Pediatr Pract Res 2023; 11(3): 164-170
DOI: 10.21765/pprjournal.1354171

ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

The Effect of Two Different Virtual Reality Videos on Pain, Fear, and Anxiety During a Venous Blood Sampling in Children: A Randomized Controlled Study

Çocuklarda Venöz Kan Alma İşlemi Sırasında Kullanılan İki Farklı Sanal Gerçeklik Videosunun Ağrı, Korku ve Anksiyete Üzerine Etkisi: Randomize Kontrollü Çalışma

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Abstract

Aims: This study evaluated the effects of two different virtual reality (VR) methods on pain, fear, and anxiety during a venous blood sampling in children.

Material and Method: This randomized controlled experimental study was conducted with 153 children aged 7-12 years and their parents who applied to the pediatric blood sampling unit of a training and research hospital. Research data were collected with the Wong-Baker Faces Pain Scale, Children's Anxiety Meter-State scale, Children's Fear Scale and Information Form. The two VR methods used were VR-Water skiing and VR-Walking in nature.

Results: The children's mean pain scale score during the venous blood sampling was 1.29±1.11 with the VR-Water skiing; 1.28±1.16 with the VR-Walking in nature; and 4.34±1.41 ($p<0.001$) in the control group. The children's mean anxiety scale score during the procedure was 0.82±1.01 with the VR-Water skiing; 0.79±1.26 with the VR-Walking in nature; and 6.57±2.08 ($p<0.001$) in the control group. The children's mean fear scale score during the procedure was 0.58±0.77 with the VR-Water skiing, 0.53±0.78 with the VR-Walking in nature; and 3.17±0.92 ($p<0.001$) in the control group. The children's pain, anxiety and fear scale scores in the VR-Walking in nature and VR-Water skiing groups were similar ($p>0.05$).

Conclusion: Two different VR videos were more effective than standard care in reducing pain, fear, and anxiety during a venous blood sampling. There was no significant difference in pain, anxiety and fear levels in the two different VR groups. Therefore, the use of VR goggles is recommended to reduce pain, anxiety, and fear during blood sampling in children aged 7-12 years old.

Keywords: Virtual reality, pain, fear, anxiety, blood sampling, child

Öz

Amaç: Bu araştımanın amacı iki farklı sanal gerçeklik videosunun çocuklarda venöz kan alma işlemi sırasında oluşan ağrı, korku, anksiyete düzeyine olan etkisini değerlendirmektir.

Gereç ve Yöntem: Bu randomize kontrollü deneysel araştırma bir eğitim ve araştırma hastanesinin çocuk kan alma birimine başvuru yapan 7-12 yaş arasındaki 153 çocuk ve ebeveynleri ile yürütüldü. Araştırma verileri Wong Baker Yüzler Ağrı Ölçeği, Çocuk Korku Ölçeği ve Çocuk Anksiyete Skalası-Durumluluk Ölçeği, Bilgi Formu ile toplandı.

Bulgular: Araştırmada venöz kan örneği alma işlemi sırasında çocukların ağrı ölçeği puan ortalaması VR-Su kayağı grubunda 1.29±1.11, VR-Doğada yürüyüş 1.28±1.16, kontrol grubunda 4.34±1.41 idi. ($p<0.001$). İşlem sırasında çocukların korku ölçeği puan ortalaması VR-Su kayağı grubunda 0.58±0.77, VR-Doğada yürüyüş 0.53±0.78, kontrol grubunda 3.17±0.92 idi ($p<0.001$). İşlem sırasında çocukların anksiyete ölçeği puan ortalaması VR-Su kayağı grubunda 0.82±1.01, VR-Doğada yürüyüş 0.79±1.26, kontrol grubunda 6.57±2.08 idi ($p<0.001$). VR-Su kayağı ve VR-Doğada yürüyüş grubundaki çocukların ağrı, korku ve anksiyete ölçek toplam puan ortalamaları benzerdi ($p>0.05$).

Sonuç: Çocuklarda sanal gerçeklik gözlüğü ile izletilen iki farklı videonun, venöz kan alma işlemi sırasında çocukların yaşadığı ağrı, anksiyete ve korku düzeyini azaltmada, standard bakıma göre daha etkili olduğu belirlendi. İki farklı sanal gerçeklik grubunda ise ağrı, anksiyete, korku düzeylerinde anlamlı bir fark olmadığı belirlendi. Bu doğrultuda, 7-12 yaş çocuklarda kan alma işlemi sırasında ağrı, anksiyete ve korkuyu azaltmak amacıyla sanal gerçeklik gözlüğünün kullanılması önerilmektedir.

Anahtar Kelimeler: Sanal gerçeklik, ağrı, korku, anksiyete, kan alma, çocuk

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Başvuru Tarihi/Received: 02.09.2023
Kabul Tarihi/Accepted: 12.09.2023

INTRODUCTION

Children may experience pain, anxiety and fear during blood sampling (1,2). It is known that pain and fear that are not effectively managed can cause posttraumatic stress disorder in children and affect behavioural and physiological responses to pain later in life (3,4). There is evidence in the literature that distraction methods have been successfully used in pediatric blood sampling units to reduce children's pain, anxiety and fear levels during the blood sampling process. These methods include using virtual reality (VR) goggles (1,2,5,6), using distraction cards (7,8), viewing a kaleidoscope (4,9) and bubble-blowing (10,11). VR goggles are a safe intervention that can be used to distract children in pediatric blood sampling units to reduce their fears and increase their compliance with the procedure (12). In a recent meta-analyses of the VR intervention's effectiveness in reducing pain, anxiety and fear caused by blood sampling procedures in the pediatric population (13), some studies reported that VR technology was more effective than other distraction methods, whereas other studies reported that it was not superior to traditional distraction methods. Although the results of another meta-analyses showed that VR technology shows promise in alleviating pain, anxiety, and fear levels during medical procedures in children. However, it is essential to acknowledge that further research is necessary to explore the effectiveness of various VR methods across different age groups (14,15). In a study conducted by Ferraz-Torres et al. (2020), two types of VR methods, interactive and passive, were used to reduce pain and anxiety associated with venipuncture in children. The results demonstrated that both VR methods significantly lowered pain and anxiety levels during the procedure, with the interactive VR method proving more effective (6). Consequently, it is imperative to compare and evaluate various VR interventions and methods. Additionally, it's noteworthy that some children prefer dynamic videos, while others find relaxation videos more appealing (16). Previous studies have assessed the impact of VR goggles using a wide range of videos, including Roller Coaster (16), natural environments like hiking and nature scenes (6), Ocean Rift (16), Aquarium VR (2), popular cartoons such as Ice Age (1), video games like Mine Craft (6,17), and experiences like Spacewalker (18). In our current study, we employed 'VR-Walking in Nature' as a relaxation video and 'VR-Water Skiing' as an engaging, dynamic video. Within this context, our study aims to investigate the effects of these two distinct VR videos—relaxing and dynamic—on reducing pain, fear, and anxiety during venous blood sampling in children aged 7-12 years, thereby comparing the outcomes of the two different VR methods.

Hypothesis 1: Children in the VR groups will have lower pain scores during the blood sampling intervention than children in the control group.

Hypothesis 2: Children in the VR groups will have lower fear scores during the blood sampling intervention than children in the control group.

Hypothesis 3: Children in the VR groups will have lower anxiety scores during the blood sampling intervention than children in the control group.

Hypothesis 4: The Virtual reality-Water skiing and Virtual reality- Walking in nature methods applied during blood sampling intervention differ in their abilities to reduce children's pain, fear and anxiety.

MATERIAL AND METHOD

Design

This randomized controlled trial was conducted between June and July 2022 at the Pediatric Blood Sampling Unit of the Training Research and Hospitals. Parents and their children aged 7-12 who volunteered to participate and met the inclusion criteria were enrolled in the study. The flow diagram of the study was presented in **Figure 1** based on the CONSORT reporting criteria (**Figure 1**).

Participants

The sample size was calculated according to the study by Özalp Gerçeker et al. (2020) (16). The study's results indicated a medium effect, which aligned with the study's objective. In this context, it was determined that at least 48 children should be included in each group with d=0.60, 80% (1-β error) power, and a 95% (α error) confidence level (G*Power). Due to the dropout rate, 53 children were enrolled in each group, for 159 children. In the VR and control groups, six children were excluded from the study because they chose to terminate their participation. Therefore, the study was completed with 153 children and their parents (**Figure 1**). End of the study, post hoc analysis was performed based on the 153 children, with a large effect size and a 95% (α error) confidence level (G*Power), the power of the study was found 99%.

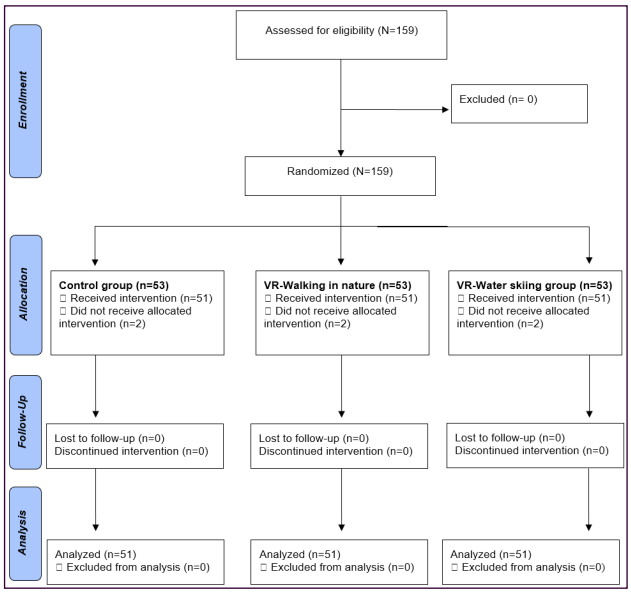

Figure 1. CONSORT flow diagram

Inclusion criteria: voluntarily agreed to participate in the research, is a child 7-12 years old, is free of chronic pain and mental health conditions, is free of hearing and visual impairments, has not used sedative or analgesic drugs within six hours before the intervention, children who do not have vertigo problems.

Exclusion criteria: refused to participate in the research, has a visual or auditory problem.

Assigning participants to the interventions and control groups employed a computer-based simple randomization (https://www.randomizer.org). A total of 153 children were randomized into the three groups, including VR-Water Skiing (n=51), VR-Walking in Nature (n=51), and the control group (n=51).

Data collection tools

Information Form: The information form was contained five questions: the child's age, gender, experience with needle procedures, the number of experiences with needle procedures, and which parent accompanied the child during the blood sampling (4,5,9,12).

Wong-Baker Faces Pain Scale (WBFPS): The WBFS allows users to rate pain by combining images and numbers. The expressions range from delighted to sad to crying. Each WBFS face is given a number rating ranging from 0 ("no harm") to 10 ("worst hurt") (19).

Children's Fear Scale (CFS): The CFS was developed by McMurtry et al. (20), translated and adapted to the Turkish language by Özalp Gerçeker et al. (2018). The CFS is used to evaluate the pain-related fear in children. This scale is a one-item self-report. The CFS is a scale from 0-4, consisting of five facial expressions ranging from a neutral expression (0=no anxiety) to a frightened face (4=severe anxiety). The content validity index value was 0.89. Test-retest reliability was found to be quite high (21).

Children's Anxiety Meter-State (CAM-S): The CAM-S was developed by Ersig et al. (22) and translated and adapted to the Turkish language by Özalp Gerçeker et al. (2018). It assesses children's anxiety in clinical settings and is used before medical procedures. The children were asked to mark how she/he felt "right now" to measure state anxiety. The children were instructed, "Put a line on the thermometer that shows how worried or angry you are". The scores varied between 0 – 10 points. The content validity index value was found to be 1.00. Test-retest reliability was found to be quite high (21).

Virtual Reality (VR): In this study, we employed Virtual Reality (VR) technology compatible with iOS mobile phones as a distraction technique. Children in the VR groups were immersed in VR 360-degree videos known as "VR-Water Skiing" and "VR-Walking in Nature". In the VR-Water Skiing group, children experienced the sensation of water skiing, complete with variable speed adjustments that simulated slowing down and speeding up. Meanwhile, in the VR-Walking in Nature group, children embarked on a virtual nature tour accompanied by calming music. To assess the suitability of these videos for children, the opinions of five experts in the field of children's health were sought, all of whom unanimously concurred that the content was suitable for child viewers. Prior to the main study, a pilot evaluation involved five children aged between 7 and 12, who watched both of these videos. Importantly, no negative feedback was received from these participants. Furthermore, VR glasses was cleaned with 70% alcohol after each use to prevent contamination.

Data collection

Before the blood sampling procedure

The subject and purpose of the study were explained to all groups before the blood sampling. The Information Form was completed. The researcher explained to the child how to use the virtual reality goggles during the blood sampling procedure. Each child was informed that the parent would be present during the procedure. Blood sampling was performed according to the relevant unit's routine practice. The scales (WBFPS, CFS, CAM-S) were introduced to the child and the parent.

During the blood sampling procedure

Virtual Reality Group (VR-Water Skiing): As soon as the child sat down in the blood sampling chair, the virtual reality goggles were put on and the 3D video was switched on. Using the VR goggles, the children in this group were shown the 3D video called "360 VR Water skiing", which began approximately three minutes before the blood sample began and continued throughout the process. After the blood sampling procedure had been completed, the video was switched off, the virtual reality goggles were removed and the child was led to the waiting area. After being allowed to rest for three minutes, the child was asked to rate the level of pain during the procedure with the WBFPS, the level of fear with the CFS, and the level of anxiety with the CAM-S scale. The parent and the researcher, who had been present during the sampling, observed the child's behaviour and rated the pain level during the procedure with the WBFPS, fear level with the CFS, and anxiety level with the CAM-S. The same steps were followed up after the blood collection procedure, in all three groups.

Virtual Reality Group (VR-Walking in Nature): As with the other group, as soon as the child sat down in the blood sampling chair, the virtual reality goggles were put on and the 3D video was switched on. Using the VR goggles, the children in this group were shown the 3D video called "360 VR Walking in nature"; as with the other group, the video began approximately three

minutes before the blood sample began and continued throughout the process. After the blood sampling procedure had been completed. The same steps were followed up as in the VR-Water skiing group.

Control Group: The children in the control group underwent blood sampling according to the clinic's routine practice. After the blood sampling procedure had been completed. The same steps were followed up as in the VR-Water skiing group.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences for Windows package (version 28.0). Descriptive statistic tests (numbers, percentages, minimum and maximum values, mean, standard deviations) were used to assess the socio-demographic characteristics. The normality test was used to assess homogeneous distribution. Kruskal Wallis test, Pearson Chi-Square and Mann-Whitney U tests with Bonferroni correction were used for data analysis. The intraclass correlation analysis was utilized to evaluate the agreement between different observers' measurements of the mean scores obtained from the participants' scales. Cohen categorized effect sizes into three categories: small (d=0.2), medium (d=0.5), and large (d ≥ 0.8). Cohen notably remarked that a medium effect of 0.5 is perceptible to the unaided eye of an attentive observer. To calculate effect size the Cohen effect size values were considered in this study.

Ethical Approach

This study was approved by the Haseki Training and Research Clinical Researches Ethics Committee (Date: 08.06.2022, Decision No: 69-2022) and the institution (Date: 03.03.2022, Decision No:78). Written informed consent was obtained from the parents, and verbal informed consent was obtained from the children. The study was conducted in strict adherence to the principles delineated in the Helsinki Declaration.

RESULTS

The socio-demographic characteristics of the children according to the groups are presented in **Table 1**. There was no significant difference in children's age, gender, number of the needle procedure (p>0.05).

Children's procedural pain score according to the Wong-Baker FACES was presented in **Table 2**. In the study, the mean WBFPS score of the children during the venous blood sampling was 4.34±1.41 in the control group; VR-Walking in nature was 1.28±1.16; VR-Water skiing was 1.29±1.11. There is a significant difference between the groups' mean WBFPS scores of the children (p<0.001). Children in the VR-Walking in nature and VR-Water skiing groups had lower WBFPS scores than children in the control group (p<0.001). There were no significant differences in pain scores of the VR-Walking in nature and VR-Water skiing groups (p>0.05). It was found that there was perfect agreement between the mean pain scores of the different raters, as assessed by intraclass correlation analysis (ICC) (p<0.001) (**Table 2**). The effect size of the VR-Walking in nature and VR-Water skiing was found large to reduce pain.

Children's procedural anxiety score according to the CAM-S was presented in **Table 3**. In the study, the mean CAM-S score of the children during the procedure was 6.57±2.08 in the control group; VR-Walking in nature

Table 1. The socio-demographic characteristics of the children by groups

	Control Group (n=51) M±SD		VR -Walking in Nature (n=51) M±SD		VR-Water Skiing (n=51) M±SD		Test	p
Age	9.71±1.77		9.53±1.90		9.58±2.04		0.230*	0.892
	n	(%)	n	(%)	n	(%)		
Gender								
Girl	23	(44.2)	24	(47.1)	23	(45.1)	0.087**	0.957
Boy	28	(55.8)	27	(52.9)	28	(54.9)		
Number of the needle procedure								
1 time	2	(3.8)	1	(2.0)	1	(2.0)		
2 time	12	(23.1)	11	(21.6)	9	(17.6)	1.040**	0.904
>3 time	37	(73.1)	39	(76.5)	41	(80.4)		

*: Kruskal Wallis test, **: Pearson Chi-Square, M: Mean, SD: Standard Deviation

Table 2. Distribution of pain scores during the venous blood sampling

Variables	Control Group[a]	VR-Walking in Nature[b]	VR-Water Skiing Group[c]	Z; p	Post-hoc Test*, p	95% CI		Effect size
						Lower	Upper	
Children	4.34±1.41	1.28±1.16	1.29±1.11	92.860; p<0.001	a > b =c	0.802	1.522	1.162
Parent	4.46±1.35	1.25±1.06	1.22±1.14	99.018; p<0.001	a > b =c	0.860	1.586	1.223
Researcher	4.31±1.28	1.22±0.99	1.22±1.13	100.916; p<0.001	a > b =c	0.855	1.581	1.218
ICC, p	9.111; p<0.001	72.878; p<0.001	30.162; p<0.001					

Z; Kruskal Wallis Test, ICC; Intraclass Correlation Coefficient; * Mann Whitney U test with Bonferroni correction

Table 3. Distribution of anxiety and fear scores during the venous blood sampling

Variables	Control Group[a]	VR-Walking in Nature[b]	VR-Water Skiing Group[c]	Z; p	Post-hoc Test*, p	95%CI		Effect size
						Lower	Upper	
CAM-S								
Children	6.57±2.08	0.79±1.26	0.82±1.01	104.593; p<0.001	a > b =c	0.867	1.593	1.235
Parent	6.25±2.07	0.84±1.14	0.82±1.01	104.883; p<0.001	a > b =c	0.884	1.612	1.248
Researcher	6.17±2.07	0.54±2.20	0.76±0.91	105.808; p<0.001	a > b =c	0.811	1.533	1.172
ICC, p	37.731; p<0.001	33,560; p<0.001	103.829; p<0.001					
CFS								
Children	3.17±0.92	0.53±0.78	0.58±0.77	96.311; p<0.001	a > b =c	0.795	1.516	1.155
Parent	3.13±0.84	0.59±0.73	0.61±0.75	98.999; p<0.001	a > b =c	0.830	1.554	1.192
Researcher	3.11±0.86	0.57±0.74	0.59±0.73	98.843; p<0.001	a > b =c	0.829	1.553	1.191
ICC, p	21.633; p<0.001	61.961; p<0.001	62.740; p<0.001					

Z; Kruskal Wallis Test, ICC; Intraclass Correlation Coefficient; * Mann Whitney U test with Bonferroni correction

was 0.79±1.26; VR-Water skiing was 0.82±1.01 (p<0.001). There is a significant difference between the CAM-S mean scores of the children according to the groups. Children in the VR-Walking in nature and VR-Water skiing groups had lower CAM-S scores than children in the control group (p<0.001). There were no significant differences in anxiety scores between the VR Walking in nature and VR Water skiing groups (p>0.05). There was perfect agreement between the mean anxiety scores of the different raters, as assessed by intraclass correlation analysis (ICC) (p<0.001) (**Table 3**). The effect size of the VR-Walking in nature and VR-Water skiing was found large to reduce anxiety.

Children's procedural fear score according to the CFS was presented in **Table 3**. In the study, The mean CFS score reported by the children during the procedure was 3.17±0.92 in the control group; VR-Walking in nature was 0.53±0.78; VR-Water skiing was 0.58±0.77 (p<0.001). There is a significant difference between the CFS mean scores of the children according to the groups. Children in the VR-Walking in nature and VR-Water skiing groups had lower CFS scores than children in the control group (p<0.001). There were no significant differences in fear scores between the VR-Walking in nature and VR-Water skiing groups (p>0.05). There was perfect agreement between the mean fear scores of the different raters, as assessed by intraclass correlation analysis (ICC) (p<0.001) (**Table 3**). The effect size of the VR-Walking in nature and VR-Water skiing was found large to reduce fear.

DISCUSSION

In this study, we evaluated the impact of two distinct VR methods on children aged 7-12 undergoing venous blood sampling at a pediatric blood sampling unit. Our primary focus was to assess the influence of these VR interventions on the children's levels of pain, anxiety, and fear during the procedure. While we have presented a comprehensive review of the existing literature, it is essential to delve into our interpretation of the effectiveness of these VR interventions within the context of our study. Our study results indicate that both the VR-Walking in nature and VR-Water skiing groups exhibited lower mean pain scores compared to the control group. This finding aligns with our hypothesis (H1) that VR interventions would lead to reduced pain levels during venous blood sampling. Our results concur with the findings of Ayran et al. (2023), who also reported a significant reduction in pain when using VR goggles among children aged 5-12 years during blood sampling (2). Our study's results corroborate with prior research conducted in various clinical settings. Akarsu et al. (2023) and Gerçeker et al. (2018) found that VR goggles effectively reduced pain during blood sampling in children (1,5). Notably, our study contributes to the growing body of evidence supporting the utility of VR interventions for pain management during medical procedures in pediatric populations. Additionally, numerous studies in the literature have investigated the effectiveness of VR goggles in mitigating acute procedural pain in children undergoing various medical procedures, such as vaccinations, acute burn injuries, port catheter exchanges, and dental procedures, among others (4, 23-28). These studies consistently demonstrate that the use of VR goggles can be an impactful strategy for alleviating pain and discomfort in pediatric patients. Our findings are consistent with this broader body of evidence and further emphasize the significance of incorporating VR technology into clinical practice to enhance the overall well-being of pediatric patients during painful procedures. In summary, our study supports the contention that VR interventions, specifically VR-Walking in nature and VR-Water skiing, effectively reduce pain levels, anxiety, and fear among children aged 7-12 undergoing venous blood sampling. Our findings align with previous research in this area, highlighting the potential for VR technology to serve as a valuable adjunct in pediatric pain management during various medical procedures. As the use of VR technology continues to evolve, further research and clinical integration may enhance the overall healthcare experience for pediatric patients, promoting their comfort and well-being during challenging medical procedures.

The study's findings regarding fear and anxiety scores in both the VR-Walking in nature group and VR-Water skiing group, as compared to the control group, support the acceptance of study hypotheses H2 and H3. This aligns with a body of research conducted on children aged 5-21 years, which consistently demonstrates that using VR goggles during venous blood sampling effectively reduces fear, anxiety, and pain levels (1, 12, 29-32). The mechanism behind this phenomenon lies in the immersive nature of VR technology, which isolates the child from the external environment and redirects their focus toward the visual and auditory stimuli provided by the goggles, effectively diverting their attention away from the painful procedure (31, 33). However, it's worth noting that in this study, the pain, fear, and anxiety scores did not exhibit significant differences between the VR-Walking in nature group and the VR-Water skiing group, leading to the non-acceptance of hypothesis H4. This outcome aligns with the findings of Gerçeker et al. (2020), who employed VR-Rollercoaster and VR-Ocean rift videos during blood collection and reported that both methods were equally effective in reducing pain in children aged 5-12 years (16). Moreover, Ferraz-Torres et al. (2020) investigated the application of two types of VR methods, namely interactive and passive, to alleviate pain and anxiety associated with venipuncture in children (6). The passive VR group was exposed to various natural landscape environments and animals, while the interactive VR group engaged in an interactive VR game using a controller/stick. It was reported that both VR methods, albeit effective, reduced pain and anxiety levels during the procedure, with the interactive VR method being slightly more effective (6). These findings underscore the importance of considering different VR techniques and their varying impacts on pain and anxiety reduction. Considering these results, it becomes evident that further research is warranted to comprehensively compare different VR methods across various age groups and for different painful medical interventions. This will help tailor VR interventions to the specific preferences and needs of pediatric patients. Healthcare professionals involved in the care of pediatric patients should consider the child's preferences, whether it be through video, gaming, or cartoons, and adapt the VR approach accordingly. Such personalized approaches can contribute significantly to improving the overall experience of pediatric patients during painful medical procedures, ensuring their comfort and well-being.

Limitations

This study has important limitations that warrant consideration. Firstly, the findings may not be broadly applicable as the data were collected solely from a single-center pediatric blood sampling unit, raising questions about generalizability. Secondly, despite being designed as a randomized controlled trial, blinding was not feasible for both participants and researchers, potentially introducing observer bias into the assessments of children's pain, anxiety, and fear. Thirdly, the study relied exclusively on subjective assessments for these outcomes, omitting objective measures that could have provided a more comprehensive understanding. Lastly, the study focused on children aged 7-12, limiting its applicability to a broader age range. These limitations underscore the need for cautious interpretation and call for future research to address these concerns in order to advance our understanding of VR interventions in pediatric pain management during medical procedures.

CONCLUSION

This study underscores the effectiveness of using VR goggles to display videos to children aged 7-12 years undergoing venous blood sampling at a pediatric unit. The results demonstrate that this VR intervention surpasses standard care in reducing levels of pain, anxiety, and fear associated with the procedure. Furthermore, our comparative analysis of two different VR videos revealed their similar effectiveness. Hence, it is imperative for pediatric blood sampling units to incorporate VR methods tailored to individual preferences, whether children favor dynamic or soothing video experiences. Healthcare professionals are encouraged to engage children in discussions regarding their VR method preference, be it video content, gaming, or cartoons, as this personalized approach may enhance compliance with the blood sampling process. Moving forward, we advocate for the execution of randomized controlled trials that explore diverse VR methods across various age groups, fostering a more comprehensive understanding of their applicability and effectiveness in diverse clinical scenarios.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Haseki Training and Research Clinical Researches Ethics Committee (Date: 08.06.2022, Decision No: 69-2022) and the institution (Date: 03.03.2022, Decision No:78).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

Acknowledgment: Authors thanks to all patients and their families.

Note: This study was presented as an oral presentation at the 3rd International Mediterranean Pediatric Nursing Congress in 2022.

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