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REPORTS OF ORIGINAL INVESTIGATIONS

When are parents helpful? A randomized clinical trial of the efficacy of parental presence for pediatric anesthesia

Quand les parents sont-ils utiles? une étude clinique randomisée sur l'efficacité de la présence parentale lors d'une anesthésie pédiatrique

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Abstract

Purpose *To examine the utility of parental presence to alleviate anxiety in a narrow age range of children undergoing outpatient surgery. We hypothesized that parental presence would lower anxiety scores as measured by the modified Yale Preoperative Anxiety Scale (mYPAS) at two time-points during pediatric outpatient surgery, i.e., separation from parents and placement of the face mask for anesthetic induction.*

Method *Sixty-one children ages three to six years scheduled for various day surgery procedures participated in this study. The children were assigned randomly to either parental presence (n = 30) or parental absence (n = 31) groups. Observer-rated anxiety was measured by the mYPAS at five time-points during the surgery experience.*

Results *Child anxiety was significantly lower in the parental presence group than in the parental absence group at the time-point when the children in the parental absence group were separated from their parents, t[59] = 2.15 (P = 0.001). However, no significant group differences in anxiety scores were noted at other time-points.*

Conclusions *Our results suggest that anxiety levels in children undergoing day surgical procedures differ as a function of parental presence at the point when children are separated from parents. Future research should examine the types of interactions that occur during this time-point that may explain this finding.*

Résumé

Objectif *Examiner l'utilité d'une présence parentale pour soulager l'anxiété chez les enfants dont l'âge est dans une plage restreinte subissant une chirurgie ambulatoire. Nous avons émis l'hypothèse qu'une présence parentale diminuerait les scores d'anxiété tels que mesurés par l'échelle d'anxiété préopératoire de Yale (mYPAS) modifiée à deux moments dans le temps lors d'une chirurgie ambulatoire chez l'enfant, soit à la séparation de l'enfant des parents et au moment de l'application du masque facial pour l'induction de l'anesthésie.*

Méthode *Soixante et un enfants âgés de trois à six ans et devant subir différentes interventions chirurgicales en ambulatoire ont participé à l'étude. Les enfants ont été randomisés à soit une présence parentale (n = 30), soit l'absence parentale (n = 31). L'anxiété telle qu'évaluée par l'observateur a été mesurée à l'aide de l'échelle mYPAS à cinq moments pendant l'expérience chirurgicale.*

Résultats *L'anxiété des enfants était significativement plus basse dans le groupe présence parentale que dans le groupe absence parentale au moment où les enfants dans le groupe absence parentale étaient séparés de leurs parents,*

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t[59] = 2,15 (P = 0,001). Cependant, aucune différence significative n'a été observée entre les groupes au niveau des scores d'anxiété aux autres moments.

Conclusions *Nos résultats suggèrent que les niveaux d'anxiété des enfants subissant des interventions chirurgicales en ambulatoire diffèrent en fonction de la présence parentale au moment où les enfants sont séparés de leurs parents. À l'avenir, les recherches devraient examiner le type d'interactions qui surviennent à ce moment de façon à expliquer cette découverte.*

Preoperative anxiety is a relatively common phenomenon in children. In fact, approximately 40-60% of children experience anxiety regarding an impending surgical experience.[1] Elevated levels of preoperative anxiety have been associated with difficulty in anesthetic induction and the development of postoperative maladaptive behavioural changes.[2,3] There has been support for allowing parents to be present during anesthetic induction in order to alleviate preoperative anxiety in their children. The efficacy of this strategy has been explored within the literature and findings have been inconsistent.[4-7] When parents are given the option to be present/absent during anesthetic induction, reductions in child anxiety are observed within groups where parents are present.[8,9] However, results of investigations where parents were randomly assigned to be present/absent during anesthetic induction have not been as positive. In some investigations, no differences in child anxiety were observed across parental presence/absence groups,[10-13] while in other studies,[14] child anxiety was found to be *elevated* in parental presence groups. To date, no randomized controlled trials have found parental presence to be an effective anxiety-reducing intervention, in particular at anesthetic induction, when compared with parental-absence groups. Additionally, a methodological concern with many of the studies highlighted above is the wide age range of the participants, i.e., ages 1-12 yr. Perhaps children at certain stages of development benefit from parental presence, but these findings may be lost when researchers draw on a wide age range.

The purpose of the present study was to provide a further examination of the utility of parental presence as a method of alleviating anxiety in children undergoing day surgery procedures. In particular, we wanted to improve on the methodological limitation of the existing literature by employing a sample with a narrower age range, i.e., ages 3-6 yr *vs* ages 1-12 yr. Employing a narrower age range facilitates better investigation into the utility of this method of intervention in a younger patient population. It was hypothesized that parental presence would lower anxiety scores, as measured by the modified Yale Preoperative Anxiety Scale (mYPAS)[15] at two time-points during pediatric outpatient surgery. Specifically, we were interested in examining anxiety at anesthetic induction and also at the time-point when children are separated from their parents – a potentially stressful time-point that is often overlooked in similar studies.

Table 1 Types of surgeries

Surgery type	%	*n*
Ear, nose and throat (ENT)	80.3	49
General surgery	8.2	5
Urology	8.2	5
Gastroenterology	1.6	1
Plastics	1.6	1

ENT = tonsillectomy, adenoidectomy, myringotomy, ear debridement, laryngoscopy, release of tongue tie; General surgery = herniorraphy; Gastroenterology = gastroscopy with biopsy; Plastics = lesion excision

Method

Participants

The participants were children recruited during 2004 and 2005 who were scheduled for various day surgery procedures (Table 1) at the IWK Health Centre (IWK), a tertiary care pediatric hospital in Halifax, Nova Scotia, Canada. Exclusion criteria included children who had a history of central nervous system disease, psychiatric disease, liver disease, renal disease, cancer, or neurological or cognitive impairment or disease. Children with a history of gastro-esophageal reflux disease were also excluded, as induction was standardized to inhalation by mask.[16] The study was approved by the IWK Health Centre Research Ethics Board. We also obtained written informed consent from the children's parents and verbal assent from the children prior to participation. No participants received premedication. This study, which realized a 76% participation rate from all of the potential participants contacted, was a part of a larger set of studies examining the impact of parental presence/absence on preoperative anxiety in children.[A] The analysis that we report herein was the primary focus of the larger set of studies.

[A] *Wright KD*. Parental resence during anaesthetic induction: investigations of the effects of parent and child traits and parent-child interactions on child anxiety levels. (Doctoral Dissertation, Dalhousie University, 2006). Dissertation Abstracts International, 67/11, AAT NR19611.

Measure

Modified yale preoperative anxiety scale

The mYPAS is an observer-rated scale designed to measure a child's level of anxiety in the preoperative setting.[14] The scale consists of 27 items in five categories: activity, vocalizations, emotional expressiveness, state of apparent arousal, and use of parents (omitted in this study). Each category is scored from 1-4, with the exception of vocalizations, which is scored from 1-6. Partial weights for each category are calculated and then added together to obtain a total score that ranges from 0-100 for each time-point. The mYPAS has shown good concurrent validity ($r = 0.79$) in predicting children's State Trait Anxiety Inventory for Children – State subscale scores[17] in the surgery context.[14] The scale also has good construct validity, as scores have been shown to increase from baseline to anesthetic induction[18], and to have good inter-rater reliability.[14] Since there was an inconsistency in the availability of parent to child throughout the five time-points (i.e., only half of the parents accompanied their child during the induction), we dropped the use of the parent scale.[18] The first rater was present during the induction and the second rater coded the mYPAS via videotape.

Experimental design

Prior to the day of surgery, the participants were randomly assigned to one of two groups (parental presence [$n = 30$] *vs* parental absence [$n = 31$]) using a random number generator, and the randomization code was placed in a sealed envelope. Parents, children, anesthesiologists, and research assistants were blind to group assignment until meeting with the anesthesiologist just prior to leaving the day surgery room. One research assistant was present throughout the day surgery procedure to complete observer anxiety ratings. A second research assistant videotaped the anesthetic induction. At a later date, a second rater independently scored the mYPAS via video tape for a random 20% of the study participants in order to calculate inter-rater reliability.

Tasks and procedure

Once a child met the study inclusion criteria and was scheduled for a day surgery procedure at the IWK, an information package (i.e., information letter and consent form) regarding the study was sent to the child's parents one to two weeks prior to the scheduled surgery time. Three days before the day of surgery, a researcher contacted the parents by telephone and asked about their interest in having their child participate in the study. If the parents were willing, the researcher arranged to meet with the parent(s) and child on the day of surgery.

Approximately 90 min before the child's surgery, the researcher met with both the child and the parent(s) to obtain parental written informed consent for the child's participation in the study and to obtain the child's verbal assent. Once the informed consent/assent process was completed, the child's observer-rated anxiety was assessed using the mYPAS. Children were rated on all subscales except the "use of parent" subscale (due to the study design). Observer-rated anxiety (mYPAS) was assessed at five time-points: 1) 90 min before surgery (baseline 1); 2) five minutes before surgery (baseline 2); 3) leaving the day surgery room for the operating room (OR) (separation); 4) when the anesthetic mask was placed on the child's face (induction); and 5) when the child returned to the day surgery area from the recovery room (day surgery).

Once the child returned to the day surgery area from the recovery room, the researcher met with the child and parent(s) once more to administer the observer-rated measure (day surgery). The child was given a sheet of stickers as a token of thanks for his/her participation.

Statistical considerations

Six separate sets of analyses were completed: 1) a series of univariate analyses of variance (ANOVA) were completed in order to investigate whether demographic information (i.e., sex, previous surgery, surgery type) influenced mYPAS scores at the two most stressful time-points (i.e., separation and induction); 2) an inter-class correlation was computed to examine inter-rater reliability of mYPAS ratings at induction; 3) a bivariate correlation was computed between age and mYPAS scores at the two stressful time-points to examine the influence of age on mYPAS scores; 4) between- and within-group comparisons using a 2 x 5 repeated measures ANOVA was performed on mYPAS total scores (i.e., group: parental presence *vs* parental absence x mYPAS assessment time: baseline 1 *vs* baseline 2 *vs* separation *vs* induction *vs* day surgery); 5) dependent sample Student's t tests were performed between mYPAS scores at the successive time-points during the surgery experience to determine the instant/s of significant differences; and 6) appropriate post hoc tests were conducted in the case of any significant results or interactions from the ANOVA.

The sample size was computed *a priori* for the two groups using analysis of variance estimates. The primary end point was the observer-rated child anxiety on introduction of the anesthesia mask as assessed by the mYPAS.[14] Given a medium effect size (i.e., $f = 0.25$), a power of 80%, and an alpha statistic of 0.05, approximately 30 participants were needed in each group.

Table 2 Descriptive statistics for mYPAS scores for parental presence/absence groups

Assessment time-point	Parental presence			Parental absence		
	Mean (SD)	Median	IQR	Mean (SD)	Median	IQR
Baseline 1	26.51(5.56)	23.00	6.25	28.06(6.84)	23.00	10.25
Baseline 2	26.09(6.26)	23.00	4.61	28.00(6.79)	25.00	10.25
Separation*	26.71(6.72)	23.00	5.56	38.87(20.89)	33.25	20.75
Induction	54.18(27.90)	43.75	48.56	52.75(24.27)	50.00	39.75
Day surgery	35.93(16.66)	29.25	12.88	34.31(6.59)	35.11	10.25

mYPAS = modified Yale Preoperative Anxiety Scale;[12] SD = standard deviation; IQR = interquartile range; baseline 1 = child in the waiting room; baseline 2 = five minutes prior to leaving the day surgery room; stress 1 = separation from parents (or at similar time point if separation did not occur); stress 2 = anesthetic mask placement; day surgery = child returned to day surgery; mYPAS total score possible range from 23 to 100; *Significant group difference at this time-point

Results

Sixty-one children aged three through six years (mean age = 5.22 yr, standard deviation [SD] = 1.02 yr) participated. Ethnicity in the sample was primarily Caucasian (90.3%). In order to investigate whether demographic information influenced mYPAS scores, a series of univariate ANOVA were performed for the two stressful time-points (i.e., separation and induction). In an effort to reduce the overall number of analyses, the focus was placed on the two stressful time-points that were of primary clinical interest. The results of these analyses indicated that mYPAS scores at separation did not differ significantly as a function of sex (F[1,59] = 0.24; P = 0.63), previous surgery[B] (F[1,59] = 0.01; P = 0.91), or surgery type (F[1,59] = 0.27; P = 0.60).[C] The results of these analyses indicated similarly that mYPAS scores at induction did not differ significantly as a function of sex (F[1,59] = 0.04; P = 0.84), previous surgery (F[1,59] = 0.35; P = 0.56), or type of surgery (F[1,59] = 0.63; P = 0.43). In order to examine whether age had a significant association with anxiety scores, bivariate correlations were computed between age and mYPAS scores at the two stressful time-points. No significant correlations were found between age and mYPAS scores (r = 0.01; P = 0.92 [separation] and r = −0.14; P = 0.28 [induction]). The non-significant correlations suggest that mYPAS scores do not vary as a result of age, at least within the narrower age range tested in the present study. For this investigation, inter-class correlations were computed between two mYPAS raters (the second rater was blind to the investigation hypotheses) for a randomly selected 20% of the participants and they yielded r = 0.89.

Impact of parental presence on children's preoperative anxiety

Results from a 2 x 5 repeated measures ANOVA (group: parental presence *vs* parental absence x mYPAS assessment time: baseline 1 *vs* baseline 2 *vs* separation *vs* induction *vs* day surgery) showed a main effect for time-point (F [4,212] = 32.28; P = 0.00) but not for parental presence group (F [1,53] = 2.15; P = 0.15). A marginally significant interaction was observed (F [4,212] = 2.18; P = 0.07). The mean, SD, median, and interquartile range of mYPAS scores are presented in Table 2. To further examine the main effect of time for the mYPAS, dependent sample Student's t tests were performed between means at successive time-points to determine the instances of significant differences. There was a significant increase in observer scores from baseline 2 (five minutes before leaving day surgery) to separation (t [59] = 2.72; P = 0.01), separation to induction (t [60] = 6.41), and a significant decrease from induction to day surgery (t [55] = −5.47). There was no significant increase from baseline 1 (waiting room) to baseline 2 (five minutes before leaving day surgery).

Upon visual examination of Table 2, it appeared that there may be a significant difference between parental presence/absence groups at separation. Given that directional predictions were made *a priori* and given the marginal group x assessment time interaction, a one-tailed independent sample Student's t test was used to examine this possible group difference. Results suggest that mYPAS scores were indeed significantly different between groups at separation (t [59] = 2.15; P = 0.001; effect size = 0.27). At separation from parents immediately prior to entry into the OR, the mYPAS scores for children in the

[B] Approximately 61% (n = 37) of the sample had no previous surgery experience. Approximately 30% (n = 9) of the parental presence group and 48% (n = 15) of the parental absence group had at least one previous surgery experience.

[C] Surgery type coded as ear, nose, and throat surgery (e.g., tonsillectomies, adenoidectomies, myringotomies, ear debridements, laryngoscopies, release of tongue tie) *vs* other surgeries (e.g., Urology: circumcisions, orchidopexies, or ovchidectomies; General Surgery: herniorraphies; Gastroenterology: gastroscopy with biopsy; and Plastics: lesion excision).

parental absence group were significantly higher than the scores for children in the parental presence group who were tested at the same time-point prior to surgery. The tests of between condition differences in mYPAS scores at the other four time-points revealed no significant differences between groups, not even at the theoretically most stressful time-point of anesthetic induction (Table 2).

Discussion

The primary purpose of this study was to examine whether preoperative child anxiety could be alleviated by parental presence. We chose to conduct a randomized controlled trial design employing a narrower age range of children than in previous studies. We also intended to examine the stress observed at parental separation and at anesthetic induction. Our results were partially consistent with the hypotheses. At the time-point when children are typically separated from parents, preoperative child anxiety was found to be significantly higher in the parental absence group than in the parental presence group. Research methodology in this area sometimes measures anxiety at the separation time-point, but group differences at this time-point are not typically a focus of discussion. For example, Kain *et al.*[11] conducted a randomized controlled trial in an examination of the effectiveness of parental presence *vs* premedication (i.e., midazolam) in alleviating preoperative anxiety, and they found group differences in levels of anxiety at the separation time-point. Similar findings were highlighted in another study by Kain *et al.*[19] Although the purpose of their study was not an exploration of the effectiveness of parental presence as an intervention and the parents generally did not accompany their children into the OR, parental accompaniment was offered in the case that the child was extremely anxious (11 children required this option). No differences in anxiety at the separation time-point were noted between children whose parents either did or did not accompany them into the OR. The latter study differed from our study in that parental presence at induction was not randomized. Cameron *et al.*[8] examined the timing of separation from parents. The parents were not assigned randomly; rather, parents who chose to accompany their child and were given permission from the participating anesthesiologist were able to be present during induction ($n = 38$). Parents who either chose not to accompany their child or were not permitted by the anesthesiologist were given the option of either accompanying their child to the theatre holding bay area ($n = 22$) or remaining in the day surgery ward ($n = 14$). Child anxiety (based on an observer-rated five-point scale) at induction was found to be higher when separation occurred in the theatre holding bay area than when separation occurred in the ward. Cameron *et al.* speculated that highly anxious parents may have been aware of the detrimental effect of their own anxiety and chose to separate earlier. Interestingly, separation in the ward was also associated with elevated child anxiety at induction. Cameron *et al.* further speculated that levels of child anxiety might have increased in the holding bay as a function of the child observing anxious behaviour of his or her parent, and this increased anxiety carried through to induction. Our findings indicated that children had higher levels of anxiety at the separation time-point in our parental absence *vs* parental presence condition, and this finding appears to be in contrast to the results of the aforementioned studies. However, it is important to note that there are methodological differences and/or limitations amongst these studies that limit the comparability of findings. Specifically, there are differences in terms of the variability in: 1) the time-point when separation took place (i.e., relative to time of induction); 2) the type of observer-rated measure of child anxiety used; 3) the comparison of group differences at the separation time-point; and 4) random assignment *vs* self-selection of participants. In terms of examining child anxiety at the separation time-point, our study improved on the limitations of past work: by using a randomized controlled trial design where parents were assigned randomly to either parental present or parental absent conditions; by measuring observer-rated anxiety using the widely employed and psychometrically sound mYPAS at time-points during the day surgery process that are consistent with the literature; and by statistically examining subsequent group differences at the separation time-point.

Cameron *et al.*[8] also found that children whose parents were present during induction were less anxious than those whose parents were absent. Providing parents the opportunity to "self-select" presence or absence during anesthetic induction, rather than employ random assignment, is seen as contributing to the divergence in the literature. Perhaps more important than the simple presence or absence of parents, the specific characteristics, qualities, and/or behaviours of the parents who choose to be present are critical factors associated with changes in child anxiety. As alluded to by Cameron *et al.*, parental anxiety was found to be associated with child anxiety and distress during anesthetic induction.[1,20-22] Specifically, elevated parental anxiety (most often measured by the State-Trait Anxiety Inventory – State subscale)[23] is positively associated with elevated child anxiety in the preoperative context. To clarify the relationship between parent and child anxiety further, Kain, Caldwell-Andrews, Maranets, Nelson, and Mayes[24] used previously collected data (586 children aged 2-12 yr) to explore whether parental presence during anesthetic induction is useful in reducing child anxiety on the basis of the interaction between the child's

and parents' baseline anxieties. They found that the presence of a calm parent was beneficial for alleviating child anxiety during induction in a baseline anxious child. In contrast, the presence of an anxious parent had no benefit for either baseline calm or anxious children. The behaviours that parents engage in while present require consideration.

The ages of children in our study ranged from 3-6 yr *vs* 1-12 yr in comparable studies.[8-14] This age distribution may have influenced previous findings. The older child's cognitive capacity and understanding of the surgery experience becomes more sophisticated.[25] The focus of children's fear and worry follows a developmental pattern: younger children's fears and worries are based on imaginary themes (ghosts, monsters), while older children have more realistic fears involving bodily injury. Older children have improved behavioural competence and social evaluation,[25,26] and Bauer[25] asserts that these findings reflect developmental changes in children's perception of reality. The beneficial effect of specific anxiolytic interventions may be diminished beyond detection when older children are included. Investigations that have examined the effect of age on the anesthetic induction experience have produced conflicting results. For example, Bevan *et al.*[20] examined preoperative anxiety in 134 children ages two to ten years in a pediatric day surgical centre. They found that younger children were more anxious at induction than older children. An additional investigation[27] found children ages two to six years significantly more likely to exhibit problematic behaviour upon separation from their parents than children ages seven to eight years. In turn, Kain, Mayes, O'Connor, and Cicchetti[1] found that children older than age seven years were more anxious than children aged four to seven years in the preoperative holding area (day surgery room). They based their finding on an observer-rated visual analogue scale. In contrast, a large survey conducted by Holm-Knudsen *et al.*[28] demonstrated that distress during anesthetic induction was not associated with age. Given that some studies have shown an association between child age and preoperative anxiety, Kain, Mayes, Weisman, and Hofstadter[29] asserted that age may be a "surrogate marker" for other factors that may have an impact on a child's surgical experience. These factors include cognitive abilities, the ability to draw on different coping strategies to help with anxious feelings, and social adaptive abilities (i.e., those behaviours that children use to respond to usual or daily experiences). In this particular investigation, Kain *et al.*[29] sought to examine the relationship between preoperative anxiety and the cognitive abilities, emotions, and adaptive abilities in 60 children aged three to ten years undergoing elective surgery. Results showed that children's social adaptive capabilities (i.e., behaviours that children use to respond to usual or daily experiences) were an independent predictor of children's preoperative anxiety. Our findings demonstrated no significant association between age and anxiety at separation or anesthetic induction, at least with respect to this more restricted age range, i.e., 3-6 yr.

Our findings were consistent with previous findings that parental presence exerted no effect on child anxiety at anesthetic induction; rather, we observed effects only when children in the parental absence group were separated from their parents. At first glance, these beneficial effects of parental presence might be taken as evidence of the utility of this intervention by advocates for allowing parents into the OR. This decreased anxiety in the parental presence group was short-lived, however, as it did not persist at anesthetic induction only a few minutes later. Alleviating and, perhaps more appropriately, preventing anxiety at this latter time-point is particularly critical, as elevated anxiety at induction has been associated with crying, sudden urination, increased motor tone, and attempts to escape from the medical personnel.[30-32] In fact, it has been noted that up to 25% of children have required physical restraint to facilitate anesthetic induction,[33] a situation that can lead to increased stress in both children and medical personnel.[34]

A number of limitations of this study must be considered. All medical personnel who were involved in this investigation were very helpful; however, at times some instructions medical personnel gave to the parents may have impacted the results. When parents entered the OR, they often were instructed to sit on a chair beside their child and were told they were allowed to hold their child's hand. These instructions may have directed the behaviour of the parents (e.g., the behaviour may not have been the natural choice of the parents) and may have impacted child anxiety during anesthetic induction. Parental presence might have been more effective if they were allowed to use their own coping strategies. On the other hand, given previous research where parental presence was associated with *increased* child anxiety,[14] parental presence might have been more harmful if parents were not provided with these instructions. Experimental examination of the association between types of comforting behaviours and child anxiety during anesthetic induction deserves further examination.

Selection bias is another factor to consider. Participation in this investigation was quite good (76% participation rate); however, it is important to consider that there may be a reason why some families did not participate. For example, the most anxious parents, those likely to impart more anxiety on their children, may also have been more likely to refuse to participate. Therefore, we may have missed an entire group of very anxious children and/or parents. A higher participation rate may have produced differences in observer-rated

anxiety at anesthetic induction. Also, in completing the observer-rated anxiety measure (mYPAS), it was impossible to have raters blinded to parental presence.

Our results suggest that anxiety levels in children undergoing day surgical procedures differ as a function of parental presence at the point when children are separated from parents. Specifically, children in the parental presence group had significantly lower anxiety scores than the parental absence group at this time-point. It would be interesting to investigate what types of parent-child interactions take place during this time-point that may explain this finding. However, it may be difficult to record (e.g., videotape) what occurs during this time-point, as the day surgery room is quite busy and many people are quickly entering and exiting this room. These findings also highlight the notion that intervention should take place at an earlier time-point, thereby possibly reducing the intensity and/or duration of child anxiety. For instance, parents and children could be provided education and training with respect to coping strategies prior to the day of surgery. MacLaren and Kain[35] initially examined the utility of a brief behavioural intervention, including shaping and exposure, to address children's preoperative anxiety. This intervention was shown to significantly increase compliance and to lessen the course of anxiety throughout the surgery experience.

Recent research has demonstrated a move towards a family-centred approach to child surgical preparation.[36] Within this framework parental presence is one component; however parental presence alone remains employed across clinical practice.[D,37] Findings from the present study and others can facilitate the development of the components of family-centred programs. Specifically, our findings suggest that the separation time-point is particularly critical, and despite the family-centred preparation program described by Kain *et al*.,[36] not all parents will be present during induction for a number of reasons (e.g., parent is extremely anxious, parent is ill, decision by anesthesiologist to not have parent present). Therefore, our findings highlight that the separation time-point requires further examination and consideration when intervention components are developed.

Anesthesiologists attempt to make the anesthetic induction experience as easy as possible for the patient. The knowledge that parents are effective in reducing child anxiety at separation and not at anesthetic induction may decrease the likelihood of anesthesiologists allowing parents to be present during the anesthetic induction. However, future studies in this area are needed to clarify the timing and nature of parental presence during anesthetic induction of the younger pediatric population.

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Competing interests None declared.

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