adjacent healthcare regions. The first were the districts of Borken, Steinfurt, and Grafschaft Bentheim, Germany, the other the Twente district of The Netherlands.

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Questions on sex, age, living status (alone or with part-

The questionnaire contained questions on psychological well-

Psychological well-being was measured with the

5-point Likert scale of the AIMS2

from “never” (1) to “every day” (5). Pain scores were calculated by summing

scores were calculated by summing the individual item scores and converting

these sum-scores into a score ranging from 0 (bad health status) to 10 (good

health status). According to the standard procedure for the calculation of

AIMS2 component scores16, psychological well-being was calculated by

averaging the 2 scale scores of level of tension and mood.

Assistive devices. Seventeen common assistive devices, mainly derived from

the HAQ, were included. The assistive devices could be divided into mobili-
ty devices (cane, crutches, walker, wheelchair, scooter, orthopedic footwear),

small tools for ADL (special cutlery, special writing pen, dressing device(s),

helping hand), housing adaptations (special kitchen, elevator, shower seat,

grab bar(s) in bathroom or toilet, special tap(s), elevated toilet seat), and spe-
cial furniture (special bed). We did not include consumer products assisting

performance of household activities, because these are also often used by

healthy people. We asked patients to indicate which of the devices they pos-

sess. We calculated the total number of assistive devices per patient.

Sociodemographics. Questions on sex, age, living status (alone or with part-
ner), net yearly income (below or above €18,000 [2002]), education (low:

vocational training, medium: high school, or high: college or university), and

country (Dutch versus German) were included.

Clinical status. A questionnaire on comorbidity was included. Patients were

asked to indicate which of the following chronic conditions they had: hyper-
tension, heart disease, stroke, epilepsy, diabetes, cancer, lung disease, kidney
disease, liver disease, stomach or intestine disease, blood disease, and other
diseases. We calculated the total number of comorbidities per patient. Further,

we retrieved the rheumatological diagnosis (RA or PsA) and disease duration
(years) from the patients’ charts.

Health status. We included questionnaires on functional status, fatigue, and

pain. Functional status was measured with the HAQ19-21. We assessed

patients’ ability to perform activities using a 4-point scale, ranging from “able
to do without difficulty” (score 0) to “unable to do” (5). We calculated the

Alternative Disability Index (ADI) by summing up the highest score on each

scale and dividing this by the total number of scales. High HAQ scores
represented low levels of physical functioning. Fatigue was measured by

means of a 100 mm visual analog scale (VAS) with endpoints “no fatigue” (0)
and “fatigue as bad as it could be” (100)22. Pain was measured using the pain

scale of the AIMS216-18. This scale consists of 5 items, which are scored on a
5-point Likert scale, ranging from “no pain” (score 1) to “severe pain” (5) or
from “never” (1) to “every day” (5). Pain scores were calculated by summing

the individual item scores and converting these sum-scores into a score rang-
ing from 0 (no pain) to 10 (severe pain).

Statistical analysis. The normality of the distribution of the data was assessed

with the Kolmogorov-Smirnov test. Correlation analyses were used to inves-
tigate the univariate relationship between psychological well-being and the

number of assistive devices per patient and to investigate the univariate rela-
tionship of both variables with sociodemographic, clinical status, and health
status variables. For the normally distributed variables, Pearson’s correlation
analyses were applied. For not normally distributed variables, Spearman’s

correlation analyses were applied. For dichotomous variables (sex, living sit-

uation, income, country, diagnosis), the significance results of correlation
analyses are exactly the same as comparing means by independent t tests (in
the case of normally distributed variables) or median scores by Mann-
Whitney U tests (in the case of not normally distributed variables). Therefore,
the results are reported in the correlational format for consistency.

The univariate relationship between the possession of assistive devices and
psychological well-being might be affected by one or more confounding
variables. Therefore, hierarchical multiple linear regression analysis with
backward elimination of potential confounding variables was used to identi-
fy the unique association between the possession of assistive devices and psy-
chological well-being. In the first block, the number of assistive devices per

patient was entered. In the second block, potential confounding variables
[variables that were univariately correlated (p ≤ 0.15) with both psychologi-
cal well-being and the number of assistive devices per patient] were entered.
A p value of 0.15 was used to be sure that we did not miss any variables that
might act as a confounder. Subsequently, all potential confounding variables
were sequentially removed. The variable with the smallest partial correlation
with psychological well-being was considered first for removal. If it met the
criterion for elimination, that is, if it changed the regression coefficient (B) of
the number of assistive devices per patient by less than 10%, it was removed.
After the first variable was removed, the variable remaining in the equation
with the smallest partial correlation was considered next. The procedure
stopped if there were no variables in the equation that satisfied the elimina-
tion criterion. The remaining variables were considered to be confounders of
the relationship between the possession of assistive devices and psychologi-
cal well-being.

Data analysis was performed with the Statistical Package for the Social
Sciences (SPSS for Windows, version 11.0).

RESULTS

We selected 327 patients. Two hundred eighteen (67%) responded and agreed to participate. Of them, 165 were eligi-
ble (HAQ score > 0) for study and received a questionnaire. Completed questionnaires were returned by 142 patients.
Patient characteristics are shown in Table 1.

The percentages of patients possessing specific assistive

devices are summarized in Table 2. Seventy-eight percent of

the patients possessed 1 or more assistive devices. On aver-
age, patients possessed 3 to 4 assistive devices (Table 1).

The findings of the correlation analyses are presented in

Table 1. With the exception of psychological functioning,

none of the variables was normally distributed. Therefore, we
calculated Spearman’s correlation coefficients. The data indi-
cate that the number of assistive devices per patient was uni-

varietally negatively correlated with psychological well-being

(r = –0.18; p = 0.03). Further, functional status, pain, fatigue,

and comorbidity were correlated (p ≤ 0.15) with both psycho-


cal well-being and the number of assistive devices per patient.

These variables were considered potential con-

founders of the relationship between the number of assistive
devices per patient and psychological well-being.

Results of the hierarchical multiple linear regression

analyses are summarized in Table 3. The results show that

only functional status was a confounder of the relationship

between the number of assistive devices per patient and psy-
chological well-being. Exclusion of functional status from

the regression model decreased the magnitude of the regression

coefficient (B) of the number of assistive devices per patient

from 0.15 to −0.07. Exclusion of the remaining potential con-
founding variables did not change the regression coefficient of the number of assistive devices per patient by more than 10% (data not shown). Therefore, these variables were not included in the final model. After controlling for confounding by functional status, the number of assistive devices per patient was significantly positively associated with psychological well-being ($r_{\text{partial}} = 0.22; p = 0.009$).

**DISCUSSION**

After controlling for differences in functional status, the possession of assistive devices was significantly positively associated with psychological well-being. Surprisingly, the number of assistive devices per patient was univariately negatively correlated with psychological well-being. This can be explained by the high correlations of functional status with the number of assistive devices per patient ($r = 0.72$) as well as psychological well-being ($r = -0.41$). These relationships suppress the positive relationship between the number of assistive devices per patient and psychological well-being, and therefore this univariate relationship becomes negative. This is a case of negative confounding, where the removal of a con-

<table>
<thead>
<tr>
<th>Table 1. Patient characteristics and their correlation with the possession of assistive devices and psychological well-being (n = 142).</th>
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<tbody>
<tr>
<td>Patient Characteristics</td>
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<tr>
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<tr>
<td><strong>Sociodemographics</strong></td>
</tr>
<tr>
<td>Age, yrs</td>
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<tr>
<td>Sex, %</td>
</tr>
<tr>
<td>Female (score 0)</td>
</tr>
<tr>
<td>Male (score 1)</td>
</tr>
<tr>
<td>Living situation, %</td>
</tr>
<tr>
<td>Alone (score 0)</td>
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<tr>
<td>With partner (score 1)</td>
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<tr>
<td>Yearly net income (2002), %</td>
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<tr>
<td>Below $\leq18,000, (score 0)</td>
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<tr>
<td>Above $\leq18,000, (score 1)</td>
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<tr>
<td>Education level, %</td>
</tr>
<tr>
<td>Low (score 1)</td>
</tr>
<tr>
<td>Medium (score 2)</td>
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<tr>
<td>High (score 3)</td>
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<tr>
<td>Country, %</td>
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<tr>
<td>The Netherlands (score 0)</td>
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<tr>
<td>Germany (score 1)</td>
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<tr>
<td><strong>Clinical status</strong></td>
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<tr>
<td>Diagnosis, %</td>
</tr>
<tr>
<td>RA (score 0)</td>
</tr>
<tr>
<td>PsA (score 1)</td>
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<tr>
<td>Disease duration, yrs</td>
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<tr>
<td>Comorbidity, no.</td>
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<tr>
<td><strong>Health status</strong></td>
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<tr>
<td>Functional status (HAQ) (0–3)</td>
</tr>
<tr>
<td>Fatigue (VAS) (0–100)</td>
</tr>
<tr>
<td>Pain (AIMS2) (0–10)</td>
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<tr>
<td>Psychological functioning (AIMS2) (0–10)</td>
</tr>
<tr>
<td>Assistive devices (number in possession) (0–17)</td>
</tr>
</tbody>
</table>

*Values are mean (SD) unless otherwise indicated. * $p \leq 0.15$; ** $p \leq 0.05$; *** $p \leq 0.01$. HAQ: Health Assessment Questionnaire, VAS: visual analog scale, AIMS: Arthritis Impact Measurement Scales.

<table>
<thead>
<tr>
<th>Table 2. Patients possessing assistive devices (N = 142).</th>
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<tbody>
<tr>
<td>n (%)</td>
</tr>
<tr>
<td><strong>Mobility devices</strong></td>
</tr>
<tr>
<td>Scooter</td>
</tr>
<tr>
<td>Walker</td>
</tr>
<tr>
<td>Cane</td>
</tr>
<tr>
<td>Crutch(es)</td>
</tr>
<tr>
<td>Wheelchair</td>
</tr>
<tr>
<td>Orthopedic footwear</td>
</tr>
<tr>
<td><strong>Tools for ADL</strong></td>
</tr>
<tr>
<td>Helping hand</td>
</tr>
<tr>
<td>Special cutlery</td>
</tr>
<tr>
<td>Special pen</td>
</tr>
<tr>
<td>Dressing device(s)</td>
</tr>
<tr>
<td><strong>Housing adaptations</strong></td>
</tr>
<tr>
<td>Elevator</td>
</tr>
<tr>
<td>Adapted kitchen</td>
</tr>
<tr>
<td>Shower seat</td>
</tr>
<tr>
<td>Grab bar(s) in bathroom/toilet</td>
</tr>
<tr>
<td>Special tap(s)</td>
</tr>
<tr>
<td>Elevated toilet seat</td>
</tr>
<tr>
<td>Special furniture</td>
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<tr>
<td>Special bed</td>
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</table>
The positive relationship between assistive devices and psychological well-being was confirmed in previous studies with patients with nonrheumatic conditions. Tomita, et al investigated the relationship between the number of assistive devices per patient and psychosocial variables in a sample of physically impaired elderly people\textsuperscript{24}. They found the number of assistive devices per patient to be inversely associated with depression, measured with the Center for Epidemiological Studies Depression Scale (CES-D), after adjusting for differences in sociodemographic variables and disability. Self-esteem, measured with Rosenberg’s Self-Esteem Scale, was not independently associated with the number of assistive devices per patient. Jutai, et al investigated the psychosocial influence of the use of several single assistive devices (e.g., wheelchairs, computer-assisted writing aids, electronic aids to daily living) in patients with degenerative diseases and spinal cord and brain injuries\textsuperscript{25,26}. They concluded that the psychosocial effect of assistive devices for ADL, measured with the Psychosocial Impact of Assistive Devices Scale (PIADS), was dependent on the type of device and the degree of disability. Overall, the psychosocial effect of assistive devices was positive.

To assess psychological well-being, we used the psychological component of the AIMS2. The AIMS2 is a disease-specific questionnaire designed to measure health-related quality of life in arthritis patients. The questionnaire is not specifically developed to measure the effect of a particular intervention, such as the prescription of assistive devices. Assistive devices might affect different aspects of psychological well-being than other interventions such as surgery or pharmaceutical treatments. Therefore, health-related quality of life measures, like the AIMS2, might not be sensitive enough to assess relatively small differences in psychological well-being associated with the use of assistive devices\textsuperscript{27}. Thus, the relationship we found between the possession of assistive devices and psychological well-being might be underestimated. Intervention-specific outcome measures, like the PIADS\textsubscript{27} and the QUEST (Quebec User Evaluation of Satisfaction with Assistive Technology)\textsuperscript{28}, for assistive devices are recommended in studies examining the effect of a particular intervention.

Device utilization is included in several frameworks for assistive device outcomes and is an important variable to consider when the effects of assistive devices are investigated\textsuperscript{29,30}. In this study we assessed only the possession of a selection of commonly used assistive devices. We realize that some patients might not use the assistive devices they possess. Assistive devices that are not in use might not contribute to improved psychological well-being. So the relationship between assistive devices and psychological well-being might have been stronger if we had assessed the use, instead of the possession, of assistive devices. Although we cannot exclude the possibility that some patients might possess more or other devices, we do not consider it likely that these rare cases might have influenced our general conclusions.

Finally, we equated all assistive devices in this study and summed them up, despite their different functions and potential different enhancing effects on the stigma of disability. It is plausible that not all assistive devices have the same effect on psychological well-being. The magnitude of the relationship, as well as the direction of the relationship (positive or negative), might differ per assistive device. Nevertheless, we found a small positive overall relationship between the number of assistive devices patients possess and psychological well-being.

Our data show that the possession of assistive devices is positively related to psychological well-being of disabled patients with rheumatic diseases. More experimental studies are necessary to investigate this issue and confirm the hypothesis that psychological well-being is improved by the availability of assistive devices.

### Table 3. Results of hierarchical multiple linear regression analysis for psychological well-being.

<table>
<thead>
<tr>
<th></th>
<th>Block 1</th>
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<th>Block 2</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>B (95% CI)</td>
<td>r</td>
<td>B (95% CI)</td>
<td>r_{\text{partial}}</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possession of assistive devices</td>
<td>-0.07 (-0.15 to 0.02)</td>
<td>-0.18</td>
<td>0.15 (0.04 to 0.26)*</td>
<td>0.22*</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional status</td>
<td></td>
<td></td>
<td>-1.29 (-1.78 to -0.79)*</td>
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</tr>
</tbody>
</table>

B: regression coefficient; CI: confidence interval; r: correlation coefficient. * p ≤ 0.01.
ACKNOWLEDGMENT
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REFERENCES