




Difference in Orthodontic Patients' Perceptions of Essix and Hawley Retainers

Putri I. Kusumawardhani¹, Krisnawati E. Tarman², Benny M. Soegiharto²

¹Orthodontics Residency Program, Faculty of Dentistry, University of Indonesia, Jakarta, Indonesia.

²Department of Orthodontics, Faculty of Dentistry, University of Indonesia, Jakarta, Indonesia.

Correspondence: Krisnawati E. Tarman, Department of Orthodontics, Faculty of Dentistry, University of Indonesia, Jln. Salemba Raya No. 4, Jakarta 10430, Indonesia. **E-mail:** krisnawatitarman@gmail.com

Academic Editor: Alessandro Leite Cavalcanti

Received: 18 June 2020 / **Review:** 14 December 2020 / **Accepted:** 13 April 2021

How to cite this article: Kusumawardhani PI, Tarman KE, Soegiharto BM. Difference in orthodontic patients' perceptions of Essix and Hawley retainers. *Pesqui Bras Odontopediatria Clin Integr.* 2021; 21:e6063. <https://doi.org/10.1590/pboci.2021.141>

Abstract

Objective: To determine differences in how orthodontic patients perceive the aesthetics relating to the use of Essix and Hawley retainers. **Material and Methods:** Photographs of a female patient using an Essix retainer and a Hawley retainer, respectively, were assessed by 70 orthodontic patients aged between 21 and 55 years. All participants were provided with the same images of the two retainer types being worn and were asked to grade the aesthetics of each retainer using a visual analog scale. The significance of differences in orthodontic patient perceptions of aesthetics in the use of Essix and Hawley Retainers in the young adult and adult age groups were tested using the Mann-Whitney test with assumed significance $p < 0.01$. **Results:** There were differences in participants' perceptions between the two retainers that were statistically significant, with responses varying between young adults aged 21 to 35 years and adults aged 36 to 55 years. According to the VAS, the two retainers' average scores in the total population are 82 for Essix Retainer and 60 for Hawley Retainer in both groups. **Conclusion:** The Essix retainer as a retention appliance is considered more aesthetically pleasing than the Hawley retainer among both young and middle-aged adults.

Keywords: Orthodontics; Orthodontic Appliances, Removable; Visual Analog Scale.

Introduction

Relapse is the tendency of dentition to return to its original positioning seen before treatment. Relapse can also be defined as the readoption of previous malpositioning by teeth. Relapse is a problem for orthodontists, although Angle states that stabilization can be achieved by creating normal occlusion [1]. It is understood that natural tooth movement will occur in patients who have already undergo orthodontic treatment and those without previous orthodontic treatment. A previous study found that relapse occurred in 68.8% of post retention patients [2]. Pratt et al. also reported that 40% to 90% of post retention patients experience changes in tooth alignment [3].

The adoption of good retention means should be considered in orthodontic treatment to prevent the occurrence of relapse. Retainers are commonly used to maintain the teeth in the desired position after orthodontic treatment is performed. A retainer not only maintains the positioning of the teeth and keeps the teeth from returning to their original position; it can also be used to alter the position of teeth in the long run [4]. Retention can be achieved by using a retention appliance or removable retainers, such as a Hawley retainer, removable wraparound clip retainer, or clear (vacuum-formed retainer) or fixed retainer according to the indications. Hawley retainers and Essix retainers are the two most widely selected removable retention appliances [5,6].

In recent years, the demand for orthodontic treatment in adults and young adults has risen significantly. As a result, many studies and reports have compared Essix and Hawley retainers, especially regarding age and aesthetic perceptions [4,6,7]. However, most previous studies have discussed perception differences among either young adults or adults, but none compared these two age groups. Per the World Health Organization and the Ministry of Health Republic, Indonesia, young adults are those aged 21 to 35 years, and adults are those aged 36 to 55 years [8,9].

Aesthetics could influence patients' selection of retention appliances and is one factor that can increase or decrease the motivation to use the chosen postorthodontic retention device [10]. Thus, better patient involvement in the selection of retention appliances can increase the success of long-term orthodontic treatment. Orthodontists and patients should discuss the selection of retention appliances to increase patients' motivation to use their retainers routinely to prevent relapse. This study aimed to elucidate differences in the perceptions of orthodontic patients about Essix and Hawley retainers.

Material and Methods

Study Design and Ethical Clearance

This research was a descriptive-analytic study with a cross-sectional design approved by the Dental Research Ethics Commission (KEPKG) of the University of Indonesia Faculty of Dentistry (no. 131/ethical approval/FKGUI/VII/2017). The patients have received all the information about the study and agree by signing a consent form.

Sample

This study included 70 orthodontic patients seen at the Dental Hospital, Faculty of Dentistry, University of Indonesia, from September to December 2017. A consecutive sampling method was used. Inclusion criteria were patients aged 21 to 55 years who do not have a dentistry education background and were divided into two groups [11]: G1: Essix retainer and G2: Hawley retainer. A total of 35 people were included in each age group.

The objects of examination in this study were photographs of a female patient using an Essix retainer and a Hawley retainer. In addition, all study participants were provided with the images of the two retainer types being worn and asked to grade the aesthetics of each retainer type using a visual analog scale (VAS) of 0 to 100, with 0 being Not Aesthetic and 100 being Very Aesthetic.

Before data collection, a questionnaire trial was conducted to determine the questionnaire's accuracy and estimate the time needed for data collection using samples of the different age groups composing a minimum sample size of 10% of the total population sample size to be tested. A questionnaire trial was conducted at a clinic in Jakarta in August 2017. Next, validity and reliability testing was conducted; the latter was carried out using intraobserver and interobserver tests to determine the accuracy of measurements made by the first and second researchers. The intraobserver test was carried out by the first researcher.

Data Analysis

The significance of differences in orthodontic patient perceptions of aesthetics in the use of Essix and Hawley Retainers in the young adult and adult age groups were tested using the Mann-Whitney test with assumed significance $p < 0.01$. All statistical analyses were performed using the Statistical Package for the Social Sciences software, version 18.0 (IBM Corp., Armonk, NY, USA).

Results

The validity test of the questionnaire using item-rest correlation with a degree of freedom ($df = N - 2 = (8 - 2) = 6$). Based on table product moment r , r table was 0.707. Further, the calculated r -values were 0.780 and 0.853, so it can be stated that the items in questionnaire for both the retainers were valid (r count $>$ r table) (Table 1). It showed that the validity test of the questionnaire items is strong for two age groups.

Table 1. Item-rest correlation for reliability of the questionnaire (r count $>$ r table).

	Correlation	p1	p2	Total
p1	Pearson Correlation	1	-0.360	0.780*
	p-value		0.382	0.671
	N	8	8	8
p2	Pearson Correlation	-0.360	1	0.853*
	p-value	0.382		0.007
	N	8	8	8
Total	Pearson Correlation	0.780*	0.853*	1
	p-value	0.671	0.007	
	N	8	8	8

*Correlation is significant at the 0.01 level.

The reliability test of the questionnaire was carried out by collecting data on the patient of the study twice, within a span of approximately two hours. The reliability test result of the questionnaire using Cronbach's alpha was 0.095.

The results of the normality test data indicate that the assessment in the young adult age group (21-35 years) and adult age group (36-55 years) of Essix retainer aesthetics is normally distributed. However, the assessment in the two age groups of Hawley retainer aesthetics demonstrated abnormal data distribution. In addition, there was a statistically significant difference in the aesthetic perceptions of the orthodontic patient toward the two retainer types in both the young adult age group ($p < 0.01$) and adult group ($p < 0.01$) (Table 2).

Table 2. Essix and Hawley retainers results according to group.

Groups	Retainer Type	N	Median (Minimum-Maximum)	p-value
Young Adult	Essix	35	82.00 (65–100)	<0.01*
	Hawley	35	60.00 (42–85)	
Adult	Essix	35	80.00 (55–100)	<0.01*
	Hawley	35	60.00 (20–75)	

*Statistically significant; Mann-Whitney U test.

Reliability testing to confirm intraobserver and interobserver agreement was carried out by collecting data on the observers of the study. Bland-Altman plots were used to see the limits of agreement (LoA) (Figures 1 and 2).

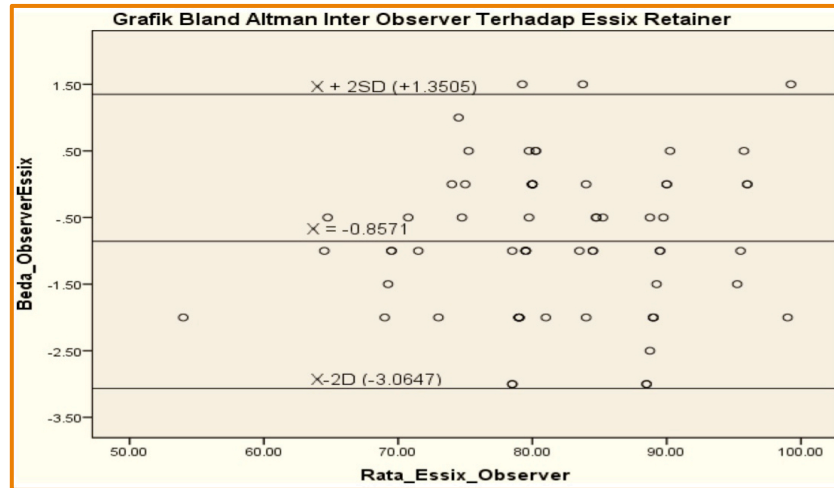


Figure 1. Bland–Altman plot shows LoA for intraobserver agreement regarding Essix Retainers.

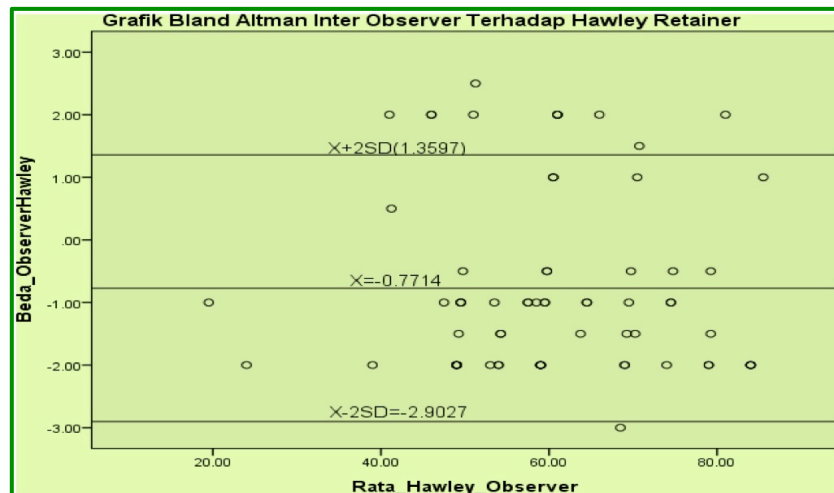


Figure 2. Bland–Altman plot shows LoA for interobserver agreement regarding Hawley Retainers.

Discussion

Aesthetics can influence patients’ decision-making in the selection of retention appliances, which is thought to be one of the factors that may increase their motivation to use postorthodontic retention devices. Patient involvement in the selection of retention appliances can increase the success of long-term orthodontic treatment.

Included in this study were orthodontic patients aged 21 to 55 years who did not have a dental education background [12]. Patients who decide to treat their teeth at an adult age are considered to be more mature in their thinking than children and adolescents. In addition, adults patients are more apt to express their individual opinions [12,13].

This study did not differentiate between the sexes; however, Al-Zarea et al. stated that considering gender does not appear to have significant value in the assessment of satisfaction regarding aesthetics [14]. This is also supported by others authors who found that gender had no effect on the outcomes of aesthetic assessment [15]. Likewise, Walton et al. revealed that women and men reported the same average value during aesthetic assessment [16].

The photos in this study were of a 30-year-old female patient who had undergone treatment at the Facility of Dentistry, University of Indonesia Dental Hospital Specialist Orthodontics Clinic. Complete facial images were used because, in everyday life, the mouth is observed as part of the overall appearance. We included images of the patient wearing both the Essix retainer and Hawley retainer so that the assessment was more focused on smile aesthetics. A similar finding was found in a study conducted by Flores-Mir et al., who stated that the inclusion of overall face images could improve the assessor's ability to examine smile aesthetics [17]. The retention appliances used in this study are the two most widely adopted retainer types: the Essix retainer and Hawley retainer [3,18].

The aesthetic assessment was completed by patients using the VAS method. The VAS is the most commonly used measurement modality in aesthetic assessments. Using it, the study participants mark the given line as representative of their assessment opinion. The distance between the left end and the incised line is the value recorded as the aesthetic value. The advantages of this method are that it is simple, valid, and reliable. The scoring process is not complicated but the results are sensitive and detailed [19]. A similar method was used by Flores-Mir et al. [17] and Zarea et al. [20] as a means to conduct aesthetic assessment.

In studies using questionnaires, the validity of the questionnaire used needs to be confirmed. To test the validity of the questionnaire in this study, a trial was conducted among 10% of the total study population from the different age groups. This trial was also carried out in an effort to discern the estimated time needed to fill out the questionnaire. During the main investigation, research data collection was conducted among 70 study participants: young adults (21–35 years old) and adults (36–55 years old). Data retrieval was done twice for each subject of research with the aim of gathering data that is really consistent with the subject of the study. According to Ellen et al., there are three main concerns in data reliability, which are stability in the answers provided when repeated, equivalence in questionnaire correlation and scoring, and internal consistency as measured by inter- and intraobserver measurements [21].

After data collection was completed, reliability testing was carried out to ensure the consistency of data collection. This reliability was also tested through intra- and interobserver tests. Intra- and interobserver tests were performed to determine the accuracy of the measurements made by the first and second researchers. The intraobserver test was carried out by the first researcher, while the interobserver test was carried out by the first two researchers, where the second researcher had already conducted a study similar to this study [22].

Bland-Altman plot analysis describes the agreement between two quantitative measurements by establishing LoA using the mean and standard deviation of the difference between the two methods [23]. When most of the scattered data remain within the LoA limit, a match is confirmed between the first and second observers (Figures 1 and 2).




Differences in orthodontic patients' perceptions of aesthetics concerning the Essix and Hawley retainers in the age groups of 21 to 35 years and 36 to 55 years differed statistically ($p < 0.01$) (Table 2). Both age groups stated that the Essix retainer is the retention appliance that is more aesthetically pleasing among the two. This is in line with research carried out elsewhere. According to Mollov et al., the highest level of satisfaction was achieved by patients who choose the Essix retainer as a retention appliance [18]. Jeremiah et al. stated that clear retention appliances are optimal choices in terms of beauty — in other words, the more invisible an appliance is, the higher the aesthetic score is [12]. This is in line with Meade et al.'s finding that social perception is influenced by the selection of retention appliances [24]. Wild et al. also revealed that 17 of 27 patients chose the Essix retainer over the Hawley retainer upon considering the aesthetics of each and patients tend to be more obedient with wearing the former [25]. Ab Rahman et al. determined that the Essix retainer is the most popular retention appliance in Malaysia [7].

According to Singh et al., the selection of retention appliances is influenced by various factors, one of which is age [26]. Patients in the adult age group tend to report higher scores than adolescents and it is said that young adults are more critical in giving ratings. Younger age groups can modify their assessment according to what is accepted by the community. Meanwhile, Feu et al. stated that young adults gave a higher assessment score when compared with adults [11]. It shows us the difference between the young age and adults about the way they make a decision. In a study conducted by Walton et al., young adults preferred using orthodontic appliances that are increasingly invisible relative to patients who are children or adolescents, who prefer orthodontic appliances that are more visible and which have colored components in them [16]. During young adulthood, emotional maturity levels are good, so any opinions expressed can be accounted for. The decision that an adult made is more responsible than the young age by emotional maturity. Patients aged 12 to 15 years do not think of aesthetics as the main deciding factor in selecting orthodontic appliances. During adulthood, the selection and use of orthodontic appliances are often based on the need for synergy with other dental treatments to improve function, so aesthetics is not too high of a priority when compared with among patients in the young adult age group.

Conclusion

The Essix retainer is more aesthetic than the Hawley retainer, as reported by both young adults and adults

Authors' Contributions

PIK		https://orcid.org/0000-0001-8120-4723	Formal Analysis, Investigation and Writing - Original Draft.
KET		https://orcid.org/0000-0003-0790-7337	Conceptualization, Methodology, Writing - Original Draft and Writing - Review and Editing.
BMS		https://orcid.org/0000-0003-0310-0990	Conceptualization, Methodology, Writing - Original Draft and Writing - Review and Editing.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

Financial Support

None.

Conflict of Interest

The authors declare no conflicts of interest.

Acknowledgment

We would like to thank all participants of this study.

References

- [1] Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Orthodontic retention: A systematic review. *J Orthod* 2006;33(3):205-12. <https://doi.org/10.1179/146531205225021624>
- [2] Kahl-Nieke B, Fischbach H, Schwarze CW. Post-retention crowding and incisor irregularity: a long-term follow-up evaluation of stability and relapse. *Br J Orthod* 1995;22(3):249-57. <https://doi.org/10.1179/bjo.22.3.249>
- [3] Pratt MC, Kluemper GT, Lindstrom AF. Patient compliance with orthodontic retainers in the postretention phase. *Am J Orthod Dentofac Orthop* 2011;140(2):196-201. <https://doi.org/10.1016/j.ajodo.2010.02.035>
- [4] Renkema AM, Sips ET, Bronkhorst E, Kuijpers-Jagtman AM. A survey on orthodontic retention procedures in the Netherlands. *Eur J Orthod* 2009;31(4):432-7. <https://doi.org/10.1093/ejo/cjn131>
- [5] Johnston CD, Littlewood SJ. Retention in orthodontics. *Br Dent J* 2015;218(3):119-22. <https://doi.org/10.1038/sj.bdj.2015.47>
- [6] Demir A, Babacan H, Nalcaci R, Topcuoglu T. Comparison of retention characteristics of Essix and Hawley retainers. *Korean J Orthod* 2012; 42(5):255-62. <https://doi.org/10.4041/kjod.2012.42.5.255>
- [7] Ab Rahman N, Low TF, Idris NS. A survey on retention practice among orthodontists in Malaysia. *Korean J Orthod* 2016; 46(1):36-41. <https://doi.org/10.4041/kjod.2016.46.1.36>
- [8] Ahmad OB, Boschi-pinto C, Lopez AD. Age standardization of rates: a new WHO standard. *GPE Discussion Paper Series: No.31. WHO*; 2001.
- [9] Indonesia KK. Profil Kesehatan Indonesia 2010. *Indones Sehat* 2010 2014; 4(3):654-61. [In Indonesian].
- [10] Valiathan M, Hughes E. Results of a survey-based study to identify common retention practices in the United States. *Am J Orthod Dentofac Orthop* 2010; 137(2):170-7. <https://doi.org/10.1016/j.ajodo.2008.03.023>
- [11] Feu D, Catharino F, Duplat CB, Capelli Junior J. Esthetic perception and economic value of orthodontic appliances by lay Brazilian adults. *Dent Press J Orthod* 2012; 17(5):102-14. <https://doi.org/10.1590/S2176-94512012000500015>
- [12] Jeremiah HG, Bister D, Newton JT. Social perceptions of adults wearing orthodontic appliances: A cross-sectional study. *Eur J Orthod* 2011; 33(5):476-82. <https://doi.org/10.1093/ejo/cjq069>
- [13] Schott TC, Schlipf C, Glasl B, Schwarzer CL, Weber J, Ludwig B. Quantification of patient compliance with Hawley retainers and removable functional appliances during the retention phase. *Am J Orthod Dentofac Orthop* 2013; 144(4):533-40. <https://doi.org/10.1016/j.ajodo.2013.04.020>
- [14] Al-Zarea BK. Satisfaction with appearance and the desired treatment to improve aesthetics. *Int J Dent* 2013; 2013: 912368. <https://doi.org/10.1155/2013/912368>
- [15] Albarakati S. Self perception of malocclusion of saudi patients using the aesthetic component of the IOTN index. *Pakistan Oral Dent J* 2007; 27(1):45-52.
- [16] Walton DK, Fields HW, Johnston WM, Rosenstiel SF, Firestone AR, Christensen JC. Orthodontic appliance preferences of children and adolescents. *Am J Orthod Dentofacial Orthop* 2010; 138(6):698.e1-12. <https://doi.org/10.1016/j.ajodo.2010.06.012>
- [17] Flores-Mir C, Silva E, Barriga MI, Lagravère MO, Major PW. Lay person's perception of smile aesthetics in dental and facial views. *J Orthod* 2004; 31(3):204-9. <https://doi.org/10.1179/146531204225022416>
- [18] Mollov ND, Lindauer SJ, Best AM, Shroff B, Tufekci E. Patient attitudes toward retention and perceptions of treatment success. *Angle Orthod* 2010; 80(4):468-73. <https://doi.org/10.2319/102109-594.1>
- [19] Heller GZ. How to analyze the Visual Analogue Scale: Myths, truths and clinical relevance. *Scand J Pain* 2016; 13:67-75. <https://doi.org/10.1016/j.sjpain.2016.06.012>
- [20] Zaera A, Sghaireen M, Alomari WM. Black triangle causes and management : a review of literature. *Br J Appl Sci Technol* 2015; 6(1). <https://doi.org/10.9374/BJAST/2015/11287>
- [21] Ellen EK, Schneider BJ, Sellke T. A comparative study of anchorage in bioprogressive versus standart edgewise treatment in Class II correction with intermaxillary elastic force. *Am J Orthod Dentofac Orthop* 1998; 114(4):430-6. [https://doi.org/10.1016/s0889-5406\(98\)70189-1](https://doi.org/10.1016/s0889-5406(98)70189-1)
- [22] Carlsson AM. Assessment of chronic pain. I. Aspects of the reliability and validity of the visual analogue scale. *Pain* 1983; 16(1):87-101. [https://doi.org/10.1016/0304-3959\(83\)90088-X](https://doi.org/10.1016/0304-3959(83)90088-X)
- [23] Pithon MM, Bastos GW, Miranda NS, Sampaio T, Ribeiro TP, Nascimento LE, et al. Esthetic perception of Black spaces between maxillary central incisors by different age groups. *Am J Orthod Dentofacial Orthop* 2013; 143(3):371-5. <https://doi.org/10.1016/j.ajodo.2012.10.020>
- [24] Meade MJ, Millett DT, Cronin M. Social perceptions of orthodontic retainer wear. *Eur J Orthod* 2014; 36(6):649-56. <https://doi.org/10.1093/ejo/cjt087>
- [25] Wild J. Patient preference and compliance between Hawley retainers and vacuum-formed retainers following orthodontic treatment. [Dissertation]. University of Louisville, School of Dentistry. 2013. Paper 1570. <https://doi.org/10.18297/etd/1570>.
- [26] Singh P, Grammati S, Kirschen R. Orthodontic retention patterns in the United Kingdom. *J Orthod* 2009; 36(2):115-21. <https://doi.org/10.1179/14653120723040>