Development of animated videos using diary's virtual reality as a medium of distraction on the anxiety

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ABSTRACT

Background: *Dental anxiety refers to anxiety about dental treatment procedures. Dental anxiety is common among pediatric patients because dental treatment procedures are usually a new experience. Therapy and desperate nonpharmacological techniques, which have already become widely used, can alleviate dental anxiety. Virtual reality is one of the various media considered to distract children during dental and oral treatment.* Produce a viable *Diary's* Virtual Reality (VR) media model and its application effectively lowers the anxiety level of child patients upon deciduous tooth extraction action.

Method: *Experimental design pretest-posttest method with control group design. There were 64 respondents which were divided into; an intervention group given the treatment of watching Diary's Virtual Reality video and a control group given the treatment of watching video using mobile phones. To assess the child's level of anxiety when the deciduous tooth is extracted, an MDAS query was used. The test results data of the model were tested using wilcoxon paired test and a Mann-Whitney paired test.*

Result: *The Expert Validation Test of Dary's VR media earned an average feasibility score of 97,5% with excellent categories with p-value=0,000. The paired data effectiveness test results showed an intervention group p-value=0,000 and a control group=0,010. The test results of the effectiveness of unpaired variable data show that the p-value between the intervention group and the control group is p=0,000. The Diary's VR model effectively lowers the anxiety level of child patients.*

Conclusion: *Giving Intervention Diary's VR lowers the anxiety level of child patients significantly compared to the control group.*

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INTRODUCTION

Anxiety can be described as the feeling often experienced by some patients who are to perform dental treatment procedures. Dental extraction is one of the treatment procedures that can make patients feel anxious.[1] In dental science, dental anxiety is a term used to describe a patient's anxiety about fear during dental care. Research worldwide reports that about ten percent (10%) of the world's population has dental anxiety, of which six to fifteen percent (6-15%) of the population is most likely to be school-aged children and in Indonesia, disabled 22% of fear and anxiety about dental care.[1,2]

Fear experienced by patients while undergoing dental treatment procedures is a problem that can have a negative impact on the treatment to be performed.[3] Patients who are afraid of dental treatment procedures tend to postpone and avoid visits to dental clinics, worsening the condition and lengthening the treatment process. Distraction techniques are a method that is used to shift the patient's focus and attention away from pain and toward other stimuli in order to overcome dental anxiety in patients. Distraction diverts a child's attention away from pain or anxiety.[1,2]

One of the techniques of distraction that can be used when dealing with child patients is using Virtual Reality (VR) distraction. VR is a technology that can project images right in front of the patient's eyes so that patients feel in contact with the environment. Virtual5.6. VR combines visual, audio, and kinesthetic sensory modalities, where the combination is considered more effective in lowering anxiety because VR distractions are able to distract patients from seeing and hearing what is happening in the real environment compered to media that only utilizes audio or visual.

RESEARCH METHOD

Research Design uses Research and Development (R&D) which has 5 stages, namely information collection, model design, expert validation, product trials and product results with a research design which utilizes True Experimental (Pretest-Posttest with Control Group Design)[4]. The research aims to create animated video products using Diary's Virtual Reality media. The research population is the patients of Poly Dental PuskesmasKeling II with a sample of 64 respondents divided into two groups: the intervention group and the control group[5]. This research has been approved by the Health Research Ethics Commission with No. 0106/EA/KEPK/2022. To measure anxiety levels in respondents The researcher has chosen to use the Modified Dental Anxiety Scale (MDAS) questionnaire[6].

RESULTS

The results of this study are divided: into information collection, design product build, expert validation and revisions, product trials, and product results.

1. Information Collection

   The results of the information collection were conducted by interviewing the head of the Puskesmas, dentist, dental and mouth therapist, and child psychologist asked 5 questions, result in table 1.

Table 1. Information Collection results

No	Quetions	Answer
1.	How are the characteristics of the child?	Characteristics of child patients tend to have high anxiety compared to adult patients because the level of anxiety makes the child patient uncooperative in the process of treatment action. The appropriate treatment
2.	What kind of treatment process is suitable given to child patients?	The process given to the child patient is the treatment that matches the characteristics of the children and is carried out with full understanding, explanation, and patience. Building a fun work environment, such as playing and distracting children from focusing on the treatment process
3.	How do you provide treatment that does not cause anxiety to child patients?	Treatment efforts that do not cause trauma to children are treatments performed in the absence of coercion that give the impression of trauma in the child's patients.
4.	What kind of distraction media is suitable for children who experience anxiety during tooth removal?	Suitable media used as a distraction medium when a child patient experiences anxiety during dental care is a medium that utilizes more than one sense, such as an example of audiovisual media
5.	. What media suits the revolution 4.0 suitable for use as a medium of distraction to children?	The most suitable distraction media used in the era of Revolution 4.0 is audiovisual media that utilizes digital technology

2. Design Product Build
   a. Manufacturing
      1) The initial concept-making
      2) Process of manufacturing game design
   b. Production process
      1) 3D asset and Environment
   c. 2) Implementation of 3D assets into Unity EnginePrograming VR
   d. Testing process
      1) Testing program with engine game
         The process of testing the application using a computer to see if there are bugs or not
      2) Testing program with smartphone
      This process is carried out using a smartphone decive whether the application can be downloaded in full and can be used.
   e. Product results
      The product results in the from of a smartphone-based Diary's VR application

Image 1. Application interface

3. Expert Validation

Expert validation is performed on three expert validators using a validation sheet instrument to test the viability of Diary's VR media, and the following results were showed in table 2. Expert validation assessment results show that the media model of Diary's Virtual Reality is relevant as a distraction medium in children during dental and mouth care, with an eligibility value of 97.5% in the excellent category and a p-value of =0,000.

Table 2. Expert validation statistic test

Department	Score	Average	*p-value*
Media expert	97,1%		
IT expert	98,5%	97,5%	0,000
Promkes expert	97,1%		

**Interclass Correlation Coffecient*

4. Product test

Table 3. Showing the results of the distribution of the frequency of anxiety of respondents before being given the intervention of Diary's Virtual Reality, 26 respondents experienced severe anxiety, 7 respondents experienced moderate anxiety, and 1 respondent experienced mild anxiety, and after the intervention of 6 respondents experienced moderate anxiety, 12 respondents experienced mild anxiety, and 16 respondents did not experience anxiety

Table 3. Distribution of Anxiety Frequency Before and After given the Treatment of Watching Video Animation Diary's VR

No	Criteria	Pre		Post	
		f	%	f	%
1.	Not anxious	0	0	16	47,1
2.	Lightweight anxiety	1	2,9	12	35,3
3.	Anxiety	7	20,6	6	17,6
4.	Heavy anxiety	26	76,5	0	0
	Number	34	100	34	100

Table 4. Anxiety Frequency Distribution Before and After given the Treatment of Watching Animated Video Using Mobile Phones

No	Criteria	Pre		Post	
		f	%	f	%
1.	Not anxious	0	0	0	0
2.	Lightweight anxiety	1	2,9	14	41,2
3.	Anxiety	4	11,8	9	26,5
4.	Heavy anxiety	29	85,3	11	32,4
	Number	34	100	34	100

Table 4. Showing the frequency distribution of anxiety of respondents in the control group before being treated to watch animated video using a handphone, 29 respondents experienced severe anxiety, 4 respondents experienced sedan anxiety, and 1 respondent experienced mild anxiety. In comparison, the frequency distribution after 11 respondents experienced severe anxiety, 9 respondents experienced moderate anxiety, and 14 respondents experienced mild anxiety.

Table 5. Data EffectivenessTest

Pair Test				
	Intervention		Control	
Anxiety	Mean Rank±Sum of Rank	p-value	Mean Rank±Sum of Rank	p-value
Pre	0,00±0,00	0,000	15,81±12,65	0,010
Post	17,5±59,5		16,73±40,15	

Table 5. Showing the effectiveness of pairs data shows that the value of the p-value intervention group is 0.000, and the p-value value in the control group is 0.010, effectively lowering the anxiety rate of child patients during the extraction of dairy teeth.

Table 6. Diary's VR Data effectiveness test is not paired with anxiety before and after Diary's VR media intervention

Unpaired test			
Variable	Group	Mean Rank ± Sum of Rank	p-value
Anxiety	Intervention	47,38±16,11	0,000
	Control	21,62±7,35	

Table 6. Showing unpaired data shows the value of p-value intervention groups and control groups is 0.000, meaning that the media Diary's VR is more effective at lowering the anxiety rate of children than animated video media using handphone alone.

DISCUSSION

The study aims to analyze the effectiveness of the media model Diary's VR as a distraction in children during dental care procedures or treatments. Efforts to know the effectiveness of the media, testing into two different groups. The first group was an intervention group that received Diary's VR treatment using VR glasses while the second group was a control group that received Diary's VR viewing without using VR glasses.

The application of virtual reality as a distraction technique is superior to other distraction

techniques that does not involve various sensory modalities. Researchers proved that distraction techniques involving audio and visuals were more effective in lowering the level of anxiety of children compared to distraction techniques that only utilize audio or visuals. This is in line with the results of this study which proved that the media Diary's VR effectively lowers the level of anxiety in children patients and is superior to the results of previous research conducted.[7]

The animated video media model using mobile phones also effectively lowered anxiety levelsbut viewed from the value of ρ-value in the control group was lower than the intervention group because the control group only used a mobile phone screen where respondents could still see the dental clinic environment, this is in agreement with previous research conducted in Saudi Arabia that compared the effectiveness of decreasing anxiety scores using VR with Ipad and found that the anxiety scores were higher in the ipad11 intervention group.[8]

Media Diary's VR is more effective at lowering dental anxiety in children than watching animated videos using mobile phones. It is because the excess media Diary's VR is believed to have a distracting effect on perceived anxiety, focusing the visual process, auditors, and physical action of the patient in the virtual space created. Previous research suggests that VR positively impacts children's anxiety due to total blockage in their visual field by watching videos with sound projected directly before children's eyes. Thus, children engage in cyberspace rather than dental clinics, treatment procedures, and dentistry equipment used.[9,10]

CONCLUSION

Based on the results of the study, it can be concluded that Diary's VR is worthwhile, and its application effectively lowers the anxiety rate of child patients when the act of dairy extraction is proven by: Diary's VR media model is worthy of distracting children during the extraction of dairy teeth, Diary's VR media model is more effective in decreasing anxiety rates of child patients when the act of extraction of dairy teeth, Produce guidelines for the use of Diary's VR media application.

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