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# The Impact of Caregivers' Anxiety on Patients' Anxiety before Fast-Track Knee Arthroplasty

## Vliv obav poskytovatele na obavy pacienta před "fast-track" aloplastikou kolena

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## ABSTRACT

PURPOSE OF THE STUDY

Anxiety may have negative repercussions on the surgery including poorer outcomes. On the other hand, the majority of patients reporting preoperative anxiety fear not receiving enough attention from a caregiver.

In patients undergoing fast-track knee arthroplasty, we determined the relationship between patients' preoperative anxiety and the anxiety the patient's caregiver. We also analyzed the influence of selected psychosocial and demographic variables on the relationship between caregivers' and patients' anxiety.

MATERIAL AND METHODS

We conducted a prospective, descriptive study in which baseline assessments of patients scheduled to undergo fast-track total knee arthroplasty between 1st November 2014 and 30th April 2015 were compared with those of their caregivers. Patients were recruited from a large teaching hospital through the orthopedics joint replacement clinic. Information on sex, age, body mass index (BMI), educational status, employment status, marital status, and living status was recorded for all patients. Patients and their caregivers completed the Spielberger State-Trait Anxiety Inventory. Baseline trait anxiety was assessed with STAI scores in the initial interview, 2 weeks before hospitalization, and state anxiety was assessed the day before the surgery.

The patients' caregivers were contacted during a scheduled postoperative clinic visit and asked to complete the STAI and to provide information on their age, degree of consanguinity with patient, and living status.

RESULTS

The mean age was 66.4 years for the 118 patients and 55.7 years for the 93 caregivers. In male caregivers, caregiver anxiety and patient anxiety were positively related but not statistically so, and in women was not significant. In male patients, a relationship between caregiver's anxiety and patient's anxiety was positive, although not statistically significant, and in women was neither present nor significant.

DISCUSSION

Given the widespread impacts of anxiety before knee arthroplasty, it is critical for surgeons to gain a better understanding of how to identify and reduce preoperative anxiety in operated patients. We found that male sex among caregivers was associated with more preoperative anxiety among patients than was female sex and that male patients more quickly accepted anxiety from their caregivers than did female patients.

CONCLUSIONS

Anxious male caregivers appear to impart their anxiety to male patients but not to female patients. The anxiety of unrelated caregivers is associated with low preoperative anxiety among patients. Preoperative interventions should focus on caregivers, especially male caregivers, and to related caregivers to help patients cope with anxiety before knee arthroplasty.

**Key words:** knee arthroplasty. knee replacement. fast track, anxiety, caregiver, preoperative stress.

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## INTRODUCTION

Patients undergoing surgery experience acute psychological distress in the preoperative period. Real or only implied stressful situation activates the hypothalamo-pituitary-adrenocortical system. The stress response of hemodynamic system includes among other increased ejection fraction of the heart and increasing blood pressure, which is induced by endocrine regulatory mechanisms and the autonomic nervous system, including the release of adrenocorticotropin and corticotropin-releasing-hormone, epinephrine, norepinephrine, dopamine, arginine vasopressin, the proopiomelanocortin-derived peptides alpha-melanocyte-stimulating hormone and beta-endorphin, prolactin, oxytocin, cytokines, acute-phase proteins. Such induced anxiety can contribute to resistance to anaesthetic induction. On the other hand, anxiety may impair the wound healing (through induction of stress hormones), may have negative repercussions on the surgery including poorer outcomes, and may account for a more intensive perception of postoperative pain (2, 19, 22, 23).

The incidence of preoperative anxiety has been reported to be as high as 80% in adults (11). Preoperative anxiety begins as soon as the surgical procedure is planned and increases to its maximum intensity when the patient enters the hospital (12).

Several factors affect a preoperative anxiety. The presence of main disease, waiting for the operation, fear of surgery or death, the possibility of surgery being postponed, operative pain, keeping an intraoperative awareness, extent of the proposed surgery, inadequate knowledge about the outcomes, uncertainty about the necessity of surgery, separation from family, loss of independence, not trusting the surgeon, or seeing the scalpel are just some of the factors that increase preoperative anxiety in patients (12, 14, 26, 27).

Other important but often-overlooked risk factors for psychological distress are existential or spiritual concerns (8), despite the fact that religion is a common and primary way of coping with anxiety and stress associated with health problems (5, 15, 25). In turn, the absence of religiosity and a lower sense of spiritual well-being have been associated with higher rates of anxiety in some studies (13). As such, when evaluating patients with preoperative anxiety, healthcare providers should consider not only contributing physical and psychosocial factors but also the influence of spiritual concerns**.**

More than 60% of patients reporting preoperative anxiety fear not receiving enough attention from a caregiver (24). This fact illustrates the importance of caregivers to a patients' emotional well-being. Although a substantial amount of research on caregiving has emphasized the negative aspects of caregiving, specifically on caregiver burden and depression (4), less attention has been paid to the relationship between the patient's and caregiver's anxiety and sex differences in psychophysical responses to preoperative stress. In this regard, knowing the emotional factors that influence the preoperative anxiety would be an important contribution to a more appropriate preventing and reducing surgical anxiety levels in patients (17, 23).

We sought to determine the relationship between patients' preoperative anxiety and the anxiety the patients' caregiver. We hypothesized that the greater the caregivers' trait anxiety, the greater the patients' preoperative anxiety would be.

We also sought to determine the influence of selected psychosocial and demographic variables on the relationship between caregivers' and patients' anxiety. We predicted that the patients' and caregivers' sex and consanguinity would moderate this relationship. That is, female patients' preoperative anxiety would be greater if anxious caregiver were male and related.

## MATERIAL AND METHODS

The study was planned according to the statement of Human and Animal Rights. It has been approved by the local Bioethical Committee of Pomeranian Medical University (KB-0012/81/12). Informed consent was obtained from all participants. The study has been adhered to the tenets of the Declaration of Helsinki. All records of participants were anonymized and de-identified prior to analysis.

### Study design

We conducted a prospective, descriptive study in which baseline assessments of patients scheduled to undergo fast-track total knee arthroplasty between 1st November 2014 and 30th April 2015 were compared with those of their caregivers.

### Patients

Patients were recruited from a large teaching hospital through the orthopedics joint replacement clinic. Subjects, both women and men, were eligible for the study if they were at least 18-year-old, met the orthopedic criteria for undergoing total knee arthroplasty, had at least one active caregiver for at least 6 hours a day for at least 5 days a week during the study period and were able to complete the questionnaires. Patients were excluded if they had a lifetime history of any psychiatric disorder, alcohol or substance abuse or dependence, or a personality disorder likely to interfere with study participation.

All patients obtained a detailed description of the study assumptions and were approached for participation in the study 2 weeks before hospitalization.

All patients underwent a preoperative systematic physical examination that included routine blood tests. All patients were evaluated by the same surgeon.

### Questionnaire

Information on sex, age, body mass index (BMI), educational status, employment status, marital status, and living status was recorded for all patients.

Patients completed the Spielberger State-Trait Anxiety Inventory (STAI). The STAI measures state anxiety as

a transitional emotional state evoked by a stressful situation, such as hospitalization or surgery, and trait anxiety as the relatively enduring individual differences in the likelihood of anxiety (20). All items are scored on a 4-point scale ranging from 1 (strong disagreement with item) to 4 (strong agreement with item). Thus, scores for both the 20-item state and trait scales range from 20 to 80 points, with higher scores indicating more anxiety. Mean scores were not calculated for respondents with more than 1 missing item. The STAI has been validated in older populations with adequate internal consistency ($\alpha$ = 0.88 to 0.94) and test-retest reliability (r = 0.51 to 0.58) (21).

Baseline trait anxiety was assessed with STAI scores in the initial interview, 2 weeks before hospitalization, and state anxiety was assessed the day before the surgery.

The patients' caregivers were contacted during a scheduled postoperative clinic visit and asked to complete the STAI and to provide information on their age, degree of consanguinity with patient, and living status (with or apart from the patient).

## Statistical methods

We assessed the correlations among all the primary variables [patient preoperative anxiety, and caregiver anxiety] with Pearson's r. We also determined whether caregiver sex, patient sex, and the degree of consanguinity of caregiver moderated the relationship between caregivers' trait anxiety and patients' preoperative state anxiety with hierarchical regression analysis. The analysis was performed three times. In each, the independent variables were centered. In the case of variable "caregiver anxiety", the centering procedure based on the standardization of results of variable was chosen. Model fit was assessed with adjusted $R^2$ and with the F test. Alpha was set at 0.05, and all tests were two-tailed. Data were analyzed with the Statistical Package for the Social Sciences (SPSS), Version 23.0 (IBM Corp., USA).

## RESULTS

Of the 150 patients approached, 32 were excluded because they did not have a suitable caregiver (Fig. 1). The mean (SD) age was 66.4 (9.7) years for the remaining 118 patients and 55.7 (13.3) years for the 93 caregivers. Patients' mean (SD) BMI was 31.2 (6.7) kg/m$^2$ (Table 1).

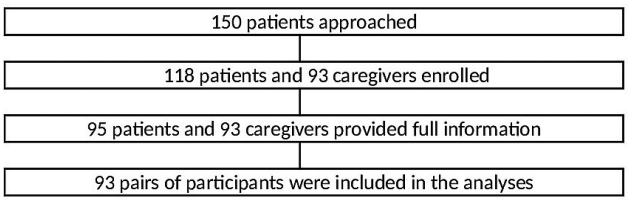


*Fig. 1. Patient selection.*

*Table 1. Characteristics of 118 patients undergoing total knee arthroplasty in a study of preoperative anxiety*

| Characteristic | n (%) |
|---|---|
| **Patients (n = 118)** | |
| **Sex** | |
| women | 78 (66) |
| men | 40 (34) |
| **Highest education level completed** | |
| primary school | 11 (9) |
| vocational training | 21 (18) |
| high school | 52 (43) |
| university | 11 (9) |
| missing data | 23 (20) |
| **Marital status** | |
| single | 10 (8) |
| married | 52 (43) |
| divorced | 4 (3) |
| widow | 29 (24) |
| missing data | 23 (20) |
| **Employment status** | |
| employee | 14 (12) |
| unemployed | 80 (67) |
| missing data | 24 (20) |
| **Living status** | |
| alone | 30 (25) |
| with a family member | 65 (54) |
| missing data | 23 (20) |
| **Smoking status** | |
| Smoker | 8 (7) |
| Non-smoker | 86 (72) |
| Missing data | 24 (20) |
| **Caregivers (n=93)** | |
| **Caregiver sex** | |
| women | 55 (59) |
| men | 38 (41) |
| **Caregiver consanguanity** | |
| wife / man | 46 (49) |
| daughter /son | 36 (39) |
| mother / father | 1 (1) |
| sister / brother | 4 (4) |
| partner | 2 (2) |
| relative | 1 (1) |
| acquaintance | 2 (2) |
| daughter-in-law / son-in-law | 1 (1) |
| **Caregiver accomodation** | |
| living with the patient | 56 (60) |
| living separately | 37 (40) |

## Caregiver anxiety and preoperative patient anxiety

Caregiver trait anxiety and patient state anxiety were not correlated (r = 0.02).

## Moderation by the sex of the caregiver

In this analysis, we examined whether caregiver sex moderated the relationship between caregiver anxiety and patient preoperative anxiety. In the first step, the regression equation included caregivers' trait anxiety and sex. Sex of the caregiver contributed significantly to the regression equation, explaining 6% of the variance in terms of preoperative patient anxiety ($P$ = 0.0033).

In the second step, when the regression equation included an interaction term for caregiver's sex and

*Table 2. Results of hierarchical regression analysis for caregiver sex, caregiver anxiety, and their interactions in predicting preoperative anxiety*

| Step and variable | β | 95% CI | t | p |
|---|---|---|---|---|
| **Step 1** | | | | |
| **Intercept** | | 26.29; 47.24 | 6.98 | < 0.001 |
| **caregiver anxiety** | 0.09 | -0.14; 0.35 | 0.83 | 0.411 |
| **caregiver sex** | -0.29 | -5.22; -0.76 | -2.67 | 0.009 |
| **Step 2** | | | | |
| **Intercept** | | 22.19; 44.35 | 5.97 | < 0.001 |
| **caregiver anxiety** | 0.18 | -0.06; 0.46 | 1.48 | 0.141 |
| **caregiver sex** | 0.65 | -4.48; 17.68 | 1.18 | 0.239 |
| **caregiver anxiety * caregiver sex** | -0.98 | -0.50; 0.03 | -1.75 | 0.083 |

$R^2$ was 0.06 for Step 1 and 0.08 for Step 2.

*Table 3. Results of hierarchical regression analysis for patient sex, caregiver anxiety, and their interactions in predicting preoperative anxiety*

| Step and variable | β | 95% CI | t | p |
|---|---|---|---|---|
| **Step 1** | | | | |
| **Intercept** | | 24.63; 45.58 | 6.46 | < 0.001 |
| **caregiver anxiety** | 0.08 | -0.16; 0.35 | 0.71 | 0.478 |
| **caregiver sex** | 0.27 | 0.51; 5.06 | 2.44 | 0.017 |
| **Step 2** | | | | |
| **Intercept** | | 24.55; 46.09 | 6.52 | < 0.001 |
| **caregiver anxiety** | 0.18 | -0.16; 0.34 | 0.68 | 0.496 |
| **caregiver sex** | 0.65 | 0.76; 5.24 | 2.66 | 0.009 |
| **Patient sex** | 0.29 | 0,15;4.78 | 2.00 | 0.049 |
| **caregiver anxiety * caregiver sex** | 0.22 | 0.15; 4.78 | 2.00 | 0.049 |

$R^2$ was 0.06 for Step 1 and 0.08.

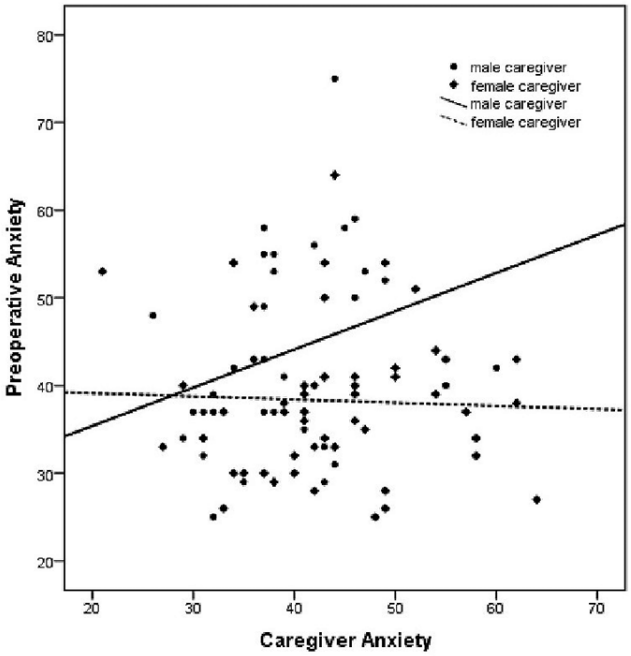


*Fig. 2. Preoperative anxiety as a function of caregiver sex and caregiver anxiety. Lines are least-square regression lines.*

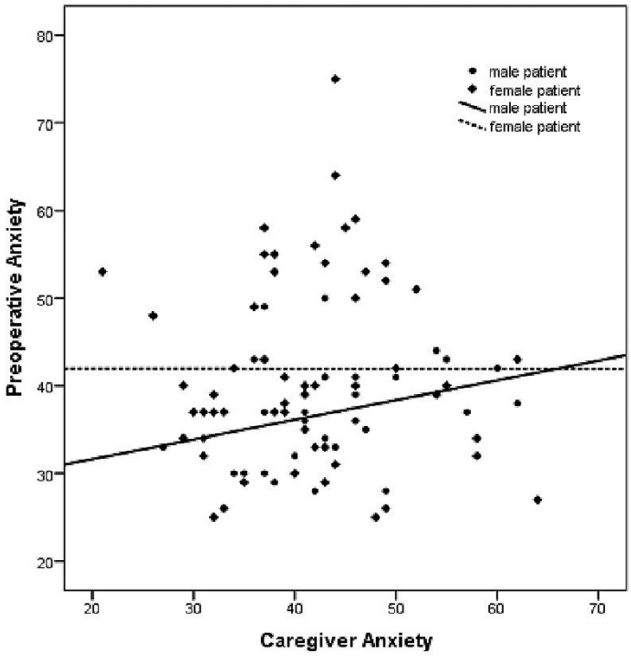


*Fig. 3. Preoperative anxiety as a function of patient sex and caregiver anxiety. Lines are least-square regression lines.*

caregivers' anxiety, caregiver anxiety and caregiver sex contributed nothing significant to the regression equation. The interaction between caregiver sex and caregiver anxiety was marginally significant. Interaction increased the range of the explained variance in terms of preoperative anxiety by 2% (change in $R^2 = 0.03$; $p = 0.08$). A model with an interactive component fit the data well ($F_{[3, 80]} = 3.47$; $p = 0.020$; Table 2).

Because the interaction term was only marginally insignificant we decided to test the relationship between caregiver anxiety and patient anxiety for female and male caregivers separately. The regression analyses showed that in male caregivers, caregiver anxiety and patient anxiety were positively related but not statistically so (β = 0.29; $t$ = 1,66; $p < 0.10$), and in women was not significant (β = 0.04; $t$ = -0,28; $p = 0.78$; Fig. 2). Thus in neither sex was caregiver anxiety and patient anxiety related.

## Moderation by the sex of the patient

In next analysis, we examined whether the patients' sex moderates the relationship between the caregiver anxiety and preoperative anxiety of patient. In the first step, the regression equation included caregiver trait anxiety and patients' sex. The sex of the patient explained 5% of the variance in preoperative patient anxiety scores ($p = 0.017$). In the second step, the regression equation included a term for the interaction between the patients' sex and the caregivers' anxiety. Hierarchical regression analysis with the interaction term showed that interaction explained 9% of the variance of preoperative anxiety (change in $R^2 = 0.04$; $p = 0.049$). This model fit the data well ($F[F_{[3, 77]} = 3.47$; $p = 0.020$; Table 3).

To explain the observed interaction, a regression analysis was performed separately in groups of male and female patients. This analysis showed that in male patients, a relationship between caregivers' anxiety and

*Table 4. Results of hierarchical regression analysis for caregiver consanguinity, caregiver anxiety, and their interactions in predicting preoperative anxiety*

| Step and variable | β | 95% CI | t | p |
|---|---|---|---|---|
| **Step 1** | | | | |
| **Intercept** | | 31.66; 54.80 | 7.43 | < 0.001 |
| **caregiver anxiety** | -0.02 | -0.27; 0.22 | -0.19 | 0.851 |
| **caregiver consanguinity** | -0.17 | -5.79; 0.75 | 1.53 | 0.129 |
| **Step 2** | | | | |
| **Intercept** | | 39.34; 67.75 | 7.50 | < 0.001 |
| **caregiver anxiety** | -0.21 | -0.53; 0.07 | -1.54 | 0.127 |
| **caregiver consanguinity** | -0.26 | -7.15; -0.43 | 2.25 | 0.027 |
| **caregiver anxiety * caregiver consanguinity** | 0.32 | -0.51; 5.84 | 2.37 | 0.020 |

$R^2$ was 0.013 for Step 1 and 0.06 for Step 2.

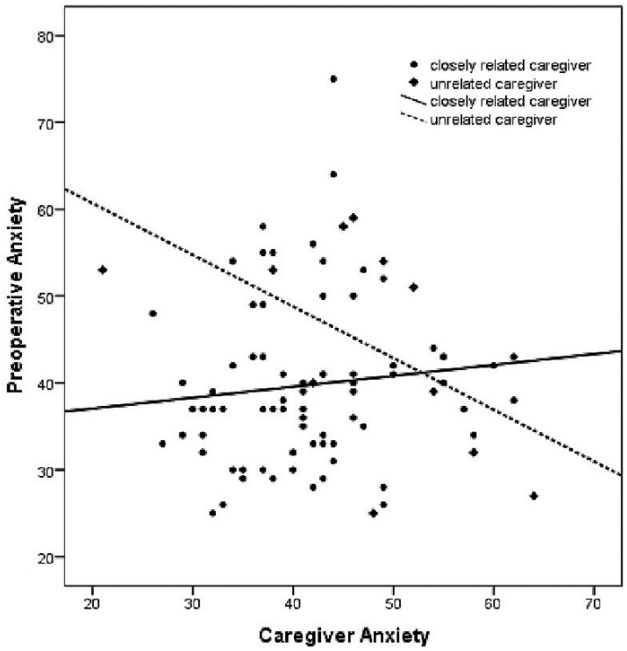


*Fig. 4. Preoperative anxiety as a function of caregiver consanguinity and caregiver anxiety. Lines are least-square regression lines.*

patients' anxiety was positive, although not statistically significant (β = 0.32; $t$ = 1.74; $p$ = 0.092), and in women was neither present nor significant (β = 0.001; $t$ = -0.003; $p$ = 0.998; Fig. 3).

### Moderation by consanguinity between caregiver and patient

In the last analysis, we determined whether the relationship between the caregiver and patient moderated the relationship between caregiver anxiety and preoperative patient anxiety. Before performing an analysis, two groups of caregivers were distinguished: closely related (wife/husband, son/daughter, mother/father) and more distantly related or unrelated (relative, daughter-in-law/son-in-law, friend, partner). The closely related group consisted of 82 persons and the distantly related group consisted of 11. In the first step, the regression equation included caregiver trait anxiety and caregivers' consanguinity. None of the variables contributed significantly to the regression equation. The second step included an interaction term for caregivers' consanguinity and caregivers' anxiety. Hierarchical regression analysis showed that the interaction between caregivers' anxiety and caregivers' consanguinity explained 6% of the variance in preoperative anxiety (change in $R^2$ = 0.06; $p$ = 0.020). The model fit the data well ($F_{[3, 80]}$ = 2.71; $p$ = 0.05; Table 4).

To explain the observed interaction effect, we analyzed the closely related and distantly related caregivers separately. This analysis showed a small negative but statistically insignificant relationship between caregivers' anxiety and patients' anxiety in distantly related caregivers (β =-0.54; $t$ = 1.91; $p$ = 0.089), and no relationship among closely related caregivers (β = 0.11; $t$ = 0.93; $p$ = 0.357; Fig. 4).

## DISCUSSION

Given the widespread impacts of anxiety before surgery, it is critical for surgeons to gain a better understanding of how to identify and reduce preoperative anxiety in operated patients (23). We found that male sex among caregivers was associated with more preoperative anxiety among patients than was female sex and that male patients more quickly accepted anxiety from their caregivers than did female patients.

In male caregivers, the relationship between caregivers' and patient' anxiety was positive and was marginally insignificant. In contrast, this relationship was not significant for female caregivers. Similar results were obtained when the analysis was done by the patients' sex. Although these are not strong relationships our findings underscore the need to consider sex in studies of preoperative anxiety.

In addition to the above mentioned sex differences in the psychophysical experience of anxiety, other recent study underscores evidence that women are more vulnerable to develop mood disorders compared to men. The authors suggest that such sex difference may have a biological basis, as they have found sex differences in expression of mood-related genes in the brains of depressed subjects (18).

Furthermore, we found associations between patients' state anxiety and the degree of consanguinity of the caregiver. Patients related to their caregiver had slightly more anxiety, but the association was not significant. In contrast, preoperative anxiety was lower, although only marginally statistically so, in patients with distantly related caregivers than it was in those with related caregivers. A possible explanation is that unrelated but anxious caregivers could better hide their anxiety about the patient and thus might be more likely to motivate the patient**.** On the other hand, anxiety in an unrelated caregiver might reassure patients that somebody cares about them. However, the anxiety of a related caregiver seems to be more "contagious" and may be induced more easily. If so, the patients' anxiety might depend on

the caregiver and on the severity of the caregivers' anxiety. However, this interpretation should be treated with caution and requires verification.

It is surprising that anxiety in related caregivers does not influence preoperative anxiety. Therefore, it appears that caregivers may require additional support in the preoperative period to help patients cope with anxiety. Caregivers receiving psychoeducation that aims at equipping caregivers with the skills of stress-coping appears to have a more positive influence on the caregivers' psychosocial wellbeing (3).

Simultaneously, supporting anxious patients before and after surgery might increase patient satisfaction, shorten hospital stay, and improve surgical outcomes in patients undergoing extensive operations, such as arthroplasty of the large joints (7, 10, 16, 23, 26).

Although a great deal of research has reported relationships between the level of education and anxiety (1, 6, 9), we found no significant association. Neither did we find significant associations between patients' anxiety and their caregivers' living status (with or without patient) or with the patients' living status (with somebody or alone).

To the best of our knowledge, this is the first prospective study to address the impact of caregivers' anxiety on state anxiety in fast track patients before big operations as joint arthroplasty.

## Limitations

We have to acknowledge certain limitations of our study. First, anxiety was assessed only through the use of self-report measures. The manifestation of anxiety typifies the interplay between cognitive, physiological, and behavioral response systems. Second, most relationships were weak or even marginally significant. We speculate that this could be due to the relative small size of respondents. Third, correlation analysis does not allow us to establish cause-and-effect relationships. The presumed direction of influence was based on theoretical assumptions, and thus results in the other direction are possible (e.g., that the caregivers' anxiety was increased by the patients' preoperative anxiety). Longitudinal studies could provide more certainty in this respect. Another limitation is that the number of closely related caregivers was much larger than the number of distantly related caregivers (82 vs. 11), which might have skewed our results.

## CONCLUSIONS

Anxious male caregivers appear to impart their anxiety to male patients but not to female patients. The caregivers' consanguinity is essential when assessing the relationship of caregiver and patient anxiety. The anxiety of unrelated caregivers is associated with low preoperative anxiety among patients. However, the anxiety of caregivers related to patients and the patients' preoperative anxiety appear to be independent of each other.

## Clinical significance

Clinically, these data suggest that caregivers should be included in the treatment plan for educating patients about preoperative anxiety. Preoperative interventions should focus on caregivers, especially male caregivers, and to related caregivers to help patients cope with anxiety.

### References

1. Ay AA, Ulucanlar H, Ay A, Ozden M. Risk factors for perioperative anxiety in laparoscopic surgery. JSLS. 2014;18: e2014.00159.
2. Charmandari E, Tsigos C, Chrousos G. Endocrinology of the stress response. Annu Rev Physiol. 2005;67:259–284.
3. Cheng Y, Chair Y, Chau P. The effectiveness of psychosocial interventions for stroke family caregivers and stroke survivors: a systematic review and meta-analysis. Patient Educ Couns. 2014;95:30–44.
4. De Labra C, Millán-Calenti C, Buján A, Núñez-Naveira L, Jensen M, Peersen C, Mojs E, Samborski W, Maseda A. Predictors of caregiving satisfaction in informal caregivers of people with dementia. Arch Gerontol Geriatr. 2015;60:380–388.
5. Farias M, Newheiser AK, Kahane G, De Toledo Z. Scientific faith: belief in science increases in the face of stress and existential anxiety. J Exp Soc Psychol. 2013;49:1210–1213.
6. Jin Z, Ding P, Liu L, Yang Q, Chen M, Liu L. Factors related to anxiety and depression in patients undergoing adrenalectomy in 220 Chinese people. Int J Clin Exp Med. 2015;8:8168–8172.
7. Jlala A, French L, Foxall L, Hardman G, Bedforth M. Effect of preoperative multimedia information on perioperative anxiety in patients undergoing procedures under regional anaesthesia. Br J Anaesth. 2010;104:369–374.
8. Johnson KS, Tulsky JA, Hays JC, Arnold RM, Olsen MK, Lindquist JH, Steinhauser KE. Which domains of spirituality are associated with anxiety and depression in patients with advanced illness?. J Gen Intern Med. 2011;26:751–758.
9. Li M, Gong, L, Sun X. Anxiety and depression in patients with dry eye syndrome. Curr Eye Res. 2011;36:1–7.
10. Lošťák J, Gallo J, Zapletalová J. [Patient satisfaction after total knee arthroplasty. analysis of pre-operative and peri-operative parameters influencing results in 826 patients]. Acta Chir Orthop Traumatol Cech. 2016;83:94–101.
11. Maranets I, Kain N. Preoperative anxiety and intraoperative anesthetic requirements. Anesth Analg. 1999;89:1346–1351.
12. Mccleane G, Cooper R. The nature of pre operative anxiety. Anaesthesia. 1990;45:153–155.
13. Pargament I, Koenig G, Tarakeshwar N, Hahn J. Religious coping methods as predictors of psychological, physical, and spiritual outcomes among medically ill elderly patients: a two-year longitudinal study. J Health Psychol. 2004;9:713–730.
14. Pawlak A, Krejca M, Janas-Kozik M, Krupka-Matuszczyk I, Rajewska J, Bochenek A. Evaluation of anxiety and depression in the perioperative period in patients subjected to myocardial revascularization. Psychiatr Pol. 2012;46:63–74.
15. Pawlikowski J, Sak JJ, Marczewski K. Physicians' religiosity and attitudes towards patients. Ann Agric Environ Med. 2012;19:503–507.
16. Pereira L, Figueiredo-Braga M, Carvalho IP. Preoperative anxiety in ambulatory surgery: the impact of an empathic patient-centered approach on psychological and clinical outcomes. Patient Educ Couns. 2016;99:733–738.
17. Robleda G, Sillero-Sillero A, Puig T, Gich I, Baños JE. Influence of preoperative emotional state on postoperative pain following orthopedic and trauma surgery. Rev Lat Am Enfermagem. 2014;22:785–791.
18. Seney ML, Sibille E. Sex differences in mood disorders: perspectives from humans and rodent models. Biol Sex Differ. 2014;5:17.

19. Sluka KA, Berkley KJ, O'Connor MI, Nicollela DP, Enoka RM, Boyan BD, Hart DA, Resnick E, Kwoh CK, Tosi LL, Coutts RD, Kohrt WM. Neural and psychosocial contributions to sex differences in knee osteoarthritic pain. Biol Sex Differ. 2012;3:26.
20. Spielberger D, Gorsuch A, Lushane R, Vagg P, Jacobs G. Manual for the state-trait anxiety inventory. Consulting Psychologists Press; Palo Alto, California, 1970.
21. Stanley MA, Novy DM, Bourland SL, Beck JG, Averill PM. Assessing older adults with generalized anxiety: a replication and extension. Behav Res Ther. 2001;39:221–235.
22. Tonelli SM, Rakel BA, Cooper NA, Angstom WL, Sluka KA. Women with knee osteoarthritis have more pain and poorer function than men, but similar physical activity prior to total knee replacement. Biol Sex Differ. 2011;2:12.
23. Wilson CJ, Mitchelson AJ, Tzeng TH, El-Othmani MM, Saleh J, Vasdev S, Lamontagne HJ, Saleh KJ. Caring for the surgically anxious patient: a review of the interventions and a guide to optimizing surgical outcomes. Am J Surg. 2016;212:151–159.
24. Yilmaz M, Sezer H, Gürler H, Bekar M. Predictors of preoperative anxiety in surgical inpatients. J Clin Nurs. 2012;21:956–964.
25. Zarzycka B. Tradition or charisma – Religiosity in Poland. In: Bertelsmann Stiftung (eds.). What the world believes: Analysis and commentary on the Religion Monitor. 2008, 201–222.
26. Zietek P, Zietek J, Szczypior K, Kolodziej L, Kotrych D, Bohatyrewicz A. A knee clinical state affects the preoperative level of anxiety in patients undergoing knee arthroplasty. Preliminary report. Psychiatr Pol. 2014;48:1025–1034.
27. Zietek P, Zietek J, Szczypior K. Anxiety in patients undergoing fast-track knee arthroplasty in the light of recent literature. Psychiatr Pol. 2014;48:1015–1024.

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