Treatment of patients with hand osteoarthritis : outcome measures, patient satisfaction, and economic evaluation

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CHAPTER **FIVE**

DETERMINANTS OF PATIENT SATISFACTION AFTER ORTHOPEDIC INTERVENTIONS TO THE HAND: A REVIEW OF THE LITERATURE

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ABSTRACT

Treatment effectiveness is increasingly evaluated from the patients' perspective. However, the interpretation of satisfaction is complex because the patient's perception of a satisfactory outcome is influenced by numerous factors. The objective of this study was to identify which factors are associated with patient satisfaction after orthopedic interventions to the hand. A literature review was conducted, including studies on determinants of satisfaction with treatment outcome or unspecified overall satisfaction of patients with hand problems. The results indicate that patient satisfaction is determined by multiple factors. There is moderate evidence that pain/symptoms, activities of daily living/function, aesthetics, and embodiment influence patient satisfaction. Furthermore, data indicate a correlation of strength, range of motion, fulfillment of expectations, deformity, workers' compensation, and length of follow-up with satisfaction. Knowledge about these determinants may lead to a more detailed decision-making process, thus contributing to improved treatment outcomes and cost-effectiveness.

Level of Evidence V

INTRODUCTION

After orthopedic interventions to the hand, objective parameters, such as range of motion (ROM), strength, and radiological findings, have often been assessed to quantify the outcome of the intervention. In recent years, subjective results based on self-assessment of function, activities of daily living (ADL), quality of life, and patient satisfaction have emerged as increasingly important outcome variables after orthopedic interventions. However, numerous studies have shown that objective parameters do not necessarily correlate with the patient's perception of treatment success. Several researchers have described the discrepancy between objective and subjective outcome assessments after orthopedic interventions to the hand[1-5]. For example, Mandl et al.[1] revealed that objectively quantified outcomes in patients after metacarpophalangeal (MCP) arthroplasty are not necessarily associated with the satisfaction of the patient. Specifically, strength and ROM showed only low-to-moderate nonsignificant correlations with patient satisfaction. MacDermid et al.[3] support Mandl et al.[1] in that they found no significant correlations between strength, ROM, radiographic findings, and patient satisfaction in patients after trapezial arthroplasty. Additionally, in patients with distal radius fractures, no significant correlation between ROM and the patient-rated wrist evaluation[4] could be shown. van Oosterom et al.[2], furthermore, could not prove a strong correlation between impairment ratings in patients with multiple finger fractures and function measured with the Disabilities of the Arm, Shoulder, and Hand (DASH) Questionnaire. However, Chung and Haas[6] found a significant correlation between strength, ROM, and satisfaction with strength and ROM, respectively. According to these findings, the use of patient-reported outcome for assessing the individual function of patients in their daily life is emphasized[2]. This statement is supported by Goldhahn et al.[5] who recommended using both objective and subjective outcome assessments in patients with distal radius fracture.

Although the value of measuring patient satisfaction has been increasingly emphasized, its interpretation is complex because of the potential influence of a variety of, so far, poorly defined factors on the patients' perception of a satisfactory outcome[7]. Weaver et al.[8] defined treatment satisfaction as ''a recipient's rating of or report on salient aspects of the process and the results of his or her treatment experience according to predetermined criteria.'' Hall and Dornan[9] defined 11 dimensions of care that patients evaluate when they are asked about their satisfaction. These dimensions include aspects of processes, such as facilities, continuity of care, humaneness, and competence, as well as the aspect of satisfaction with the outcome of care.

PURPOSE OF THE STUDY

Although assessing patient satisfaction is becoming more and more important, evidence about factors that determine the subjective treatment success is still insufficient. For that reason, the objective of this narrative review was to identify factors that are associated with patient satisfaction after orthopedic interventions to the hand.

METHODS

A literature search was conducted using MEDLINE, the Cochrane Library, OTseeker, PEDro, CINAHL, PsycINFO, and EMBASE until November 2009. The search comprises the terms patient

satisfaction, treatment satisfaction, subjective outcome, and patient reported outcome in combination with determinant or influence or predictor or predict. All terms were combined with hand or wrist or finger or thumb (Figure 1). Limits were set for English, German, and Humans.

All studies investigating determinants of satisfaction with treatment outcome or unspecified overall satisfaction after orthopedic interventions for hand problems were included in the review.

Studies about satisfaction with aspects of processes, such as facilities, continuity of care, humaneness, and competence, as well as studies assessing satisfaction with a treatment without investigating the relationship between outcomes and satisfaction, were excluded.

All studies meeting these criteria were considered, regardless of their methodological quality. The search and article selection were done by the main author. For the article selection, the titles and abstracts were firstly screened to ascertain that they were relevant for the review. If so, the full texts were analyzed, and the decision for inclusion or exclusion was made. References were checked for additional relevant studies.

The resulting articles were reviewed for independent variables, which have a correlation to or predict patient satisfaction. The quality of each study was rated according to the Structured Effectiveness Quality Evaluation Scale (SEQES)[10]. The SEQES scores range from 0 to 48 with higher scores indicating higher methodological quality.

Concerning the strength of the association of independent variables and patient satisfaction, correlation coefficients were extracted, if available. $r \leq 0.25$: little to no correlation; $0.26 \leq r \leq 0.5$: mild correlation; $0.51 \leq r \leq 0.75$: moderate correlation; and $r \geq 0.76$: good correlation[11].

The statistical methods used in the studies for assessing variables and their relationship to patient satisfaction were quite heterogeneous, thus making it impossible to compare the data quantitatively for a meta-analysis. For this reason, the results are displayed descriptively.

RESULTS

The literature search yielded 296 articles in different databases (Figure 2). Of these, 263 were excluded after reading the title and abstract. After reading the full texts, 17 articles[1, 3, 12-26] were included in the final analysis.

The 17 articles examined the association of 25 independent variables with patient satisfaction. In 12 articles, the aim of the study was to investigate the factors influencing patient satisfaction, whereas in the remaining five studies, the investigation of factors influencing

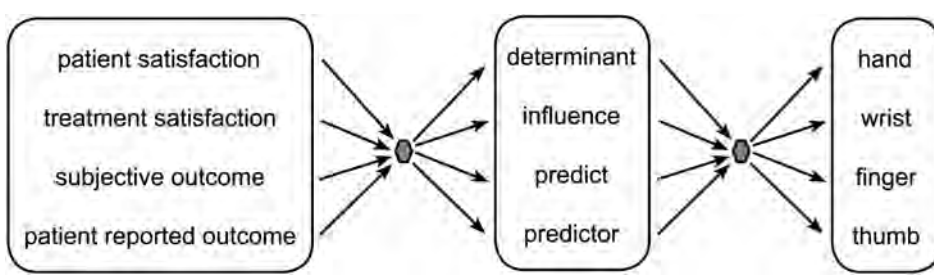

Figure 1 Search strategy. All terms of the three boxes were combined with AND

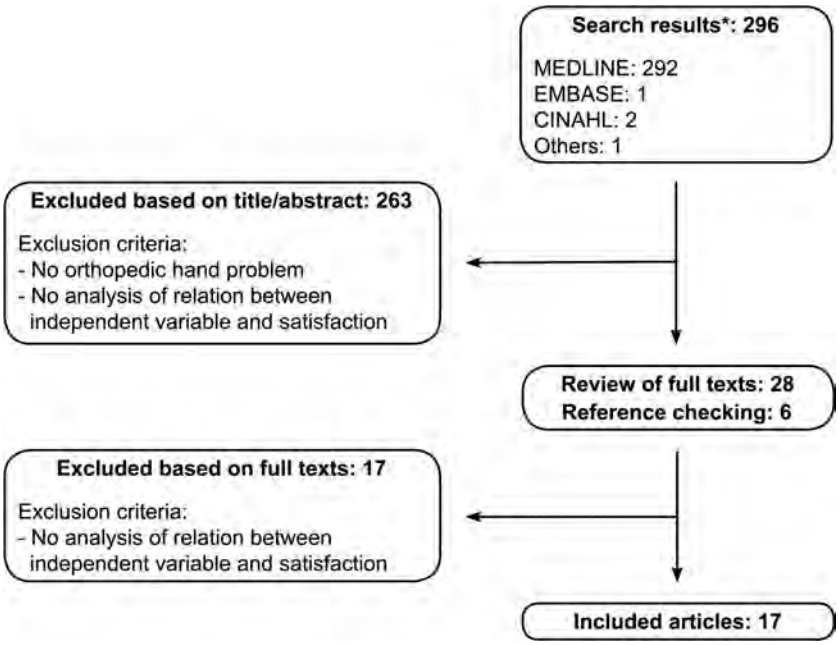

Figure 2 Quorum diagram of article selection process
*Inclusion criteria: satisfaction with treatment outcome or not specified overall satisfaction and studies involving patients with any orthopedic hand problem

satisfaction was not the primary objective. The methodological quality of the studies ranged from 10 to 32 points of 48 on the SEQES scale.

In the studies, 918* subjects were investigated overall, receiving the following interventions: carpal tunnel release (546 patients), elective hand surgery (122 patients), MCP arthroplasties (80 patients), conservatively managed distal radius fractures (74 patients), hemiresection interposition arthroplasties of the distal radioulnar joint (52 patients), trapezial arthroplasties (25 patients), and partial wrist denervation (19 patients).

The correlation coefficients between the investigated factors and satisfaction are shown in Table 1. The factor most related to satisfaction is pain/symptoms showing low-to-good correlation coefficients (r = 0.01 - 0.87) followed by ADL/function (r = 0.14 - 0.86) and aesthetics (r = 0.6 - 0.7). For the factor "alcohol use," only the regression coefficient with $\beta = 3.1$ ($p = 0.002$) is given[26].

The factors studied among the greatest populations were age, pain/symptoms, and psychological factors. The least studied factors were number of hand problems and length of follow-up. A detailed description of each study and an appraisal of the level of correlation can be found in Appendix 1.

* The following studies investigated patients from the same population: Katz et al. 2001[26]; Bessette et al. 1997[23, 25]; Hobby et al. 2005[12, 22]; Anzarut et al. 2004[20] and Jaremko et al. 2007[19]; for calculation of the total sample size, the population of these studies was only taken once. Regarding the studies of Katz et al. 2001[26] and Bessette et al. 1997[23, 25], the number of 250 subjects was taken, reflecting the surgical cohort of the Maine carpal tunnel study.

Table 1 Studies investigating the influence of different factors on patient satisfaction

	Study	Number of Subjects	Correlation Coefficient (r)	SEQES
Pain / symptoms	Bain et al.[17]	52	0.87	18
	MacDermid et al.[3]	25	0.78**	14
	Kadzielski et al.[18]	49	0.63***	27
	Mandl et al.[1]	26	0.46*- 0.67**	10
	Katz et al.[26]	241	0.01 - 0.18*	24
	Lozano Calderón et al.[16]	49	/	17
	Hansen & Larsen[24]	101	/	17
ADL / function	Goldfarb et al.[15]	36	0.86***	18
	Bain et al.[17]	52	0.69	18
	MacDermid et al.[3]	25	-0.02 to 0.81**	14
	Mandl et al.[1]	26	0.12 - 0.56	10
	Katz et al.[26]	241	0.14 - 0.22**	24
	Weinstein & Berger[21]	19	/	11
Aesthetics	Mandl et al.[1]	26	0.60**- 0.70**	10
	Goldfarb et al.[15]	36	0.69***†	18
Strength	Bain et al.[17]	52	0.71	18
	Mandl et al.[1]	26	0.03 - 0.37	10
	MacDermid et al.[3]	25	0.11 - 0.29	14
	Katz et al.[26]	241	0.21	24
	Lozano Calderón et al.[16]	49	/	17
Fulfillment of expectations	Hudak et al.[13]	122	0.53 - 0.69	21
	Kadzielski et al.[18]	49	0.36**	27
ROM	Bain et al.[17]	52	0.60	18
	MacDermid et al.[3]	25	0.19 - 0.35	14
	Mandl et al.[1]	26	0.20 - 0.24	10
	Burgess et al.[14]	18	/	17
Embodiment	Hudak et al.[13]	122	-0.54***	21
Deformity	Mandl et al.[1]	26	0.30 - 0.50	10
	Goldfarb et al.[15]	36	/	18
	Burgess et al.[14]	18	/	17
Workers´ compensation	Bessette et al.[25]	202#	0.37***†	24
	Hudak et al.[13]	122	0.09	21
	Katz et al.[26]	241#	/	24
Length of follow-up	MacDermid et al.[3]	25	-0.38	10
Radiographic findings	Bain et al.[17]	52	-0.31 to 0.05	18
	MacDermid et al.[3]	25	-0.30 to 0.22	14
	Jaremko et al.[19]	74#	/	32
	Anzarut et al.[20]	74#	/	30
Reasons for surgery	Bessette et al.[23]	220	0.16* - 0.31*	23
Psychological factors	Lozano Calderón et al.[16]	49	-0.25*	17
	Katz et al.[26]	241#	-0.24**	24
	Hudak et al.[13]	122	-0.07 - 0.11	21
	Hobby et al.[12]	97	/	22
	Bessette et al.[25]	202#	/	24
Physical health	Katz et al.[26]	241	-0.22**	24

(Continued on next page)

Table 1 (continued)

	Study	Number of Subjects	Correlation Coefficient (r)	SEQES
Age	Katz et al.[26]	241	-0.18*	24
	MacDermid et al.[3]	25	0.06	14
	Hudak et al.[13]	122	0.06	21
	Lozano Calderón et al.[16]	49	/	17
	Hobby et al.[22]	97	/	21
Number of hand problems	MacDermid et al.[3]	25	0.18	14
Social status	Hudak et al.[13]	122	-0.13	21
	Lozano Calderón et al.[16]	49	/	17
	Katz et al.[26]	241	/	24
Sensibility	Katz et al.[26]	241	-0.02 to -0.04	24
Comorbidities	Katz et al.[26]	241	0.02	24
Disease	Katz et al.[26]	241	/	24
Intervention	Katz et al.[26]	241	/	24
Marital status	Lozano Calderón et al.[16]	49	/	17
	Katz et al.[26]	241	/	24
Physical signs	Katz et al.[26]	241	/	24
Gender	Lozano Calderón et al.[16]	49	/	17
	Hansen & Larsen[24]	101	/	17
	Bain et al.[17]	52	/	18
	Hobby et al.[22]	97	/	21
	Katz et al.[26]	241	/	24
Drinking / smoking	Katz et al.[26]	241	β = 3.1** (alcohol use)	24

DISCUSSION

The results indicate that a number of factors play a role in determining patient satisfaction, with some of them beyond the influence of the hand surgeon and therapist and others guidable through the physician/therapist. However, as can be seen from Table 1 and Appendix 1, only a small number of studies can prove a good correlation between a factor and patient satisfaction. This might be because of methodological issues of some studies, such as small sample sizes, and indicates that more research is needed in this field.

In the context of assessing the patient's view of an intervention, the International Classification of Functioning, Disability and Health (ICF) has gained increasing relevancy. The ICF offers a comprehensive understanding of the individual health condition based on body functions and structures, activities, participation, personal and environmental factors and provides a scientific base for studying health, health-related states, outcomes, and the related determinants[27]. Not only the health condition of an individual but also his/her satisfaction with treatment is influenced by factors relating to all these categories mentioned above. The determinants revealed in this literature review could be effectively classified into five ICF categories. The results show that factors of every dimension may have an impact on treatment satisfaction, although most of them are related to body functions/body structures (Figure 3).

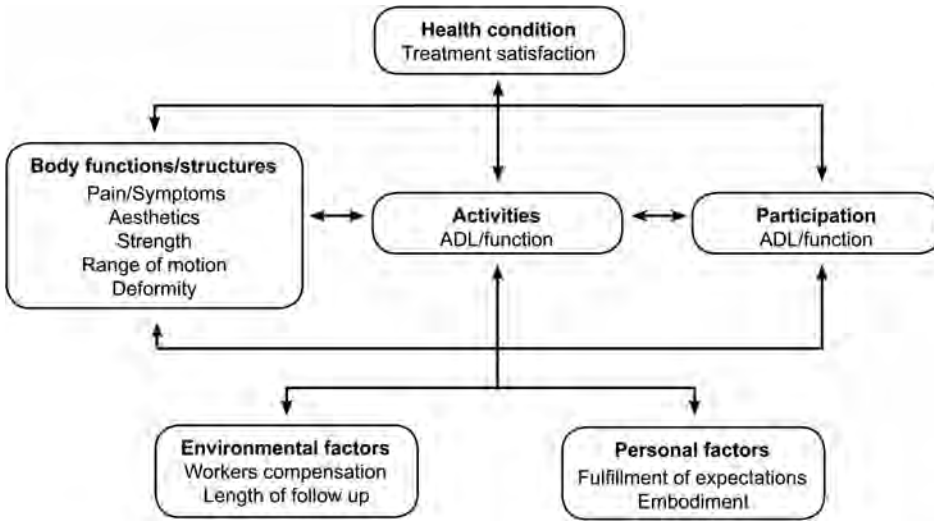

Figure 3 Categorization of all factors according to the International Classification of Functioning, Disability and Health concept[27] where at least mild correlations between the factor and satisfaction could be shown. Graph was adapted with agreement from the World Health Organization. ADL = activities of daily living.

This may be because of the fact that these factors are the ones studied most often, whereas others such as environmental and personal factors are less investigated. Further research assessing the influence of factors related to these categories is needed.

According to the ICF, the factors' symptom or pain improvements could be classified into the category of body functions/body structures. Their correlation with patient satisfaction is rated differently with a trend toward increased satisfaction with pain/symptom improvement. These findings are supported by Jackson et al.[28] who established that symptom improvement increased satisfaction in patients presenting a physical symptom. Another factor, which could be classified into the ICF category body functions/body structures, the postoperative aesthetics, is also regarded as an important parameter that may contribute to satisfaction[1,15]. These findings are confirmed by Mandl et al.[29] and Synnott et al.[30] who found that a very important expectation of patients after MCP joint replacement was to improve the appearance of their hand.

Deformity, which mildly correlates with satisfaction, might also be associated with aesthetics. Synnott et al.[30] hypothesized that the correction of the MCP deformity may be the cause for improved appearance of the hand, which in turn, influences patient satisfaction.

Strength and ROM seem to have a correlation with patient satisfaction although there is a great diversity in the correlation coefficients ranging from 0.11 to 0.71 and 0.19 to 0.6, respectively. Chung and Hass[6] defined cutoff points for grip strength, key pinch strength, ROM, and satisfaction with these objective parameters after surgery for distal radius fractures. They found these points to be at 65%, 87%, and 95%, respectively, of the function of the other unaffected hand. These findings highlight the importance of measuring objective outcomes and defining values for distinguishing between satisfied and dissatisfied patients also for other hand problems.

The role of functional improvements, measured by different assessments, is discussed differently in the investigated articles. A reason of these different results might be the various measurement methods of ADL/function, highlighting the need for standardized, valid, and reliable methods for assessing function. However, a trend toward greater satisfaction with increased function could be seen. This is supported by Jackson et al.[28] who revealed that functional status had an independent effect on satisfaction. Another study[31] that determined the reasons why patients seek MCP joint arthroplasty could show that impaired function was the most significant predictor of choosing MCP reconstruction.

In the ICF category of environmental factors, the impact of receiving money during disability can be confirmed by Weinstein and Berger[21] who found that a need for subsequent procedures for pain relief after partial wrist denervation was significantly associated with workers' compensation claims. Further studies also indicate that patients receiving workers' compensation were less satisfied with the results of a revision trapeziometacarpal joint arthroplasty[32] and that the most influential predictor of pain and disability was third-party compensation[33].

Another factor belonging to the ICF category of environmental factors is the time between treatment and assessment. There is mild evidence that a longer follow-up is associated with a poorer outcome[3]. However, it remains unclear, if the worse rating corresponds to an effective worse condition of the patients or just a worse perception of the condition.

Besides satisfaction, the fulfillment of preoperative expectations is an increasingly important assessment of treatment success. The conclusion that patients seem to be more satisfied if preoperative expectations are fulfilled[13, 18] is further confirmed in other studies with patients with orthopedic and abdominal surgeries[34], patients seeking out-of-hours care[35], adults presenting a physical symptom[28], and patients undergoing total hip and knee arthroplasty[36, 37]. In the field of hand surgery and therapy, sufficient evidence about the importance of expectations is still rare. Patients are often unaware of the severity of an injury and the complexity of treatment[38]. They expect that if just a small part of the body is injured that it can be quickly managed with a simple surgical procedure or conservative treatment. O'Brien and Presnell[38] highlight the importance of detailed patient education about the injury and the resulting intervention to lead to a better adherence to the treatment. The correlation between expectations and satisfaction substantiate the relevance of the decision-making process before an intervention. The physician and therapist have to be aware of the patients' expectations and should guide them to realistic assumptions of the treatment outcome. There is a need for developing a standardized assessment tool that can be routinely used in daily practice for evaluating patients' expectations before the treatment and their fulfillment when the treatment is finished.

A phenomenological concept, not widely known in the field of hand surgery, was investigated by Hudak et al.[13, 39, 40]: Embodiment ''serves to de-emphasize the physical body with its assumed subject-object split and instead to create an understanding of our bodies as they are given to us: agents of our consciousness that are capable of action on the plane of our experience that we have to call the ''physical" world[41]. Gadow[42] elucidated four different states of embodiment representing the unity or disunity between the body and self. Hudak et al.[39] suggested that patients satisfied with their treatment had a relative lack of consciousness of the affected hand, leading to a unity of body and self. A body-self unity means that a person takes his body for granted without thinking of it because the body or parts of it are unproblematic[39]. If

body-self unity can be achieved after surgery, even when the clinical outcome is poor, a patient could be satisfied. Nevertheless, the authors stated that it remains unclear whether body-self unity leads to satisfaction or whether satisfaction facilitates body-self unity. However, they recommend consideration of the patient's embodiment as an important aspect of treatment outcome and suggest interventions to facilitate body-self unity[13].

The influence of different psychological factors is discussed diversely in the investigated articles. Several authors[13, 25] could not find an association between measures of psychological state and functional improvement or satisfaction after surgery. By contrast, Lozano Calderon et al.[16] could show that depression significantly affected satisfaction, accounting for 25% of the variance in the satisfaction score. Furthermore, depression and ineffective coping skills combined with static numbness accounted for 54% of the variability of perceived disability (DASH score). Articles other than hand studies have also confirmed the effect of psychological factors. Ineffective coping skills, lower personal control, somatization, serious illness worries, depression, and anxiety are shown to have an impact on the functional outcome or on satisfaction[43-45]. Awareness of the influence of the psychological state may help the physician and hand therapist achieve a better treatment outcome, probably by considering accompanying psychological therapies.

Factors that cannot be influenced by the health care provider, such as age and gender, are discussed diversely. Although significant correlations could not be proved, the included articles, as well as studies dealing with other patients, suggest that age has at least a slight influence on patient satisfaction with older people being more satisfied than younger ones[9, 13, 28, 46-48]. This is in contrast to the study of Hobby et al.[22], who found out that satisfaction appeared to be lower in patients older than 70 years. Moreover, in hand surgery and therapy, it is not proven that gender affects patient satisfaction, although results of other studies indicate that it influences patient satisfaction[28] and independently predicts the DASH score with females having higher scores than males[43].

Furthermore, aspects of social status, such as education and income, did not predict satisfaction in the included articles, whereas other authors have shown an influence of income[47] and education[13, 48, 49] on patient satisfaction.

In areas other than hand surgery and therapy, some other factors influence patient satisfaction, such as shared decision making[50] and the information given to the patient[28, 48]. Furthermore, the influence of hospital-related factors, such as friendliness of the staff[46, 48, 51, 52], duration of waiting times[46], time spent with the provider[46, 53], state of facilities[48], and food[48, 52], have to be kept in mind. These aspects may also affect patient satisfaction, but the investigation of them was beyond the scope of this study. Nevertheless, in daily practice, the treatment environment and the behavior of the staff should be considered to make patients more satisfied. A scientific investigation of these factors in the field of hand surgery and therapy remains to be done.

Jackson et al.[28] suggested a model to explain patient satisfaction in patients presenting a physical symptom. The authors showed that fulfillment of expectations, age older than 65 years, better functioning, symptom improvement, and no need for another clinical visit for the symptom could explain 38% and 40% of the variance in patient satisfaction at two weeks and three months postvisit, respectively. Another model was proposed by Katz et al.[26] for patients after carpal tunnel release. By including functional limitations, mental and physical health status, tobacco and alcohol use, day pain, and bilateral symptoms, they found an explained variance of 15%. Adding work-related factors (attorney involved, forceful, repetitive work) to this model,

the variance increased to 27%. Besides these very helpful approaches, there is a need for assessing patient satisfaction in the field of hand surgery and therapy more comprehensively.

Some limitations have to be acknowledged: Due to the heterogeneous measurement of the variables, an analytical approach was impossible, limiting the validity of this review. Satisfaction, for example, was measured using various approaches, such as different Likert scales, a visual analog scale, or the Michigan Hand Questionnaire satisfaction subscale, which precluded statistical comparisons. Further issues are the different approaches for calculating correlation coefficients and the lack of correlation coefficients in some studies complicating an evident conclusion. Given that most of the studies are observational studies without comparison group, the quality of some studies is quite low with SEQES scores of eight studies being below 20 points of 48 points. Therefore, caution is advised in generalizing the results without proving the evidence in further studies.

CONCLUSIONS

To conclude, the findings of the current narrative review provide moderate evidence that the factors pain/symptoms, ADL/function, aesthetics, and embodiment have an influence on patient satisfaction. Furthermore, the data indicate a correlation of strength, ROM, fulfillment of expectations, deformity, workers' compensation, and length of follow-up with patient satisfaction. For daily practice, it can recommend that a treatment goal should be relief of pain or symptoms, restoration of the individual's important functions while taking the appearance of the hand and the body-self unity into account. In addition, restoration of strength, ROM, and deformity should be addressed. However, besides evaluating these objective outcomes, the impact of the patients' individual expectations, if they are involved in workers' compensation, and the time between treatment and follow-up have to be considered.

Knowledge about these factors may lead to a more detailed decision-making process and higher patient adherence, thus contributing to improved treatment outcomes and cost-effectiveness[7]. Nevertheless, further well-designed prospective trials are needed to quantify the influence of possible determinants on satisfaction in patients with hand problems and to establish a standardized method of assessing patient satisfaction.

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APPENDIX 1

Table A-1 Description of studies investigating correlations between independent variables and satisfaction

Factor	Author	Methods
Pain / symptoms	Bain et al.[17]	52 patients with 55 hemiresection interposition arthroplasties of the distal radioulnar joint Postoperative pain and overall satisfaction rated on a VAS Pearson's correlation coefficient
	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction and self-reported improvement of Pain measured by a VAS Pearson's correlation coefficient
	Kadzielski et al.[18]	49 patients with carpal tunnel release Modified DASH to assess symptom relieve, satisfaction measured by a VAS Spearman's correlation coefficient
	Mandl et al.[1]	26 RA patients with 160 MCP joint replacements MHQ postoperative pain subscale Spearman's correlation coefficient
	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale, Postoperative symptoms measured on the Symptom Severity Scale Spearman's correlation coefficient
	Lozano Calderón et al.[16]	49 patients with carpal tunnel release Satisfaction measured by a VAS
	Hansen & Larsen[24]	101 patients with carpal tunnel release, Boston questionnaire, Satisfaction measured by a VAS
ADL/ function	Goldfarb et al.[15]	36 RA patients with 208 MCP arthroplasties MHQ functional and satisfaction subscale Simple regression analysis
	Bain et al.[17]	52 patients with 55 hemiresection interposition arthroplasties of the distal radioulnar joint Daily activities and satisfaction rated on a VAS Pearson's correlation coefficient
	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Hand function measured by JTHF and PPT satisfaction, improvement of ADL ability, hand and wrist movement and strength measured on a VAS Pearson's correlation coefficient
	Mandl et al.[1]	26 patients with RA received 160 MCP joint replacements, MHQ, JTHF Spearman's correlation coefficient
	Katz et al.[26]	241 patients with carpal tunnel release Functional Limitation Scale, Satisfaction measured by a 5-point Likert scale Spearman's correlation coefficient
	Weinstein & Berger[21]	19 patients received 20 partial wrist denervations Functional outcome measured by the DASH

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Results	SEQES	Correlation
Change of pain correlated with satisfaction: r=0.87, No information about significance	18	Good
Correlations with satisfaction: r=0.78**	14	Good
Relieved symptoms correlated with satisfaction: r=0.63***	27	Moderate
Correlation with satisfaction: r=0.46*-0.67**	10	Mild to moderate
Correlation between dissatisfaction and Symptom Severity Score r=0.18* and day pain r=0.15*. No correlation between night pain r=-0.06 and duration of symptoms r=0.01	24	None
Absent distal motor and sensory latencies, presence of atrophy, static numbness and EMG findings at follow up do not correlate significantly with satisfaction. No correlation coefficient given.	17	None
Postoperative symptom score determines patient satisfaction: OR=3.05** No correlation coefficient given	17	/
Function correlated with satisfaction: r=0.86*** †	18	Good
Correlation between satisfaction and change of daily activities: r=0.69, No information about significance	18	Moderate
Correlation between satisfaction and JTHF subtest ´checkers` r = -0.68*, movement r=0.81**, strength r=0.73**, ADL ability r=0.73**. No correlation with JTHF subtests r=-0.35 - -0.02 and PPT r=-0.19- -0.16	14	None to Good
Correlation with satisfaction: r=0.12-0.56; ´hold large light objects` correlates with satisfaction*	10	None to moderate
Correlation between dissatisfaction and functional limitation r=0.22** , exposure to physical stressors at work r=0.19*, no correlation with exposure to keyboard activities r=-0.14	24	None
No correlations between DASH results and satisfaction No correlation coefficient given	11	None

Table A-1 (continued)

Factor	Author	Methods
Aesthetics	Mandl et al.[1]	26 RA patients with 160 MCP joint replacements, MHQ postoperative aesthetic Spearman's correlation coefficient
	Goldfarb et al.[15]	36 RA patients with 208 MCP arthroplasties MHQ postoperative aesthetic and satisfaction subscale Simple regression analysis
Strength	Bain et al.[17]	52 patients with 55 hemiresection interposition arthroplasties of the distal radioulnar joint Strength and overall satisfaction rated on a VAS Pearson's correlation coefficient
	Mandl et al.[1]	26 RA patients with 160 MCP joint replacements Grip strength; Key grip; three-point pinch Spearman's correlation coefficient
	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction measured by a VAS, tip and key pinch, grip strength Pearson's correlation coefficient
	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale Spearman's correlation coefficient
	Lozano Calderón et al.[16]	49 patients with carpal tunnel release Satisfaction measured by a VAS
Fulfillment of expectations	Hudak et al.[13]	122 patients with hand surgery Satisfaction measured by a 9-item questionnaire. Spearman's correlation coefficient
	Kadzielski et al.[18]	49 patients with carpal tunnel release Modified DASH to assess postoperative met expectations; satisfaction measured by a VAS Spearman's correlation coefficient
ROM	Bain et al.[17]	52 patients with 55 hemiresection interposition arthroplasties of the distal radioulnar joint ROM and overall satisfaction rated on a VAS Pearson's correlation coefficient
	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction measured by a VAS, thumb extension and abduction, wrist extension and flexion Pearson's correlation coefficient
	Mandl et al.[1]	26 RA patients with 160 MCP joint replacements Sum of active MCP ROM Spearman's correlation coefficient
	Burgess et al.[14]	18 RA patients with 62 revision MCP arthroplasties Patients were asked if they would have surgery again pleased or not displeased
Embodiment	Hudak et al.[13]	122 patients with hand surgery Embodiment assessed by a questionnaire Satisfaction measured by a 9-item questionnaire Spearman's correlation coefficient

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Results	SEQES	Correlation
Correlation with satisfaction: r 0.60**-0.70**	10	Moderate
Aesthetics correlated with satisfaction: r=0.69*** †	18	Moderate
Change of strength correlated with satisfaction: r=0.71 No information about significance	18	Moderate
Correlation with satisfaction: r=0.15-0.29; r=0.18-0.37; r=0.03-0.19	10	None to mild
Correlation with satisfaction: r=0.11; r=0.11; r=0.29	14	None to mild
Grip strength correlates with dissatisfaction: r=-0.21*	24	None
Thumb abduction weakness does not correlate significantly with satisfaction. No correlation coefficient given	17	None
Expectations correlate with global satisfaction: r= 0.53-0.69	21	Moderate
Postoperatively met expectations correlated with satisfaction: r=0.36**	27	Mild
Change of range of motion correlated with satisfaction: r=0.60, No information about significance	18	Moderate
Correlation with satisfaction: r=0.35; r=0.19; r=-0.22; r=0.28	14	None to mild
Correlation with satisfaction: r=0.20-0.24	10	None
Pleased patient showed less residual extensor lag after surgery than displeased patients 17° versus 30°** No difference between the groups for flexion, No correlation coefficient given	17	/
The state of embodiment correlates with satisfaction with care: r=-0.54***	21	Moderate

Table A-1 (continued)

Factor	Author	Methods
Deformity	Mandl et al.[1]	26 RA patients with 160 MCP joint replacements Sum of postoperative ulnar deviation of the 4 MCP Spearman's correlation coefficient
	Goldfarb et al.[15]	36 RA patients with 208 MCP arthroplasties Degree of postoperative MCP ulnar drift, MHQ satisfaction subscale
	Burgess et al.[14]	18 RA patients with 62 revision MCP arthroplasties Patients were asked if they would have surgery again pleased or not displeased
Workers ´ compen-sation	Bessette et al.[25]	202 patients with CTS Satisfaction measured by a 10-item questionnaire Multiple linear regression
	Hudak et al. [13]	122 patients with hand surgery Satisfaction measured by a 9-item questionnaire. Spearman's correlation coefficient
	Katz et al.[26]	241 patients undergoing carpal tunnel release Satisfaction measured on a 5-point Likert scale
Length of follow-up	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction measured by a VAS Pearson's correlation coefficient
Radio-graphic findings	Bain et al.[17]	52 patients with 55 hemiresection interposition arthroplasties of the distal radioulnar joint Satisfaction measured by a VAS Pearson's correlation coefficient
	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction measured by a VAS, assessment of prosthetic position and wear Pearson's correlation coefficient
	Jaremko et al.[19]	74 patients with distal radius fractures Difference in satisfaction between patients with acceptable and unacceptable values of radiographic deformities
	Anzarut et al.[20]	74 patients with distal radius fractures Radiographic evaluation of dorsal and volar tilt 2 Questions about satisfaction with medical care
Reasons for surgery	Bessette et al.[23]	220 patients with carpal tunnel surgery Patients were asked for reasons for having carpal tunnel surgery and their satisfaction 6 months after surgery Spearman's correlation coefficient
Psycho-logical factors	Lozano Calderón et al.[16]	49 patients with carpal tunnel release CES-D depression, PASS anxiety, PCS ineffective coping skills Pearson's correlation coefficient
	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured by a 5-point Likert scale, SF-36 mental subscale score Spearman's correlation coefficient

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Results	SEQES	Correlation
Correlation with satisfaction: r=0.30-0.50	10	Mild
A greater degree of ulnar drift was associated with decreased satisfaction** No correlation coefficient given	18	/
Pleased patient showed less ulnar deviation after surgery than displeased patients 9° versus 30°*** No correlation coefficient given.	17	/
Increased variance of satisfaction by 10% by adding workers compensation to baseline variables r=0.37***†	24	Mild
Workers compensation status does not correlate with satisfaction with care: r=-0.09	21	None
Receiving workers compensation plus an attorney had significantly higher dissatisfaction scores than patients without an attorney or without workers compensation** No correlation coefficient given	24	/
Correlation between the time of follow up since surgery and satisfaction: r=-0.38	10	Mild
No radiographic parameter correlated well with satisfaction: r=-0.31-0.05	18	None to mild
Correlation with satisfaction: r=0.22; r=-0.30	14	None to mild
No significant difference in satisfaction between patients with acceptable and unacceptable radiographic deformities No Correlation coefficient given.	32	None
No significant difference between patients with acceptable and patients with unacceptable dorsal/volar tilt No correlation coefficient given	30	/
Correlation between satisfaction and importance to improve strength r=0.31*, performance at work r=0.25*, ability to grasp and use small objects r=0.21*, sensation in hand and fingers r=0.19*, performance at household tasks r=0.16* and relief of day pain r=0.18*	23	None to mild
CES-D: r= -0.24*; Neither PASS-score nor PCS score present significant predictors of satisfaction	17	None
Mental health correlated with dissatisfaction: r=-0.24**	24	None

Table A-1 (continued)

Factor	Author	Methods
	Hudak et al.[13]	122 patients with hand surgery MHLC beliefs of health-related behaviors, LOT optimism, SCS self-consciousness, CHA depression; global satisfaction question Spearman's correlation coefficient
	Hobby et al.[12]	97 patients with CTS HAD anxiety and depression, Satisfaction measured by a 7-point Likert scale
	Bessette et al.[25]	202 patients with CTS Satisfaction measured by a 10-item questionnaire, MHI
Physical health	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale, Physical health measured with SF-36 Spearman's correlation coefficient
Age	Katz et al.[26]	241 patients undergoing carpal tunnel release Satisfaction measured by a 5-point Likert scale Spearman's correlation coefficient
	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction measured by a VAS Pearson's correlation coefficient
	Hudak et al.[13]	122 patients with hand surgery Satisfaction measured by a 9-item questionnaire Spearman's correlation coefficient
	Lozano Calderón et al.[16]	49 patients with carpal tunnel release Satisfaction measured by a VAS
	Hobby et al.[22]	97 patients with CTS PEM satisfaction subscale
Number of hand problems	MacDermid et al.[3]	25 patients with 30 trapezial arthroplasties Satisfaction measured by a VAS Pearson's correlation coefficient
Social status	Hudak et al.[13]	122 patients with hand surgery Satisfaction measured by a 9-item questionnaire. Spearman's correlation coefficient
	Lozano Calderón et al.[16]	49 patients with carpal tunnel release Satisfaction measured by a VAS
	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale
Sensibility	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale Spearman's correlation coefficient

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	Results	SEQES	Correlation
	No significant correlations between all measures of psychological state and global satisfaction: r=-0.067-0.108	21	None
	No difference in satisfaction between depressed and normal patients, Anxious patients were slightly less satisfied than normal patients** No correlation coefficient given	22	/
	No correlation between MHI score and satisfaction. No correlation coefficient given.	24	/
	Correlation with dissatisfaction: r=-0.22**, Physical health status determines dissatisfaction: β=-3.3***	24	None
	Higher age significantly correlates with dissatisfaction: r=-0.18*	24	None
	Patients >60 years reported higher satisfaction than younger ones*, correlation with satisfaction: r=0.06	14	None
	Age does not correlate with satisfaction r=0.06	21	None
	Age does not correlate significantly with satisfaction. No correlation coefficient given	17	None
	Patients <70 years reported higher satisfaction with treatment* as well as satisfaction with hand outcome* No correlation coefficient given	21	/
	Correlation with satisfaction: r=0.18	14	None
	Education has no correlation with satisfaction with care: r=-0.13	21	None
	The obtained academic degree, numbers of years of education and the occupation do not correlate significantly with satisfaction. No correlation coefficient given	17	None
	Labourers were less satisfied than managers or patients with other occupations*, no difference in dissatisfaction between high school and college No correlation coefficient given	24	/
	No correlation between satisfaction and 2-point discrimination r=-0.04, numbness r=-0.03, tingling r=-0.02	24	None

Table A-1 (continued)

Factor	Author	Methods
Co-morbidities	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale Physical health measured with SF-36 Spearman's correlation coefficient
Disease	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale
Intervention	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale
Marital status	Lozano Calderón et al.[16]	49 patients with carpal tunnel release Satisfaction measured by a VAS
	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured by a 5-point Likert scale
Physical signs	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured on a 5-point Likert scale
Gender	Lozano Calderón et al.[16]	49 patients with carpal tunnel release Satisfaction measured by a VAS
	Hansen & Larsen[24]	101 patients with carpal tunnel release Satisfaction measured by a VAS
	Bain et al. [17]	52 patients with 55 hemiresection interposition arthroplasties of the distal radioulnar joint Satisfaction measured by a VAS
	Hobby et al.[22]	97 patients with CTS PEM satisfaction subscale
	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured by a 5-point Likert scale
Drinking / Smoking	Katz et al.[26]	241 patients with carpal tunnel release Satisfaction measured by a 5-point Likert scale

SEQES = Structured Effectiveness Quality Evaluation Scale[10]; VAS = visual analog scale; DASH= Disabilities of the Arm, Shoulder, and Hand Questionnaire; RA = rheumatoid arthritis; MCP = metacarpophalangeal; MHQ = Michigan Hand Questionnaire; EMG = electromyographic; OR = odds ratio; JTHF = Jebsen's Test of Hand Function; PPT = Purdue Pegboard Test; ADL = activities of daily living; ROM= range of motion; CTS = carpal tunnel syndrome; CES-D = Center for the Epidemiological Study of Depression instrument; PASS = Pain Anxiety Symptom Scale; PCS = Pain Catastrophizing Scale; SF-36 = Short Form 36; MHLC= Multidimensional Health Locus of Control Scale; LOT = Life Orientation Test; SCS = Self-Consciousness Scale; CHA = Current Health Assessment;

	Results	SEQES	Correlation
	No correlation with dissatisfaction: r= 0.02	24	None
	No difference in dissatisfaction between diabetic and non-diabetic patients No correlation coefficient given	24	None
	No difference in dissatisfaction between Endoscopic and open release No correlation coefficient given	24	None
	Marital status does not correlate significantly with satisfaction. No correlation coefficient given	17	None
	No difference in dissatisfaction between married and non-married patients or between patients living alone and with others No correlation coefficient given	24	None
	No difference in dissatisfaction between present/absent tinels sign, phalens sign, thenar athrophy	24	None
	Gender does not correlate significantly with satisfaction. No correlation coefficient given.	17	None
	Gender determines patient satisfaction OR=6.30** with males being less satisfied than females. No correlation coefficient given	17	/
	Female patients were more satisfied mean 79% on the VAS than male patients mean 46%** No correlation coefficient given	18	/
	No difference in treatment satisfaction between males and females No correlation coefficient given	21	/
	No difference in dissatisfaction between males and females No correlation coefficient given	24	/
	Drinkers* and Smokers* have higher dissatisfaction scores than non-drinkers and non-smokers, Drinking determines dissatisfaction: β=3.1** No correlation coefficient given	24	/

HAD = The Hospital Anxiety and Depression Scale; MHI = Mental Health Inventory; PEM = Patient Evaluation Measure.

$r \leq 0.25$: no correlation; $0.26 \leq r \leq 0.5$: mild correlation; $0.51 \leq r \leq 0.75$: moderate correlation; $r \geq 0.76$: good correlation[11].

*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

† Calculated from R^2.