

Can We ‘Grow Lips’ In Therapy? The Efficacy of Lip Stretching and Strengthening Exercises in Patients with Lip Incompetence

This article was published in the following Scient Open Access Journal:

Journal of Dental and Oral Health

Received October 09, 2018; Accepted October 26, 2018; Published November 02, 2018

Dana K. Hockenbury*

IAOM Board Certified Orofacial Myologist TM,
1345 Sixth Avenue at West 55th Street Second
Floor New York, NY 10105, USA,

Abstract

Purpose: To assess the efficacy of lip stretching and strengthening exercises in subjects with lip incompetence. **Methods:** Data were collected from 56 children, teens and adults. Exercises were prescribed 3 times per day over a 4-month period.

Measurements and Results: A digital caliper and lip strength gauge were used to measure the length and strength of the upper lip in therapy sessions. At the end of the 4-month treatment period, all subjects demonstrated improvements in length and strength of lips. Mean upperlip length achieved was 0.96 mm. Maximum upperlip length achieved was 5.71 mm. Increased lip length was observed in 92.9% of subjects. With regard to lip strength, children and teenage subjects (8-20 y.o.) demonstrated the greatest improvements. Mean improvement of lip strength among children and teenagers was 2.96 lb., while the maximum amount of lip strength for children and teens was 6.25 lb. Among adults, the mean improvement in lip strength was 1.55 lb., while maximum improvement in lip strength was 4.25 lb. All subjects demonstrated a significant reduction in interlabial gap. The average decrease in interlabial gap was 3.16 mm and the maximum decrease in the interlabial gap was 7.23 mm.

Conclusion: Outcomes demonstrated that therapy exercises to stretch lengthen and strengthen the upper lip soft tissues are effective. At the completion of the therapy program, 36 of 56 subjects reported achieving lip competence both diurnally and nocturnally.

Keywords: Vertical lip growth, Lip incompetence, Interlabial gap, Orbicularis oris muscle, Mentalis muscle, Orofacial Myofunctional Disorder, Orofacial myofunctional therapy

Introduction

While working with patients who demonstrate anterior tongue thrusting during saliva, liquid or solid swallows, certain postural characteristics can be identified from an orofacial myofunctional perspective. Many of these patients present with a typically-observable profile: lips are parted, mandibles are hinged open and tongues may be positioned interdentially.

When lips are parted at rest, lip incompetency is observed. Lip incompetency is defined as ‘the inability to close the lips without strain’ [1]. With incompetent lips, an interlabial gap is typically observed. This gap can be caused by a variety of factors such as an anterior open bite, excessive maxillary overjet, excessive facial height or a shortened upper lip [2]. Whatever the causal factor, the patient is forced to strain to achieve a lip seal.

When incompetent lips contact, strain is usually noticed in the mentalis muscle area [3] which results in tension, dimpling or a “golf ball-like appearance” in the muscle fibers and overlying skin [4]. This strain can create a minimum, moderate or maximum amount of tension due to the overworked mentalis muscle.

According to [5], lip functions have been thought to be one of the most important factors in determining tooth position. They contend that there is a relationship between lip-closing force and dental characteristics. The lip-closing force of the upper lip has been reported to have a strong influence on maxillary incisor angulation. These authors feel that assessing lip function is significant for orthodontic diagnosis, treatment planning and stability of post-treatment results.

Frankel proposed a relationship between anterior open bites and incompetent lips. In his view [6], incompetent lips do not provide an anterior oral seal, which

* **Corresponding Author:** Dana K. Hockenbury,
IAOM Board Certified Orofacial Myologist TM,
1345 Sixth Avenue at West 55th Street Second
Floor New York, NY 10105, USA, Tel:
646-334-1713, Email: dkhnyc@aol.com

contributes to overall weakness of the orofacial musculature. Frankel contended that achieving lip competency and a lip seal can activate and improve the "tone" of the lip muscles.

Vertical growth of the lips was studied cephalometrically by [7]. The amount of serial data collected at various ages from lateral cephalometric head films permitted them to extrapolate their serial data to a longitudinal report of lip growth according to age. They established that the upper and lower lips grow variably between the ages of four and 20 years. Growth spurts were found between the ages 6 and 12 years for the upper lip and between 10 and 14 years for the lower lip. By age 13, a lips-together posture is expected. Vertical growth for both lips continues until the age of 20, with a vertical growth plateau at age 17 for males and females. At the completion of lip growth, the average length of the upper lip is 26-28 mm and for the lower lip, 45-46 mm.

In an electromyographic (EMG) study of the lips conducted by [1], lip stretching was performed for one year with children (mean age of 9.4 years) who demonstrated incompetent lips and also evidenced an interlabial gap, compared against a control group with similar findings who were not given lip stretching training. These researchers found that this training increased the length of the lips and decreased the interlabial gap; whereas in the control group, the interlabial gap increased. In addition, [1] also found that in the lip training group the thickness of the upper lip decreased, and in most subjects, the lower-lip covered the incisal edge of the upper incisors. In the control group, no increase in lip height was found and the interlabial gap along with the thickness of the upper lip increased significantly. The lip training provided for the experimental group did not affect tooth position over the one-year study period.

The [1] findings are compatible with a separate study reported in 1975 by Barber and Bonus. [8] measured lip strengthening of children who demonstrated a tongue thrust pattern. They found that not only could flaccid lips become strengthened through daily exercise, as compared to non-tongue thrusters, but this improvement remained stable for 18 months after the exercises were terminated. Both studies, using accepted standards of evidence and control groups, concluded that lip seal and lip morphology can be modified by orofacial myofunctional therapy.

In evaluating these data, we might speculate that if orofacial myologists engage appropriately-selected patients in upper lip stretching and strengthening exercises, the exercises may result in increased vertical lip length. Indeed, if we consider the growth rates documented by [7], then we may also speculate that during those growth spurts for the upper lip, we may be able to achieve both maximum upper lip stretch and increases in vertical lip length. Thus, we could use these natural growth patterns to our advantage. Since strengthening of the lips can be achieved and maintained [8] then perhaps lengthening of the upper lip can also be achieved and maintained over time. Likewise, for late teens and adults with lip incompetence who have completed lip growth, achieving lip closure with myofunctional exercises is a worthy challenge and goal of therapy.

Research Design

This research attempts to determine whether lip stretching and strengthening exercises in subjects with lip incompetence can achieve a lips-together rest position without mentalis strain. A secondary purpose is to determine whether therapy for achieving

lip closure occurs more readily in children, teens or adults; that is, are there age-group performance differences according to whether lip growth has been completed or continues?

With a patient-centered treatment protocol, an appropriate goal is to achieve maximum length of the upper lip through stretching exercises. Obtaining a longer upper lip in therapy is advantageous for several reasons: 1) To eliminate mentalis muscle strain; 2) To eliminate an interlabial gap; 3) To achieve diurnal and nocturnal lip competence; 4) To ensure a stable oral environment to help avoid post-orthodontic treatment relapse; and 5) To help answer the question: can we 'grow lips' in therapy?

The study protocol includes data collection and analysis relative to the following variables: 1) Age and gender of the subjects; 2) Initial and final upper lip length measurements; 3) Initial and final strengthening measurements; 4) Initial and final interlabial gap measurements; 5) Measurement tool used to measure upper lip length; 6) Measurement tool used to measure upper lip strength; 7) Measurement tool used to measure an interlabial gap; 8) Materials used to stretch the upper lip; 9) Materials used to strengthen lips; 10) Description of the exercises; 11) Compliance level of the subjects (frequency of exercising: 1x - 2x - 3x/ day); and 12) Post-therapy subjective questionnaire

Materials and Methods

Subjects: 56 subjects (24 males and 32 females, 8 to 71 years of age with a mean age of 26.5 years) consented to participate in this study. Of the 56 subjects, there were 18 children (8 -12 y.o.), 6 teenagers (13 - 20 y.o.) and 32 adults (21 - 71 y.o.) who were being treated for the elimination of an anterior tongue thrust swallowing pattern. All subjects who were included in the study demonstrated a tongue thrust swallowing pattern, an interlabial gap at rest, lip incompetency and flaccid lips. Subjects identified as having a restricted maxillary labial frenum were excluded from the study.

An informed consent was obtained from all subjects.

Methods

Examination methods

The age and gender of each subject, upper lip length, lip strength and interlabial gap measurements were recorded during the initial evaluation as part of the standard evaluation protocol derived from a variety of sources (see acknowledgements). The same measurements were recorded again at the end of the four-month therapy program consisting of eight sessions with the clinician and home assignments intended to be practiced on a daily schedule. All measurement tools were properly sanitized before each use and Latex-free gloves were consistently worn by the clinician to ensure sanitary conditions.

For all pre- and post-treatment measurements, the subjects sat upright while resting lightly against the back of the examination chair. Both feet rested securely and comfortably on the floor to ensure that the body and head were balanced and symmetrical. Each subject was instructed to keep their head straight and eyes focused forward during all measurement portions of the examination.

Examination items

A TRESNA EC 16 digital caliper was used to measure upper lip

length. The length of the upper lip (or philtrum) was measured from the bottom of the nose (upper margin of the philtrum at the base of the nose) to the bottom vermilion drape of the upper lip [9]. The caliper rested lightly against the patient's philtrum while an examiner's finger was placed lightly against the patient's face for stability. The measurement was recorded in millimeters (mm) and repeated twice to ensure reliability.

The TRESNA EC 16 digital caliper was also used to measure the interlabial gap. The interlabial gap was measured from the bottom vermilion drape of the upper lip and the top roll of the vermilion of the lower lip [9] at the midline. The measurement, recorded in millimeters, (mm), was also repeated twice to ensure reliability.

A lip strength gauge, CHATILLION IN-10, was employed to measure lip strength in pounds (lb.). The attached plastic light-weight button measured 25.16 mm in diameter. The flat side of the button was placed against the occluded anterior teeth as the upper and lower lips were placed over the button, holding it in place. Verbal directions were given to each subject to hold the button with both lips as tightly as possible and to resist the pull from the examiner. Each subject was encouraged to engage mid- and upper-body tension to stabilize head position during the pull. A practice pull was performed first without recording the value obtained. Lip strength was measured and recorded in lbs. in each of three trials in order to achieve a mean response for each subject. The examination items and methods used in this study are part of the regular examination protocol of the author (see acknowledgements).

Exercises

Exercise methods

All exercise tools were properly sanitized and individually packaged before they were utilized with each study subject. Each exercise was initially described to the subject and then demonstrated by the examiner. The subject was then instructed to perform the exercises while verbal prompts and corrections were given when necessary. A large free-standing table-top mirror was used to allow the patient to monitor him/herself and to make corrections as needed. Immediately after the completion of each new exercise, each subject was instructed to retell how the exercise was to be performed to ensure complete understanding and proper completion of the home exercises.

Exercise methods

To activate the Upper-Lip Stretch exercise, the following muscles were targeted: the orbicularis oris and (bilateral) levator labii superioris [9]. Each subject was instructed to firmly grasp the upper lip with thumbs placed behind the lip, extending the thumbs into the labial vestibule up to the superior border of the vestibule (under the base of the nose). At the same time, the fore-fingers were placed over the outside of the upper lip at the same area as the thumbs, adjacent to the base of the nose. Subjects were also instructed to "wrinkle" the nose, as if something adverse was smelled, prior to and held throughout the downward pull. Wrinkling of the nose provided increased resistance intended to increase the effectiveness of the lip stretching. The upper lip downward pull was held for a 20 count. The exercise was to be repeated five times during three separate daily exercise periods at home.

To activate the Button Pull exercise, the following muscles

were targeted: the orbicularis oris, levator labii superioris, and depressor labii inferioris [9]. To facilitate this exercise, a plastic button was tied to a light-weight string. The flat side of the button was placed against the occluded anterior teeth as the upper and lower lips were placed over the button, holding it in place. Subjects were instructed to keep the button at the labial midline. Subjects were then instructed to pull on the string using lip resistance to hold the button behind the lips for five seconds before pulling out the button with a "pop". This was to be repeated 20 times, during three separate daily practice periods at home.

Photos of the interlabial gap of each patient were taken during the initial evaluation, midway through and at the end of the therapy program to document lip length gains and also to provide patient motivation. Photos taken were dated and transferred to the same Word document. Specifically, a close-up photo of the lips at rest was taken at the same distance and angle as measured from the camera lens to the lips. Results were discussed and a copy of each photo taken was printed and offered to each subject to take home.

Questionnaire and Record Keeping

The Compliance Questionnaire was created by the author (Appendix A). This form was designed to collect subjective data reported by the study subjects. The Compliance Questionnaire was completed by each patient at the end of the myofunctional therapy program. This questionnaire assessed three components of subject performance: 1) subject compliance, including the actual time each subject spent on each exercise and the overall length of time exercises were practiced at home; 2) whether or not the subjects perceived any difference in lip length and lip strength during the therapy period; and 3) the subjects' graded level of enjoyment for each exercise.

A Patient Stats form was created by the author (Appendix B). This form was designed to collect normative data. Each study subject and stat sheet was assigned a number to ensure confidentiality. Specifically, pre- and post - measurements for lip length, lip strength and interlabial gap measurements were recorded. Patient age and gender were also documented. The Patient Stats form was completed by the author as each patient completed the myofunctional therapy program.

Results

The pre- and post-therapy measurements for lip length, lip strength and interlabial gap results were analyzed according to the effectiveness of the Upper Lip Stretch and Button Pull exercises. The exercises were assessed and compared based on age of patients, the frequency of the exercises practiced, and overall compliance with the instructions given. The self-evaluation completed by the study subjects were analyzed from data taken from the questionnaires.

The resulting data underwent statistical analysis using the Python coding system of Numpy, Pandas and Matplotlib [10].

Exercise Results

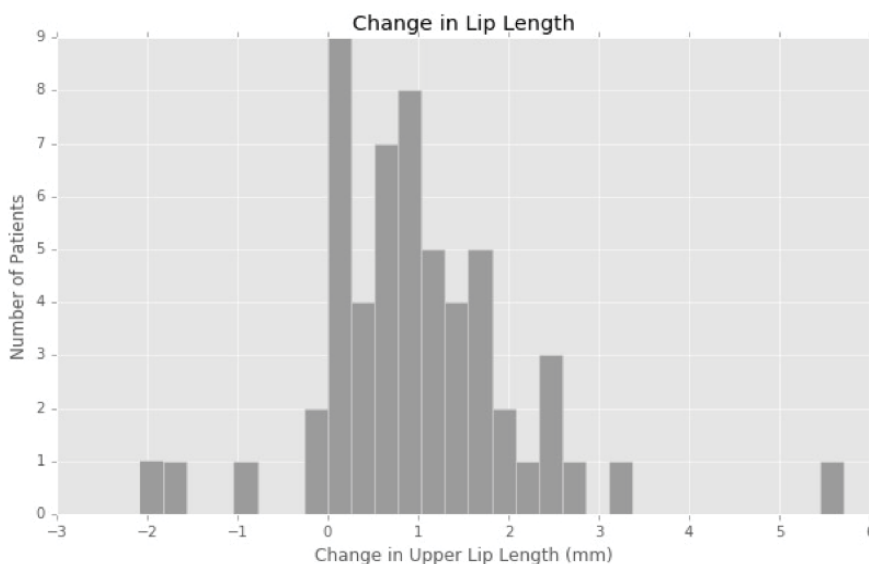
Positive effects of the Upper-Lip Stretch exercise and the Button Pull exercise on lip length, lip strength and interlabial gap were reported by the subjects in the study protocol to be

effective, and the measurements obtained were determined to be statistically significant.

Upper lip length improvements were observed on 92.9% of the subjects, demonstrating a normal distribution curve. The average upper lip length achieved was 0.96 mm. Maximum lip length achieved was 5.71 mm.(Graph 1).

maximum decrease of the interlabial gap was 7.23 mm and, this finding, as would be expected, occurred in a child.

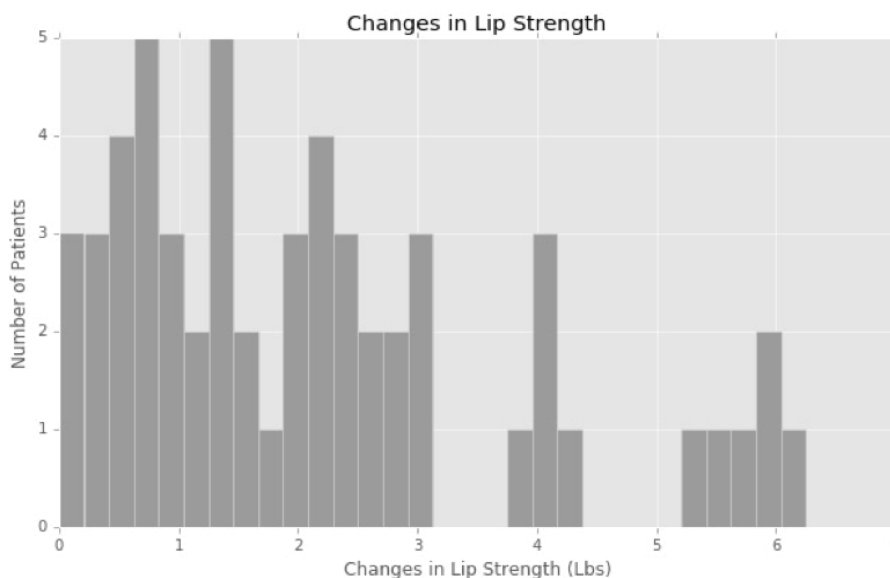
At the completion of the study, 36 of the 56 subjects demonstrated lip competency; that is, no interlabial gap and no mentalis strain. However, the 20 subjects who did not achieve consistent lip competency continued to evidence mentalis strain.



Graph 1: The change in upper lip length at the completion of therapy. A positive change was achieved in most subjects.

All subjects demonstrated measurable increases in lip strength. The average gain in lip strength was an increase of 2.5 lb. The maximum increase in lip strengthening was 6.25 lb.(Graph 2).

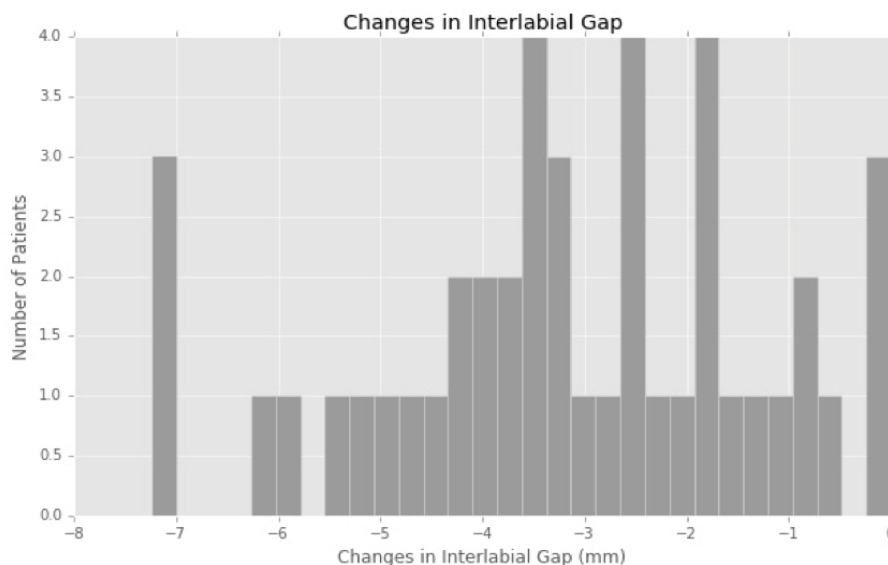
Age: The results of lip length, lip strength and interlabial gap among children, teenagers and adults were compared with regard to age. There was no significant statistical difference in increased



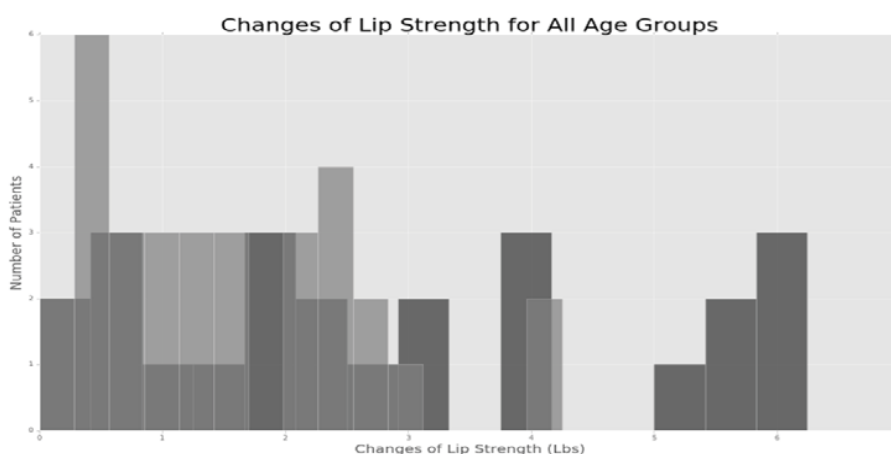
Graph 2: The change in lip strength at the completion of therapy. A positive change was achieved in most subjects.

The interlabial gap demonstrated a statistically significant reduction when comparing the pre- and post-therapy data. The average decrease in interlabial gap was 3.16 mm. (Graph 3). The

lip length and decreased interlabial gap among the three groups; that is, the gains of the Upper-Lip Stretching exercise on lip length and interlabial gap were not influenced by age.



Graph 3: The change in interlabial gap achieved at the end of the therapy program. The interlabial gap decreased in most subjects.



Graph 4: The improvement of lip strength for children & teenagers (<20 years old) and adults (>=20 years old) at the completion of the therapy program.

However, the results in increased lip strength in children, teenagers and adults did vary by age. Analysis of the study data revealed that the changes in overall lip strength among children and teenagers were greater than the outcomes for the adult population. The mean improvement in lip strength among children and teenagers was 2.96 lb. Maximum lip strength in children and teens was 6.25 lb. The mean improvement among adults was 1.55 lb. (Graph 4). Maximum lip strength in adults was 4.25 lb.

Compliance Frequency: When analyzing the results in terms of the frequency with which the study subjects performed their home exercises consistently, those subjects who consistently practiced the Upper-Lip Stretch exercise 3 times per day yielded greater lip length outcomes (average 1.31 mm) compared with those subjects who reported practicing the exercises 2 times per day (0.74 mm) and 1 time per day (0.11 mm).

The study subjects who consistently performed the Button Pull exercises 3 times per day yielded greater lip strength outcomes (average 2.15 lb.) compared with the subjects who practiced the home exercises 2 times per day (1.76 lb.) and 1 time per day (1.73 lb.).

Gender: There was no statistical difference in the increase in lip length, lip strength or decrease of interlabial gap with regard to gender.

Questionnaire Results: The results of the questionnaire demonstrated that all subjects subjectively reported an overall increase in lip length and strength along with a decrease of the interlabial gap as they moved through the program. All subjects reported an increase of lip competency both diurnally and nocturnally.

All of the subjects reported that they enjoyed the Button

Pull exercise, while only 75% reportedly enjoyed the Upper Lip Stretch exercise.

Discussion

This research study revealed that all age groups achieved an increase in lip length and lip strength during the four-month study period. As would be expected, the patients who were highly compliant in performing the exercises 3 times per day as prescribed achieved greater overall results. The compliance results from this study will hopefully be used by other clinicians to educate patients about the value of faithfully following clinician instructions due to the relationship between practice times and expected treatment outcomes.

The finding that all patients demonstrated improvements in lip length regardless of age should encourage clinicians that the exercises described are useful and effective. This conclusion is compatible with the data reported in the research study by [1].

With regard to lip strength, the children and teens (8 - 20 y.o.) demonstrated the greatest improvements. The similar findings in the current study, and as reported in the [8] study, confirm that resistance exercises can be effective with all age groups; however, the older the patient, the more challenging it may be to increase muscle strength in the lips.

[5] contended that lip competency promotes a proper oral seal which ensures the stability of orthodontic treatment. They further postulated that it is possible to influence the morphology and function of the upper lip by consistently engaging in upper lip stretching and strengthening exercises. The combination of these two exercises should serve to reduce the interlabial gap to the extent that many individuals are able to achieve and maintain lip competency.

The findings of the current study appear to be compatible with the findings of [5]. Exercises to lengthen and strengthen the upper lip using the current study protocol reveals that a 4-month period of orofacial myofunctional therapy using the techniques described, in 8 sessions with the clinician, and home practice of exercises three times per day, can and has successfully lengthened the vertical rest position of the upper lip in children, teenagers and adults.

Reasons to Treat Children: One of the prevailing considerations for accepting a child referred for therapy who exhibits lip incompetence and other related orofacial variations relates to the social status of the child. If a child is being teased or is reported by parents to have some social problem due to an open-mouth rest posture that may include an interdental tongue rest posture along with lip incompetence, the author is more inclined to accept such a child into therapy in spite of the fact that the lip incompetence aspect of the overall oral problems may involve some spontaneous, positive changes during the period of therapy. However, considering that the clinical research protocol being reported takes place over a 4-month period, it seems unlikely that spontaneous lengthening of the lips would constitute a significant event that would negate the need for therapy. Since clinicians usually see lip incompetence in their practices that does not occur alone, but usually in combination with other observations such as an interdental tongue position and the mandible being habitually hinged open beyond the normal range, those accompanying oral rest variations serve to

merit including many children in therapy who are at least age 6 years.

Can We "Grow Lips" in Therapy? The question was posed in the title of this article: Can we 'grow lips' in therapy? Although this catchy question may seem a bit facetious, it merits discussion. Any claim of an ability to 'grow lips' in therapy cannot easily be supported with children and younger teenagers when the possibility of spontaneous closure of an interlabial gap can account for changes observed in therapy. However, in a study of children with tongue thrusting and lip incompetence by Barber and Bonus (1975), the children who underwent circumoral muscle resistance exercises exhibited stability and retention of the results of exercises 18 months following the cessation of therapy. These authors also reported that the longer period of therapy (6 months of treatment for one of four groups rather than 3 months for another group) resulted in greater muscle strength achieved in relationship to the amount of time spent in therapy.

The findings in the [8] showing that resistance exercises used with children with lip incompetence remained stable at 18 months following therapy, cannot be attributed to spontaneous lip growth because of the short period of the study protocol. Likewise, the 4-month period of therapy in the current study would seem to eliminate any impact of spontaneous lip growth in the 18 children in the study. Nonetheless, comments about the children in this study are qualified due to the possibility of spontaneous lip growth being a factor in the discussion of findings.

While children with lip incompetence may be considered a controversial group to support the notion that therapy exercises can 'grow lips' due to the spontaneous lip length growth experienced up to age 13 when a lip seal is expected, a better sample of subjects for discussion are individuals in the later teen years, and adults, whose lips have reached a peak of growth and will no longer lengthen spontaneously. It seems fair to speculate that the changes observed in therapy for lip incompetence with an adult group, with the use of resistance exercises, may legitimately be described as 'growing lips' where a reduction in the interlabial gap is achieved [11,12]. Perhaps the catchy claim that orofacial myofunctional therapists can 'grow lips' may be more than folly?

Conclusions

Based upon the results of this research, lip stretching and lip strengthening exercises should continue to remain in the 'tool kit' of the orofacial myologist. These exercises can safely and effectively be implemented in patients of all ages. The exercise protocol and results of therapy reported here will hopefully encourage other orofacial myofunctional clinicians to develop and implement similar therapy protocols.

Limitations of the Study

A limitation of this research is the small number of participants (56). Future research should ideally include a larger data-base of subjects. Further study also should include documenting stretching and strengthening effects of the upper lip in a longitudinal study.

One delimiting factor in this study is an absence of a control group matched for age and sex. Due to the nature of the private practice from which the 56 subjects in this study were derived,

there were no additional potential subjects available within this practice. It was the decision of the author to not withhold treatment from any of the individuals referred for therapy. Doing so for study purposes was not considered to be feasible or ethical. Accordingly, control subjects in the studies by [1,8] as well as the serially-obtained longitudinal data from the [7] study provide information regarding the growth patterns of the lips in children that can be compared with the results of this study.

Acknowledgements

The author recognizes the contributions of several sources for the measurement and exercise protocols used in this study which include:

Coulson, S. (2010) The Coulson Institute of Orofacial Myology Manual CD

Moeller, J. (2007) Introductory Level 1 Course

Snow, M. Orofacial Myology Study Guide

The author would like to thank Dr. Robert Mason, DMD, PhD who encouraged me to pursue this research project.

References

1. Ingervall B, and Eliasson GB. Effect of lip training in children with short upper lip. *Angle Orthod.* 1982;52(3):222-233.
2. Simpson M. Lip incompetence and its relationship to skeletal and dental morphology-an electromyographic investigation. *BrJ Orthod.* 2016;3(3):177-179.
3. Kanao A, Mashiko K, Kanao K. Application of functional orthodontic appliances to treatment of 'mandibular retrusion syndrome'. *Japanese Journal of Clinical Dentistry for Children.* 2009; 14(4):45-62.
4. YU Y, Kim Y, Lee D, Lim Y. The predictability of dentoskeletal factors for soft-tissue chin strain during lip closure. *Korean J Orthod.* 2013;43(6):279-287.
5. Fujiwara A, Kuroyanagi F, Kawabata A, Tome W, Kitai N. Relationship between lip-closing force and three-dimensional lip morphology in adults with straight facial profile. *Int J Orofa Myolo.* 2015;41:24-36.
6. Frankel R. Lip seal training in the treatment of skeletal open bites. *Eur J Orthod.* 1980;2(4):219-228.
7. Vig PS, Cohen AM. Vertical growth of the lips: A serial cephalometric study. *AmJ Orthod.* 1979;75:405-415.
8. Barber TK, Bonus HW. Dental relationships in tongue-thrusting children as affected by circumoral myofunctional exercises. *J AmDen Asso.* 1975;90(5):979-988.
9. Baker E. Head and Neck Anatomy for Dental Medicine, New York: Thieme Publishers. 2010.
10. James G, Witten D, Hastie T, Tibshirani R. An introduction to statistical learning. New York: Springer. 2013.
11. Hanson ML, Mason RM. Orofacial Myology: International Perspectives. Springfield, Illinois: Charles C. Thomas, Publisher. 2003.
12. Mason RM. Orthodontic perspectives on orofacial myofunctional therapy. *Int JOrofMyol.* 1988;14(1):49-55.

APPENDIX A

Compliance Questionnaire

Now that you have completed the program please fill out this questionnaire; I will use this information to improve my business practices. In addition, I am conducting a clinical research study regarding the efficacy of upper lip stretch and button pull exercises as a procedure in Orofacial Myofunctional Therapy. I am interested in documenting specific information such as actual time spent on the exercises, the overall length of time exercises were practiced, how much the gap between the lips at rest was reduced, and the amount of lip lengthening that was obtained.

Because there is little documentation regarding this topic in professional journals, I thought this would be a great opportunity to contribute to the field of Orofacial Myology. By filling out this form you are giving permission for the data collected to be used in the research report.

It is hoped that the results of this study will aid other patients in the future. Thank you.

1. Overall, how often did you do the Upper-Lip Stretch exercise?

a. 3 times/day _____ b. 2 times/day _____ c. 1 time/day _____

2. If you were unable to execute the Upper-Lip Stretch exercise on a particular day, did you do extra to 'catch-up'? YES / NO

If so, how much more did you do?(in minutes) _____

3. Did you stretch your upper-lip more than prescribed? YES / NO

If so, how much more?(in minutes) _____

4. As you progressed through the program, did you see a difference in your overall lip length? YES / NO

5. In general, did you enjoy doing the lip stretching exercises? YES / NO

6. If not, what did you dislike? _____

7. Rate your level of "compliance"; that is, your faithfulness in following the instructions given and the times suggested for the Upper-Lip Stretch exercise:

↓-----
-----◇

Poor inconsistent f a i r
consistent excellent

8. Overall, how often did you do the Button Pull exercise?

a. 3 times/day _____ b. 2 times/day _____ c. 1 time/day _____

9. If you were unable to execute the Button Pull exercise on a particular day, did you do extra to 'catch up'? YES / NO

10. If so, how much more did you do?(in minutes) _____

11. Did you work on strengthening your lips more than prescribed? YES / NO

12. If so, how much more? (in minutes) _____

13. As you progressed through the program, did you feel an overall increase in lip strength? YES / NO

14. In general, did you enjoy doing the lip strengthening exercises? YES / NO

15. If not, what did you dislike? _____

16. Rate your level of "compliance"; that is, your faithfulness in following the instructions given and the times suggested for the Button Pull strengthening exercise:

↓-----
-----◇
Poor inconsistent f a i r
consistent excellent

APPENDIX B

PATIENT STATS FORM

Patient # _____

DOB: _____

Age: _____

Lip Strength:

Pre: _____

Post: _____

Lip Length:

Pre: _____

Post: _____

Interlabial Gap:

Pre: _____

Post: _____

Length of time stretching lip: _____

Length of time strengthening lip: _____