

How Are Orthodontists and Dentists Different?

What is an orthodontist? Better yet, why are there orthodontists in the first place? To answer the first question, an orthodontist is a specialist in dentistry that completes an extra two to three years of education to learn how to correctly align teeth and jaws, as well as how to diagnose, treat, and prevent dental and facial irregularities.¹

But to answer the second question, we need to step back in time.

Humans have been interested in straightening their teeth since ancient Egyptian times. Mummified Egyptians have been found with gold bands wrapped around their teeth, which researchers believed

1 “What We Do,” American Association of Orthodontists, accessed September 2017, <https://www.aaoinfo.org/about/what-we-do>.

were laced with catgut in an attempt to either close space between teeth or prevent unwanted shifting.²

But the Egyptians weren't alone in their efforts. Many other ancient cultures found ways to manipulate teeth in order to improve their appearance or to correct a bad bite, also known as a *malocclusion*. Between 500 and 300 BC, both Hippocrates and Aristotle spoke of diseases of the teeth and various treatment methods, from extraction to the use of wires to hold loose teeth or broken jaws in place. By AD 166, the Etruscans had developed dental prosthetics that we may consider modern, such as fixed bridgework and gold crowns,³ and in the early eighteenth century, French dentist Pierre Fauchard used a u-shaped piece of iron called a *blandeau* to expand arches.⁴

Modern orthodontics, however, didn't begin to appear until the 1800s, when the invention of vulcanized rubber spurred dental inventors to come up with new appliances to improve the alignment of the teeth and bite.

EARLY INNOVATIONS IN ORTHODONTIC APPLIANCES

- **1819**—Christophe-Francois Delabarre invents the “wire crib,” a half-moon-shaped device attached directly to the tooth to help straighten it.

2 “Braces, Pointless and Essential,” *The Atlantic*, accessed September 2017, <https://www.theatlantic.com/health/archive/2015/07/braces-dentures-history/397934/>.

3 “History of Dentistry Timeline,” American Dental Association, accessed September 2017, <http://www.ada.org/en/about-the-ada/ada-history-and-presidents-of-the-ada/ada-history-of-dentistry-timeline>.

4 “The History of Dental Braces,” Dr. Jaw Orthodontists, accessed September 2017, <http://www.drjaw.net/blog/history-dental-braces/>.

- **1843**—Edward Maynard first uses gum elastics attached to wire to align the jaw.
- **1850**—E. J. Tucker uses rubber bands cut from rubber tubing instead of wire to help align the jaw.
- **1893**—Henry A. Baker uses Delabarre's wire crib and Tucker's rubber bands to create an improved jaw alignment system.
- **1899**—Dr. Edward Angle invents the modern orthodontic appliance: metal bands tensioned with wire to straighten teeth.
- **1900–Present Day**—Orthodontists and engineers have designed better, more efficient brackets and orthodontic appliances. They are all modifications on Dr. Angle's original appliance using bands and wires.

THE LAUNCH OF MODERN ORTHODONTICS

The beginning of modern orthodontics can be traced back to 1900, when Dr. Edward Angle founded the Angle School of Orthodontia in St. Louis, Missouri.⁵ This was the first time orthodontics was formalized as a dental specialty. Before then, most dentists dabbled in some orthodontics, but no one solely focused their practice in that one specialty.

5 “History of Dentistry Timeline,” American Dental Association, accessed September 2017, <http://www.ada.org/en/about-the-ada/ada-history-and-presidents-of-the-ada/ada-history-of-dentistry-timeline>.

At Dr. Angle's school, dentists were able to take a post-graduate course on how to straighten teeth using appliances that Angle himself had developed. These appliances were some of the first to be directly affixed to the teeth using materials such as steel and sometimes gold.

Thanks to Dr. Angle, orthodontics is considered the first and oldest specialty in dentistry, and Angle is revered as the founding father of modern orthodontics.

From 1900 on, dentists who wanted to perform orthodontics would go to a post-graduate orthodontic school for additional education in this specialty—a tradition that continues to this day.

Becoming an orthodontist isn't easy, however. Dentists looking to pursue this specialty must apply to an orthodontic residency after graduating dental school and be accepted to the program, which are highly sought after by dental students. Due to the competitiveness, orthodontic programs tend to only take dental students who are at or near the top of their class and have great scores on their national board exams. Average doesn't fly in orthodontics.

For instance, when I graduated from dental school, I was at the top of my class of 150 students and had received a ninety-ninth percentile score on my national board exam. And yet, of the ten programs I applied for, I was only accepted by three.

Most orthodontic programs have anywhere from 300 to 600 applicants vying for two to ten resident positions. In my case, the program I chose to attend had 540 applicants for four positions. It's not an easy specialty to get into, and when you do, it's a challenging and rigorous program to complete.

THE ORTHODONTIST-IN-TRAINING

Most orthodontic programs range in length from twenty-four to thirty-six months and involve 6,000 to 8,000 hours of training and studying. During that time, the resident learns how to diagnose everything that can negatively affect the teeth, the alignment of the teeth, facial deformities, and the bite—from skeletal discrepancies between the upper and lower jaws to skeletal discrepancies between the jaw and the skull. They learn how the jaw develops and how the teeth develop and erupt in the mouth. They learn what causes the crowding and misalignment of teeth, and they learn multiple different techniques and strategies to address these problems and even correct them before they occur, if the patient gets to them early enough.

Sometimes, just by taking out a baby tooth at the right time, for instance, you can avoid a lot of problems down the road. Or, by placing fixed or removable appliances on permanent teeth, an orthodontist can treat discrepancies before they become so aberrant that only jaw surgery can correct them.

From treating obvious issues to mending problems unapparent to the untrained eye, orthodontics goes well beyond the training of a typical four-year dental program. In most dental schools, orthodontics tends to be treated as a tertiary topic, glossed over in favor of the main dental procedures of fillings, crowns, bridges, root canals, tooth extractions, and learning how to treat periodontal diseases and gingivitis.

I recall only spending about twenty to thirty hours of the entire four years of dental school on orthodontics. Most of the orthodontic education centered on very simple things, like recognizing what an over or underbite looks like and knowing that you need to call an orthodontist when you see those conditions. It wasn't that we weren't

willing to study these conditions, but there's simply not enough time to learn both general dentistry and orthodontics at the same time.

Orthodontics already intrigued me, and I was fortunate to match with a great orthodontics resident during our dental school's ten-week rotation through the orthodontics department. He helped me treat a case during my time there—a case that will always stand out to me because of how excited the patient was with the results.

It was a short and simple case, wherein we basically moved one of the patient's front teeth out of a crossbite and back into alignment with the adjacent teeth using a removable, retainer-like appliance. It was a condition that the forty-five-year-old patient had lived with her whole life. When she saw it corrected, she practically went through the roof with excitement, and right then and there I knew that I was hooked on becoming an orthodontist.

SPECIALIZING IN A WORLD OF RAPIDLY ADVANCING TECHNOLOGY

For all dental professionals, education doesn't end at graduation. In most states, there is a yearly minimum of twenty-five hours of continued education required, which is important due to the rapid advancement of new techniques created, mostly by the increasing number of new digital tools and new dental materials available.

Keeping up with all of the advancements and what you need to know in your own particular field of dentistry leaves little room to learn other specialties, such as pediatric dentistry, oral surgery, or orthodontics, to a level of competency. For instance, in order to just keep up with everything that's going on in orthodontics, I end up enrolling in anywhere from twenty-five to fifty hours of continued education every year.

With this incredible growth in mind, one must ask: How can a dentist be good at orthodontics and yet still be a good dentist?

DENTISTS THAT “DO” ORTHODONTICS

There's a dirty little secret about dentistry: the field is overproducing dentists. According to a 2014 study conducted by the American Dental Association's Health Policy Institute, “The per capita supply of dentists in the United States is projected to increase through 2033. Total inflows to the dentist workforce are expected to exceed total outflows, and the net gain is expected to exceed the growth in the U.S. population.” That is, we'll have more dentists graduating college by 2033 than we'll have dentists retiring—at a rate that will exceed our total population growth.⁶

With so much competition in dentistry, the typical dentist must find ways to stand out. Unfortunately, this often means expanding their repertoire of procedures into areas in which they have little formal training.

For instance, dentists may offer not only cleanings, fillings, and cavity restoration, but also periodontal procedures, orthodontics, and oral surgery—all areas that dentists used to refer out to specialists but are now being offered in-house to boost office revenue. Instead of two to three years of training in these specialties, however, these dentists are relying on the training they received in three-day weekend courses or courses offered over several weekends.

Many of these courses cover the basics of orthodontic diagnosis and treatment, such as how to diagnose a bad bite (malocclusion), how to put on braces, which wires to use, and how to straighten out

⁶ Bradly Munson and Marko Vujicic, “Supply of Dentists in the United States is Likely to Grow,” *American Dental Association*, October 2014, http://www.ada.org/~media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_1014_1.ashx.

the “smile” teeth (the first six visible teeth in your mouth). There is very little on how to finish a case with a proper, functional bite.

These courses, however, don’t focus on the vital interrelationships of bite, jaw, and tooth position in relation to facial aesthetics. Instead, they only touch on the basics, which means dentists who attend these weekend orthodontic courses do not gain a full understanding of what their patients need and how to really fix it.

For example, during a typical orthodontic residency program, a resident may spend a whole year taking a course in cephalometrics, which is the study of the head x-rays taken by most orthodontists. If these weekend courses touch on cephalometrics at all, it’s maybe a few hours at most.

Dentists leave these weekend programs with cursory knowledge of the subject or procedures. They’re not learning how to diagnose a case properly, and their patients will not get the best treatment options, because without the best diagnosis, you’re not going to get the best treatment. If your dentist can’t understand the core of your problem, how is he or she going to fix it?

TREATING THE CAUSE, NOT THE EFFECT

One of the most common problems I see when dental colleagues attempt orthodontic treatments is not understanding the core issues that created the problem in the first place, like crooked teeth or a bad bite. More-knowledgeable dentists have a bit more expertise and ability to diagnose what the problem may be but may not be versed in the treatment plan needed to correct the problem.

For example, dentists often fail to see skeletal discrepancies, tooth size discrepancies, or a number of other issues that may not be visible to the untrained eye. Or they believe that you don’t need to

take out teeth to correct overcrowding; they think that all you need to do is expand the jaw. Expanding the upper jaw may alleviate the need for extractions in a very small percentage of cases, but in the vast majority of cases, this may also be contraindicated—meaning that trying to expand the jaws will create more problems than it will solve.

Many dentists fail to realize that the lower jaw cannot be expanded—it’s a single, solid bone. You can shift the teeth away from the tongue and expand the arch, but that’s rarely advisable. When the teeth are moved outward for alignment, they are being moved into the outer portion of the bony support structure. The upper jaw can be expanded, because it’s made of two separate plates, but again, the overall harmony of the jaw relationship must be kept in mind. If widened too much, the upper jaw could be expanded beyond the lower jaw and create a bite that is not coordinated—a bite that can be awkward and uncomfortable.

In one particular case, I remember seeing a patient whose dentist, in order to avoid extractions, had expanded her upper jaw so far out that her upper teeth didn’t come in proper contact with her lower teeth, and her lower teeth were expanded so far out that they were at the edge of their support structures. The patient’s bone and gums were so thin that she was likely going to have a lot recession in those areas in the next several years.

There was little I could do for her at that point except recommend moving her teeth back to their ideal position, which likely meant taking out some teeth to prevent the crowding that she was trying to correct in the first place.

Many patients have come to me over the years with the same complaint resulting from dentist-conducted orthodontic procedures: either their teeth aren’t as straight as they want them to be, or their bite just doesn’t feel right—or both. On the other hand, the case

treated by the orthodontist usually will have a better finish, a more ideal bite, and a more aesthetic result. There are dentists out there who can produce good orthodontic work, but it is usually after years or decades of practice. When comparing the results of cases, most cases finished by orthodontists will have a more ideal result versus cases finished by dentists.

Not too long ago, a dentist asked for my help following a braces procedure he conducted. He was trying to straighten out his patient's teeth but couldn't figure out why there was such a large overjet created between the upper and lower teeth after they were aligned ("overjet" refers to the overlapping of the upper teeth over the lower teeth, while "overbites" describes when the upper teeth stick out significantly beyond the lower teeth). I noticed that the patient had a large Class 2 molar relationship—that is, there was a large discrepancy between the upper and lower teeth because of the bite. The lower jaw was too far back to meet the upper jaw with the teeth in an ideal bite. The dentist didn't realize this, and by straightening the patient's teeth, he also created an overjet of about eight millimeters.

In another case presented to me about five or six years ago, a twenty-eight-year-old woman routinely saw a dentist to close down an anterior open bite, which is where the front teeth don't meet and jut out as though the tongue has been pressing against them (which it often has). In trying to push those teeth back in, the dentist had pulled down the woman's upper teeth so much so that when she smiled, she showed almost three-quarters of an inch of gums.

When she came to me, she broke down crying, saying that her dentist had made her look like a horse and begged me to fix it. When I told her that the only way to fix her condition at that point was a type of jaw/face operation called orthognathic surgery, she almost became hysterical.

She had trusted her dentist to know what he was doing with the procedures, and also it costed less than going to an orthodontist. In the end, if she were to undergo the orthognathic surgery, it would've cost her anywhere from \$18,000 to \$25,000.

This was all because her dentist failed to really look at her facial structure, conduct a cephalometric analysis (basically an x-ray and analysis of the head), and account for skeletal issues. The dentist didn't realize the young woman's out-thrust teeth weren't due to the position of her teeth, but rather the position of her jaws and how they diverged from each other. Any orthodontist conducting a simple cephalometric analysis would've seen this and treated her in a way that altered the skeletal relationship to repair the cause—such as with temporary anchorage devices or by going directly into surgery—instead of spending years in costly braces first.

But the dentist, only seeing the out-thrust teeth, chose to treat the effect and not the cause. And the end result was far from ideal.

COMMON PATIENT RESULTS CAUSED BY MINIMAL ORTHODONTIC TRAINING

- bite feels "off"
 - patient doesn't like the final appearance of teeth
 - teeth not aligned correctly
 - teeth pushed out too far
 - overcrowding issues are not addressed properly
(tooth mass not reduced)
-

Most of the problems dentists make center around the bite, because the easiest procedure in orthodontics is to put braces on or to put an Invisalign tray in someone's mouth. On the other hand, one of the hardest things to do in orthodontics is achieve an ideal finish, where all the teeth fit together properly and are in harmony with the surrounding bone and facial structures.

Finishing a case to the ideal is where orthodontists thrive, but for dentists, the focus is less on the bite and more in straightening the teeth. They just don't have the knowledge and techniques to correct the bite.

Practicing orthodontics in a dental office isn't illegal, of course, just like it's not illegal for an oral surgeon to perform nose surgery or do a breast augmentation. But most people would say it's not recommended and that you should probably see a specialist for these procedures.

So, the question is, who do you want doing your orthodontics?

COMMON QUESTIONS: DENTIST VERSUS ORTHODONTIST

Q: Are my teeth going to be any straighter if I see an orthodontist instead of a dentist?

A: A lot of the time, what patients really mean by this question is, "Straight teeth are straight teeth are straight teeth. Why does it matter who straightens my teeth as long as they're straight?"

The thing is, there's more to orthodontics than just straightening teeth, and straightening teeth isn't as easy as putting on braces or using an Invisalign tray. Once you start moving teeth, all kinds of

things can happen. The key is in knowing how to avert these problems before they occur and, if they do occur, knowing how to fix them.

Q: Why does an orthodontist's treatment cost so much more than what my dentist is charging?

A: The difference is due to the experience and training that an orthodontist has over a dentist, as well as the orthodontist's ability to finish a case. Anyone can put braces or Invisalign in your mouth and start the process, but finishing the case is where all 7,000 hours of training plus hundreds of hours of continuing education come into play: in finishing that orthodontic case to the ideal.

Chapter 1 Summary

- Orthodontics is a specialization of dentistry that involves an additional two to three years of training and education on how to correctly align teeth and jaws, as well as how to diagnose, treat, and prevent dental and facial irregularities.
- Humans have been attempting to straighten teeth since the days of ancient Egypt.
- Modern orthodontics can officially be traced back to the opening of the Angle School of Orthodontia in St. Louis, Missouri in 1900. Dr. Edward Angle is considered the founding father of modern orthodontics.
- Orthodontic programs are notoriously difficult to get into and typically only take dental students who graduated top of their class and have very high scores on their national board exams.

- Most orthodontic programs range in length from twenty-four to thirty-six months and involve 6,000 to 8,000 hours of training.
- Dental schools rarely spend much time on learning dental specialties such as orthodontics, oral surgery, and endodontics.
- Orthodontists focus on learning how the jaw develops, how the teeth develop and erupt in the mouth, and what causes the crowding and misalignment of teeth. They learn different techniques and strategies to address these problems and even prevent them before they occur.
- To stand out in the dental field, more dentists are offering procedures that are typically referred out to specialists.
- To train for these specialized procedures, dentists will often take weekend courses that only focus on the basic procedure and not on the bigger picture of what may be causing the issue to begin with (i.e., they may not be able to provide a proper diagnosis).
- Dentists may start procedures such as braces but may not have the knowledge and training to properly finish these cases. This is where orthodontists excel—finishing to the ideal.

CHAPTER 2

The Benefits and Realities of Orthodontics

The majority of people who walk into an orthodontic practice are looking to improve their smile. It's usually their highest priority, whether it has to do with an overbite, underbite, crowding, or just crooked teeth. Their main goal is to improve the teeth that show in their smile. When a patient needs to undergo a complex and lengthy orthodontic treatment, they will often ask, "Can't you just straighten my front teeth in six or seven months?" What most patients don't realize is that in some cases, just straightening out the front teeth may actually take their bite from bad to worse.

A smaller number of patients will come to us for bite issues. They may feel like their bite is off or that it's not functioning correctly—something we call a *functioning occlusion*—but the vast majority are concerned first and foremost with straightening their teeth.

However, correcting their bite, or *occlusion*, is often far more complex than just slapping on some braces and walking out six months later with the perfect smile.

MORE THAN “JUST STRAIGHTENING TEETH”

Of course, there are occasional patients who come in to get their teeth straightened and don't care whether or not their bite is functioning properly and in harmony with the rest of their mouth. As orthodontists, we would be doing those patients a disservice by leaving them with a bad bite. Doing so could lead to numerous problems down the road, including the worsening of issues they might already be suffering from, which includes, but is not limited to:

- chipping
- fracturing
- tooth loss
- excessive wear
- poor chewing ability
- problems with the jaw joint

So, when we tell patients what we'll need to do to straighten their teeth, they are often surprised at the number of steps needed. Our response is that straightening teeth is complex. We have to go through these steps to make sure we're not just improving how their teeth look, but also how the teeth fit together and function overall.

We also need to correct other aspects of their bite that will benefit the patient for a lifetime.

In a way, it's a lot like losing weight. Patients may want to lose weight to look better and feel better about themselves immediately, but doctors want the patients to lose weight to benefit their long-term health. For instance, every pound that people move away from their ideal healthy weight makes their bodies unhealthier, just as every degree that a person's teeth move away from an ideal bite leaves their mouth and body that much unhealthier.

At the same time, losing weight isn't just about lowering the number on the scale; it's about doing so in a healthy manner that doesn't deteriorate the patient's health. Instead, it improves it, and the same goes for orthodontics.

When patients come in looking to improve their smiles for their own self-esteem or just to look better, they should realize not only do their orthodontists want the same for them, but they also want their patients to have a better bite and improved function of their teeth so that their teeth can last longer and be healthier. Ultimately, that's the goal of any orthodontist.

BENEFITS OF A PROPER BITE

An ideal, functional bite—that is, when only certain teeth touch as the jaw moves around—both allows the mouth to function at optimal levels and also helps prevent issues like excessive wear and tear on the jaw joint. In an ideal bite, teeth fit together the way nature intended them to fit together. In an ideal, functional bite, there are contacts made between certain teeth. And depending on the chewing movement, the teeth are meant to function a specific way, and there are certain teeth that should hit first. For instance,

when a patient slides their lower jaw forward into an edge-to-edge incisor position, none of the back teeth should be touching. The contacts during movement are called *protective excursions* and help the teeth function properly, which in turn help the teeth last longer. In addition, because the teeth are being moved to the middle of their support structures (such as the jaw bone and gums), they are in a much healthier position, with maximum support.

Additionally, improvements in the bite can help protect against general injuries and trauma, such as wear and tear from parafunctional habits such as teeth clenching and grinding, as well as prevent injuries from traumas such as sports injuries or falls. A patient with a deep overbite may suffer from excessive wear on the lower front teeth, however, if a patient has a deep overbite and grinds their teeth at night, the problem is compounded.

Then there's the overall benefit to mouth health and cleanliness. When the teeth are aligned properly, the natural cleansing mechanisms from the saliva and tongue are more effective, and the aesthetic appearance of a properly aligned bite is often a source of pride. Patients who like their smile and feel good about how their teeth are positioned in their mouths also tend to have more self-confidence and are more diligent about taking care of their teeth.

Finally, there's the benefit of improved skeletal relationships between the upper and lower jaws, which not only ensures a healthier jaw joint, but can also help with chewing, speech, and a more balanced, improved profile. When it comes to chewing, for instance, a bad bite can make it difficult to eat certain foods. In one case, I had a patient who had basically been functioning off of only two teeth in the back of her mouth. None of her other teeth touched, which made it difficult for her to eat anything solid. For years, her poor bite determined what she could eat, and in turn, her diet and

nutrition suffered. Once we were able to achieve an ideal bite for her, fresh fruit, vegetables, and salads became more prominent in her diet. Her overall health improved, and she lost about thirty pounds that first year.

Speech, too, can be affected by an improper bite. While a lot of speech is muscular in nature, the structure of the mouth around the lips, tongue, and palate, as well as the influence of the teeth and bones, can play a big role in our ability to speak clearly.

BITE COMPLICATIONS THAT CAN AFFECT SPEECH

- **Crossbite:** When the overlap of the upper jaw over lower, or vice versa, is extreme (such as with overbites and underbites), the ability to pronounce letters such as *s*, *z*, and */* can be compromised, forcing these letters to be pronounced with a *t*, *n*, or *d* sound.
- **Open bite:** When either the upper or lower jaw is forced outward so far that the teeth don't touch those on the other jaw, the same pronunciation problems found with a crossbite can occur. However, with an open bite, the ability to pronounce *s* sounds can be particularly challenging.
- **Overjet:** If the space between the upper and lower front teeth is greater than an average of about two mm—resulting in what's commonly called “buck teeth,” where the upper jaw sticking out

further than the lower—then the result can be an audible “hissing” effect with sibilant sounds such as *s* and *z*.

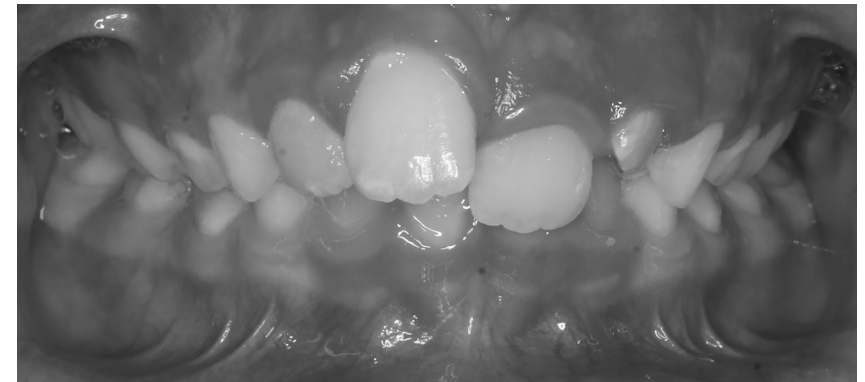
While the sounds are not created by the teeth, the lips and tongue use the teeth to create many of the sibilant sounds (*s*, *z*, *sh*, *zh*, *ch*, and *j*). Abnormalities of the front teeth can interfere with the tongue tip and the lips. Sometimes the tongue can adapt to these abnormalities, but the sounds still may not sound ideal. Moreover, a narrow maxillary (upper) arch can cause distorted speech and resonance because it limits the amount of space for the tongue to move within the mouth.

There are numerous reasons why having an ideal bite is the best thing for mouth health and health overall, but in general, teeth that are in the ideal position are not as likely to have complications (such as gum and bone disease, gingivitis, and periodontal disease), are more adept at clear speech, and are more resistant to injury and trauma.

THE IMPORTANCE OF A BEAUTIFUL SMILE

The visual appeal of having a straight and healthy smile can be a life-changing experience. Orthodontics can take shy, embarrassed children and give them the confidence to engage and participate in every aspect of their life. According to a perception study conducted by research firm Kelton in 2012, “Nearly three in four (73%) Americans would be more likely to trust someone with a nice smile than someone with a good job, outfit, or car,” and “87% would forego something for a year in order to have a nice smile for the rest of

their life,” among other findings.⁷ Another study has shown that 80 percent of respondents noticed someone’s smile before anything else.



In our orthodontic practice in Dublin, California, we treat several kids a year just because of these psychosocial factors. In the age of social media and smartphones, children especially are increasingly self-conscious about their image. They’re often embarrassed about their teeth, either because they’re being teased at school or because it

⁷ Invisalign, “First Impressions Are Everything: New Study Confirms People With Straight Teeth Are Perceived as More Successful, Smarter and Having More Dates,” PR Newswire, April 19, 2012, <http://www.prnewswire.com/news-releases/first-impressions-are-everything-new-study-confirms-people-with-straight-teeth-are-perceived-as-more-successful-smarter-and-having-more-dates-148073735.html>.

bothers them personally. We even have some kids as young as eight or nine asking their parents for braces to get rid of gaps or overbites. It's surprising sometimes how aware kids are of their teeth, and it's rewarding to treat them, too. Their excitement when they finally remove their braces and share their perfect smiles with the world is palpable, and their confidence is contagious.

Adults will often come to our practice to have their teeth straightened, because they feel a straighter smile will help with their job or work environment. For example, if they're hoping for a promotion to an executive position, applying for a new job, or just have to speak with people on a regular basis, they want to get their teeth straightened to improve their overall appearance.

Their concern is a real one. The condition of a smile can potentially affect a person's job prospects. A study published in 2014 by the American Association of Orthodontists found that "Persons with ideal smiles are considered more intelligent and have a greater chance of finding a job when compared with persons with nonideal smiles."⁸

What was particularly interesting about this study was that it wasn't based on hiring managers' opinions of job candidates with good teeth versus different candidates who have bad teeth. Instead, it involved showing one group of participants the original photo of a person smiling and showing their real, crooked teeth, and showing a second group of managers an image of the same person with their bite digitally corrected to appear straight. What the researchers discovered was that the candidate images with the digitally corrected smiles were consistently given higher scores by the participating hiring managers, evaluating the altered images "as superior with

respect to intelligence" compared to "the same subjects with nonideal dental esthetics."

Whether or not it's right for people to form opinions about others based on their smile, the fact is that we all, on some level, judge others by their aesthetics—at least initially. So, when it comes to self-esteem and self-confidence, straightening teeth can have a huge impact on kids and adults alike.

BETTER BITE FOR BETTER BREATHING

Another area of oral health orthodontists are in a prime position to help with, especially in adolescents, is the condition of sleep apnea, or sleep-disordered breathing. The orthodontist may not be the first type of doctor that people think to ask about sleep apnea or better breathing, but orthodontists are some of the best doctors to see for opening up a constricted airway.

Many times, the issue of an airway narrowing or closing during sleep is directly due to the shape of the palate and the position of the tongue. What orthodontists can do is widen the palate, either with certain types of expansion appliances for children or through surgery with adults.

Orthodontists can also advance the lower jaw, bringing it more in harmony with the upper jaw and allowing the airway to open up. By bringing the lower jaw forward, the tongue moves forward too, and away from the back of the throat. This causes the airway to open more.

Even if a patient is treated for sleep-disordered breathing with a separate surgical procedure, such as a tonsillectomy or adenoidectomy, the removal of those lymph nodes may not be enough to open up the airway. Sometimes you need to do skeletal changes as well,

8 MM Pithon et al., "Do dental esthetics have any influence on finding a job?" *Am J Orthod Dento facial Orthop*, October 2014;146(4):423–9. doi:10.1016/j.ajodo.2014.07.001.

adjusting the jaw and palate to move the tongue forward and away from the back of the throat.

SLEEP APNEA/SLEEP-DISORDERED BREATHING AND ADHD

According to the National Sleep Foundation, attention-deficit/hyperactivity disorder (ADHD) “is linked with a variety of sleep problems,” including sleep-disordered breathing.⁹ The article went on to quote from a study published in the *Journal of Sleep Research*, which “found that treating sleep problems may be enough to eliminate attention and hyperactivity issues for some children.”¹⁰

The article also brought up the potential link between sleep problems and ADHD in adults, quoting an additional study in which “researchers compared adults with narcolepsy, idiopathic hypersomnia, and ADHD and found a high percentage of symptom overlap, suggesting the possibility of ADHD misdiagnosis among adults.”¹¹

Children and adults alike who have been diagnosed with ADHD should seriously consider seeing an ear, nose, and throat (ENT) doctor, as well as having a sleep study and an orthodontic evaluation done. Over the years, I’ve known several patients with ADHD and behavioral issues who were evaluated for sleep apnea and treated orthodontically. In turn, their ADHD or behavioral issues just disappeared.

9 “ADHD and Sleep,” National Sleep Foundation, accessed September 2017, <https://sleepfoundation.org/sleep-disorders-problems/adhd-and-sleep>.

10 S. Shur-Fen Gau, “Prevalence of sleep problems and their association with inattention/hyperactivity among children aged 6-15 in Taiwan,” *J Sleep Res*, December 2006:15(4):403–1. doi:10.1111/j.1365-2869.2006.00552.x.

11 M. Osterloo et al., “Possible confusion between primary hypersomnia and adult attention-deficit/hyperactivity disorder,” *Psychiatry Res*, August 30, 2006:143(2–3):293–7. doi:10.1016/j.psychres.2006.02.009.

This whole area of sleep apnea and ADHD is still relatively new, and there are many studies being done to discover the link between sleep and ADHD. However, there are more and more cases every year that show orthodontic treatment creating improvement in sleep and, consequently, improvement in the patient’s ADHD.

MAIN CAUSES OF SLEEP APNEA

There are two main causes of sleep apnea:

1. A complication with the central nervous system (CNS)
2. A structural obstruction, such as enlarged tonsils

CNS-oriented sleep apnea is rare and is typically caused by a brain disorder that doesn’t allow the patient to sleep well. Instead, the vast majority of patients with sleep apnea have some type of structural obstruction, usually from soft tissues such as the adenoid (the large tonsil at the back of the nasal cavity), the tonsils, or the nasal turbinates (tonsil-like ridges of tissue that line the inside of the nose). If any of these soft tissues become enlarged or constricted, they can block airways and make breathing difficult. The tongue can also cause hindered breathing if it becomes enlarged and/or falls to the back of the throat during sleep.

Allergies can play a significant role in sleep issues. Allergies can cause inflammation, especially if those soft tissues block airways, forcing breaths through the mouth and possibly contributing to difficulty sleeping. For children, especially very young children, regular allergies that result in mouth-breathing can have a negative effect on their palate development.

If children can breathe through their nose, for instance, then their mouth is closed and their tongue naturally presses against their palate, helping to shape it as it develops. If the mouth is

open, however, whether from allergies or anything else, the jaw will naturally sit further back during sleep, which may prevent the palate from expanding. At the same time, the developing soft tissue, such as the tonsils and adenoid, will be more inclined to follow gravity and grow down and back, potentially reducing the size of the airway. Then, if the tongue follows and starts to sit more in the back of the throat, the airway can become even more constricted.

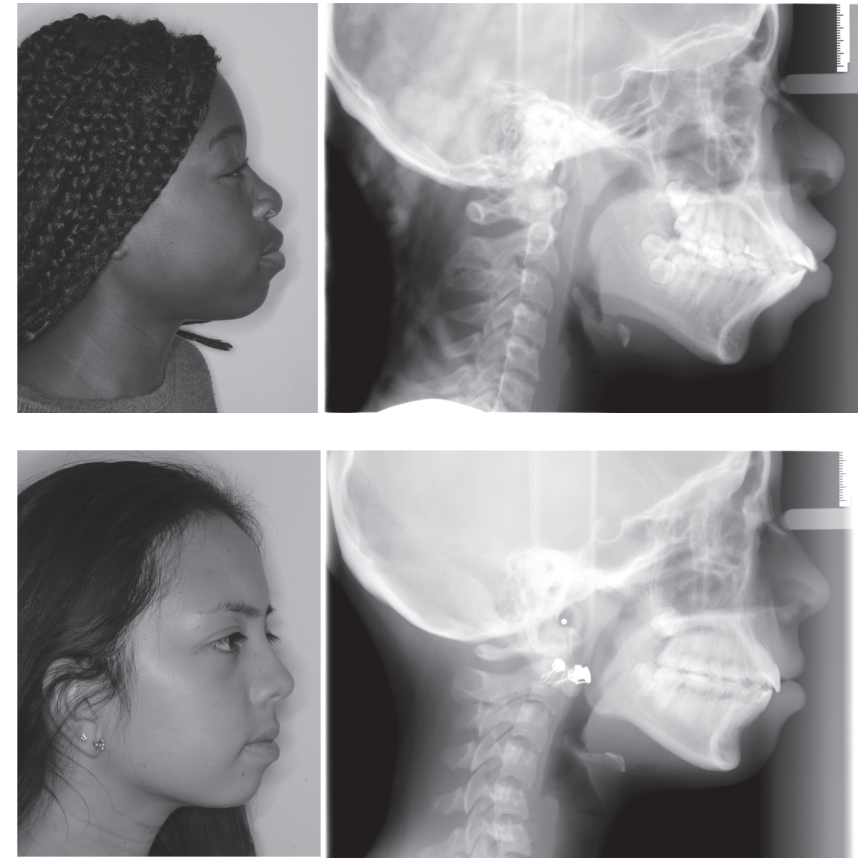
Being overweight can also contribute to these problems, as the additional mass can enlarge the soft tissues and make the situation worse. A person who might only have mild sleep apnea but is overweight may develop moderate sleep apnea because of it, though you don't need to be overweight to have sleep apnea.

In most cases, however, if a CNS issue isn't causing the sleep apnea, then improving the width of the palate can treat the condition. This not only helps open up the back of the throat but also gives the tongue more space. At the same time, advancing the lower jaw can also open up that space and improve breathing.

CREATING FACIAL BALANCE

Orthodontics can also do a lot to improve facial balance. For example, lip competence—your ability to close your lips together just by closing your mouth—and lip profile can both benefit from orthodontic treatment.

Reducing the angle at which the front teeth stick out can often treat lip competence and profile issues, particularly in patients suffering from a condition called *bimaxillary protrusion*, or the tendency of both jaws to jut out in a way that makes the lower half of the face look like it's pressing outward.

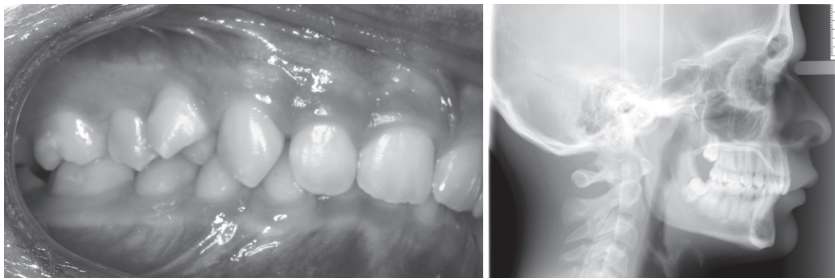


Patients exhibiting bimaxillary protrusion and lip strain. Notice the flexing of the muscles around the chin in order to close the lips.

With bimaxillary protrusion, patients often have to forcefully flex their lip muscles together to close them. Over time, this can cause their muscles to produce a kind of dimpled-chin look, also known as the “golf ball effect.” By moving the teeth together into better alignment with the skeletal structure, the lips and soft tissue structures can return to their ideal positions, resulting in better lip competence and profile.

Patients with the opposite condition, where the teeth lean too far back into the mouth, can also benefit from bringing the teeth

into proper alignment and giving them a little more projection and support.



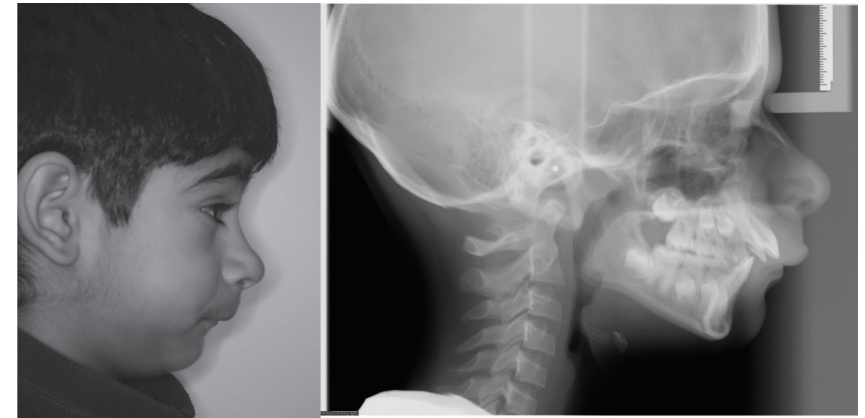
Notice how the front teeth are tipped inward and creating a deep overbite.

Additionally, there are patients who come in with narrow arches; one of their chief complaints is that others can see a lot of their teeth when they smile. In a lot of these cases, what orthodontists can do is widen the arch in a way that keeps the smile harmonious with the lips and soft tissues while also allowing the teeth to fill in the smile comfortably, ultimately giving the patient a wider and more pleasing smile.

There are several things orthodontists can do without surgery to affect facial profile. If the jaw is too far back, orthodontists can advance it to give the chin more projection. If the mid-face is too far back, such as with an underbite, an orthodontist can adjust the upper jaw so that it grows forward, giving the mid-face a little more projection and bringing the jaws in line with each other and with the skull.

We can make even more drastic changes with orthodontic surgery. Patients with “gummy” smiles, for instance, are often suffering from an over-eruption of front teeth, in which the teeth have grown downward too far, bringing the gums with them. To correct this, orthodontists can move the teeth back to a more ideal

position, bringing the jaws into harmony. The gum line will naturally follow the teeth, resulting in a smile that shows much less gum. If needed, the patient can also undergo orthognathic (corrective jaw) surgery, which involves moving the whole jaw up so that the front teeth aren't excessively lower down.



Notice the dramatic change in the patient's profile due to orthodontic treatment.

We can also take care of the reverse, where the teeth show very little when the patient smiles because the upper jaw is so high up. In most

of these cases, the teeth can be moved down orthodontically, though some more severe cases may require surgery.

TREATING TMJ PAIN

A lot of the time, TMJ—*temporomandibular joint*, or simply the *jaw joint*—problems are caused by a number of problems, but one of the biggest factors is the patient's parafunctional habits: mouth/jaw habits apart from chewing, such as clenching or grinding.

When you have a poor bite, these parafunctional habits can cause much more harm. Grinding and clenching will have far more impact on the condition of the teeth and may lead to TMJ issues. While patients with a poor bite may not have TMJ issues, they are more likely to suffer from them, especially if they suffer from parafunctional habits.

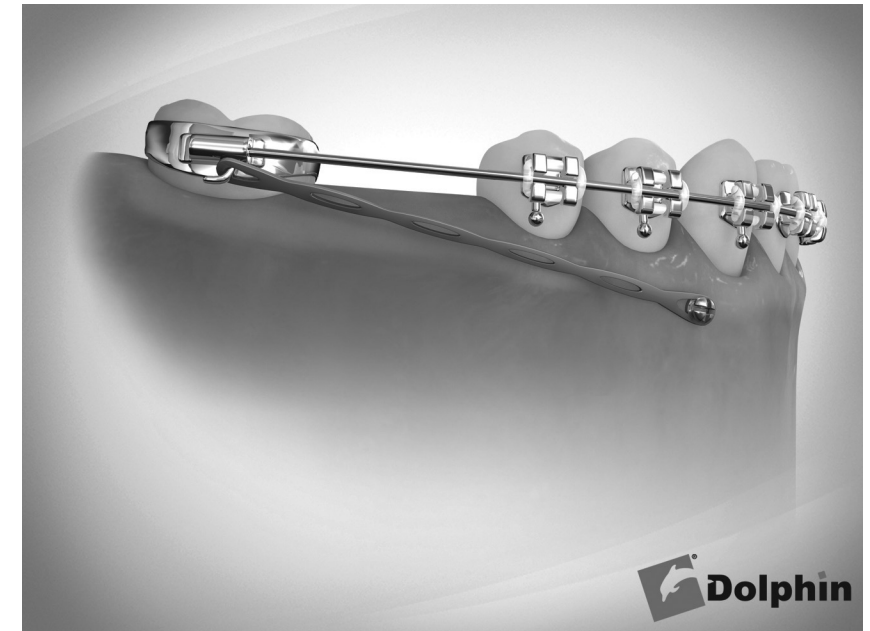
ADVANCEMENTS IN TOOTH MOVEMENT

Since the early 2000s, the use of temporary anchorage devices, also known as TADs or TOADS (temporary [orthodontic] anchorage devices), has made moving teeth much easier and much less cumbersome for patients.

In the past, orthodontists would need to use external anchorage devices to move teeth, like headgear or face masks, or they'd have to pull on other teeth, which could lead to unintentional movement of the anchor teeth. With TADs, however, you can insert the small, screw-like device in the jawbone and move the teeth just by anchoring them to it.

If a tooth needs massive restoration, such as a root canal and crown, an orthodontist may recommend removing the tooth and

closing the space with a TAD instead of going through the restoration process.



I've had several cases where patients thought they needed implants, and we were able to close the space with TADs instead. Several adults a year come for orthodontic treatment because of their bite before getting an implant, and in many of those cases, we were able to close that space instead. Kids will also visit with missing teeth and a recommendation from their dentist that they get an implant when they're older, maybe around seventeen or eighteen. But just as with the adults, there's a strong likelihood that we can close that space with TADs, and the child wouldn't need to worry about implants down the road.

Orthodontic Realities

EXTRACTION MAY BE THE BEST OPTION

Even with healthy teeth, extractions are sometimes necessary and may even be the best thing you can do for your mouth.

Once a person turns six or seven, and the first molars erupt in the mouth, the spacing of the teeth in the jaw is pretty much set, even though the jaw and body will continue to grow. So, from there on out, it's a question of how large or small the new, permanent teeth will be in relation to the jaw. As the teeth erupt, they'll either all be able to fit in the jaw, or they won't.

In a lot of cases, you just can't fit all the teeth in the jaw because there's too much tooth mass, which leaves you with two options: shaving down teeth to make them thinner, or extracting teeth to create more space within the jaw.

The reason for this overcrowding typically has to do with the size of the jaw and the size of the teeth not matching up. If teeth are trying to squeeze into the jaw, and there's not enough space in the bone, the teeth will naturally push to the outer edges, making them more susceptible to gum and bone recession, and periodontal problems. Such overcrowding also makes the mouth a lot more unstable. As the teeth crowd up, they automatically receive more pressure from the lips and cheeks, which want to push them back in.

Of course, the reverse can be true as well. If the teeth grow too far inward, it can create too much pressure on the tongue, causing it to push the teeth back out in a way that can result in awkward angling and gaps. This can also happen when a patient has a very large tongue. In most people, the teeth will erupt into a position that is at equilibrium (in balance) between the cheeks, lips, and tongue.

Ideally, the teeth should grow in a way that keeps them in an ideal position not only within the bone, soft tissue, and gums, but also between the tongue, lips, and cheeks to achieve a natural equilibrium. This will create a more stable result over the long term. Sometimes, this harmonious ideal can only be achieved with extraction.

THE LIMITATIONS OF JAW EXPANSION

There's a common misconception that expanding the jaw is better than extraction for relieving overcrowded teeth, but there are a few limitations to this approach. First, the lower jaw is made of a single, solid bone and cannot be expanded. You can move the teeth outward to expand the arch of teeth. In doing so you will gain approximately 1 mm of arch length space for every 3 mm of expansion.¹² This is not a very good ratio. The other problem is that the teeth are healthiest sitting in the middle of the bone, not on the outer edges of the bone.

The second principle one must consider is that of a coordinated upper and lower jaw. While the upper jaw can be expanded during the growing years, it still needs to coordinate with the lower jaw (which cannot be expanded). For example, if the upper jaw is 4 mm too narrow to coordinate with the lower jaw, then expanding the upper jaw by 4 mm would be advisable, but as studies have shown, this will only gain 1–2 mm of extra arch length in the upper arch.¹³ Sometimes teeth just have to be extracted in order for them to all fit within the bone structures. It could be that the teeth are overcrowded, but the upper jaw is already expanded as far as it will go, or it's already in harmony with the lower jaw, which can't be expanded.

12 Nicholas Germane DMD et al., "Increase in arch perimeter due to orthodontic expansion," *AJO-DO* 100, no. 5 (November 1991): 421-27, [https://doi.org/10.1016/0889-5406\(91\)70081-7](https://doi.org/10.1016/0889-5406(91)70081-7).

13 Ibid.

Even when expansion is performed to help reduce overcrowding, it doesn't create a lot of space. For example, a typical result for expansions is about 1 mm of arch length for every 3 mm of expansion. A typical expansion is anywhere from 6 to 10 mm, so the most you can expect to get is around 3 mm of extra arch length—about the height of two stacked pennies.

Of course, you can increase that space by shaving teeth through a process called *interproximal reduction*. This is much more effective at gaining arch length than expansion. If you were to shave half a millimeter off each of your front eight teeth (a very safe amount of enamel reduction), you could gain another 4 mm of space. But sometimes even that isn't enough to relieve crowded teeth. To gain 4mm of arch length through expansion, you would need approximately 12 mm of expansion. That's a lot of expansion to the upper arch, and it still needs to be coordinated with the lower arch.

With tooth extraction, however, you can quickly gain anywhere between 14 mm and 16 mm of extra space within the jaw simply by removing two teeth.

SPEECH IMPEDIMENTS: EXPANSION IS NOT ALWAYS AN INSTANT FIX

Even though I spoke earlier in this chapter about speech impediments and how the skeletal structure of the mouth can influence them, expanding the palate and bringing the bite closer to the ideal is often only the beginning. The adjustment may help improve speech and correct the discrepancy so they're able to make sounds easier, but patients may still need speech therapy.

WE'RE NOT PLASTIC SURGEONS

Although orthodontists can affect the aesthetics of a smile and even improve lip posture and profile, we still can't make a person look radically different. Instead, the changes in facial appearance are going to be more subtle. The major changes are mainly seen in the patient's smile. The soft tissue of the lips, cheeks, chin, and nose are not changed.

The teeth and smile could look totally different, but when it comes to creating facial harmony, the patient is inevitably going to come out of it looking pretty much like the same person.

ORTHODONTICS IS NOT ONE-SIZE-FITS-ALL

Even though advertising and the media may make it seem as though teeth can be perfected in no time and with the same, simple procedures, this just isn't true. Orthodontics and dentistry in general are not one-size-fits-all. There are "procedures" that advertise straight teeth in as little as six months. These procedures are mainly touted by general dentists and there is nothing magical or special about these treatments. Any orthodontist can straighten the front teeth in six months. What the advertisers fail to mention is that the bite and jaw relationships are not addressed in these procedures. The complexity of most cases comes from trying to achieve a good bite and establish the proper relationships between the teeth and jaws and create a good facial balance.

I have many patients ask for certain treatment, such as Invisalign or expanders, and when I don't recommend it, they want to know why. Other patients may want their teeth straightened, but they don't want extractions, because none of their friends who had their teeth straightened needed it. I try to tell all my patients that, simply put, we're all unique. Braces or expanders may have one effect on one

person and a different effect on another, so we can't always apply the same treatment to every patient.

Chapter 2 Summary

- In some cases, just straightening out the front teeth may actually take a bite from bad to worse.
- Correcting a bite is often far more complex than just putting on braces and often takes much longer than six months to complete.
- An ideal functional bite leads to a cleaner mouth, a more aesthetically pleasing smile, healthier jaw joints, a more balanced profile, and good chewing and speech functions.
- Bite complications can affect speech, making it difficult to pronounce certain sounds, such as *t*, *n*, and *d*, or causing an audible hissing effect on sibilant sounds such as *s* and *z*.
- Orthodontic treatment can improve self-esteem and confidence, and help patients engage and participate in every aspect of their life, potentially including their job prospects.
- Orthodontic treatment has been shown to help with sleep apnea, a condition some studies have linked to ADHD.
- Even with healthy teeth, extractions are sometimes necessary, especially when it comes to overcrowding.
- The upper jaw can be expanded, but the lower jaw cannot—it can only be repositioned.

- The same procedure will work differently for each patient. There is no one-size-fits-all treatment that provides the same results every time.