THE REDUCTION OF PREOPERATIVE ANXIETY: THE EFFECT OF AGE ON THE SUCCESS OF ELECTRONIC DISTRACTION INTERVENTIONS

by

Briahna Havis, B.A.

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Committee Members:

Priscilla Goble, Chair

Farya Phillips

Amy Weimer

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LIST OF ABBREVIATIONS

Abbreviation	Description
CCLSs	Certified Child Life Specialists
PMP	Portable Multimedia Player
VG	Video Glasses
mYPAS	modified Yale Preoperative Anxiety Scale

I. INTRODUCTION

In the United States alone, approximately 450,000 pediatric patients (i.e., patients under the age of 18) are admitted to the hospital for surgery each year (Tzong et al., 2012). The surgical experience can provoke preoperative anxiety in children due to a number of factors, including: the unfamiliar nature of the hospital setting, a child's fear of separation and abandonment, and the child's feeling of loss of control. Preoperative anxiety is both a psychological and physiological response that develops through tension, irritability, and an amplified reaction of the autonomic nervous system (e.g., increased heart rate) that occurs prior to a surgical procedure (Aytekin et al., 2016). Approximately 40% to 60% of surgical pediatric patients have experienced some psychological or physiological form of preoperative anxiety (Aytekin et al., 2016). If preoperative anxiety is not treated, it can lead to numerous psychological and physical complications, which can be extremely detrimental for children's health and development (Aytekin et al., 2016). To address this concern, Certified Child Life Specialists (CCLSs) are utilized within children's hospitals to assist in providing necessary psychological preparation and interventions that reduce preoperative anxiety in pediatric patients.

According to Aytekin et al. (2016), an effective intervention to reduce preoperative anxiety in pediatric patients, implemented by CCLSs, is distraction. For example, a CCLS might hold up an iPad playing the child's favorite cartoon show, to divert their attention away from the anesthetic medicine that is being administered before surgery. This type of intervention is thought to reduce preoperative anxiety because it provides children with the opportunity to focus their attention on something that is pleasant and that they enjoy. In most hospital settings, the only option for electronic

distraction is a portable multimedia player (PMP), such as an iPad or tablet. There are other options, however, such as video glasses (VG) which might be more effective at reducing preoperative anxiety for younger children, who have been shown to be less-adept at filtering external stimuli, as compared to older children (Akhtar & Enns, 1989).

Although it is common practice for CCLSs to select toys and games based on a child's developmental level (e.g., bubbles for young children and board games for older children), selecting the best choice of electronic devices to distract children of various ages can be challenging. Thus, the present study examined the effectiveness of two types of electronic devices, the VG and the PMP, at reducing preoperative anxiety across children of a broad age range. It was hypothesized that the effectiveness of the electronic devices on reducing preoperative anxiety would be moderated by age, a proxy of the patient's ability to engage in selective attention. This hypothesis has not been previously examined in practice or through research, but given recent advancements in technology such as the emergence of video glasses, there are now unique opportunities to examine how devices might reduce preoperative anxiety. Past research exploring the use of electronic devices to reduce preoperative anxiety has used the terms 'children' and 'patients' interchangeably. Thus, the present study similarly describes participants using these terms interchangeably.

Preoperative Anxiety

Preoperative anxiety can appear in individuals at any age or developmental period and has been shown to occur more often in children (40-60%) than adults (32-50%; Aytekin et al., 2016; Gomes et al., 2016; Sigdel, 2015). Children, in comparison to adults, are significantly more vulnerable to the stress of surgery, and therefore, to preoperative

anxiety. This is due to the fact that children have less cognitive capacity, medical knowledge, and life experiences, than adults (William Li et al., 2007).

Preoperative anxiety can be considered pathological when the emotional and physiological response is inconsistent with the stimuli presented, or with what is expected from a typically developing patient (Gomes et al., 2016). For example, it is not expected that a 16-year-old patient will unconsolably cry and plead for their parent as they head to the operating room. However, this behavior might be expected from toddlers and preschool age children. Pathological preoperative anxiety has been shown to have detrimental effects such as the obstruction and extension of anesthesia induction, emergence delirium, postoperative recovery complications, and in some cases, eating disorders within pediatric patients (Aytekin et al., 2016; Kerimoglu et al., 2013). Given the negative experiences related to preoperative anxiety for children, it is crucial to examine intervention methods that assist in reducing anxiety in pediatric surgical patients, to provide them with an overall better healthcare experience.

Interventions for Pediatric Preoperative Anxiety

There are several interventions that are utilized within the hospital setting to reduce preoperative anxiety in pediatric surgical patients. Specifically, these interventions include medical play, procedural preparation, and distraction. Medical play is implemented to familiarize pediatric patients with the hospital setting, as well as assist them in conveying their feelings and concerns about their healthcare experience (Li et al., 2016). The main technique that is used to familiarize patients with the hospital environment is to provide them with authentic medical equipment, such as stethoscope, gloves, a mask, bandages, a syringe (with or without the needle), and many others (Li et

al., 2016). This permits patients to touch, wear, and play with the equipment that will be used during their procedure. While, procedural preparation is employed in order to provide children with a greater understanding of the reasoning for their hospitalization, and to deliver a sense of ease regarding their upcoming procedure (Li et al., 2016). Procedural preparation involves walking a patient through each step of their upcoming procedure. This is done by performing the procedure on a pretend medical doll, using either real or play medical equipment (Li et al., 2016). In the hospital setting, CCLSs utilize a combination of each of these interventions for psychological preparation; however, when the interventions are used in isolation, distraction has been found to be one of the most effective in reducing preoperative anxiety in pediatric patients, though it may not be every patient's preferred coping style (Aytekin et al., 2016; Koller, 2018; Li et al., 2016).

Distraction is implemented immediately prior to a medical procedure (e.g., IV insert or surgery; Ahmed et al., 2011; Li et al., 2016). The main techniques that are used for this type of intervention are blowing bubbles, pop-up books, hand-held electronic games, sensory toys, web-based entertainment (e.g., YouTube), music, and video devices (Li et al., 2016). Hashimoto et al. (2020) found that these distraction techniques can alleviate a patient's preoperative anxiety by having them focus on the stimulus in front of them, rather than the multitude of potentially frightening stimuli that encompass an operating room. Research has also shown that other forms of technology, such as watching cartoons/movies, playing video games, and engaging in virtual reality systems, are particularly effective in reducing preoperative anxiety (Kerimoglu et al., 2013). Specifically, Kerimoglu et al. (2013) found that when pediatric patients (ages 4-9 years)

focus on and engage with video games, their preoperative anxiety is reduced as efficiently as midazolam, a preoperative sedative medication.

Hashimoto et al. (2020) examined the effectiveness of two video devices in reducing preoperative anxiety. The first video device is the video glasses (VG), which is an eyeglass display system that encompasses the patient's lenses, therefore, isolating the visual field (Hashimoto et al., 2020). This, in turn, inhibits the patient from seeing potentially frightening stimuli within the operating room, and instead, focuses their attention on the video until the anesthesia has been administered, and they are fully sedated. The second video device is the portable multimedia player (PMP), which is a standard electronic device that is commonly used within hospital settings for viewing videos (e.g., tablets; Hashimoto et al., 2020). This device distracts the patient, but does not shield them from surrounding stimuli within the operating room. Hashimoto et al. (2020) concluded that VG are a significant anxiety reducer, and distraction technique, then the PMP during anesthesia induction.

Despite the valuable findings from Hashimoto et al. (2020), the authors did not consider the patients age (i.e., 4-11 years old) when examining the effects of the VG and the PMP devices for reducing preoperative anxiety. It is possible that the effects presented in the original study differ by age, given that children's hospital related fears and anxiety, coping skills, and ability to filter external stimuli vary by age.

Pediatric Development

As a child ages, they move through developmental stages, which allows them to acquire and master new concepts and skills. According to Piaget (1964), the age of children in the preoperational stage (2-7 years old), compared to those in the concrete

operational stage (7-11 years old), can show significant perceptual differences. Children in the preoperational stage are actively transitioning from relying only on their perceptions of an event, to more logical thinking; this process can develop the belief that a medical procedure is a form of punishment (Rollins et al., 2005). In contrast, children in the concrete operational stage are able to think logically and understand a series of events. Furthermore, according to Erikson, the needs of children in the initiative vs. guilt stage (3-6 years old), compared to those in the industry vs. inferiority stage (6-12 years old) are vastly different psychosocially (Gross, 2020). Children in the initiative vs. guilt stage want and need to have control over their environment, which can be extremely difficult in a hospital setting (Rollins et al., 2005). Children in the industry vs. inferiority stage are building a sense of competence and have the want to succeed in tasks, such as staying still during medical procedures and remaining cooperative throughout. (Rollins et al., 2005). Therefore, after exploring the perceptual and psychosocial differences between younger and older children, it is possible that the effects presented in the original study differ by age, and need to be considered in the examination of the effectiveness of each of the electronic distraction interventions.

Additionally, in a hospital setting, a child's developmental age can be examined through the way in which they adjust and cope, as well as the issues they present with hospitalization. Rollins et al. (2005) states that hospitalization issues of younger children (3-6 years old) are separation anxiety, fear of bodily injury and pain, misconceptions, and frightening fantasies. Whereas, the hospitalization issues of older children (6-12 years old) are fear of bodily injury, fear of loss of mastery, and fear of illness, disability, or death (Rollins et al., 2005).

It has also been demonstrated that older children can outperform younger children on attentional based tasks (Akhtar &. Enns, 1989) as younger children cannot focus on one task for a prolonged period of time, and they become easily distracted by external, irrelevant stimuli. Akshoomoff (2002) measured reaction time, and therefore attentional function, between preschoolers, kindergartners, and second graders. The results displayed that when the younger children were presented with the distraction cue, they were unable to avoid it, and therefore received slow reaction scores (Akshoomoff, 2002). In contrast, older children received faster reaction scores because they were able to avoid the distraction cue, and focus on the task at hand.

The ability to filter out visual stimuli has been commonly assessed through the classic Stroop task (Plude et al., 1994). In this assessment, participants are shown a set of words that spell out the name of colors (e.g., red). The words themselves are written in a specific ink color, which is a different color than the word presented (e.g., green). Participants are asked to focus on the color of the ink in which the word is written (e.g., green), say it out loud as quickly as possible, while consciously ignoring the word of the color that has been spelled out (e.g., red). Results of this assessment in a life-span study showed that the filtering of stimuli was faster and more seamless as age increased throughout childhood and early adulthood (Plude et al., 1994). Many tasks similar to the Stroop task have been created to examine an individual's ability to filter out irrelevant stimuli; it is almost always found that there are age-related improvements (Plude et al., 1994). These results suggest that older children are able to filter out external stimuli better than younger children and will therefore be more easily distracted by device use in the operating room; however, there might be differences across age groups of children by

device type. For example, it could be that portable multimedia players (PMP) are effective for older children, and video glasses (VG) are best for younger children, since they aid in blocking the visual field.

The Present Study

The study examined data collected by Hashimoto et al. (2020) as a secondary data analysis to assess whether age is a significant factor in the effectiveness of preoperative anxiety interventions. Data were gathered at Sapporo Medical University School of Medicine Hospital in Sapporo, Japan, and focused on pediatric patients (4-11 years old), who were undergoing elective surgery.

While data for the current study were collected in Japan, they likely represent data gathered from similar hospitalized children around the world. Shields (2001) conducted a literature review that examined the effects of hospitalization on children and parents in two developed countries (e.g., United States) and developing countries (e.g., Botswana), and found that the effects of hospitalization were no different between these groups. Rather, a child's hospital experience is based more on their developmental period, separation anxiety, personality, parental presence, and communication between the hospital staff and the parents or caregivers (Shields, 2001).

Given that children can have diverse reactions to hospital stimuli (e.g., IV insert) depending on their age, and that there might not be a sole intervention that will result in decreased anxiety for all patients, it was hypothesized that the effectiveness of preoperative anxiety interventions would depend on the age of the patient. Specifically, two hypotheses were made:

1) Video glasses (VG) will be an effective intervention for children at all ages,

due to the complete blocking of their visual field.

2) Portable multimedia players (PMP) will only be effective in reducing preoperative anxiety in older children, due to the cognitive limitations of younger children to filter distracting stimuli in their environment.

II. METHOD

Participants

Healthy patients between the ages of 4 and 12 years old were recruited for this study at Sapporo Medical University School of Medicine Hospital. However, the exclusion criteria included diagnoses with visual field defects, hearing disturbances, and severe cardiac or respiratory diseases. The sample, presented by Hashimoto et al. (2020), included 64 patients who were undergoing elective, inpatient surgery with general anesthesia, at Sapporo Medical University School of Medicine Hospital in Sapporo, Japan. Prior to the study, 4 patients were excluded due to the fact that their surgery was postponed. Furthermore, 2 additional patients, one from each group, were excluded from the study because their data was lost. Therefore, a total of 58 patients were included in the study; 23 females and 35 males, with a median age of 5 years old. Within this sample, 23 patients underwent surgery for otorhinolaryngology, 16 for ophthalmology, 10 for plastic surgery/dermatology, 5 for orthopedics, 3 for oral surgery, and 1 for digestive surgery. The finalized 58 patients were split evenly and assigned to either the video glasses (VG) or the portable multimedia players (PMP) group through computerized randomization.

Procedures

The day prior to surgery, patients were asked which cartoon animation they would like to watch before their procedure. They also were given the device to practice with and explore its capabilities. The day of surgery, the patients were given their assigned device as soon as they entered the preanesthetic holding area, up until they were sedated at the end of anesthetic induction. All additional preanesthetic medications were withheld to

avoid respiratory distress. Additionally, parents were allowed to remain with their child until they were successfully sedated at the end of the anesthetic induction. Previous research has established that preoperative anxiety is highest at the time of anesthesia induction (Hashimoto et al., 2020), so that is when measures were recorded by an anesthesiologist who is trained in evaluating modified Yale Preoperative Anxiety Scale (mYPAS). This anesthesiologist was not involved in the patient's anesthetic management during surgery (Hashimoto et al., 2020).

Measures

Age

Age of child was reported by parents in years. Children's ages ranged from 4 years old to 11 years old.

Anxiety

Modified Yale Preoperative Anxiety Scale (mYPAS) was assessed by an anesthesiologist when the anesthesia was administered in the operating room. The mYPAS consists of five areas – A: activity, B: vocalization, C: emotional expressivity, D: state of apparent arousal, and E: use of parents, and the total score is calculated as (A/4 + B/6 + C/4 + D/4 + E/4) X 100/5. Sample items include: Looking around, curious, playing with toys, reading (or other age-appropriate behavior); moves around holding area/treatment room to get toys or go to parent; may move toward operating room equipment (Activity – level 1). As well as, crying, screaming loudly, sustained (audible through mask) (Vocalization – level 6). The mYPAS scores range from 23.3 to 100, with a higher score representing a higher state of anxiety.

Data Analysis

Descriptive statistics, skewness, and kurtosis of all study variables were examined using SPSS Version 25. Preliminary analyses (i.e., correlations) were conducted to examine pediatric patient characteristics (i.e., gender, type of surgery, and past surgical history) as potential control variables. Correlations among the study predictors (i.e., VG, PMP, and age) and outcome (i.e., preoperative anxiety) were examined. To test the study hypothesis, age was examined as a moderator in the relation between intervention groups and preoperative anxiety scores. Finally, as a follow up to the hypothesis testing, exploratory analyses examined the study hypothesis for each of the five subscales of the mYPAS, to determine if the pattern of effects varies by anxiety subtypes.

III. RESULTS

Preliminary analyses were conducted utilizing SPSS Version 25. The descriptive statistics, skewness, and kurtosis of all study variables were examined as an entire sample (N = 58) and by intervention group, video glasses (VG) (n = 29) and portable multimedia players (PMP) (n = 29) (see Table 1). The study predictor (i.e., age) and outcome (i.e., preoperative anxiety) displayed no significant correlation (see Table 2). However, the study predictors (i.e., VG and PMP) were significantly correlated with the outcome. These findings are consistent with the findings presented by Hashimoto et al. (2020).

To examine the study hypotheses, a linear regression framework was utilized, with age as a moderator in the relation between intervention condition and preoperative anxiety scores. The findings displayed no significant moderation effect of age on the relation between intervention groups and preoperative anxiety scores (see Table 3). Therefore, the hypotheses, that PMP would only be effective in reducing preoperative anxiety in older children, was not supported. Furthermore, as a follow up to the hypothesis testing, exploratory analyses examined the study hypotheses for each of the five subscales of the modified Yale Preoperative Anxiety Scale (mYPAS). The findings did not reveal any significant pattern of effects by anxiety subtypes.

IV. DISCUSSION

The present study utilized data collected by Hashimoto et al. (2020) to assess whether age is a significant factor in the effectiveness of preoperative anxiety interventions (i.e., video glasses) (VG) and portable multimedia players (PMP)) in pediatric patients (i.e., 4-11 years old) undergoing elective, inpatient surgeries (i.e., otorhinolaryngology, ophthalmology, plastic surgery/dermatology, and more). It was hypothesized that VG would be an effective intervention for children at all ages, due to the complete blocking of their visual field. Whereas, PMP would only be effective for older children, due to the potential cognitive limitations of younger children's ability to filter distracting stimuli in their environment. Consistent with the study hypothesis and findings presented by Hashimoto et al. (2020), the use of VG during anesthetic induction was significantly related to lower levels of preoperative anxiety for children, regardless of age. The second hypothesis, however, was not supported in the present study.

The original study conducted by Hashimoto et al. (2020) concluded that VG were more effective than PMP in reducing preoperative anxiety during anesthetic induction in pediatric patients. Building on this finding, the present study suggests that age is not a moderator in the effectiveness of VG on reducing preoperative anxiety. In other words, consistent with the first hypothesis of the present study, VG were effective in reducing preoperative anxiety regardless of children's age. As discussed, VG themselves are a display system that covers the patient's lenses, which in turn obstructs the patient from viewing their surroundings (Hashimoto et al., 2020). This visual obstruction allows the patient to focus solely on the cartoon animation playing in the VG, rather than perceiving the potentially frightening stimuli surrounding them in the operating room.

Developed on the basis of children's selective attention ability, it was also hypothesized that PMP would be an effective intervention for reducing preoperative anxiety but more so for older children. The lack of moderation suggests that the second hypothesis was not supported in the present study. Previous research has demonstrated that when younger children were presented with a visual distraction cue during a task, they were unable to avoid it, resulting in longer, more drawn-out tasks (Akshoomoff, 2002; Plude et al., 1994). In comparison, when older children were presented with the same visual distraction cue, they were able to ignore it and complete the task at hand. Therefore, due to younger children's possible inability to filter out distracting stimuli and the PMPs lack of visual obstruction, it was postulated that it would only be an effective intervention for older children. There could be a few reasons why the current study did not find support for this hypothesis. First, the study contained significantly more younger children than older children, which may have skewed the distribution, and suppressed a significant correlation. Second, the stimuli presented in the operating room may have been too distracting to ignore. Therefore, the older children may have had a more difficult time engaging in selective attention with the PMP due to overstimulation. Finally, in the overall study, PMPs were still an effective intervention for reducing preoperative anxiety and this may be due to having had a parent present in the operating room. The presence of a parent may have comforted children of all ages and compensated for the lack of visual obstruction. Previous research has shown that parental presence during induction of anesthesia, also known as PPIA, has resulted in lower modified Yale Preoperative Anxiety Scale (mYPAS) scores in patients at the time of induction, compared to patients who did not have a parent present (Sadeghi et al., 2016).

Limitations and Future Directions

The limitations of the present study are important to address, as they might have impacted the findings, and are imperative for future directions. First, the secondary data that was utilized was originally collected in Sapporo, Japan. Although, Shields (2001) found that the effects of hospitalization were not significantly different between children in developed countries and developing countries, it does not mean that cultural differences did not occur. Therefore, research should be done on a United States sample to better generalize the results. In addition, the aspect of parental presence needs to be examined more in depth due to the fact that in the study conducted by Hashimoto et al. (2020), parents were allowed to remain with their child during preoperative until they were successfully sedated at the end of the anesthetic induction. This practice is not commonly implemented in the United States, and thus should be examined separately for its direct effect on the reduction of preoperative anxiety. Third, Hashimoto et al. (2020) did not explicitly state if children were prepped for their surgery prior to the implementation of the study (e.g., steps of surgery were explained to them, education was provided on reasoning for surgery, surgical equipment was shown to children, etc.). If children were not prepped prior to the surgery, it is something that needs to be considered in future research, due to the fact that distraction is not normally used in isolation.

Fourth, the sample size that was utilized was quite small with a total of 58 participants, and 29 per intervention group. This small sample size places the study at a higher risk for error and for low external validity. Finally, the age of the participants was positively skewed with a mean of 5.33 and a range of 4 to 11 years old. With a larger sample size, the age of the participants could become normally distributed, and therefore

provide a stronger test on the effectiveness of preoperative anxiety interventions.

Conclusions

Advancements in technology, and especially the emergence of VG, raise questions about their use as distraction tools in the hospital setting. CCLSs utilize a combination of interventions for psychological preparation in the hospital setting such as medical play, procedural preparation, and distraction. When these interventions are examined individually, distraction has been found to be one of the most effective in reducing preoperative anxiety in pediatric patients (Aytekin et al., 2016; Koller, 2018; Li et al., 2016). Distraction commonly includes technology-based items, such as hand-held electronic games, web-based entertainment (e.g., YouTube), and video devices (Li et al., 2016). The present study did not provide significant evidence for age as a factor in the reduction of preoperative anxiety across the two electronic interventions. These results in combination with Hashimoto et al. (2020) suggest that although VG are more effective than PMP, either intervention would be appropriate for use in reducing preoperative anxiety across childhood.

APPENDIX

Table 1

Descriptive Statistics for Experimental Group, Patient's Age, Gender, Type of Surgery, modified Yale Preoperative Anxiety Scale Scores, and Past Surgical History.

	Total (N = 58)						
	%	*M*	*SD*	Min	Max	Skew	Kurtosis
Covariates							
Patient's Gender (Female)	39.70%						
Past Surgical History							
0	81%						
1	15.50%						
2	0.00%						
3	3.40%						
Type of Surgery							
Digestive	1.70%						
Orthopedic	8.60%						
Otorhinolaryngologic	39.70%						
Ophthalmologic	27.60%						
Oral	5.20%						
Plastic	8.60%						
Dermatology	8.60%						
Patient's Age		5.33	1.29	4	11	2	6.27
mYPAS							
A		1.26	0.58	1	3	2.17	3.61
B		1.59	1.06	1	5	2.19	4.31
C		1.52	0.76	1	3	1.08	-0.36
D		1.29	0.65	1	3	2.02	2.6
E		1.41	0.75	1	4	2.24	5.28
Score		32.7	15.66	23.3	81.67	1.99	3.38

Note. 0 = no previous surgeries. 1 = one previous surgery. 3 = three previous surgeries. mYPAS = modified Yale Preoperative Anxiety Scale. A = Activity. B = Vocalization. C = Emotional Expressivity. D = State of Apparent Arousal. E = Use of Parents.

	Video Glasses (N = 29)						
	%	*M*	*SD*	Min	Max	Skew	Kurtosis
Covariates							
Patient's Gender (Female)	41.40%						
Past Surgical History							
0	79.30%						
1	17.20%						
2	0.00%						
3	3.40%						
Type of Surgery							
Digestive	0%						
Orthopedic	13.80%						
Otorhinolaryngologic	37.90%						
Ophthalmologic	31.00%						
Oral	0%						
Plastic	3.40%						
Dermatology	13.80%						
Patient's Age		5.21	1.4	4	11	2.63	10.06
mYPAS							
A		1.14	0.44	1	3	3.43	12.01
B		1.21	0.62	1	4	3.72	15.27
C		1.21	0.56	1	3	2.7	6.38
D		1.1	0.41	1	3	4.2	18.09
E		1.14	0.35	1	2	2.22	3.12
Score		26.95	9.84	23.33	68.33	3.46	12.31

Note. 0 = no previous surgeries. 1 = one previous surgery. 3 = three previous surgeries. mYPAS = modified Yale Preoperative Anxiety Scale. A = Activity. B = Vocalization. C = Emotional Expressivity. D = State of Apparent Arousal. E = Use of Parents.

	Portable Multimedia Player (N = 29)						
	%	*M*	*SD*	Min	Max	Skew	Kurtosis
Covariates							
Patient's Gender (Female)	37.90%						
Past Surgical History							
0	82.80%						
1	13.80%						
2	0.00%						
3	3.40%						
Type of Surgery							
Digestive	3.40%						
Orthopedic	3.40%						
Otorhinolaryngologic	41.40%						
Ophthalmologic	24.10%						
Oral	10.30%						
Plastic	13.80%						
Dermatology	3.40%						
Patient's Age		5.45	1.18	4	9	1.25	1.99
mYPAS							
A		1.38	0.68	1	3	1.59	1.26
B		1.97	1.27	1	5	1.54	1.52
C		1.83	0.81	1	3	0.33	-1.36
D		1.48	0.79	1	3	1.25	-0.1
E		1.69	0.93	1	4	1.55	1.92
Score		38.45	18.27	23.33	81.67	1.38	1.16

Note. 0 = no previous surgeries. 1 = one previous surgery. 3 = three previous surgeries. mYPAS = modified Yale Preoperative Anxiety Scale. A = Activity. B = Vocalization. C = Emotional Expressivity. D = State of Apparent Arousal. E = Use of Parents.

Table 2

Correlations between and among Age, mYPAS, VG, and PMP

Total (*N* = 58)

	1	2	3	4	5	6	7
1 Patient's Age	-						
mYPAS							
2 A	-0.19	-					
3 B	-0.04	0.86***	-				
4 C	-0.11	0.65***	0.78***	-			
5 D	-0.16	0.87***	0.79***	0.72***	-		
6 E	-0.09	0.84***	0.88***	0.70***	0.79***	-	
7 Score	-0.12	0.92***	0.95***	0.85***	0.91***	0.93***	-

Note. mYPAS = modified Yale Preoperative Anxiety Scale. A = Activity. B = Vocalization. C = Emotional Expressivity. D = State of Apparent Arousal. E = Use of Parents.

Video Glasses (*N* = 29) / Portable Multimedia Player (*N* = 29)

	1	2	3	4	5	6	7
1 Patient's Age	-	-0.22	-0.04	-0.14	-0.24	-0.13	-0.17
mYPAS							
2 A	-0.22	-	0.85***	0.58***	0.85***	0.88***	0.92***
3 B	-0.18	0.94***	-	0.76***	0.74***	0.90***	0.94***
4 C	-0.19	0.75***	0.70***	-	0.65***	0.69***	0.82***
5 D	-0.16	0.91***	0.90***	0.84***	-	0.80***	0.89***
6 E	-0.21	0.80***	0.69***	0.58***	0.64***	-	0.95***
7 Score	-0.21	0.96***	0.93***	0.88***	0.95***	0.80***	-

Note. mYPAS = modified Yale Preoperative Anxiety Scale. A = Activity. B = Vocalization. C = Emotional Expressivity. D = State of Apparent Arousal. E = Use of Parents. Correlations between and among the study variables for patient's in the video glasses group are on the lower half of the diagonal, and patient's in the portable multimedia player group are on the upper half of the diagonal. Standardized beta estimates (standard errors) and p-values are reported. *p < .05 ** p. < .01 *** p < .001.

Table 3

Regression Coefficients for All Models on Preoperative Anxiety.

	Preoperative Anxiety		
	b (SE)		β
Covariate Effects Models			
Patient's Gender	-3.40	(3.91)	-0.11
Past Surgical History	5.84	(3.05)	0.24
Type of Surgery	1.13	(1.36)	0.10
Main Effects Models			
Patient's Age	-1.32	(2.00)	-0.11
Patient's Group	11.87	(3.82)	0.38**
Moderation Effects Models			
Age X Group	-0.40	(3.11)	-0.02

Note. Unstandardized beta estimates, standard errors, standarized beta estimates are reported for all models. *$p < .05$, **$p < .01$, ***$p < .001$.

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