

Effectiveness of Chewing Technique on Vocal Phonation among Female Speech-Language Pathology Students: A Pilot Study

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ABSTRACT

Voice is an essential tool for communication and professional performance, particularly among speech-language pathology students who are exposed to high vocal demands. The present study aimed to evaluate the effectiveness of the chewing technique on vocal phonation among female speech-language pathology students. Thirty female students aged 18–20 years were randomly assigned to an experimental group (n = 16) and a control group (n = 14). The experimental group practiced the chewing technique for 8 weeks, while the control group received no intervention. Acoustic and aerodynamic parameters, including Jitter (%), Shimmer (%), Noise-to-Harmonics Ratio (NHR), Fundamental Frequency (f0) and Maximum Phonation Time (MPT) were assessed before and after intervention using PRAAT software and stopwatch measures. The results demonstrated significant improvements in Jitter, Shimmer, NHR and fundamental frequency in the experimental group following the intervention, indicating enhanced vocal stability, improved voice quality and better phonatory control. However, no significant improvement was observed in Maximum Phonation Time. These findings suggest that the chewing technique is an effective voice facilitation method for improving selected acoustic aspects of vocal phonation among female speech-language pathology students and may serve as a useful preventive strategy for maintaining vocal health in individuals with high vocal demands. Further research with larger sample sizes and longer intervention periods is recommended to establish its long-term effectiveness and clinical applicability.

Keywords: Chewing technique, Vocal phonation, Voice therapy, Speech-language pathology students, Acoustic analysis, Fundamental frequency (F0), Jitter, Shimmer and Vocal health

INTRODUCTION

Voice is generated through vocal fold vibration and subsequently shaped by the resonators of the vocal tract (Titze, 1994). Physiologically voice production involves the coordinated interaction of four interdependent subsystems: Respiration, Phonation, Resonance and Articulation (Stemple, Roy & Klaben, 2014). Voice is essential not only for conveying information but also for professional performance and interpersonal interaction.

Professional voice users rely heavily on effective vocal communication during performance and teaching. Speech-Language Pathologists frequently use their voice for communication therapy, placing them at

greater risk for vocal fatigue and occupational voice disorders. Maintaining good vocal health is essential for professional efficiency and therapeutic effectiveness.

Voice facilitating techniques are widely used to promote efficient voice production and maintain vocal health. By encouraging balanced phonatory function and reducing unnecessary vocal effort, these techniques help individuals achieve a clearer, more resonant and stable voice quality.

Vocal facilitating technique like Chewing was first introduced by Froeschels in 1943. The technique was developed based on the observation that individuals are capable of chewing and speaking simultaneously. Froeschels proposed that chewing and speech production share functional similarities as both processes involve the coordinated activity of the same musculature and neural pathways. Later in 1956, Beebe supported Froeschels observations and described voiced chewing as an innate and instinctive human behaviour.

Chewing technique offers multiple benefits for voice users by improving both vocal quality and efficiency. The person sits comfortably with a relaxed posture and normal breathing. The clinician models slow, exaggerated chewing (no voice) to loosen the jaw, tongue and facial muscles. The person practices silent chewing with lips slightly apart and free jaw movement. After the muscles relax, phonation is gradually added to the chewing motion. The rhythmic chewing movements facilitate smoother vocal fold vibration, improved resonance and reduced phonatory effort. For SLPs, who use their voices extensively throughout the day, regular practice of the chewing technique may help reduce vocal fatigue, improve vocal endurance and prevent occupational voice disorders.

Burg, Meier, Nolte, Oppermann, Rogg and Beushausen (2015) implemented an online survey to identify the variety of methods described in theory to apply in practice of 434 voice therapists in Germany, Austria, and Switzerland and concluded that a patient-oriented selection of appropriate exercises is of primary importance to voice therapists and that they rarely focus on specific direct voice therapy methods.

Meerschman, D'haeseleer, De Cock, Neyens, Claeys and Van Lierde (2016) measured chewing technique across 18 weeks on 27 female SLP students and concluded that chewing exercises can improve phonatory function in healthy individuals with high vocal demands.

Barmak, Altan, Tatar, Er and Korkmaz (2023) examined the effectiveness of voice therapy in patients with mutational falsetto and concluded that voice therapy techniques including chewing exercises are effective non-invasive approaches for reducing vocal tension and restoring normal vocal function.

Viana, Brasil, Dornelas and Ribeiro (2025) investigated the use of voice therapy techniques including chewing exercises among speech language pathologists working with transgender women in Brazil and concluded that these techniques are effective in improving voice quality and supporting gender-congruent voice outcomes.

The high vocal demand placed on speech language pathology students can contribute to the development of voice problems and vocal fatigue. Preventive voice therapy technique is essential in promoting vocal health and minimising these issues among aspiring SLPs. Evaluating the effectiveness of the chewing technique may aid in the development of clinically relevant and effective voice management strategies for SLP students.

Froeschels, Weiss and Beebe (1950) expanded and documented the chewing approach proposing its application in the management of speech disorders such as stuttering and dysarthria as well as in the training of healthy speaking and singing voices and they noted that empirical evidence supporting these applications was limited.

Froeschels (1952) reported improvements in vocal quality among individuals with various voice disorders including vocal fold paresis, cysts, papillomas and both hypo-functional and hyper-functional voice conditions following the use of the chewing technique.

Friedrich, Brodnitz and Emil Froeschels (1954) studied the chewing method as a treatment for vocal cord nodules in patients with voice misuse in the United States. They proposed that vocal nodules result from functional voice strain and that chewing exercises help to promote relaxed, natural phonation. The study suggested that this technique reduces hyperfunctional voice patterns and supports recovery concluding that the chewing method can be an effective non-surgical therapy for vocal cord nodules.

Mosby (1970) presented a case study from the United States comparing psychotherapy and traditional voice therapy techniques (chewing, yawn-sigh and humming) in a child with a severe functional voice disorder (hoarseness, tension, low pitch, vocal cord nodules). Voice therapy techniques alone produced minimal improvement whereas psychotherapy led to more consistent and lasting changes in both vocal quality and behaviour. The study states that psychological factors can strongly influence voice disorders and suggests that combining voice therapy (including techniques like chewing, yawn-sigh and humming) with psychotherapy may provide more comprehensive and long-term benefits especially when emotional or behavioral issues contribute to the vocal pathology.

Boone (1971) recommended chewing technique for patients with muscle tension dysphonia characterized by excessive muscular tension, hard glottal attacks and restricted jaw movement.

Drudge and Philips (1976) investigated the process of behavior shaping during voice therapy in individuals with hyperfunctional hoarse voice associated with vocal nodules. The therapy program incorporated facilitating techniques such as the chewing technique, yawn-sigh technique and other vocal facilitation methods to modify maladaptive vocal behaviors. The findings demonstrated that these techniques helped shape desired vocal behaviors through successive approximations, while self-evaluation played an important role in achieving successful voice modification and improved vocal outcomes.

Logemann (1991) conducted research in the United States describing the management of oropharyngeal dysphagia which begins with a comprehensive assessment including the use of the Videofluoroscopic Swallow Study (VFSS) to evaluate swallowing physiology. Treatment is categorized into compensatory strategies, direct therapy and indirect therapy, where compensatory methods reduce symptoms, direct therapy improves swallowing physiology and indirect therapy enhances neuromuscular control. The author also indicates that exercises targeting oral functions such as chewing exercises can contribute to improvement by strengthening muscles involved in swallowing. Individualized treatment planning and the use of VFSS to assess treatment effectiveness are emphasized.

Park, Shim, Hwang, Jae Cho, Hoon Joo, Hae Cho, Chul Nam, Sik Kim and Sun (2011) investigated the effectiveness of combining voice therapy (using techniques such as humming, chewing and yawn-sigh) with antireflux medication in patients with laryngopharyngeal reflux and voice symptoms in South Korea. Patients receiving both interventions showed significantly greater and faster improvement in voice quality (measured by Reflux Symptom Index, Voice Handicap Index and GRBAS) than those on medication alone. The study supports a combined approach integrating behavioural voice therapy with medical management as more effective for restoring vocal function and accelerating recovery in reflux-related voice disorders. Ongkasuwan and Friedman (2013) reviewed the effectiveness of voice therapy in the management of vocal fold nodules in children. The authors reported that voice therapy is a commonly recommended conservative treatment approach for paediatric vocal fold nodules. Various behavioural techniques including progressive relaxation, yawn-sigh technique, laryngeal massage, vocal intensity reduction, pitch

elevation, vocal function exercises, confidential voice therapy and resonant voice therapy, were discussed. The review concluded that voice therapy can help reduce vocal misuse, improve voice quality, and lessen the negative social and academic impacts associated with pediatric voice disorders.

Burg, Meier, Nolte, Oppermann, Rogg and Beushausen (2015) conducted an online survey in Germany, Austria and Switzerland with 434 voice therapists to examine how voice therapy methods are selected in clinical practice including techniques such as the chewing method. The results showed that therapists rarely rely on a single method; instead, they combine multiple voice therapy approaches based on individual patient needs. Choices were influenced more by factors like movement limitations, emotional state and learning ability than by the specific voice disorder. The study concluded that voice therapy is typically individualized and flexible and methods like chewing are integrated rather than used alone.

Meerschman, D'haeseleer, De Cock, Neyens, Claeys and Van Lierde (2016) studied the chewing technique as a vocal exercise in 27 female speech-language pathology students using a randomized controlled design. After 18 weeks the experimental group showed improved vocal measures, including reduced jitter and noise-to-harmonic ratio, increased fundamental frequency, expanded voice range and higher Dysphonia Severity Index scores while shimmer and maximum phonation time showed no change. The study concluded that chewing exercises can improve phonatory function in healthy individuals with high vocal demands.

Meerschman, Bettens, Dejagere, Tetaert, D'haeseleer, Claeys and Van Lierde (2016) investigated the effects of the vocal-facilitating techniques Chant Talk and Pitch Inflections on the phonation of healthy female speech-language pathology students. The study found a significant reduction in the noise-to-harmonics ratio following both techniques, indicating improved vocal quality. Additionally, the Chant Talk technique significantly increased fundamental frequency. The authors concluded that these vocal-facilitating techniques may improve phonatory function and reduce breathiness in individuals with high vocal demands.

Almeida and Souza (2018) investigated the immediate effects of different vocal techniques on acoustic, aerodynamic, perceptual, and self-assessment measures of voice in 40 women without vocal complaints. Participants were divided into four groups, with each group performing a specific vocal technique for one minute. The results showed that all techniques demonstrated a tendency toward vocal improvement. However, the high-pitched sound technique produced the most significant improvements in acoustic and perceptual voice parameters. The study concluded that vocal techniques can positively influence vocal performance and may serve as effective strategies for voice improvement and vocal health promotion.

Denizoglu, Sahin, Bayrak and Uygun. (2019) investigated the efficacy of the DoctorVox Voice Therapy Technique in the treatment of mutational falsetto. Twenty-one males with mutational falsetto underwent voice therapy using the DoctorVox device, which provides high back-pressure during phonation. Acoustic, electroglottographic, perceptual, and self-assessment measures were evaluated before treatment and at one- and six-month follow-ups. The results demonstrated significant improvements in vocal pitch, voice quality, perturbation measures, and voice-related quality of life following therapy. By one month after treatment, participants achieved a normal speaking pitch, and further improvements were observed over six months. The study concluded that the DoctorVox Voice Therapy Technique is highly effective in the management of mutational falsetto and produces sustained vocal improvements.

Mansuri, Torabinezhad, Jamshidi, Dabirmoghadam, Gharamaleki and Ghelichi (2019) conducted a study in Iran investigating the effects of voice therapy on vocal tract discomfort in patients with muscle tension dysphonia. Their study demonstrated that voice therapy significantly improved acoustic parameters such

as jitter, shimmer and harmonics-to-noise ratio while also reducing perceptual features like roughness and breathiness. The findings highlight that therapeutic techniques including relaxation and resonant approaches such as humming, chewing and yawn-sigh play a key role in reducing laryngeal tension and discomfort. Additionally the study reported a marked decrease in symptoms like pain, tightness, dryness and irritation, reinforcing the effectiveness of voice therapy as a comprehensive, non-invasive intervention for improving both vocal quality and vocal tract comfort in MTD patients.

Aghadoost, Jalaie, Khatoonabadi, Dabirmoghaddam and Khoddami (2020) compared Vocal Facilitating Techniques (VFTs) and Manual Circumlaryngeal Therapy (MCT) in teachers with Muscle Tension Dysphonia. Both techniques significantly improved voice outcomes with VFTs showing greater improvement in Dysphonia Severity Index and MCT demonstrating greater improvement in the physical aspect of the Voice Handicap Index. The authors concluded that both approaches are effective in the management of MTD.

Agheana and Mircea (2022) examined resonant vocal techniques for treating singing voice disorders in Romania using an eclectic therapy model that combined vocal hygiene with humming, disguised yawning and chewing exercises. Based on five case studies participants showed improvements in vocal quality, reduced laryngeal pain and better quality of life after therapy. The study concluded that resonant voice therapy is an effective non-invasive approach for improving vocal function in singers.

Barnak, Altan, Tatar, Serap Er and Korkmaz (2023) examined the effectiveness of voice therapy in patients with mutational falsetto in Turkey. The study showed significant improvements in acoustic and perceptual voice parameters after therapy and supported the use of techniques such as chewing, yawn-sigh and humming for reducing vocal tension and improving voice production. They concluded that the chewing techniques for voice therapy is an effective non-invasive approach for restoring normal vocal function.

Jaroentonyakorn, Chinchai, Bunrayong, Wanicharoen and Shibamoto (2024) conducted a study in Thailand examining the efficacy of a hybrid group telepractice voice therapy program for primary school teachers with voice disorders. Their findings indicate that telepractice-based voice therapy can effectively improve certain acoustic parameters such as jitter, shimmer the harmonics-to-noise ratio and maximum phonation time, along with the emotional aspects of voice handicap. The study supports the use of structured voice therapy programs incorporating vocal hygiene and exercises such as humming, chewing and yawn-sigh to enhance vocal efficiency and prevent further vocal strain. Overall, the research highlights telepractice as a practical and accessible approach for delivering effective voice therapy particularly for professionals at risk of voice disorders.

Viana, Brasil, Dornelas and Ribeiro (2025) studied speech-language pathologists' practices in vocal assessment and gender-affirming voice therapy for transgender women in Brazil. The study highlighted a multidimensional and individualized approach to therapy, using techniques such as humming, yawn-sigh, chewing exercises, breathing training, pitch modulation and vocal hygiene. Findings showed that clinicians commonly combine these methods to improve resonance and achieve gender-congruent voice outcomes. They concluded that these techniques are effective and widely used in supporting voice quality and gender identity in therapy.

Vahid, Mansuri, Farzadi, Tohidast, Bagheri and Scherer. (2025) investigated the immediate effects of combining Kinesio taping with voice therapy in patients with Muscle Tension Dysphonia (MTD). Twenty participants were assigned to either a voice therapy group or a combined Kinesio taping and voice therapy group. The voice therapy program included laryngeal manual therapy, humming, chewing technique and

yawn-sigh technique. Results demonstrated significant improvements in auditory-perceptual voice quality, acoustic measures, vocal tract discomfort and pain in both groups following a single treatment session. However, the addition of Kinesio taping did not result in significantly greater improvements compared to voice therapy alone. The study concluded that voice therapy techniques such as humming, chewing and yawn-sigh are effective in improving voice quality and reducing discomfort in individuals with MTD. Fard, Hasanvand, Darouie, Naebian and Biglarian (2026) compared the immediate effects of Semi-Occluded Vocal Tract (SOVT) exercises and Vocal Facilitating Techniques (VFTs) on traditional Iranian singers with Muscle Tension Dysphonia (MTD). Twenty-six singers were randomly assigned to either the SOVT or VFT group and completed a single one-hour intervention session. Acoustic and perceptual assessments revealed significant improvements in vocal quality, breathiness and dysphonia severity in both groups. Although SOVT exercises produced greater improvement in breathiness, both SOVT and VFT approaches were found to be effective in enhancing vocal function. The study supports the clinical usefulness of vocal facilitating techniques in the management of voice disorders among professional voice users.

METHODOLOGY

AIM

The Aim of the study was to assess the effectiveness of chewing technique on vocal phonation among female speech-language pathology students and to compare the acoustic characteristics, F0, JITTER, SHIMMER, NHR and MPT for /a/ vowel.

SUBJECTS

A total of 30 female students in the age range of 18-20 years were randomly assigned into Experimental group (n=16) and a control group (n=14). The Experimental group practiced chewing exercise for 8 weeks, whereas the Control group received no vocal exercise /facilitating technique.

INCLUSION CRITERIA

- Female Speech Language Pathology Students.
- Age range should be in 18-20.
- Individuals with no self-reported history of voice disorders or laryngeal pathology.

EXCLUSION CRITERIA

- Subjects with a history of voice disorders, ENT (ear, nose and throat) diseases or psychological conditions.
- Individuals who had previously participated in voice therapy or training.

PROCEDURE

A baseline acoustic measurement was obtained for both the experimental and control groups using PRAAT (version 6.4.59) software, were instructed to phonate vowel /a/ in isolation. The acoustic measurements were carried out in a quiet environment using an ASUS laptop equipped with PRAAT software (Boersma and Weenink, 2026).

Maximum phonation duration was measured using a stopwatch and the duration of sustained phonation was recorded. Acoustic parameters including jitter, shimmer, F0 and NHR were analysed using PRAAT

software.

Subjects practiced the chewing technique for a period of 8 weeks. Following the completion of the eight-week intervention, post-intervention acoustic measurements were obtained using PRAAT software and compared to the baseline data.

Statistical analysis

SPSS (Version 27) was used for the statistical analysis of the data. All analysis were conducted at $p > 0.05$.

RESULT AND DISCUSSION

The aim of the study was to assess the effectiveness of chewing technique on vocal phonation among female speech-language pathology students and to compare the voice characteristics, F0, JITTER, SHIMMER, NHR and MPT for /a/ vowel.

Table 1

Shows the Pre-Intervention comparison of Control and Experimental group:

		N	Mean	Standard Deviation	p-value	Significance
Jitter %	Control	14	0.75	0.12	<0.001	S
	Experimental	16	1.07	0.12		
Shimmer %	Control	14	3.75	0.55	<0.001	S
	Experimental	16	4.91	0.56		
NHR dB	Control	14	19.52	1.17	0.7480	NS
	Experimental	16	19.65	1.00		
f0 Hz	Control	14	204.36	7.68	<0.001	S
	Experimental	16	229.13	10.75		
MPT sec	Control	14	17.38	1.40	0.3660	NS
	Experimental	16	16.93	1.30		

* NHR- Noise to harmonic ratio; f0- Fundamental frequency; MPT- Maximum Phonation Time. S- significance; NS- not significant.

Table 1 shows pre-intervention comparisons between the control and experimental groups revealed significant differences in Jitter, Shimmer and F0 values. However, no significant differences were observed for NHR and MPT prior to the intervention.

Table 2

Shows the Post-Intervention comparison of Control and Experimental group:

		N	Mean	Standard Deviation	p-value	Significance
Jitter %	Control	14	0.75	0.12	<0.001	S
	Experimental	16	0.59	0.08		
Shimmer %	Control	14	3.75	0.55	0.001	S
	Experimental	16	4.53	0.58		
NHR dB	Control	14	19.52	1.17	<0.001	S
	Experimental	16	17.51	1.27		

f0 Hz	Control	14	204.36	7.68	<0.001	S
	Experimental	16	244.50	11.06		
MPT sec	Control	14	17.38	1.40	0.479	NS
	Experimental	16	17.03	1.30		

**S-significance; NS-not significant.*

Table 2 shows Post-intervention comparison revealed significant differences between the control and experimental groups in Jitter %, Shimmer %, NHR and f0 values following the facilitation of the chewing technique in the experimental group. The experimental group demonstrated reduced Jitter % and NHR values along with increased f0 values. However, no significant difference was observed for MPT ($p = 0.479$) between the groups after intervention.

Table 3

Shows the comparison of pre and post intervention in control and experimental groups:

Paired Differences (Pre-Post)	Control				Experimental			
	Mean	Standard Deviation	p-value	Significance	Mean	Standard Deviation	p-value	Significance
Jitter %	0.00	0.000	-	-	0.48	0.14	<0.001	S
Shimmer %	0.00	0.000	-	-	0.39	0.70	0.044	S
NHR dB	0.00	0.000	-	-	2.14	0.93	<0.001	S
f0 Hz	0.00	0.000	-	-	15.38	0.62	<0.001	S
MPT sec	0.00	0.00	-	-	0.00	0.00	-	-

**S- significance*

Table 3 shows the overall comparison of pre and post-intervention measures and revealed that no significant differences were observed across all acoustic parameters within the control group. In contrast, the experimental group which was facilitated with the chewing technique demonstrated significant difference in Jitter, Shimmer, NHR and F0 values. However, no change was observed in MPT following intervention.

DISCUSSION

The present study aimed to assess the effectiveness of the chewing technique on vocal phonation among female speech-language pathology students by analyzing acoustic and aerodynamic parameters including Jitter, Shimmer, NHR, f0 and MPT for sustained /a/ vowel production. The findings revealed that the experimental group demonstrated significant improvements in Jitter %, Shimmer %, NHR and f0 values following the facilitation of the chewing technique whereas no notable changes were observed in the control group. Reduction in Jitter and Shimmer values indicates improved stability and regularity of vocal fold vibration while decreased NHR suggests enhancement in overall voice quality with reduced noise components in the voice signal. The increase in fundamental frequency (f0) following intervention may

indicate improved vocal flexibility and phonatory control. However, there were no significant post-intervention changes in MPT implying the chewing technique had limited influence on phonatory duration.

The findings of the present study are in accordance with Meerschman et al. (2016), who reported significant improvements in jitter, NHR and f0 following the chewing technique among healthy female speech-language pathology students. Their study similarly observed no significant change in MPT corroborating the current findings. The similarity in findings supports the effectiveness of the chewing technique as a vocal facilitating method for improving selected acoustic parameters of voice.

Overall, the findings of the study suggest that the chewing technique can be considered an effective voice facilitation method for improving selected acoustic aspects of vocal phonation among female speech-language pathology students.

SUMMARY AND CONCLUSION

Voice is the sound produced by the vibration of the vocal folds and plays a vital role in human communication. The present study investigated the effectiveness of the chewing technique on vocal phonation among 30 female speech-language pathology students aged 18–20 years, who were randomly assigned to an experimental group and a control group. The experimental group underwent chewing technique intervention for 8 weeks, while the control group received no intervention. Acoustic and aerodynamic parameters, including Jitter, Shimmer, Noise-to-Harmonics Ratio (NHR), Fundamental Frequency (f0) and Maximum Phonation Time (MPT), were assessed before and after the intervention. The findings revealed significant improvements in Jitter, Shimmer, NHR and fundamental frequency following the chewing technique intervention, indicating enhanced vocal stability, improved voice quality and better phonatory control. However, no significant improvement was observed in Maximum Phonation Time. Overall, the results suggest that the chewing technique is an effective voice facilitation method for improving selected acoustic aspects of vocal phonation among female speech-language pathology students. As this was study with a small sample size, further research with larger samples and longer intervention periods is recommended to establish its long-term effectiveness and clinical applicability.

IMPLICATIONS OF THE STUDY

- The chewing technique can improve voice quality in female Speech Language Pathology students.
- It helps reduce irregular vocal fold vibrations leading to a more stable voice.
- The technique may be useful as a preventive voice care strategy for individuals with high vocal demands.
- It can be included in vocal hygiene and voice training programs for Speech Language Pathology students.
- Regular practice of the chewing technique may help maintain healthy and efficient voice production.
- The technique is simple, non-invasive and easy to perform without specialized equipment.
- The findings support the use of vocal facilitating techniques for promoting vocal health in future professionals.

LIMITATIONS OF THE STUDY

- The study was conducted on a small sample of healthy female Speech Language Pathology students aged 18–20 years, limiting the generalizability of the findings.

- The intervention period was limited to 8 weeks and long-term effects of the chewing technique were not assessed.
- Only selected acoustic parameters were evaluated, while subjective voice-related outcomes were not examined.
- Baseline differences between the control and experimental groups existed for certain acoustic measures.

FUTURE DIRECTIONS

- Conduct studies with a larger sample size to improve the reliability of findings.
- Include both male and female participants from different age groups.
- Investigate the long-term effects of the chewing technique through follow-up assessments.
- Examine the effectiveness of the technique in individuals with voice disorders.
- Compare the chewing technique with other voice facilitation techniques such as humming, yawn-sigh and resonant voice therapy.
- Include subjective outcome measures such as vocal fatigue, voice handicap and quality of life.

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