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Toward Identifying Moderators of Associations Between Presurgery Emotional Distress and Postoperative Pain Outcomes: A Meta-Analysis of Longitudinal Studies

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Abstract: **Presurgery emotional distress has had variable associations with outcomes of surgery in past narrative reviews. This meta-analysis was designed to evaluate the overall strengths of relations between presurgical emotional distress and key postsurgical pain outcomes (ie, pain intensity, analgesic use, functional impairment) and to identify moderators that might explain effect size heterogeneity between studies. PubMed, Web of Science, PsychINFO, Google Scholar, and Science Direct databases were searched to identify studies subjected to meta-analysis. Forty-seven studies of 6,207 patients met all 10 inclusion criteria. High presurgery emotional distress levels were associated with significantly more postsurgical pain, analgesic use, and impairment after surgery, with small to medium average effect sizes. Moderator analyses for relations between distress and pain intensity indicated effect sizes were larger in studies that assessed catastrophizing, anxiety, and/or depression than other types of emotional distress as well as those with lower rather than higher quality scores. Associations between presurgery distress and postoperative impairment were moderated by type of surgery. Heterogeneity in these relations was reduced or no longer significant after statistically controlling for moderators. Moderator analyses also supported the role of presurgery emotional distress as a risk factor for, rather than simply a correlate of, elevations in postoperative pain and disability.**

Perspective: ***This meta-analysis indicates presurgery emotional distress has significant associations with postoperative outcomes but specific methodological factors and sample characteristics contribute to effect size variability in the literature. Considering emotional distress within presurgical assessment protocols may aid in identifying vulnerable patients who can benefit from interventions targeting distress reductions.***

Key words: *Meta-analysis, postoperative pain, emotional distress, catastrophizing, pain intensity, functional impairment.*

Although pain is the most frequent complaint reported within 24 hours after surgery,[9] 10%–50% of surgery patients develop chronic postsurgical pain (CPSP) that persists for at least 2 months after surgery.[36,41] In light of such data, researchers have attempted to identify factors that increase risk for poorer postoperative functioning. Preoperative emotional distress is widely assumed to be a possible psychosocial vulnerability factor yet reviewers have drawn highly disparate conclusions about its effect. For example, Munafò and Stevenson[48] reported that preoperative anxiety reliably predicts acute postoperative

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pain. Another early review contended neither depression nor anxiety were preoperative predictors of CPSP[56] in contrast to Hinrichs-Rocker and colleagues[24] who asserted preoperative elevations in depression and stress predict increased risk for CPSP whereas the data are inconclusive for other types of emotional distress, including anxiety. Still other authors[27,36,42,78] have concluded elevations in preoperative anxiety, catastrophizing, and other forms of emotional distress predict higher rates of acute postoperative pain, analgesic use, and/or CPSP.

Together, past reviews suggest overall associations between presurgery emotional distress and postoperative outcomes are highly variable but clearly imply subtype(s) of emotional distress assessed and surgery to follow-up assessment intervals are potentially important moderators that contribute to discrepant effect sizes between individual studies and reviews. Type of surgery[24,78] and demographic characteristics such as sample age and sex composition[27] have also been discussed as key influences on variable strengths of relation between presurgery distress and postoperative outcomes within this literature. For example, an important review of retrospective and prospective research concluded that depressed or anxious patients are more susceptible to CPSP after undergoing complex rather than circumscribed surgeries.[24] Because of its potential implications, this contention should be followed-up on the basis of a larger number of effect sizes and studies that are strictly longitudinal.

Typically, past reviews were narrative or qualitative in nature and examined a broad array of influences aside from emotional distress. Hence, because explicit tests of possible moderators were undertaken only rarely, little is known about factors that account for comparatively strong or weak links between presurgery distress and postoperative outcomes. Meta-analysis, a variant of traditional narrative reviews that draws conclusions from analyses of specific effect sizes of relevant studies instead of expert judgments or general "vote-counting" analyses (eg, proportion of total studies having significant results), might clarify average strengths of relation between presurgery distress and postoperative functioning. Furthermore, meta-analysis can explicitly test moderators hypothesized to influence effect size heterogeneity between studies.

On the basis of this overview, a meta-analysis of longitudinal surgery studies was performed to determine overall associations between presurgery emotional distress and specific postoperative pain outcomes (ie, pain intensity, analgesic use, functional impairment) and identify factors that moderate these associations. We hypothesized presurgery emotional distress would have modest, significant positive average correlations with each outcome but also anticipated high levels of effect size heterogeneity, given the lack of consensus between past reviews. Hence, we also assessed the extent to which effect size differences between studies for each outcome were moderated by specific methodological influences (ie, type of emotional distress, surgery to follow-up assessment interval, and statistical control of presurgery responses on outcome measures within analyses) as well as type of surgery, sample age, and sex composition.

Literature Search Methods

Search Strategy

To identify relevant studies, PubMed, Web of Science, PsychINFO, Google Scholar, and Science Direct database searches were performed from August, 1995 to September, 2015. Search terms were "surgery" or "postoperative" or "post-surgical" and "pain" or "impairment" or "functioning" or "dysfunction" or "analgesic" or "medication," and "emotion" or "emotional" or "affect" or "affective" or "distress" or "depression" or "anxiety" or "fear" or "phobia" or "phobic" or "stress" or "catastrophizing" or "optimism" or "well-being" or "mental health." All searches used the broad search field, "anywhere" to identify citations. Reference lists of previous reviews of postoperative pain and articles identified from database searches were also reviewed to increase the pool of eligible studies.

Selection Criteria

Abstracts of all possibly eligible studies were independently screened by the first 2 authors (T.J., P.T.) to exclude articles in which the content was not germane. Subsequently, full-text versions of potentially relevant articles were retrieved and reviewed to determine if they met the following 10 selection criteria:

1. In contrast to the inclusion of cross-sectional and prospective evidence in some past reviews, this meta-analysis was restricted to longitudinal studies that included presurgery and postsurgery assessments. When more than 1 follow-up assessment was indicated, the longest follow-up interval with available effect size information was used in analyses.
2. A minimum sample n of 30 patients was required because results of very small prospective studies are often unreliable.[77]
3. Samples were comprised of adult human patients with mean ages of 18 years or older.
4. Within included studies, patients had undergone a discrete surgical intervention. Research involving dental procedures (eg, tooth extraction) or surgeries designed to provide ongoing pain relief (eg, implants providing deep brain stimulation) were excluded.
5. Included studies assessed at least 1 association between presurgery emotional distress and a salient postoperative outcome (ie, pain intensity, analgesic use, and/or functional impairment). Presumably, different types of emotional distress overlap with each other, yet there is utility in determining whether certain forms are more or less critical to postoperative outcomes. Therefore, emotional distress indices included narrowly defined measures of anxiety, fear, and depression, general indices of negative affect/psychological distress