Brief Report: Prediction of Children's Preoperative Anxiety by Mothers and Fathers

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Objective To assess the ability of mothers and fathers at predicting children's anxiety at anesthesia induction. **Methods** Participants were parents and their children aged 2–12 years ($n = 159$). Parents predicted child anxiety using a Visual Analog Scale. Observed child anxiety was assessed using the Yale Preoperative Anxiety Scale. **Results** Results of linear regressions indicated that fathers' predictions were significantly related to children's anxiety, whereas mothers' predictions were not. Baseline anxiety in mothers and fathers did not contribute to a model predicting children's observed anxiety. Child gender did not moderate the relations between fathers' predictions and children's observed anxiety. **Conclusions** Fathers' predictions of children's anxiety were related to children's observed anxiety at anesthesia induction; mothers' predictions were not. Thus, fathers may be able to more accurately identify a need for intervention. Further research is needed to better explain discrepancies between mothers and fathers.

Key words anxiety; father; parents; surgery.

Preoperative anxiety among children undergoing surgery is a frequent occurrence and may put children at risk for experiencing maladaptive behavioral changes postoperatively including general anxiety, nighttime crying, enuresis, separation anxiety, and temper tantrums (Kain et al., 2004; Kain, Mayes, O'Connor, & Cicchetti, 1996; McCann & Kain, 2001). Parents' judgments of their children's anxiety on the day of surgery are important as they may determine subsequent interventions (e.g., preoperative medication). Unfortunately, there is very little literature on parents' perceptions of their children's preoperative anxiety.

Of the research that has been conducted in the perioperative arena, most has focused primarily on mothers, or a combination of both mothers and fathers. Very little research has compared mothers and fathers or looked at fathers specifically. In the past, this may have been because mothers were viewed as the primary caretakers. However, recent cultural and ideological shifts emphasize a desire for increased paternal involvement, suggesting a growing need for research examining fathers in the perioperative setting (LaRossa, 1988).

Outside the perioperative realm, the literature does reveal differences in the ways that mothers and fathers rate child behavior. Although a comprehensive review of this literature is beyond the scope of this paper, several investigators have found that mothers provide higher ratings of internalizing behavior than fathers (Huberty, Austin, Harezlak, Dunn, & Ambrosius, 2000). Mothers have also been found to report higher incidences of psychiatric symptoms (Jensen, Traylor, Xenakis, & Davis, 1988) and other problematic behavior (Seiffge-Krenke & Kollmar, 1998) than fathers. The exact explanation for these differences in ratings is unclear, but it is possible that mothers are more sensitive to the presence of problems than fathers. This may be due to the greater amount of time that mothers typically devote toward caretaking activities, which in turn may result in mothers being more attuned to subtle changes in children's behavior than fathers. Indeed, Jensen et al. (1998) found that

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familiarity of the child to the rater was strongly related to concordance between child and parent ratings of behavior. It is also possible that mothers rate behaviors higher than fathers because children are socialized to display more emotion in the presence of their mothers than their fathers.

Discrepancies in the ways that mothers and fathers rate children's behavior may also be related to the gender of the child. Differences in the socialization of emotion expression between boys and girls may be a contributing factor. For example, it was found that fathers are more likely to attend to and reinforce submissive behavior from girls than from boys (Chaplin, Cole, & Zahn-Waxler, 2005). When examining agreement between different raters, Jensen et al. (1988) found that the pattern of agreement between parent and child report for boys was different than the pattern of agreement between parent and child report for girls. These authors hypothesized that discrepancies between boys and girls may be a function of differences in the meanings of high scores on rating scales for boys and girls.

Given that mothers or fathers may be responsible for making decisions about interventions for their children on the day of surgery, it is necessary to compare how mothers and fathers predict anxiety. Further, given that differences between boys and girls were found to influence children's behavior and parent behavior ratings, an exploration of this gender variable is also important. This study aims to assess the relations between prediction of preoperative anxiety by mothers versus fathers and children's observed anxiety at anesthesia induction. Given that there is no previous literature in the perioperative field, directional hypotheses are not made; rather, these analyses are considered exploratory. In further exploratory analyses, this study also examines whether the relations between parent predictions and children's observed anxiety differed based on child gender (i.e., whether child gender was a moderator).

Method

Participants

Participants were mothers ($n = 120$) and fathers ($n = 39$) of 159 healthy 2- to 12-year-old children undergoing elective outpatient surgery. Demographic data for the sample is included in Table I. Children in this study underwent the following surgical procedures: general surgery ($n = 33$, hernia, strabismus); urological surgery ($n = 13$, circumcision, orchiopexy); ear, nose, and throat surgery ($n = 71$, tonsillectomy and adenoidectomy, Pressure Equalizing tubes); plastic surgery ($n = 11$, dermoid cyst, benign skin lesion); orthopedic surgery ($n = 10$, thumb trigger release, heel cord lengthening); and other minor surgery ($n = 21$, endoscopy, colonoscopy). Exclusionary criteria included children with chronic illness, prematurity (<32 weeks of gestation), and reported developmental delay.

Measures

Yale Preoperative Anxiety Scale

This is an observational measure of children's preoperative anxiety consisting of 27 items divided into five categories: Activity, Vocalizations, Emotional Expressivity, State of Arousal, and Use of Parent. Scores in each category range from 1to 4 (Activity, Emotional Expressivity, State of Arousal, and Use of Parent) and 1–6 (Vocalizations), with behavioral descriptors presented for each anchor.

Table I. Baseline Characteristics of Parents and Children

	Study group		
	Mothers $N = 120$	Fathers $n = 39$	Test statistic
Children			
Age (years)	6.24 (23.1)	5.83 (2.7)	$t(157) = 0.74$, NS
Gender (female %)	48.7	53.8	$\chi^2(1) = 0.09$, NS
Race (white %)	70.60	75.90	$\chi^2(4) = 2.92$, NS
Baseline anxiety (mYPAS)	30.59 (14.82)	27.14 (8.0)	$t(157) = 1.39$, NS
Anxiety at induction (mYPAS)	47.53 (27.4)	39.05 (20.4)	$t(157) = 1.77$, NS
Parents			
Trait anxiety (STAI)	36.31 (8.7)	34.52 (6.5)	$t(123) = 1.08$, NS
Baseline state anxiety (STAI)	39.96 (10.0)	35.90 (8.9)	$t(140) = 2.22$, $p < .05$*
Mother age	39.24 (7.7)	38.31 (7.0)	$t(128) = 0.58$, NS
Father age	39.99 (7.2)	40.28 (7.6)	$t(122) = 0.19$, NS
Education (with some post-secondary education %)	74.5	69.0	$\chi^2(1) = 0.34$, NS

With the exception of gender, race and education, all data are shown as Mean (*SD*).

Because each category has a different range of scores, proportions are calculated in which the child's actual score is divided by the highest potential score for the category. Proportion scores are then summed to result in an overall Yale Preoperative Anxiety Scale (mYPAS) score. Scores range from 22.5 to 100, with higher scores indicating greater anxiety. Trained observers rate children in the preoperative holding area and at the induction of anesthesia. Using κ-statistics, all mYPAS categories have been demonstrated to have good to excellent inter- and intraobserver reliability (0.73–0.91), and when validated against other global behavioral measures of anxiety, the mYPAS had good validity ($r = .64$) (Kain et al., 1997).

Visual Analog Scale

This type of scale is often used as an observational and self-report measure of anxiety. The Visual Analog Scale (VAS) is a 100-mm horizontal line that pictorially represents two behavioral extremes at either end of a continuum. VASs have been widely used to assess subjective states such as anxiety and pain and do not show the clustering of responses that is typical of Likert-type scales (McGrath, 1990). In this study, mothers and fathers marked on a line how anxious they thought their child would be when s/he entered the operating room (OR), with one anchor reading *not anxious* and the other reading *very anxious*. Scores ranged from 0 to 100, with higher scores indicating higher levels of predicted anxiety.

State-Trait Anxiety Inventory (Spielberger, 1983)

This self-report anxiety assessment contains two 20-item self-report rating scales for measuring trait and state anxiety. Parents respond on a 4-point scale, with total scores for each questionnaire ranging from 20 (*low anxiety*) to 80 (*high anxiety*). Test–retest correlations for the State-Trait Anxiety Inventory (STAI) are high, ranging from .73 to .86 (Spielberger, 1989). Validity of the instrument was examined in two studies in which the STAI was given under high- and low-stress conditions to large samples of students. The *r*-value ranged from .83 to .94 (Spielberger, 1989), suggesting very good validity.

Procedure

Sample Selection

Participants in the current study were from a larger study comparing parents' predictions of children's anxiety at anesthesia induction to that of healthcare providers (MacLaren, Thompson, Weinberg, Morrison, Hollister, & Kain, 2008). All children in this study had one parent present at anesthesia induction, and following standard procedure by anesthesiologists, all parents were given a choice as to which parent (mother or father) would be present at induction.

Study Protocol

All procedures were approved by the Institutional Review Board. Participants were recruited before the day of surgery by phone or on the day of surgery in the preoperative holding area. Demographic data and baseline measures of anxiety (STAI, mYPAS) were obtained following informed consent and assent (for children aged 7 and older). Trained research personnel administered all measures used in this study.

Parents who were to accompany their children into the OR (either mothers or fathers) were asked in the holding area to predict their children's level of anxiety in the OR using the VAS. Parents also rated their own anxiety using the STAI. All parents accompanied their children into the OR and were present for the induction of anesthesia, and none of the children received a sedative premedication. Observers rated the behavior of the child at anesthesia induction using the mYPAS. Upon leaving the OR, parents again rated their own anxiety using the STAI.

Results

Statistical Analyses

Statistical analyses were carried out in stages. First, preliminary analyses were conducted to examine differences between mother and father groups on demographic and baseline characteristics. Continuous variables were compared using *t*-tests, and dichotomous variables were compared using Chi-square tests. Next, relations between mothers' and fathers' predictions of child anxiety at induction were examined using linear regression including anxiety in holding as a covariate. The moderating effect of child gender on the relations between parent predictions and observed anxiety was evaluated using linear regression (Holmbeck, 1997).

Preliminary Analyses

Preliminary analyses were conducted to examine demographic and baseline differences between mothers and fathers and their children. Mothers and fathers did not differ on parent trait anxiety or child anxiety in holding. Mothers were, however, significantly more anxious in holding than fathers, but parent state anxiety in holding was not related to predictions of child anxiety, $r = .15$, NS. There were no differences between mother and father groups on child age, gender, race, and baseline anxiety. Children's anxiety at anesthesia induction did not differ between mother and father groups. Procedures were

Table II. Regression Analyses of Child Observed Anxiety by Parent Predictions and State Anxiety

Variable	B	SE-B	β	95% CI for β	*t*	Cumulative R^2
Fathers ($n = 37$)						0.389
Anxiety in holding (STAI)	0.23	0.30	0.11	−.38 to .84	0.77	
Predition (VAS)	0.46	0.11	0.58	.23 to .68	4.18*	
Mothers ($n = 97$)						0.001
Anxiety in holding (STAI)	−0.02	0.28	−0.01	−.58 to .53	0.01	
Predition (VAS)	0.04	0.11	0.04	−.73 to .25	0.35	

*denotes $p < .01$.

categorized as either major or minor surgery by an attending anesthesiologist (ZK) who was blind to other participant data on the basis of the extent of the surgery (i.e., time, potential for complications) and the expected amount of postoperative pain. There were no differences in child observed anxiety based on procedure type, $t(158) = 1.23$, NS.

Relations of Predicted and Observed Anxiety for Mothers and Fathers

Overall, there were no differences in predictions of children's anxiety between mothers ($M = 54.10$, $SD = 27.9$) and fathers ($M = 46.89$, $SD = 23.7$), $t(149) = 1.41$, NS. Results of linear regression models with parent predictions and state anxiety entered simultaneously are shown in Table II. The model of children's observed anxiety in the father group indicated that fathers' predictions and state anxiety in holding accounted for 38.9% of the variance in children's observed anxiety, $F(2, 34) = 10.81$, $p < .001$. Fathers' state anxiety was not a significant contributor to children's anxiety in this model. Supporting the importance of fathers' predictions, a model including only fathers' predictions accounted for a similar amount of variance, $r^2 = 0.378$, $p < .001$. In contrast to the father model, the mother model indicated that mothers' predictions and mothers' state anxiety in holding accounted for <1% of the variance in children's observed anxiety, $F(2, 94) = 0.06$, NS. Neither mothers' predictions nor state anxiety were significant predictors in the model.

Child Gender, Father Predictions, and Children's Observed Anxiety

Linear regressions were used to evaluate child gender as a moderator of the relation between parents' predictions and children's observed anxiety. Given that mothers' predictions were not related to children's anxiety, moderator analyses for this group were not conducted. Centered father predictions, child gender, and the interaction between prediction and gender were entered simultaneously as predictors in the model. The father model accounted for significant variance in children's observed anxiety, $R^2 = .384$, $F(3, 33) = 6.87$, $p < .001$. Child gender, $\beta = .17$, $t(1) = .56$, NS, and the interaction between child gender and parent predictions, $\beta = .27$, $t(1) = .41$, NS, were not significant predictors in the model. Results of this model indicated that child gender did not moderate the relations between fathers' predictions and children's observed anxiety.

Discussion

The purpose of this brief report was to explore differences between mothers' and fathers' predictions of their children's anxiety at anesthesia induction. Results indicated that fathers' predictions accounted for ~38% of the variance in children's observed anxiety at induction, whereas mothers' predictions accounted for <1%. Parents' anxiety at baseline did not contribute to the prediction of children's observed anxiety for mothers or fathers.

Findings of differences between mothers' and fathers' predictions of children's anxiety are interesting, as—to our knowledge—this is the first study to explore mothers and fathers separately in the perioperative environment. The explanation for these disparities between mothers and father deserves further attention. Trait anxiety of parents and parent anxiety in the holding area were not related to parent predictions, and since children's observed anxiety in holding was not different across mother and father groups, it is unlikely that children's overt behavior in the holding area (as assessed by the mYPAS) accounted for differences in agreement. In terms of explaining higher agreement between fathers' predictions and observed anxiety, it is possible that fathers generally attend more to children's overt behavior than mothers and thus are more able to predict their children's overt reaction at anesthesia induction. This explanation is consistent with prior research suggesting that fathers engage in more active play with children (Roopnarine & Mounts, 1985) and are more likely to agree with ratings of externalizing than internalizing behaviors of their children (Jensen et al., 1988). Further research is needed to explore these hypotheses and to determine why these differences between mothers and fathers emerged.

While children's overt behavior at induction is certainly an important outcome (i.e., mYPAS scores have been found to predict children's postoperative pain and maladaptive behavioral changes, Kain, Mayes,

Caldwell-Andrews, Karas, & McClain, 2006), it is important to note that overt behavior may not capture the full range of children's experiences with anxiety during anesthesia induction. It is possible that the reliance of the mYPAS on observable behavior may have led to the oversight of subtle or inhibited expressions of anxiety. Literature outside the perioperative realm suggests that mothers are more attuned to internalizing symptoms; thus, it is possible that rather than being ''less accurate'' than fathers, mothers' predictions may have been based on idiosyncratic changes in children's expression of anxiety that were not noted by the observational measure. Collection of children's self-reported anxiety in future studies may better reflect children's internal states and thus may be more likely to be related to mothers' predictions.

Several methodological limitations of this brief report should be noted. First, this study used all fathers who chose to be present at anesthesia induction and a random sampling of a group of mothers who chose to be present. Because this was not a randomized control trial, it is possible that mothers differed from fathers on some other variable that accounted for their differences in predictions. Thus, these preliminary results should be followed-up with a study in which mothers and fathers are randomly assigned to make predictions and be present at anesthesia induction. In addition, this study only asked the parent present for induction to predict child anxiety. Future research should examine intracaregiver correspondence by assessing differences in prediction agreement between mothers and fathers within the same family. Criterion contamination may also have been a concern in this study, especially given the correlational nature of the data. Fathers who predicted their children's anxiety were present at anesthesia induction and therefore could have affected the children's behavior at this time-point, thus inflating their prediction agreement. It is important to note, however, that if this were true, the contamination did not apply to mothers, for although they were also present at anesthesia induction, their predictions were not related to children's observed anxiety. Lastly, it should be acknowledged that only parents who chose to be present during anesthesia induction were included in this study, as it is standard practice in anesthesiology to only bring parents into the OR who have a desire to be present. Thus, the results can only be generalized to those parents present at anesthesia induction.

Summary and Clinical Implications

In sum, this study indicated that, fathers' predictions of their children's anxiety were related to children's observed anxiety, whereas mothers' predictions were not. This is an important finding, given that parents make the final decision regarding treatment of children's preoperative anxiety (i.e., whether the child is given sedative premedication). These preliminary results suggest that when fathers are present, their predictions, as compared to mothers', may be more related to children's overt response at anesthesia induction, an important outcome that has been found to be related to children's postoperative pain and behavioral recovery (Kain et al., 2006). Given fathers' apparent predictive ability, it may be more beneficial for healthcare providers to seek a collaborative decision from mothers and fathers about preoperative interventions, rather than relying solely on maternal preference. If fathers are not able to be present, healthcare providers could suggest that parents discuss decisions regarding intervention at home, prior to the day of surgery. Future research to ascertain *how* parents make accurate predictions of children's anxiety at induction will be informative. Is it the case that predictions are made on the basis of experience with prior procedures, children's behavior at home before arriving at the surgery center, or some other factor? Such information could aid in the development of coaching programs for those parents who are less likely to accurately assess their children's need for intervention. Developing screening tools to ascertain which parents may be in need of this intervention will also be important. Based on the data presented here, parent gender may be one variable to include in such a screening, but there are likely other variables that influence abilities to predict children's anxiety at anesthesia induction.

Conflicts of interest: None declared.

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