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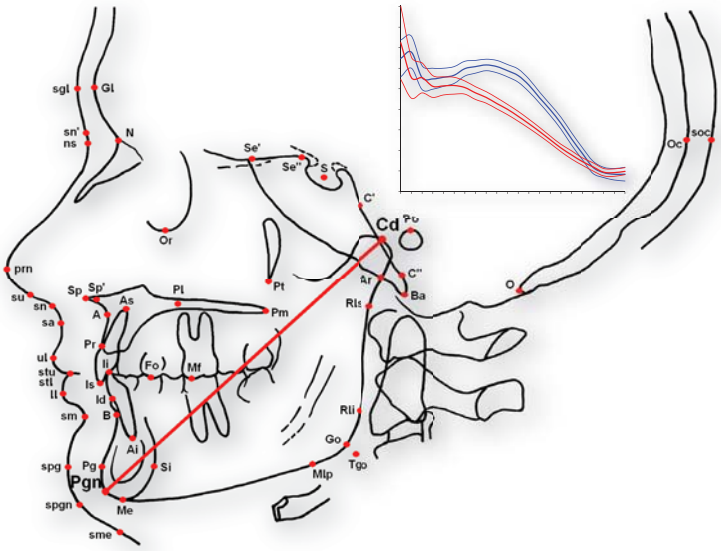
MARJUT EVÄLAHTI

CRANIOFACIAL GROWTH AND DEVELOPMENT OF FINNISH CHILDREN — A LONGITUDINAL STUDY



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Craniofacial Growth and Development of Finnish Children

A longitudinal study

Marjut Evälahti

ACADEMIC DISSERTATION

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Dedicated to the children and parents
in the longitudinal "Mother-Child Study"

CONTENTS

ABSTRACT

The amount, velocity, timing, and sensation of growth of the craniofacial complex are of interest to clinicians, researchers, and individuals alike, with different populations around the world exhibiting variation.

The aims of this study were: to generate population-standard values for craniofacial growth and development in Finns from 4 to 25 years of age as well as to investigate population-specific features regarding growth timing and velocity.

This work was based on the prospective Helsinki Longitudinal Growth Study conducted between 1967 and 1994. At the end of the study, when the subjects were examined as a group for the last time, 190 participants, young adults at the time, had remained in the study. Most of them were then aged 24 to 25, the youngest ones being 19 to 20 years of age. After the exclusion of children treated for orthodontics, 105 subjects, 50 boys and 55 girls, formed the final study group of untreated healthy individuals. The present study is based on 551 cephalograms taken from these individuals between the ages 4 to 25 years. This equated to 3 to 8 lateral skull radiographs of each child, with an average 5.2 radiographs per child. These radiographs were analyzed with a computer program specially developed for this study. Tables, growth curves, growth velocity curves, and change curves were created for reference values of Finnish children to describe their size, shape, dimensions, and respective changes.

Findings are that Finnish children have a strong closing growth pattern and square facial form when compared to those of other populations, notably British children. Sexual dimorphism appeared in the findings, with males showing more pronounced closing in their pattern of growth and a more distinct mandibular pubertal growth spurt than females. Late or residual growth between ages 20 and 25 years occurred in many variables, especially in males.

It is hoped that these data will be useful to clinicians, researchers, and individuals as a reference sample for Finnish normal craniofacial growth.

1. INTRODUCTION

Craniofacial growth has been under intensive study for a long time, first anthropometrically and almost for a century also cephalometrically, and more recently regarding soft tissues, by photogrammetric analyses (Wen et al. 2017). Growth charts on the basis of cephalometric data have been created in various parts of the world for the growth of individuals and for population growth; mainly for Caucasians, African Americans, and Asians in cross-sectional and longitudinal studies (Hunter et al. 1993; El-Batouti et al. 1994; Thilander et al. 2005; Moon et al. 2013). In early studies, groups were often very small or non-homogeneous, and the same norms served all over the world.

Currently accepted standard is that a population study to create craniofacial reference values is most useful and valuable when it is performed among a representative sample of one ethnic group living in the same geographic area, to minimize the influence of environmental factors on growth. In our rapidly globalizing world, ethnic groups are becoming more and more mixed, but that phenomenon may also have a long historical background. For instance in the most recent published longitudinal study on craniofacial growth, the subject Columbian Mestizo population is a mixture of Amerindians, Africans, and Europeans (Jimenez et al. 2020). Still, it is important that reference values for different ethnic groups are available to study and compare similarities and eventual differences between them, and, most importantly, to be able to distinguish between those who are healthy and those in need of treatment. At least theoretically, as populations become more mixed, one may find it important to start creating new mixed reference values, which is non-trivial and time-consuming.

Longitudinal craniofacial growth studies based on roentgen cephalometry are no longer allowed in healthy individuals for ethical reasons. Therefore, new descriptive population studies using roentgenologic means are impossible, making every existing growth study extremely valuable and worth being presented. Each such study should also be included in a world database directory at some timepoint to be available for general use. In the future, even when new non-invasive techniques are utilized to investigate human growth, it still takes 25 years to study the growth of a child, and until then, the earlier formats remain indispensable. The growth of the cranial-facial complex of healthy and orthodontically untreated Finnish children has not been analyzed in a longitudinal setting before this thesis. It is, and will remain, the sole source of comprehensive lateral radiographic data on the craniofacial growth of Finnish children up to early adulthood.

2. REVIEW OF THE LITERATURE

2.1 Historical aspects of craniofacial research in Finland

2.1.1 TURKU APPROACH

Finland has long traditions in craniofacial growth research. Koski and his research in craniofacial growth have been world renowned since the 1950's (Koski 1951). Koski, in researching widely different aspects of craniofacial development, studied anthropology, craniometry, and cephalometrics, and wrote articles about their connections (Koski 1968; Koski 1985). He developed a cephalometric circle method and other analyses. However, his most important findings came from histological animal studies in rats, where he studied especially mandibular and condylar growth, but in addition, growth of cranial base synchondroses (Koski and Rönning 1969; Koski and Rönning 1970; Koski and Rönning 1971).

Koski delivered the first Sheldon Friel Memorial Lecture on the mandibular complex at the Congress of the European Orthodontic Society (Koski 1974). Several of his studies were carried out together with Rönning, who later became the lead investigator in Turku (Rönning 1991).

Other students of Koski in craniofacial growth research include Isotupa, Vinkka-Puhakka, Peltomäki, and Kylämarkula, continuing the animal studies on mandibular condyle and growth cartilages (Isotupa and Koski 1991; Peltomäki et al. 1997). Peltomäki later disseminated his study field to the Universities of Zurich, Tampere, and Eastern Finland (Kawashima et al. 2002). Varrela compared modern man to 200-year-old human skulls from Finland and found that the early craniofacial skull pattern was very square and more closed in its growth rotation than in modern day Finns (Varrela 1990). Along with Rönning, the University of Turku studies continued later at the University of Oulu, in northern Finland. There, Kantomaa (Kantomaa and Rönning 1985) and Pirttiniemi extended the histological condyle studies in rats, Pirttiniemi especially studying condylar growth that leads to mandibular deviation (Pirttiniemi et al. 1996; Pirttiniemi et al. 2009). Huggare studied the effect of cold climate and nasorespiratory function on head posture (Huggare 1987; Huggare and Laine-Alava 1997). Using cephalometrics he observed that Finns living in the colder northern regions of the country had craniofacial morphological differences when compared to Finns in the more temperate south, even though the magnitude of these differences was small. His work also highlighted the importance of natural head posture (Huggare 1993).

2.1.2 HELSINKI APPROACH

Researchers at the University of Helsinki have studied extensively the molecular and genetic aspects in craniofacial growth and development. Already during the 1970's Haataja was providing investigators with many of the original ideas, for instance that molecular biology would be the path to follow in the future. Haataja himself and Ranta were in the field of cleft lip and palate (Haataja et al. 1971). Essential to the present work is that Haataja was the initiator of the whole Helsinki longitudinal study and led it for its first 15 years. Haavikko assembled a vast, cross-sectional, unselected collection of dental panoramic tomograms and lateral cephalograms, which have served as controls in many studies (Haavikko and Rahkamo 1989). Haavikko herself concentrated on development of the dentition (Haavikko 1970). Pirinen (formerly Myllärniemi) analyzed dentitions in over 1,600 Finnish children under age 16 (Myllärniemi 1970), and afterwards became a lead researcher collaborating with the Children's Hospital at Helsinki University Hospital, investigating rare diseases and their craniofacial and somatic growth with pediatricians (Pirinen 1995; Pirinen 1998).

The most famous Helsinki investigator is Thesleff, whose focus has been the genetic and molecular regulation of craniofacial development, notably tooth development using embryonic mouse teeth as the model system (Thesleff 2003). Together with Rice, Thesleff also investigated the molecular mechanisms regulating craniofacial bone development in particular suture formation (Rice et al. 2000; Rice 2008). Orofacial clefting has been studied in its many aspects in Finland (Ranta et al. 1985; Hurmerinta et al. 1997; Rice et al. 2004; Heliövaara et al. 2019). Hurmerinta has been studying clefts in respect to trying to induce lengthening in the craniofacial structures by distraction osteogenesis (Hurmerinta et al. 2004; Gürsoy et al. 2008). Waltimo-Sirén has investigated craniofacial features in rare genetic diseases, particularly in osteogenesis imperfecta by cephalometry (Waltimo-Sirén et al. 2005). These studies also include longitudinal craniofacial growth investigations (Arponen et al. 2012).

The tradition of craniofacial growth research in Finland continues in the present thesis, albeit from a more clinical point of view.

2.2 Aspects of the Helsinki longitudinal growth study

To date, the Helsinki longitudinal growth study has concentrated on several important aspects for the benefit of Finnish dental research. Nyström has intensively studied dental development, with much international cooperation (Nyström 1982; Nyström et al. 2000; Nyström et al. 2001; Chaillet et al. 2004).

Among this group of young individuals, Alaluusua made a study on caries and *Streptococcus mutans* in primary teeth (Alaluusua et al. 1987), and Asikainen surveyed the subgingival microflora and periodontal conditions in healthy teenagers (Asikainen et al. 1986).

Könönen with his group studied tooth wear (Könönen et al. 2006) and temporomandibular disorders and psychosomatic symptoms (Suvinen et al. 2004).

2.3 Craniofacial research in other Nordic countries

Craniofacial research has been very active, wide, and abundant in Nordic countries. The most famous is Björk, who carried out his world-renowned investigations with metallic implants in 1955-1983 in Copenhagen, Denmark, to explore how the craniofacial complex grows between 5 and 25 years of age. He collaborated actively during those years, and led numerous scientists into the field of craniofacial growth (Björk 1955; Björk 1963; Björk 1966; Kreiborg et al. 1981; Skieller et al. 1984).

Melsen, from Århus, Denmark, has likewise had a long path in orthodontic research. Her work on cranial base development is considered a classic (Melsen 1974). Studying autopsies of 0 to 20-year-old individuals, she showed the growth patterns of cranial base structure, identifying the areas of resorption and apposition, and the important development of spheno-occipital synchondrosis.

Solow, from Copenhagen, was active in many fields of orthodontic research, and studied head posture and its effect on craniofacial development and many other aspects of growth (Solow and Siersbaek-Nielsen 1986; Solow and Houston 1988; Iseri and Solow 1990; Tallgren and Solow 1991; Solow and Sandham 2002).

Thilander, from Gothenburg, Sweden, created among other things the roentgen-cephalometric standards for a Swedish population between the ages of 5 and 31 years together with Persson and Adolfs-

son. In a highly important piece of research, she, together with Persson, also constructed templates to follow the growth (Thilander et al. 2005). Additionally, she performed a longitudinal study from the age of 5 to 31 years, concluding that vertical growth of the face and eruption of the dentition occurs well into adulthood (Thilander 2009). The students of Thilander, Kiliaridis (later in Geneva, Switzerland), and Katsaros (later in Nijmegen, the Netherlands, and Bern, Switzerland) introduced the effects of environment to their studies by investigating how a hard or a soft diet changes the facial morphology. With a hard diet, the face develops a squarer form and shows a more closing type of growth pattern (Kiliaridis 1995; Katsaros et al. 2002). They also correlated changes in the craniofacial sutures with alterations in hard and soft diets (Katsaros et al. 2006).

The Lundström family, in three generations of Swedish orthodontists, have given a great contribution to orthodontics (Lundström and Lundström 1992). Anders Lundström also collaborated with many other investigators like Woodside from Canada and Linder-Aronson (Woodside et al. 1991). Linder-Aronson is known for his wide studies of adenoids in Scandinavia (Linder-Aronson 1970; Linder-Aronson 2018).

Ekström presented in his thesis facial growth rate by the growth of the mandible, and its relation to somatic maturation in healthy Swedish children between 7 and 18 years of age (Ekström 1982). McWilliam in Sweden introduced photographic subtraction as a tool for longitudinal cephalometric growth studies, but that is most valid over a short period of time (eg. one year) rather than over many years (McWilliam 1982). Sheldon Peck from Boston, USA, has worked in close contacts with Swedish researchers including Lundström (Peck 2010). Over the years, Peck has conjoined the art and science of facial esthetics together in his studies. Leena Peck from the Helsinki longitudinal research group worked alongside Sheldon Peck to achieve that goal (Peck and Peck 1995).

Berg from Norway used Nittedal (a place near Oslo) material to describe the dentofacial growth of Norwegian children between 6 and 12 years of age according to various types of occlusion (Berg 1983).

From the University of Oslo, Norway, appeared the longitudinal cephalometric studies by Axelsson et al. for cephalometric standards in the neurocranium and sella turcica (Axelsson et al. 2003; Axelsson et al. 2004). Kjaer from Copenhagen, Denmark, was a visiting scholar for these two Norwegian studies. Kjaer herself made extensive craniofacial studies on autopsy material (Kjaer and Graem 1990; Eriksen et al. 1995).

2.4 Somatic growth

The first growth and weight standard charts for Finnish children came into use in 1959 and were published in 1966 (Hallman et al. 1966). During that same period, Tanner and his group created standards from birth to maturity for height, weight, and their respective growth velocities in British children (Tanner et al. 1966). These standards have been very widely used around the world. The Finnish growth and weight standard charts have been partially updated, to reflect the earlier onset and extent of children's growth (Sorva et al. 1989).

Normal somatic growth was under intense study in Finnish children in the 1980's, thus generating normative growth data (Sorva et al. 1984; Sorva et al. 1990) Perheentupa J, personal communication 2002). Among modern extensive somatic growth studies, some have resulted in the development of contemporary growth references (Saari et al. 2011). Based on measurements of individuals from

Espoo, Finland, the cohort is considered to be a representative genetic mixture of ethnic Finns, so the growth curves are thus applicable in the whole country (Saari et al. 2011).

Two well-known phenomena are involved in population-specific growth norms. One is the secular trend, a reason to update normative values, and the other is the difference between urban and rural areas. The height of an individual is determined by a number of factors, such as genetic predisposition, hormones, morbidity, and nutrition among other environmental factors. The latter are putatively the reason for the secular trend, that is to say differences in children growing up in different environments. Also in Finland, children in large cities like Helsinki tend to grow taller and mature quicker than do children in rural areas (Bäckström-Järvinen 1964).

The people of the Nordic countries are among the tallest in the world. Positive secular changes in height occur in four Nordic populations: Danes, Finns, Norwegians and Swedes. The trend is still ongoing; from 20th to 21st century, females show a height increase of 4 to 7 mm/decade and males 5 to 15 mm/decade, respectively (Holmgren et al. 2019). A comparative study of twin cohorts in eight countries, showed that in general only minor differences occur in the genetic architecture of height between Caucasian populations, especially among men (Silventoinen et al. 2003).

The view is that facial skeletal growth is concurrent with general growth (Hunter 1966; Mellion et al. 2013). In Switzerland, Patcas et al. have been studying the relationship between statural and mandibular growth. According to Patcas the condylar and symphyseal landmarks should be preferred over the gonion in investigating the growth of the mandible (Patcas et al. 2016). The same question was already of interest to Bishara and his co-workers some decades earlier. They concluded that the statural height increment and mandibular growth show different profiles but are both more pronounced in boys than in girls (Bishara 1981). They discussed their findings in the context of clinical orthodontics, saying that prediction of the mandibular growth spurt appears to be difficult if based on changes in statural height, and that marked inter-individual differences occur in the timing and extent of the growth of the mandible. Therefore, postponing the start of functional treatment of skeletal discrepancies to the pubertal growth spurt may not take full advantage of growth potential in light of their findings (Bishara et al. 1981). Analysis of vertical height increase in various dentoalveolar regions shows differences between early and late pubertal growth periods, as analyzed from hand-wrist radiographs, with more increase occurring during early growth (Arat and Rübendüz 2005), but here tooth eruption may play a significant role. In the same series, but divided into three skeletal maturation groups based on hand-wrist radiographic records, the groups revealed no differences in the increase of posterior cranial base length or vertical increase in facial dimensions (Arat et al. 2001).

2.5 Cephalometrics

2.5.1 BEGINNING AND SPREADING OF CEPHALOMETRICS

Cephalometrics, the study of cranial structures by means of radiographic imaging with cephalostat and measuring cephalograms, was first developed in the United States of America by B.H. Broadbent in 1931 (Broadbent 1931). This major advancement was seminal in opening up a whole new world in study of bony and soft tissue structures of the head. It also made America the leading country in craniofacial research, with many cephalometric analyses being developed there. Then came the much-used analyses by Downs, Steiner, and Ricketts (Downs 1948; Steiner 1953; Ricketts 1981). Later, very popular and still much used, is the analysis by McNamara from the University of Michigan, Michigan,

USA (McNamara 1984). In all, there have been hundreds of analyses developed or modifications to existing analyses.

Halazonetis, from Greece, has developed cephalometric, morphometric, and model analyses extensively with his ViewBox programing in 2D- and 3D techniques. These tools have proven to be invaluable to many research groups all over the world (Cocos and Halazonetis 2017; Katsadouris and Halazonetis 2017).

2.5.2 LONGITUDINAL GROWTH STUDIES

The use of the roentgen cephalometrics gave a start to the great longitudinal-growth studies in North America. The review by Hunter et al. describes the 12 largest and most important longitudinal studies (Hunter et al. 1993). These have been collected into a common database by the American Association of Orthodontists Foundation (AAOF), the AAOF Legacy Collection (AAOF). This resource is available on a complimentary open-access basis. The AAOF warmly hopes for the addition of further collections. Baumrind and Curry have published an overview of that collection (Baumrind and Curry 2015). Baumrind and co-workers have also been investigating the landmark- and measurement identification and reliability in the collection (Baumrind and Frantz 1971a; Baumrind and Frantz 1971b).

The Bolton Broadbent Study is the largest, with 5700 subjects forming 850 longitudinal record sets. It is very much used and well renowned, with a template method (Broadbent et al. 1975). Thompson and Popovich carried out a longitudinal evaluation of the Burlington Growth Center data in 1977, including sex- and growth-type-specific templates of facial growth from the age 4 to age 20, based on serial radiographs of 120 males and 90 females (Popovich and Thompson 1977; Thompson and Popovich 1977). The Burlington sample has 1632 subjects in total, also including siblings and parents. In the Forsyth Twin Study from Boston, USA, Morrees collected a remarkable number of records of twins, approximately 200 sets of age-matched siblings and 225 parents, totaling about 600 sets.

The Michigan Growth Study has produced the world-famous Atlas of Craniofacial Growth 1974 (Riolo et al. 1974). Moyers was in charge of this study for many years, and now it is under the care of McNamara, who has produced high-quality follow-up research. The sample size is 191 subjects of ages ranging from 5 to 18 years.

The Fels Growth Study in Ohio consists of 9500 lateral head films from 400 subjects. The Krogman Philadelphia Study is a mixture of many different records, with subsamples consisting of 600 healthy Caucasian and African-American children, plus children with cleft palate. The Oregon Health Sciences University Study with 409 sets is a mixed longitudinal study from age 3 to 18 years, with some records that are even up to the age of 30 years. These are among the largest studies comprising samples of normal children (AAOF) (Hunter et al. 1993).

The most recent longitudinal study on craniofacial growth was published in 2020 based on cephalometric serial data on Mestizo in Columbia and forming the only respective study from South America (Jimenez et al. 2020). Likewise, longitudinal studies on normal growth from Asia are rare, but one has recently been performed in Korea (Moon et al. 2013). On the Australian continent, Townsend has conducted longitudinal growth studies focused on differing aspects , notably on twins (Townsend and Brook 2014).

In Europe, a large longitudinal growth study was collected by Leighton in London, UK. Bhatia and Leighton produced a manual of facial growth in 1993 for the use of orthodontists (Bhatia and Leighton 1993). In the 1970's, Prahl-Andersen from Holland and co-workers published a mixed-longitudinal study on the growth of 4- to 14-year-old Dutch children (Prahl-Andersen and Kowalski 1973). In 2001, Verbeek from the Netherlands and Evälahti from Finland compared data from the longitudinal Groningen Elementary School Study and the present longitudinal Helsinki growth study in three different age groups, finding significant differences (Verbeek and Evälahti 2001). In London, UK, McDonald, together with Bondarets from Russia, used Multilevel Modeling applications to examine facial growth in severe hypodontia, with reduced vertical dimensions, and in ectodermal dysplasia a growth tendency towards CL III with anterior growth rotation. (Bondarets and McDonald 2000; Bondarets et al. 2002). Moreover, a longitudinal facial growth study has also come out of Turkey, but the ethnicity of the study subjects could not be verified from the reports (Arat et al. 2001; Arat and Rübendüz 2005).

A longitudinal approach to study of facial development has also been applied in all Nordic countries, including Finland (the current study). Björk, with Skieller, in Denmark performed the classic studies where metallic implants served as reference points (Björk 1955; Björk and Skieller 1983). Notably, craniofacial growth has also been under study in ethnic Norwegians (Berg 1983; El-Batouti et al. 1994), Swedes (Thilander et al. 2005), and Icelandic children and adolescents (Thordarson et al. 2006). In the Icelandic study, radiographic recordings were restricted to two ages: 6 and 16 years.

A compilation of selected studies with longitudinal data on craniofacial growth is in Table 1, presenting them in alphabetical order by name of study or of first author.

2.5.3 LONGITUDINAL GROWTH STUDIES REVISITED

Because of the harmful effects of ionizing radiation, healthy individuals are no longer ethically allowed to be recorded by cephalometry solely for the purpose of research. This fact has caused the old studies to be revisited with newer methods and caused a broadening of scope for what was earlier found.

The Italians Franchi and Baccetti were long-time visiting scholars with McNamara, and in a very productive cooperation revisited the Michigan Growth Study (Franchi et al. 2007; Baccetti et al. 2011). Together they developed the cervical vertebral maturation method for diagnosing the growth peak (Franchi et al. 2018). Their most recent cooperation records growth in those with untreated class III malocclusion (Rutili et al. 2019).

Six of the earlier growth studies (Bolton-Brush, Denver, Fels, Iowa, Michigan, and Oregon) were revisited by Oh et al. (Oh et al. 2019) and they discovered important indicators of growth to predict from younger ages the adult facial type. The Forsyth Morrees Twin Study was revisited by Hersberger-Furfluh et al. who found that twins show differences in the vertical dimension, with influence from both genetic and environmental factors (Hersberger-Zurfluh et al. 2018; Hersberger-Zurfluh et al. 2019).

Although secular trends in craniofacial morphology have mainly been revealed by means of anthropometry, the era of cephalometrics has been sufficiently lengthy to enable comparison of craniofacial features and growth in lateral radiographic materials a generation apart. Based on a selection from nine samples in the AAOF's Craniofacial Growth Legacy Collection, an increase has been apparent in the position of the maxilla in relation to the anterior cranial base (SNA angle), in the convexity of the hard tissue profile (ANB angle), the length of the anterior cranial base (S-N), and sagittal depth of

Table 1. *Selected craniofacial growth studies with longitudinal lateral cephalometric data. The follow-up of all subjects within the longitudinal subsets seldom extend over the entire age range given.*

Study	Subjects						Cephalograms		Comments
	Total number	Longitudinal subset	Males	Females	Maximum age range; years	Ethnicity/ ancestry	Total number	Magnification %	
Arat et al., 2001; Arat & Rübendüz, 2005	78	62	26	36	10-16				Mixed longitudinal, normal facial patterns, study performed in Turkey
Bhatia & Leighton, 1993	736				3-22	British Caucasian		107.8	Study started in 1952. Number diminished to 142 at 18 years
Björk, 1955 Björk & Skieller, 1983	110				4-25	Danish Caucasian	≈2000	105.5	Metallic implants. Includes malocclusions and treated subjects
Broadbent Bolton* Broadbent et al., 1975	5700	850			1-18 →	American	>22000 by 1975	Indiv.	Study started in 1929. Mixed longitudinal <15% treated
Burlington* Popovich and Thompson, 1977	1632	303 945	167 488	136 457	4-20 6-20	European Canadian		109.8	30% treated
Denver Growth Study* Nanda, 1988	250	200	60	60	4-30	European Caucasian			Mixed longitudinal
Ekström, 1982	107	107	57	50	7-16	Swedish Caucasian		110	Translation of Gnathion from anterior cranial base, Somatic maturation
Fels Growth Study*	>400	>400			0.25 →	American White and Black (2%)	>9500	Indiv.	Study started in 1952. Every 6 mo up to 5 y, thereafter annually, 10% treated
Forsyth Twin Study*		>615	162 155	135 163	4-18 6-10 10-16	European Caucasian	4505	106	Twins, untreated
Iowa Child Welfare Study* Bishara, 1981	132	35	20	15	4-25	European Caucasian		Indiv.	Study started in 1946. Longitudinal, untreated. Every 6 mo up to 12 y, then annually to 17 y
Jiménez et al., 2020	49	49	19	30	6-24	Colombian Mestizo		110	Study started in 1992. Normal, untreated
Korean Dental Growth Study Moon et al., 2013	410	223	107	116	6-14	Korean	>1784		Carried out 1995-2003. Normal, untreated

Table 1 cont.

Study	Subjects						Cephalo-grams		Comments
	Total number	Longitudinal subset	Males	Females	Maximum age range; years	Ethnicity/ ancestry	Total number	Magnification %	
Krogman Philadelphia*		600 150			12-18	American White American Black	>2400		4-6 records of each, mixed longitudinal
Mathews Implant Collection*	36	36				European Caucasian			Metallic implants, mean no. of records 8.5
Meharry Growth Study*	160	160 100			6-14 5-20	African American			Every 6 mo up to 14 y, thereafter annually
Michigan Growth Study* Riolo et al., 1974		191 ≈100	99	92	5-18 →	European Caucasian some Asian	>1270	112.5	Mixed longitudinal, longitudinal sample untreated
Montreal Growth Study*			50 30	50 20	6-15 10-19	French Canadian	>2434	112,5	Mixed longitudinal, untreated
Nittedal material Berg, 1983	113	113	57	56	6-12	Norwegian Caucasian		105.6	Year of birth 1958-1972, normal, untreated
El-Batouti et al., 1994		74	35	39	6-18				
Oregon Growth Study*	409	20	188	221	3-18 3-27	North European Caucasian		Indiv.	Mixed longitudinal, 29% treated
Prahl-Andersen et al., 1979	486		232	254	4-14	Dutch Caucasian		104.2	Study started in 1960. Mixed longitudinal, six cohorts, born 1961-1967
Thilander et al., 2005	169	169	75	94	5-31	Swedish Caucasian	469	110	Normal occlusion, untreated
Thordarson et al., 2006	363	182	95	87	6-16	Icelandic	638	105.6	Subjects born 1981-1982, cephalograms at ages 6 and 16 y., untreated

*Included in Hunter WS, Baumrind S, Moyers ME. An inventory of United States and Canadian growth record sets: Preliminary report. American Journal of Orthodontics and Dentofacial Orthopedics 103:545-555, 1993.
Magnification 100%; natural size.

the face (Co-A), while point B in relation to the skull base has become more retrognathic (Antoun et al. 2015). The Denver Growth Study cohort (Nanda 1988) also served as reference for studying eventual secular trends in mandibular growth in another Caucasian collection, the Zurich Growth Study sample (Patcas et al. 2017). A comparison using hand-wrist radiographs for assessing the skeletal age of the subjects in both collections revealed that the highest increment in mandibular size (Co-Pg) occurred at a mean skeletal age of 13.8 years in boys, 0.6 years earlier than before, and in girls at a mean skeletal age of 12.4 years, 0.3 years earlier than before.

2.5.4 LATE CRANIOFACIAL GROWTH

Behrents has published widely on late craniofacial growth and showed that many changes take place in the craniofacial complex up until late adulthood (Behrents 1985a; Behrents 1985b). These studies are based on the collections of the Michigan Growth Study (Behrents 1985c) and Bolton-Broadbent Growth Study.

Similar findings to those of Behrents have been shown by Pecora, Baccetti and McNamara (Pecora et al. 2008). They concluded that significant skeletal changes occur from adolescence to mid-adulthood, whereas significant changes from late adolescence up to late adulthood are confined to soft tissues. Increases in S-Na, and in mid-facial and lower anterior facial heights were detectable. Sexual dimorphism was apparent in late growth changes of the mandible. Women displayed downward and backward rotation, men, forward mandibular rotation and increase in chin prominence. Thinning and elongation of the upper lip, dropping of the nasal tip, and more acute nasolabial angles occurred. Other investigators like Bishara et al. and West et al. have also studied aging in the dentofacial skeleton (Bishara et al. 1994; West and McNamara 1999).

2.5.5 3-DIMENSIONAL STUDIES

Three-dimensional imaging has been greatly developed since the 1980's. Common methods include magnetic resonance imaging (MRI), computed tomography (CT), and in the beginning of the new millennium, 2000, cone-beam computed tomography (CBCT) (Hall 1994). CBCT requires a relatively lower radiation dose (Palomo et al. 2014). Three-dimensional imaging techniques have since been applied to cephalometric analyses as well.

Three-dimensional laser and photographic methodology have also been developed, notably under Richmond in the United Kingdom, who has combined data with Oulu University Cohort Data (Farnell et al. 2019).

3. AIMS OF THE STUDY

The aim of this prospective longitudinal study was to create a thorough understanding of the features of the craniofacial growth and development of Finnish children. This understanding will aid, above all, clinical orthodontics – diagnostics, treatment planning, and prognoses of growth. This study therefore more specifically aims to

- explore age- and gender-related changes in facial size and form by measuring a large variety of angles and distances
- extract from the data annual changes in order to understand timing of growth, growth velocities, and their changes in different craniofacial regions at various ages
- relate earlier information to the somatic growth of the group of children and of selected individuals to also exemplify inter-individual variation
- create reference values covering the whole growth period up to the age of 25 years for the normal healthy Finnish population. These values could serve as basic control values for various purposes: in evaluating healthy individuals, in comparing them to each other, in orthodontic treatments, or in treating individuals with various illnesses and syndromes
- discover any specific features in Finns by comparing Finns with populations of other ethnicities.

4. SUBJECTS AND METHODS

4.1. Background

A longitudinal study was conducted in Finland at the University of Helsinki, Institute of Dentistry, Department of Pedodontics and Orthodontics, during 1967 to 1993-94 (Nyström et al. 2001). This study also bears the name "The Mother Child Study". It covered craniofacial growth and development, jaw- and tooth development, caries occurrence, saliva content, and mineral content of teeth, periodontal condition, temporomandibular function, tooth-wear and masticatory force in children. The present study, extending over that whole time period, concerns craniofacial growth and development of the children in the main study and thus can be considered one of the central parts of that multifaceted longitudinal growth study.

4.2. Study subjects

In five Helsinki central-region maternity centers, health-care personnel gave verbal and written information to all pregnant mothers asking them to participate in this study. The National Board of Health and the health authorities of the City of Helsinki gave their permission for the project.

During 1966-69, a total of 790 mothers who were expecting their first child showed an interest in the study. There were 382 children brought to the first check-up as six months old and to the next one at the age of nine months. During the next five years, until 1973, 53 siblings of these children were added to the sample. Hence, 435 children started the study. Their dental and health records had been collected since birth. The examinations were carried out biannually until 1978 at time points close to the children's birth dates, and thereafter annually. On each occasion an extensive clinical examination was performed, alginate impressions were taken to produce plaster models of the dentition, and from time to time, radiographs were taken. Plaster models were used in this study for the purpose of dental class assessment. Standing height, weight as well as anthropometric dimensions of the cranium were measured almost every time. During certain years, saliva was sampled, periodontal health measured, and temporomandibular functions and masticatory forces examined.

A general finding in longitudinal studies is participant numbers declining with the years; either because of growing tired with attending or because of moving to another region. At their age of five, the number of participating children was 267 (61.4% of the original sample). In 1993 (with a few in 1994), when the subjects were examined as a group for the last time, 190 participants, young adults at the time, had remained in the study. Most of them were then aged 24 to 25, the youngest ones being 19-20. Some who had interrupted their participation, re-entered the study for the final years. The final drop-out percentage was 56.3%.

The study was concordant with the Declaration of Helsinki and approved by the Ethics Committee of the Institute of Dentistry, University of Helsinki. The approval was provided by the Committee twice because of the study's long duration.

At every check-up, the contents of the visit were orally explained to the children and their parents, and the procedures were undertaken after their stated assent. Near the end of the study, all the participants gave their informed consent form.

Several children in the main study had had orthodontic treatment, since for ethical reasons, they could not be left without treatment if in need of it. They were excluded from the present study, because orthodontic treatment influences craniofacial growth (Oda et al. 2016). The final sample thus comprised 105 healthy, orthodontically untreated children. The study sample is summarized as a flow chart (Figure 1).

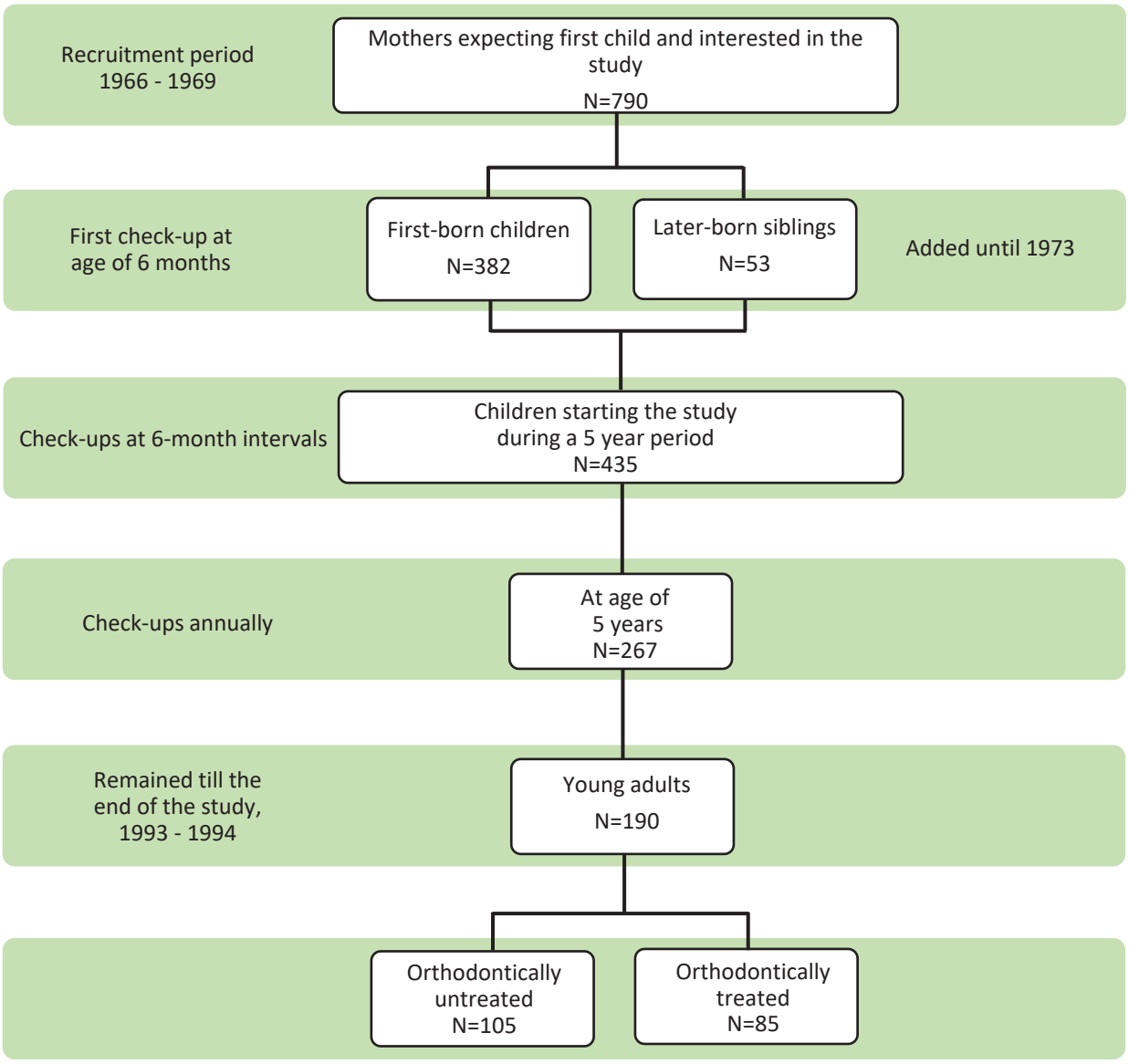


Figure 1. *Subject sampling with only orthodontically untreated subjects included in the final sample.*

4.3. Radiographic technique

All radiographic examinations were performed at the Department of Radiology, Institute of Dentistry, University of Helsinki. A Cephalostat was used to obtain lateral two-dimensional cephalometric records. Each subject was positioned with the head oriented in the Frankfurt horizontal plane parallel to the floor with the eyes looking into a mirror. Ear rods were fastened against the skull to maintain the head position, the midsagittal plane parallel to the film.

Lateral cephalograms were obtained in two different ways:

I. At the **old Institute of Dentistry** (Fabianinkatu, Helsinki) until the year 1979:
The film-to-focus distance was constant, and the head was placed in the cephalostat with the right cheek touching the film holder. As the head width had been measured with an anthropometric caliper and recorded in the study files, the distance of the midsagittal plane from the film could be calculated and thereby the enlargement, separately for each radiograph. Enlargement varied between 4.9% and 6.6%.

At the old institute, the Björk cephalostat was in use; the author of this thesis was trained in its use, and subsequently took some of the radiographs during the study. During the era of the old institute, the children were still young, but whenever age-appropriate to be positioned without the child moving, an attempt was made to obtain the cephalogram. The absolute rule was to limit the number of exposures to one and never repeat the radiography during the same session. This was intended to keep radiation exposure as low as possible. For this reason, not all the cephalograms are of the same quality as the ones taken of the children at later ages.

II. At the **new Institute of Dentistry** (Mannerheimintie, Helsinki) since autumn 1979:
A rigid Wehmer cephalostat (Wehmer 517, BF Wehmer Co., Lombard IL, USA) was used. The distance of the film to focus and to the midsagittal plane of the head was constant in all the radiographs, and thus the enlargement also was constant at 10% in each radiograph.

A thyroid shield prevented the thyroid gland from harmful ionizing radiation, with the consequence that only two or three of the uppermost cervical vertebrae, at maximum four, were visible in the majority of the cephalograms. At the old institute, the shield was too rigid and large for the small children, partially obscuring the mandible, and thus could not be used.

When using cephalostats, at both Institutes of Dentistry, the right side of the face was towards the film and the nose was pointing to the left. Therefore, the cephalograms had to be examined in that direction to obtain the correct view of the bilateral and differentially enlarged structures.

4.4. Radiographic material

The final radiographic material included 551 lateral skull radiographs taken from 50 boys and 55 girls. Radiographs were taken between the ages of 3 and 25 years, with a few exceptions, with the number of radiographs per subject ranging from 3 to 8 (Table 2, Figures 2 and 3).

Table 2. *Distribution of the cephalograms.*

Number of cephalograms per individual	Number of boys	Number of girls
3	2	8
4	6	7
5	16	16
6	22	20
7	4	3
8	-	1

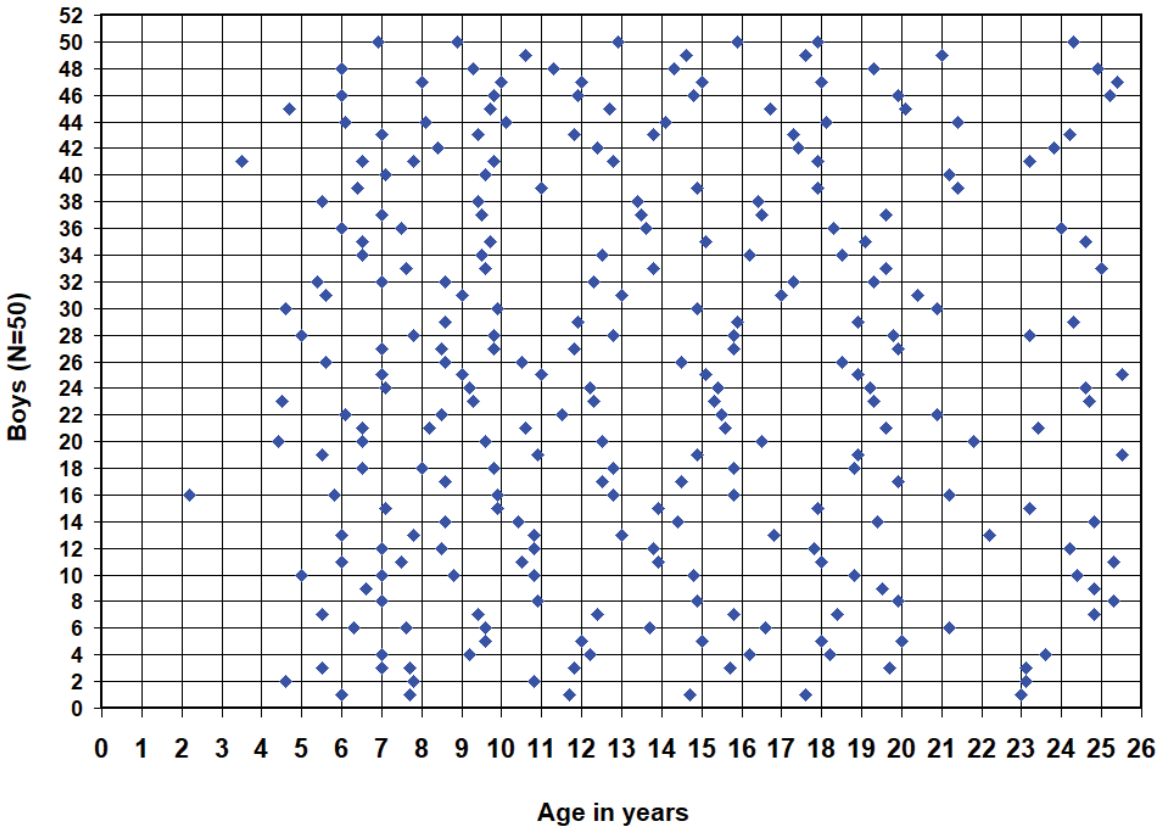


Figure 2. *Timing of cephalography among the cohort's boys. The number of cephalograms per individual ranging from 3 to 7 during the longitudinal study period.*

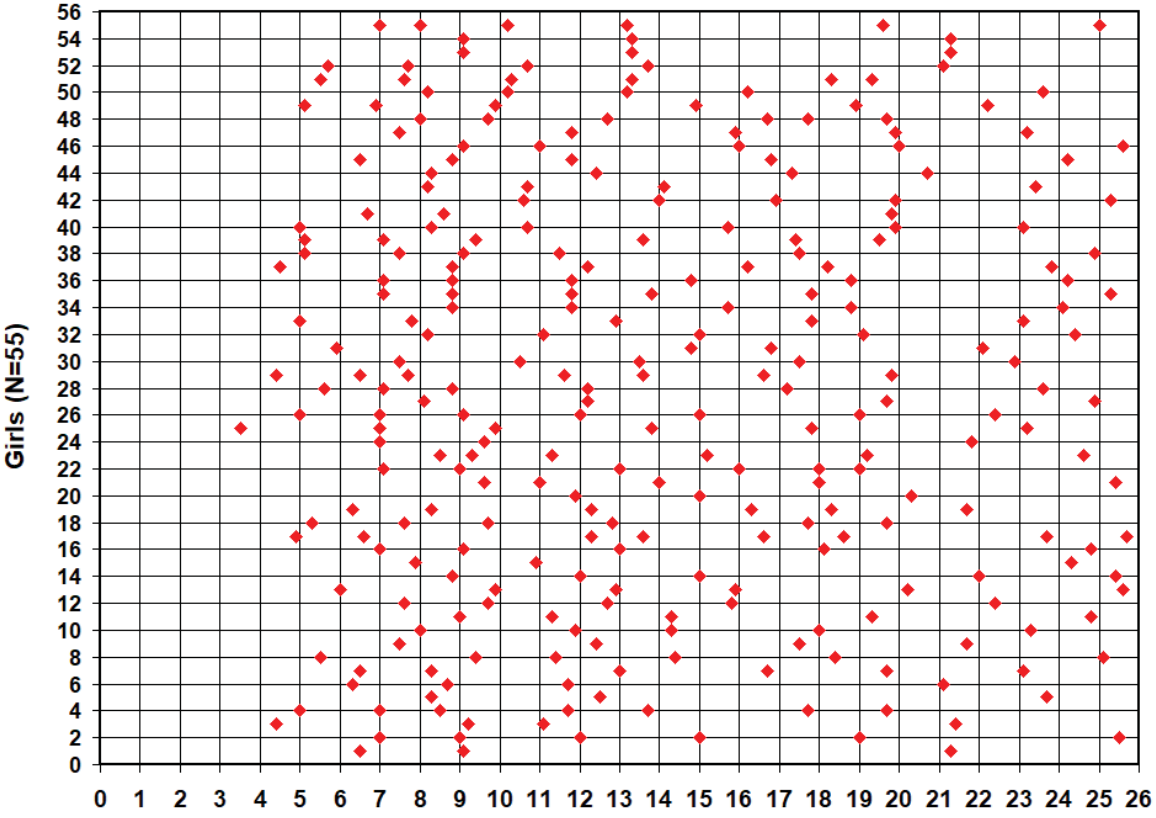


Figure 3. *Timing of cephalography among the cohort's girls. The number of cephalograms per individual ranging from 3 to 8 during the longitudinal study period.*

4.5. Collection and handling of radiographic data

4.5.1 DIGITIZATION OF RADIOGRAPHS

Radiographs were digitized with a Scriptel (Scriptel Corporation, Columbus, Ohio, USA) digitizer directly on the x-ray without tracing during 1990-1996, and corrections were made until 1998. The same person (the author ME) digitized all the radiographs. The cephalometric software, called Cephscan, was developed by the late Professor Houston from London in the 1980's and later modified together according to the wishes of the author (ME) for Finnish use. At the time, the software was very advanced, with the possibility to return any time to redo the digitizing. This was made possible by the use of four fiducial points, which were withdrawn from the corners of the cephalograms and fixed into position. When digitizing, the radiograph was viscerocranium-centered on the digitizing table with its Frankfurt horizontal plane placed horizontally and fiducials in an outermost square formation.

The digitizing procedure took place in a dark room, and the sides of the digitizing board were also masked with a dark board frame, leaving only the radiographic area lit. Before starting the actual digitizing, the whole x-ray series of each child was inspected carefully; one radiograph from the middle of the series was chosen to serve as a basic radiograph on which the other x-rays were superimposed by best fit using Björk's superimposition method (Björk and Skieller 1983) modified by William Houston. It utilizes primarily anatomic structures in the anterior cranial base and secondarily in the mandibular body.

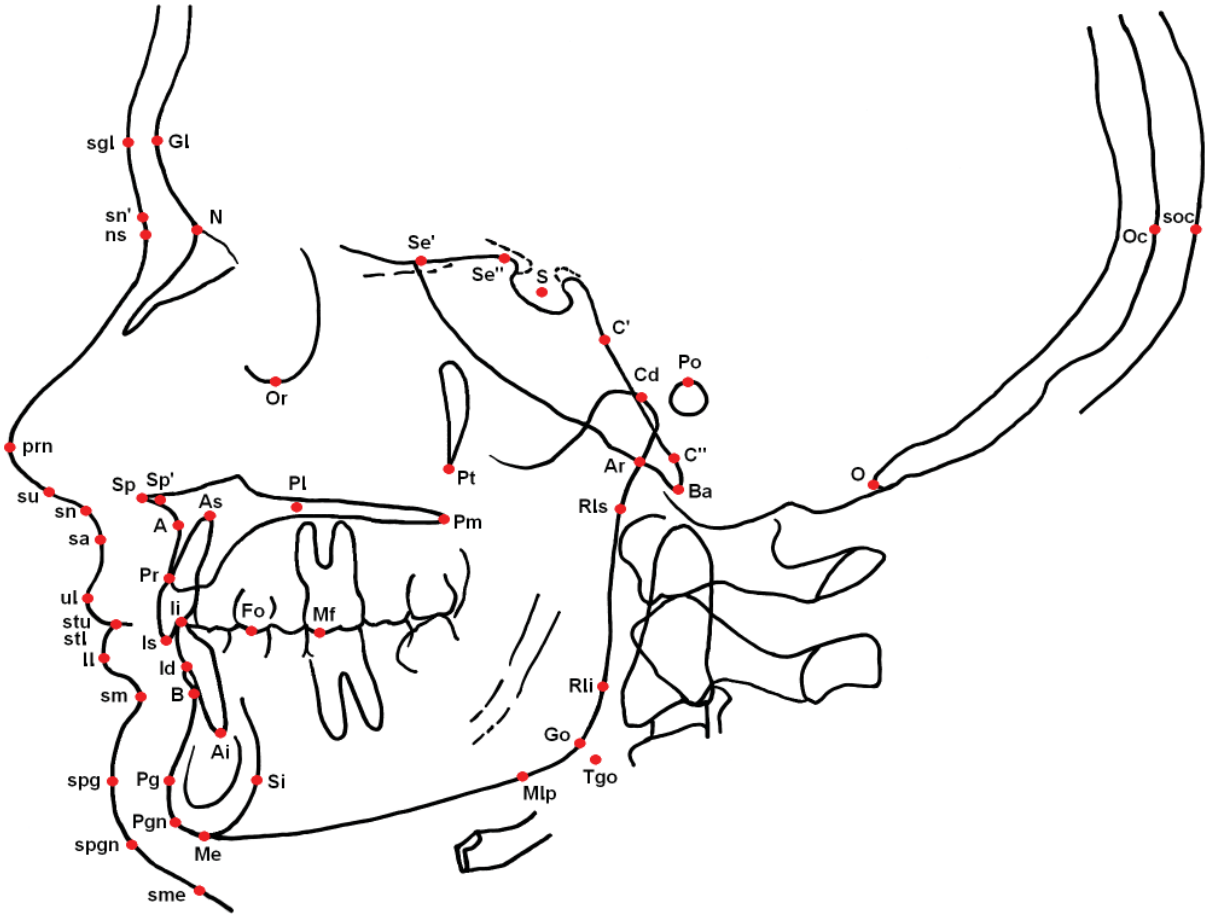


Figure 4. *Cephalometric landmarks. Abbreviations explained in Table 3.*

Transparent thin acetate sheets having lines and some millimeter lines aided in digitizing, for example points on tangents to certain structures or at a 3 mm distance posterior from spina nasalis anterior. The dental plaster models and panoramic dental tomograms of the same child were helpful in assessing the occlusion and other features. The roentgen monocular was of help as well.

At the time of the research, there was no automatic or scanned cephalometry. Approximately 50,000 points were measured during this study by the author of this thesis.

4.5.2 CEPHALOMETRIC POINTS

Points to be digitized were carefully selected to facilitate later use of a variety of cephalometric analyses. The hard tissue points were marked with a capital first letter and the soft tissue points with a lower-case first letter (Figure 4 and Table 3). Points digitized but not shown and listed include the midpoint between crown and root in upper incisor (Im) as well as two arbitrarily selected points on the cranial base (Cb1 and Cb2), and two arbitrarily selected mandibular points (Mn1 and Mn2), constant for each subject separately. The four latter points were digitized to facilitate superimposition on these structures if later desired.

4.6. Mathematical processing of cephalometric data

4.6.1 DIGITIZED DATA

Radiographs were digitized with a Scriptel device which produced complex binary files. A computer specialist wrote an assembler program that converted the files to ASCII-format. The converted files contain each digitized point with identification and x and y coordinates on a millimeter scale with its origin in lower left corner of the digitizing area. The program was written to identify multiple digitizing and calculated mean values. In this case, the coordinates were given with two decimals. Single measurements were given with one decimal.

4.6.2 CORRECTIONS OF MEASURED COORDINATES

During data analysis, it was noted that the coordinate reader did not reproduce a consistently reliable linear output. There was minor skewness in the whole area of the digitizing board. It turned out that within a 200 x 200 mm area in the center, corrections could be made using linear equations of the first degree. The coordinates outside of the middle square tended to drift towards the midpoint of the digitizing area, and to correct these non-linear equations of fifth degree had to be used (Figure 5).

Correcting functions were calculated with linear regression analysis using 289 digitized points. They were digitized twice in a rectangular grid with 20-mm steps. The overall accuracy when using the correction functions was about 0.35 mm in both directions x and y.

Every cephalogram first underwent the coordinate correction described above, followed by a magnification correction to correspond to natural size in the midsagittal plane.

Table 3. *Cephalometric landmarks illustrated in Figure 4 in alphabetical order*

Hard-tissue points		Soft tissue points	
A	A-point	ll	outmost point of lower lip
Ai	Apex of lower incisor	ns	soft tissue nasion
Ar	Articulare	prn	pronasale
As	Apex of upper incisor	sa	soft tissue a-point
B	B-point	sgl	soft tissue glabella
Ba	Basion	sm	submentale
C'	Clivus plane, point 1	sme	soft tissue menton
C''	Clivus plane, point 2	sn'	extension of S-N line on soft tissue profile
Cd	Condylion	sn	subnasale
Fo	Help point of functional occlusal plane	soc	soft tissue occipitale
Gl	Glabella	spg	soft tissue pogonion
Go	Gonion	spgn	soft tissue prognathion
Id	Intradentale	stl	lower stomion
Ii	Edge of lower incisor	stu	upper stomion
Is	Edge of upper incisor	su	between pronasale and subnasale
Mf	Molar functional point	ul	outmost point of upper lip
Me	Menton		
Mlp	Lowest point of mandible in angular area		
N	Nasion		
O	Opisthion		
Oc	Occipitale		
Or	Orbitale		
Pg	Pogonion		
Pgn	Prognathion		
Pl	Palatal plane help point		
Pm	Spina nasalis posterior		
Po	Porion		
Pr	Prosthion		
Pt	Pterygomaxillare		
Rli	Lower point of ramus		
Rls	Upper point of ramus		
S	Sella		
Se'	Sphenoidale plane, point 1		
Se''	Sphenoidale plane, point 2		
Si	Inner border of symphysis		
Sp	Spina nasalis anterior		
Sp'	3 mm posterior of Sp, midpoint		
Tgo	Tangent gonion		

Correction functions, input = {UX,UY} mm, output = {Xcor,Ycor} mm.

UX and UY are the measured coordinates in millimetres, zero at down left.
X = UX-145, Y = UY-145 are the measured coordinates origo in the middle.

Linear corrections were carried out in a 200 x 200 mm square in the middle.
Non-linear corrections were made outside of the middle square.

UA=X/100 x-coordinate origo in the middle, unit 100 mm, temporal variable.
VA=Y/100 y-coordinate origo in the middle, unit 100 mm, temporal variable.

Correction functions for linear range in middle square
Xnon= 1.0058*UX + 0.00404*UY
Ynon= 1.0072*UY - 0.00220*UX
Correction functions for area outside of middle square
Xcor= 1.0025*UX + 0.0044*UY + 0.4180*UA*UA*UA*UA*UA
Ycor= 1.0027*UY - 0.5036*VA*VA + 0.4985*VA*VA*VA*VA*VA

In case ABS(X)<100 and ABS(Y)<100 use values Xnon and Ynon.

Figure 5. *Equations used to correct the position of the cephalometric points.*

4.6.3 CONVERSION INTO DISTANCES AND ANGLES

The transformation from measured points into lines and angles was carried out with a program written in Basic language reading a parameter file, first the names of points and then the rules for lines and angles. Measured points are given in a file with 551 lines from 105 subjects. About 100 lines or angles were calculated in each row.

Radiographs contain geometric enlargement. These were corrected to correspond to the actual anatomical scale by dividing the measured and corrected dimensions with enlargement factor of each radiograph, typically 1.100. In the early years of this study, the magnification factor was always individually calculated and was less than 1.100. Angles are unaffected by geometric enlargement.

4.7. Linear and angular variables

The data were checked in all measures first by going through it manually, after which re-digitizing was performed. Later, scattergrams were plotted for all the variables, with outliers and extreme values checked. Taking statural height as an example, whether the measurement represented an exceptionally tall or short individual or was an error. If needed, the data were corrected to the reachable best.

These data were used to create a database of Craniofacial Growth and Development of Finnish Children with its variables listed in Table 4. Growth curves and growth velocity curves are presented for all in Appendix 3, and for selected variables in the results section of this thesis. In addition to gender-specific group means, selected individual growth curves and scatter plots are presented.

4.8. Data presentation and analysis

dBASE III Plus was used as a platform for the database. It is interchangeable with MS Excel but has a better programming language for all required conversions and calculations. The study team used Excel files in data collection and preparation. All statistical analyses were carried out with a self-made statistical package originating from 1960-69, written originally in ALGOL and appearing later in Q-basic for 32-bit machines. Most of the computer programs for this thesis were written during 1996-1998 using MS Basic or dBASE III Plus. The programs were compiled to be run in a 64-bit environment.

Table 4. *Linear and angular measurements in alphabetical order*

Field name	Explanation	Unit
ANB	Antero-posterior jaw base relationship	degrees
Ar-Go	Ramus height without condyle	mm
Ar-Tgo	Ramus height without condyle	mm
ArGoMe	Gonial angle	degrees
ArTgoMe	Gonial angle	degrees
Ba-O	Foramen magnum	mm
BMI	Body Mass Index	
Burll	Lower lip from Burstone line	mm
Burul	Upper lip from Burstone line	mm
Cd-A	Maxillary length from condylion by McNamara	mm
Cd-Go	Ramus height with condyle	mm
Cd-Pg	Mandibular length	mm
Cd-Pgn	Mandibular length	mm
Cd-Sp'	Maxillary length from condylion by Harvold	mm
Cd-Tgo	Ramus height with condyle	mm
Chin/Mand	Chin/mandibular angle	degrees
Chin/SN	Chin/SN angle	degrees
Cliv/For	Clivus plane/foramen magnum angle	degrees
DifferenceHar	Difference between jaw lengths by Harvold	mm
DifferenceMcN	Difference between jaw lengths by McNamara	mm
EstL	Lower lip from esthetic line	mm
EstU	Upper lip from esthetic line	mm
Gl-Oc	Head length	mm
Height	Height	cm
li_A-Pg	Lower incisal edge from A-Pg line	mm
ls_A-Pg	Upper incisal edge from A-Pg line	mm
LAFH/AFH %	LAFH/AFH % vertical face height ratio	percent
Low/Mand	Lower incisor angle	degrees
Mand/Ram	Gonial angle by corpus and ramus tangents	degrees
MandAAH	Lower anterior dentoalveolar height	mm
MandPAH	Lower posterior dentoalveolar height	mm
Max/Fop	Maxilla/functional occlusal plane angle	degrees
Max/Mand	Maxilla/mandible angle	degrees
MaxAAH	Upper anterior dentoalveolar height	mm
MaxPAH	Upper posterior dentoalveolar height	mm
Me-Go	Corpus length	mm
Me-Tgo	Corpus length	mm

Table 4 cont.

Field name	Explanation	Unit
N-Me	Anterior face height	mm
N-S	Anterior cranial base	mm
N-Sp'	Upper anterior face height	mm
NAPg	Facial convexity (hard tissue)	degrees
NGoMe	Lower gonial angle	degrees
ns-sme	Face height	mm
ns-sn	Upper face height = Nose height	mm
NSAr	Saddle angle	degrees
NSBa	Cranial base angle	degrees
NTgoMe	Lower gonial angle	degrees
Ntip	Nose tip from facial line	mm
OB	Overbite	mm
OJ	Overjet	mm
PFH/AFH %	PFH/AFH % vertical face height ratio	percent
Pg-Si	Symphysis breadth	mm
Pgn-Go	Corpus length	mm
Pgn-Tgo	Corpus length	mm
S-Ar	Upper posterior face height	mm
S-Ba	Clivus length	mm
S-Go	Posterior face height	mm
S-Mlp	Posterior face height	mm
S-Pgn	Mandible tip from sella	mm
S-Tgo	Posterior face height	mm
sglnsprn	Nasofrontal angle	degrees
sgl-sme	Face height	mm
sgl-soc	Head length	mm
SN/FH	SN/Frankfurt horizontal angle	degrees
SN/Mand	SN/mandibular angle	degrees
SN/Max	SN/maxillary angle	degrees
sn'prnspg	Facial convexity (soft tissue)	degrees
sn'snspg	Facial convexity without nose	degrees
sn-sme	Lower face height	mm
sn-stu	Upper lip length	mm
SNA	Maxillary prognathism	degrees
SNB	Mandibular prognathism	degrees
SNPg	Chin prognathism	degrees
Sp'-Me	Lower anterior face height	mm
Sp-Pm	Maxillary length	mm
Sphen/Cliv	Sphenoidal/Clivus plane angle	degrees
stl-sme	Lower face height	mm
susnul	Nasolabial angle	degrees
Upp/Low	Inter-incisal angle	degrees
Upp/Max	Upper incisor angle	degrees
Upp/SN	Upper incisors/SN angle	degrees
Wits_app	Wits appraisal	mm

Standard methods of descriptive analysis were applied. Means, standard deviations and confidence intervals were used. Differences between genders in distances, angles, growth and growth changes were compared with an ordinary two-tailed *t*-test. The limit of statistical significance was set at $p<0.05$. More complex mathematical methods were avoided to keep the results understandable for a general audience.

4.8.1 HANDLING AGE IN THE DATA ANALYSIS

The data consists of measurements and observations that are distributed widely on age scale. There are very few observations at exact year intervals according to birthdates. Therefore, a special system had to be developed. The program follows spline principle so that it calculates for each age a series of moving polynomial fit using at least three and at most seven consecutive observations. The estimated value of exact age is obtained using the moving polynomial equations. This program was written in 1998. A similar algorithm is nowadays called Cubic Spline Interpolation (de Boor 1978). In this work, the degree of fitting formula was dependent upon the number of usable observations.

The annual changes and growth velocities were based on the first derivative of calculated polynomials. The output of this straightforward method is similar to the primary tables.

4.8.1.1 CORRECTION FOR AGES 20 TO 25 YEARS

Some results show that the measures decline at ages over 20 years. The primary reason of this is likely to be the lack of data at this age, mostly in the age range 20-21 years. Secondly, the number of radiographs was limited towards the end of the study for ethical reasons. Moving polynomial fit did result in lower values for some measurements. The weight and thus body mass index (BMI; kg/m^2) were measures that clearly increased at ages over 20 years.

A correction routine was added in the programs using the following algorithm:
- consider the last measurement of a subject at age A
- if A is at least 19.00 years and if there are four or more measurements then the last measurement is repeated for ages A+1.0 and A+2.0 years
- tables are constructed as earlier.

In many instances, this correction raises the degree of fitting polynomial. The effect is seen as 0.1 or 0.2 mm (0.1 degrees in angles) in some measures under the age of 19 years. The changes are so small, however, that they are not noted in the curves. The correction affects those in the age range of 20 to 25 years so that the number of observations increases, and the curves tend to turn more horizontal.

4.8.1.2 AGE IN TABLES AND GRAPHICS

This study includes 551 skull radiographs which are tabulated in two different ways in Table 5. The left part has been arranged using rounded age as vertical index. Rounded age means, for example, that age row 5 contains all children within the age range 4.50 to 5.49 years at the time of radiography.

In descriptive statistics, age tables are normally constructed so that age is given in full years. The part of the table on the right has been collected accordingly with truncated ages without decimals. Thus for example, age row 5 contains all children within age range 5.00 to 5.99 years at the time of radiography.

In this thesis, all tables are constructed with one-year steps using continuous moving polynomial modeling with a ten-year window, 5 years on both sides of the year under calculation. The values for example on the 10 year row mean that the numerical values of measures or angles are calculated by putting age=10.00 years in the polynomial equation.

To exemplify the effects of different ways of handling age in the data analysis, the height of the subjects in this study has been given in age groups defined in these three ways; rounded, truncated, and polynomial modeling gender-specifically (Tables 6-8). Rounding of the age and polynomial modeling result in nearly the same values, whereas the use of truncated age would give higher values during the younger years.

Table 5. *Age distribution of the radiographic material using either rounded or truncated age definitions.*

Rounded age				Truncated age			
Age	**Boys**	**Girls**	**Total**	**Age**	**Boys**	**Girls**	**Total**
2	1	0	1	2	1	0	1
3	0	0	0	3	1	1	2
4	3	3	6	4	5	6	11
5	6	11	17	5	12	12	24
6	20	10	30	6	19	11	30
7	18	18	36	7	20	23	43
8	17	21	38	8	17	22	39
9	17	25	42	9	24	21	45
10	22	12	34	10	14	10	24
11	11	13	24	11	10	18	28
12	16	20	36	12	17	15	32
13	11	15	26	13	10	18	28
14	12	13	25	14	14	9	23
15	15	9	24	15	15	10	25
16	14	10	24	16	9	11	20
17	8	13	21	17	11	14	25
18	14	14	28	18	13	11	24
19	13	12	25	19	16	19	35
20	13	14	27	20	6	3	9
21	8	7	15	21	6	10	16
22	2	8	10	22	1	5	6
23	7	8	15	23	10	12	22
24	8	10	18	24	13	11	24
25	13	12	25	25	6	9	15
26	1	3	4				
Total	**270**	**281**	**551**	**Total**	**270**	**281**	**551**

Table 6. *Height comparison of the male cohort using either rounded or truncated age definitions or continuous moving polynomial modeling for age.*

Boys

	Rounded age			Truncated age			Polynomial moving modeling		
Age	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
3				28	96.79	(7.05)			
4	38	99.44	(7.78)	40	108.38	(4.71)	52	104.8	4.04
5	47	109.88	(4.60)	33	113.73	(4.89)	69	111.6	4.50
6	32	117.50	(5.02)	30	120.86	(6.58)	76	118.3	4.75
7	29	123.86	(6.45)	30	127.53	(5.40)	82	124.3	4.93
8	28	131.75	(4.45)	38	133.69	(4.36)	83	129.9	5.12
9	35	134.82	(4.82)	46	139.60	(5.50)	84	135.4	5.18
10	55	140.72	(5.34)	57	144.45	(5.40)	85	140.7	5.53
11	60	146.59	(5.85)	69	149.83	(5.68)	85	146.2	5.70
12	69	152.04	(6.75)	74	155.99	(6.91)	85	152.2	6.14
13	78	157.55	(7.00)	83	162.29	(7.77)	85	158.8	6.78
14	84	165.45	(7.42)	76	169.90	(7.04)	85	165.7	7.00
15	76	172.38	(7.67)	76	175.79	(6.22)	85	171.8	6.87
16	72	176.60	(6.56)	63	178.85	(6.38)	85	176.4	6.67
17	65	179.52	(6.58)	67	180.55	(6.55)	85	179.2	6.83
18	61	180.88	(6.60)	46	181.56	(5.76)	85	180.6	6.97
19	41	183.03	(5.80)	39	182.72	(6.84)	85	181.2	7.20
20	29	179.60	(6.84)	11	179.12	(8.24)	85	181.5	7.36
21	15	181.45	(6.42)	10	180.09	(6.37)	85	181.5	7.36
22	7	180.83	(6.67)	6	182.88	(6.29)	85	181.4	7.36
23	13	183.93	(7.49)	19	181.43	(7.91)	82	181.4	7.49
24	18	180.67	(6.49)	24	185.31	(7.00)	74	181.5	7.31
25	26	182.84	(7.74)	13	178.18	(4.63)	66	181.6	7.57
Total	**978**	**156.99**	**(25.24)**	**978**	**156.99**	**(25.24)**			

Table 7. *Height comparison of the female cohort using either rounded or truncated age definitions or continuous moving polynomial modeling for age.*

Girls

	Rounded age			Truncated age			Polynomial moving modeling		
Age	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
3				29	97.32	(6.87)			
4	49	100.87	(7.60)	41	107.12	(4.42)	59	104.1	4.38
5	55	110.28	(4.24)	49	113.89	(6.26)	87	110.8	4.52
6	35	118.57	(5.43)	33	119.89	(5.28)	93	117.4	4.63
7	23	123.75	(4.92)	24	127.68	(5.60)	96	123.6	4.76
8	31	128.75	(5.48)	38	131.46	(6.72)	100	129.0	5.22
9	44	135.12	(6.36)	54	137.80	(5.85)	102	134.9	5.57
10	61	140.34	(5.16)	73	144.23	(6.26)	103	141.0	6.07
11	78	147.28	(7.21)	78	149.86	(7.75)	105	147.2	6.64
12	84	153.32	(7.91)	94	156.79	(7.40)	105	153.3	6.91
13	94	158.97	(7.39)	94	161.78	(6.57)	105	158.6	6.71
14	90	163.21	(6.37)	95	164.69	(6.01)	105	162.5	6.21
15	97	165.30	(6.02)	90	165.44	(5.64)	105	165.1	5.80
16	88	165.81	(5.71)	84	166.53	(6.07)	105	166.3	5.73
17	77	166.58	(6.32)	70	166.54	(6.03)	105	167.0	5.78
18	68	167.05	(6.21)	60	167.34	(5.89)	105	167.3	5.79
19	51	167.02	(5.29)	49	166.24	(6.06)	105	167.5	5.78
20	37	165.95	(6.08)	11	168.92	(3.74)	105	167.5	5.74
21	15	168.21	(3.80)	15	167.45	(4.67)	105	167.5	5.71
22	12	165.37	(4.75)	12	165.92	(4.23)	105	167.5	5.64
23	12	167.86	(6.06)	21	167.96	(6.98)	99	167.6	5.65
24	29	168.62	(6.17)	28	168.44	(5.67)	92	167.5	5.71
25	31	166.20	(5.88)	19	165.64	(5.73)	81	167.3	5.87
Total	**1161**	**152.05**	**(20.54)**	**1161**	**152.05**	**(20.54)**			

4.9. Error study

For the error study, 30 cephalograms were re-digitized after at least one year, or on some occasions even after 3 years, if the radiograph was digitized among the first children for the first time. This new round was totally new. The selection of the radiographs for the second digitizing was not random. The sample for the error study was selected systematically: there were 5 radiographs from numbers 1, 2, 3, 4, 5, 6 of each from the series of the children equally distributed among the whole study group. This way all age groups were presented.

In the error analysis the means of differences of two readings (in any direction), standard deviations and paired T-test were used. In error analysis both the points and calculated measures were used (Tables 8 and 9). The overall repeatability was good according to both error analyses. The analyses were made without the coordinate corrections of the digitizer. This way, the error calculation is genuine and not manipulated. Points and measurements with statistically significant differences between the two recordings are marked with asterisks.

Table 8. *Error study of digitized points*

		Difference					Difference		
Variable	**N**	**Mean**	**SD**	**Paired T-test**	**Variable**	**N**	**Mean**	**SD**	**Paired T-test**
N	30	0.12	1.31	0.484	O	30	0.64	2.95	1.181
S	30	0.22	0.73	1.614	Oc	30	0.29	2.88	0.543
Ar	30	0.28	0.74	2.082 *	Gl	30	1.67	5.06	1.808
Ba	30	0.68	1.85	2.012	Se'	30	0.24	1.49	0.879
Or	30	0.84	2.66	1.727	Se''	30	0.24	1.07	1.214
Sp	30	0.30	1.54	1.054	C'	30	0.80	1.64	2.686 *
Sp'	30	0.10	1.42	0.390	C''	30	0.86	1.98	2.388 *
Pl	30	0.31	1.45	1.161	Cb1	30	0.79	2.46	1.765
Pm	30	0.15	1.28	0.658	Cb2	30	0.47	1.59	1.625
Pt	30	1.01	3.05	1.809	Mn1	30	0.45	2.30	1.079
A	30	0.28	1.77	0.876	Mn2	30	0.36	2.38	0.833
Pr	30	0.11	1.50	0.419	sgl	30	0.58	3.17	1.003
Is	27	0.06	1.47	0.198	sn'	30	0.38	1.37	1.498
Im	27	0.13	1.41	0.484	ns	30	0.35	1.78	1.079
As	27	0.21	1.37	0.802	prn	30	0.14	1.57	0.505
Ii	28	0.17	1.39	0.630	su	30	0.20	1.65	0.647
Ai	28	0.25	1.62	0.805	sn	30	0.47	1.58	1.622
Id	30	0.32	1.49	1.163	sa	30	0.35	2.78	0.682
B	30	0.09	1.78	0.262	ul	30	0.29	1.67	0.947
Pg	30	0.28	2.20	0.696	stu	30	0.29	1.79	0.877
Pgn	30	0.17	1.75	0.525	stl	30	0.26	1.78	0.811
Me	30	0.54	1.90	1.549	ll	30	0.15	1.78	0.475
Si	30	0.12	1.80	0.352	sm	30	0.49	1.79	1.495
Mf	30	0.43	1.60	1.469	spg	30	0.96	2.07	2.534 *
Fo	30	0.52	1.86	1.543	spgn	30	0.19	2.31	0.449
Mlp	30	0.15	2.66	0.313	sme	29	0.80	2.25	1.918
Go	30	0.41	2.03	1.092	soc	28	0.82	4.13	1.051
Tgo	30	0.60	1.49	2.205 *					
Rli	30	0.80	2.12	2.070 *	f1	30	0.20	1.96	0.556
Rls	30	2.65	2.94	4.940 ***	f2	30	0.32	1.88	0.926
Cd	30	0.42	1.93	1.195	f3	30	0.33	1.88	0.960
Po	30	0.41	3.18	0.713	f4	30	0.15	1.86	0.432

* *p<0.05; *** p<0.001*

Table 9. *Error study of distances and angles*

		Difference					Difference		
Variable	**N**	**Mean**	**SD**	**Paired T-test**	**Variable**	**N**	**Mean**	**SD**	**Paired T-test**
SNA	30	0.25	0.83	1.636	SN/Max	30	0.32	1.15	1.512
SNB	30	0.14	0.65	1.136	Max/Mand	30	-0.08	1.44	-0.309
ANB	30	0.11	0.50	1.249	Max/Fop	30	-0.11	1.91	-0.309
NAPg	30	-0.26	1.09	-1.302	Sphen/Cliv	30	-0.11	3.82	-0.162
SNPg	30	0.13	0.55	1.254	Cliv/For	30	-1.62	3.68	-2.413 *
NSBa	30	-0.65	1.23	-2.891 **	Mand/Ram	30	-0.65	1.45	-2.445 *
NSAr	30	0.06	1.21	0.271	Chin/Mand	30	-0.29	2.16	-0.727
NGoMe	30	0.21	0.37	3.121 **	Chin/SN	30	-0.05	1.85	-0.154
MeGoAr	30	0.03	0.69	0.264	Upp/SN	27	0.68	155	2.286 *
NS	30	-0.19	0.61	-1.717	Upp/Max	27	0.94	2.12	2.299 *
SBa	30	0.83	1.24	3.681 ***	Low/Mand	28	0.05	2.00	0.131
ArGo	30	-0.08	1.89	-0.228	Upp/Low	27	-0.97	2.87	-1.766
PgnGo	30	0.29	1.61	0.992	AB/Fop	30	-0.11	1.98	-0.306
SPgn	30	0.08	0.45	1.024	sglsoc	28	-0.30	1.16	-1.374
CdPgn	30	0.38	1.20	1.724	nssme	29	0.09	1.35	0.361
SpPm	30	0.42	1.25	1.829	nssn	30	0.02	1.14	0.075
GlOc	30	-0.44	1.34	-1.810	snsme	29	0.07	0.77	0.495
OPr	30	0.47	1.70	0.961	snstu	30	-0.17	0.68	-1.376
Old	30	0.53	2.62	1.100	stlsme	29	0.29	0.96	1.619
OS	30	0.46	2.25	1.120	EstU	30	0.07	0.39	0.930
OGo	30	0.25	3.50	0.384	EstL	30	-0.01	0.43	-0.127
NMe	30	0.16	0.60	1.417	Ntip	30	0.14	0.30	2.582 *
NSp'	30	-0.03	0.54	-0.265	Burul	30	0.15	0.47	1.761
Sp'Me	30	0.21	0.49	2.316 *	Burll	30	0.11	0.43	1.453
SMlp	30	0.08	1.33	0.317	sn'snspg	30	0.35	1.04	1.845
PgSi	30	-0.12	0.71	-0.912	sn'prnspg	30	-0.07	0.84	-0.457
BaO	30	0.41	3.33	0.677	susnul	30	0.08	2.63	0.174
MaxPAH	30	-0.12	0.53	-1.279	sglnsprn	30	-0.10	2.22	-0.239
MaxAAH	27	-0.45	0.82	-2.860 **	STgo	30	-0.15	0.66	-1.250
MandPAH	30	-0.06	0.48	-0.696	ArTgo	30	-0.18	0.84	-1.180
MandAAH	28	0.23	0.46	2.570*	CdSp'	30	0.28	1.36	1.142
OJ	27	-0.03	0.46	-0.288	NTgoMe	30	0.09	0.52	0.951
OB	27	-0.10	0.40	-1.318	MeTgoAr	30	-0.18	1.09	-0.920
SN/Mand	30	0.23	0.72	1.774	SN/FH	30	-0.04	2.31	-0.097

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

5. RESULTS AND DISCUSSION

5.1. Ancestry of the study sample

The parents of the study individuals were born between 1923 and 1947 and were all Caucasian, and more precisely, were ethnic Finns, with few exceptions. The parents represent the generation born before, during, and immediately after World War II. Of the parents, 38.2% were born in the Helsinki metropolitan area, whereas 61.8% of them originated from other parts of Finland. The parents, therefore, represent geographically an area larger than the capital region, and the genes of the study children were inherited from many parts of Finland. This is illustrated in Figure 6, a map of Finland marked with the birthplaces of the parents. Three of the parents' birthplaces were located outside the map area: Pärnu in Estonia, Neheim in Germany, and Petroskoi in Russia.

5.2. Growth of the study subjects

The somatic and craniofacial growth and development of the present sample of Finnish children are presented mostly in the form of tables and curves, with the main focus on growth curves and on changes in growth velocity. A craniofacial growth database of these Finnish children was created and is included as an appendix containing numeric tables and growth curves for a total of 98 measures. Fifty-three of these measures are included as results and discussed later in greater detail.

All the growth curves depict the mean, the 95% confidence interval (CI), the upper, 97.5% confidence limit (Upper CL), and the lower, 2.5% confidence limit (Lower CL). As additional information, the tables also include the standard deviation (SD) and point out the ages where *t*-tests revealed a statistically significant difference between the genders (p-value < 0.05).

The growth tables and curves are given on page openings for each measure, in the order of appearance in the Results and Discussion section.

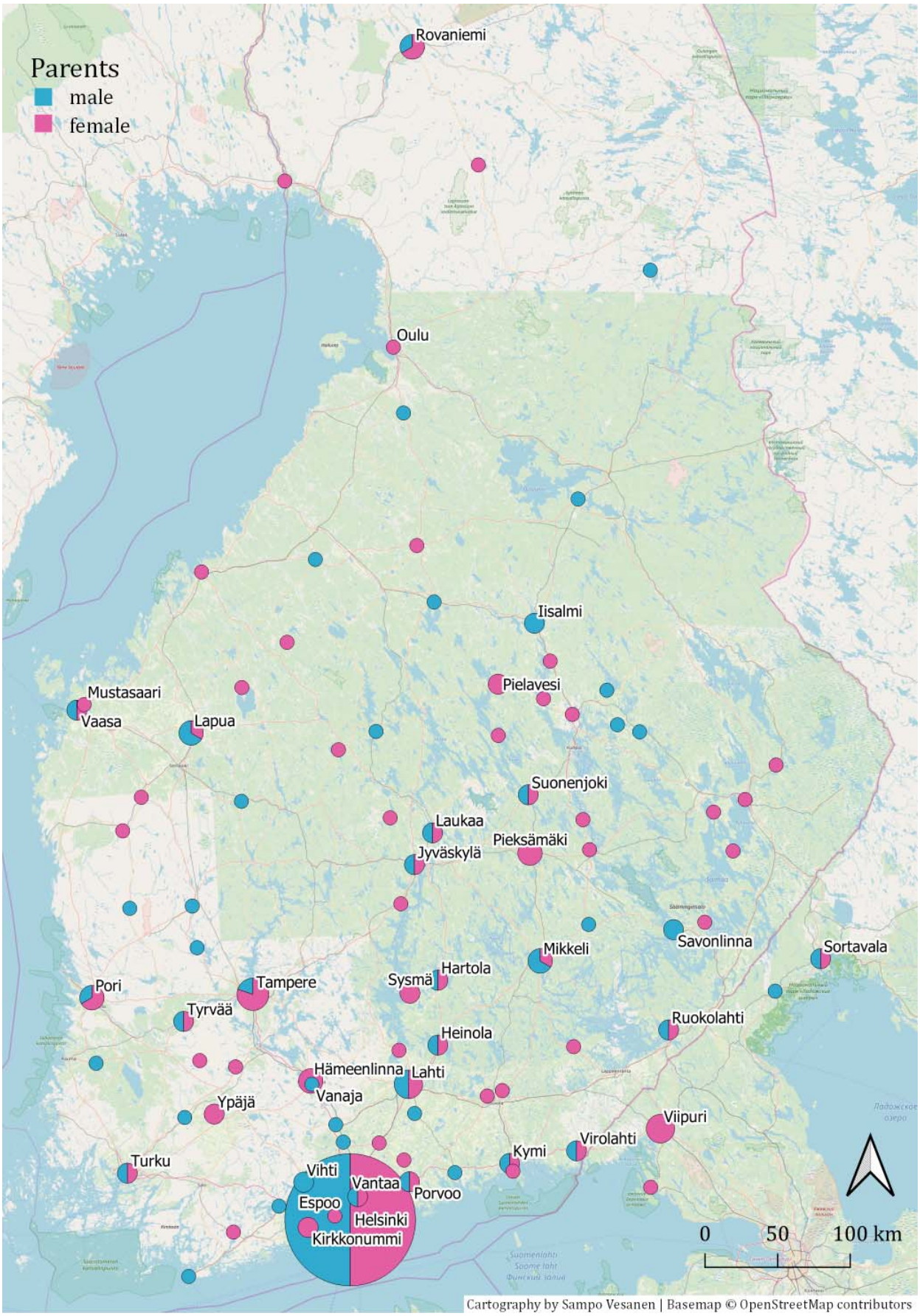


Figure 6. *Birthplaces of the parents of the Finnish study individuals. Courtesy of Sampo Vesanen.*

5.2.1 SOMATIC GROWTH

5.2.1.1 GROWTH MEASUREMENTS (Figures 7 and 8)

Analysis of statural height was based on the measurements of 190 children, in other words all the children who participated until the end of the longitudinal study. This group comprised of both orthodontically treated and untreated individuals. Results of the 2,139 height measurements performed on them, 978 on boys and 1,161 on girls, are shown in the scattergrams.

5.2.1.2 GROWTH CURVES (Figure 9)

Based on the individual measurements, growth curves were constructed, showing the mean and upper and lower confidence limits for boys and girls. Statural growth was very similar in both genders until the age of 13, after which the boys' growth became more pronounced. As judged from the growth velocity curves, the pubertal growth spurt was seen in boys on average in age groups of 12-14 years. In girls, the mean height growth velocity reached a peak in the age group of 10-11 years, but the peak value of 6.20 cm (SD 1.42) per year remained at a lower level than in boys with a peak value of 6.74 cm (SD 1.42) per year, respectively. Statural growth stabilized around the age of 20 years.

The one-year height increments in this material were very similar to those reported earlier in a group of approximately similar size, of Finnish-speaking children from Helsinki, with mean increments above 6 cm in 12- to 15-year-old boys and 10- to 12-year-old girls (Bäckström-Järvinen 1964). Notably in their material, the one-year increments were larger than in the other age groups also for 6- to 7-year-old girls (6.1 cm) and 7- to 8-year-old boys (6.0 cm). We found yearly statural growth increments above 6 cm in the groups of 5- and 6-year old boys and in the 5-year old group of girls, indicating a so-called juvenile or mid-growth spurt, reported to be observed in two thirds of children, a year earlier in girls than in boys (Molinari et al. 1980). This spurt, documented in most studies around the age of 7 years, overlaps with an increase in adrenal androgen secretion, but one speculated causative relationship between these phenomena has been disproven (Remer and Manz 2001).

5.2.1.3 ADULT HEIGHT (Figures 10 and 11)

Comparison of the mean growth curves to the Perheentupa standard showed that regarding all ages, metropolitan Finnish children in the current study, later young adults, were quite tall. In this study, at the end of growth, the mean height for boys at the age of 25 years was 181.6 cm (SD 7.57), and for girls 167.3 cm (SD 5.87). Hence, the children forming the study group were on average taller than the Finnish population means reported by the Perheentupa research group (Sorva et al. 1984; Sorva et al. 1990) (Perheentupa Jaakko, personal communication 2002).They are the same height as children in the most recent Finnish growth charts from the year 2011, although those children were born between 1983 and 2009, a generation later than the children in the present study (Saari et al. 2011). Boys in the present study became 0.9 cm taller in mean height at the age of 25 years than boys at the age of 20 years according to the report by Saari et al. (Saari et al. 2011). This indicates that there is residual growth in boys, on average 0.9 cm, between ages of 20 and 25 years. The growth of the boys in the present study was exactly 1 cm in mean values between 18 and 25 years of age. Girls in both studies were of similar height and did not accumulate height after 18 years of age.

Since the urban living environment may be one reason for the height of these children, living in Helsinki, it is of particular interest to compare their height to an earlier group of Helsinki residents back for approximately one-half to one generation. At the age of 7 years and at the age of 20 years the Helsinki Metropolitan children of the present thesis were approximately 3.5 cm taller in the boys, and

approximately 2.5 cm taller in girls, than were those from Helsinki in the Bäckström-Järvinen studies (Bäckström-Järvinen 1964). Since her study used random sampling from child welfare centers, elementary and secondary schools, we can speculate that some socio-economic differences may exist between her study cohort and the children of the present research who continued to attend the long follow-up study, whereas a secular trend offers a more likely explanation.

Information and records regarding the parents of the study group children were gathered cross-sectionally in 1984. The mean height for the fathers was 178.4 cm (SD 6.25) and for the mothers 164.9 cm (SD 5.33). They were hence also quite tall for their generation, indicating that the war-time had seemingly not affected their growth. Nevertheless, the statural height showed an increasing secular trend in the cohort children.

5.2.1.4 INDIVIDUAL HEIGHT GROWTH CURVES (Figures 12-15)

Individual height growth curves of three boys and three girls —one short, one of medium height and one tall— were compared to Perheentupa standards from 2002. Up to 12.5 years of age, the tall boy and the boy of medium height grew similar to the Perheentupa standard mean, after which the tall boy started to show increased growth. Growth of the boy of medium height also exceeded the standard, but this occurred at a later time point, after 14.5 years of age, whereas the short boy grew less than the Perheentupa standard, especially after 14.5 years of age. In girls, this comparison gave different results: at all time points the tall girl was taller; the girl of medium height equal to; and the short girl shorter than the Perheentupa standard mean. In addition to growth curves, the graphs indicate the original measured heights.

Growth velocities of the six example children were compared to the entire present study group. Since individuals tend to reach their peak height velocities at different ages, the mean growth velocity curves are flat in form. Hence it is natural that individual growth velocity curves occasionally rise above the mean curve. This is also evident in all the example boys. The short boy happened to enter his pubertal growth spurt earlier than the mean, and the other two later than the mean. The example girls all had their periods of fast growth later than the mean, but the short girl´s growth velocity never exceeded the flat population mean curve.

Taken together, individual growth should always receive attention by being measured and considered during orthodontic treatment planning.

5.2.1.5 BODY MASS INDEX (BMI) (Figure 16)

Body Mass Index (BMI) values were calculated for 190 children from height values and 2,132 weight measurements (974 of boys and 1,158 of girls). BMI values of the study group were within the normal range, indicating the absence of significant underweight or overweight in any of the individuals (Saari et al. 2011). The mean BMI range in boys was between 16.6 and 23.8 kg/m^2 and in girls between 16.8 and 21.7. Small children showed no gender difference, and at first their BMI was slightly decreasing, until it started to increase after the age of 8 years, meaning that small children gained relatively more statural growth than weight. In girls, a peak increase of BMI by 0.64 kg/m^2 was noted at the age of 13.5 years, and in boys by 0.67 kg/m^2 at 15.5 years. Following the onset of puberty, boys generally gained more body mass than girls. The BMI in girls stabilized earlier, whereas boys continued to develop larger muscles. The gender difference was significant between 17 and 20 years of age, and very significant after 20 years of age, with boys having higher BMI.

Comparing the present sample and the earlier Helsinki sample in terms of BMI at the age of 20, girls were identical with a BMI of 21.2 kg/m^2, whereas the boys in our sample were relatively heavier, with a BMI of 22.7 kg/m^2 versus 21.5 kg/m^2 in the earlier **Bäckström-Järvinen** sample (Bäckström-Järvinen 1964).

5.2.2 CRANIOFACIAL GROWTH

5.2.2.1 CRANIAL BASE

NSBa Cranial base angle (Figure 17)

NSBa, the cranial base angle, becomes stable at the age of 8 years in both genders. Prior to that, it displays minor fluctuation in size and in amount of annual change. The cranial base is constantly flatter in girls than in boys by approximately 2 degrees, and the difference between genders is statistically significant between the ages of 14 and 22 years.

The finding that the cranial base angle is consistently smaller in boys than in girls is in line with the concept that the growth pattern, which is more closing in boys than in girls, is associated with the craniofacial morphology already at the level of the cranial base.

N-S Anterior cranial base (Figure 18)

N-S, a linear length measure of the anterior cranial base, increases with age. The average total growth taking place between 4 and 25 years of age is 13 mm in boys and 10 mm in girls. At all ages, the anterior cranial base is statistically significantly longer in boys than in girls. Between the ages of 9 and 14 years, the boys exhibit a small growth spurt in N-S, whereas girls display no noticable increase in their growth velocity.

S-Ba Posterior cranial base (Figure 19)

S-Ba, the linear length measure of the posterior cranial base is also known as clivus length. It increases up to the age of 20 years, showing from 4 years of age an average increase of 10.3 mm in boys and 6.4 mm in girls. In comparison to girls, the S-Ba distance becomes 3.8 mm longer in boys, the difference starting at 11 years and being statistically significant.

Anterior and posterior parts of the cranial base show similar growth and growth velocity curves.

5.2.2.2 MAXILLA AND MANDIBLE

SNA Maxillary prognathism (Figure 20)

SNA is an angle reflecting the sagittal position of the maxilla in relation to the anterior cranial base. SNA first decreases, because the deciduous incisors are more upright and the point A is therefore more prominent, then SNA increases slightly after 5 years of age in boys and 7 years of age in girls, on average by 3.0 degrees in boys and by on average 1.1 degrees in girls. At the end of growth, at 19 to 25 years of age, SNA of boys is 2.5 degrees larger compared to that of girls. The change in SNA is more pronounced in boys between 11 and 18 years of age. At all ages, the SNA angle is larger in boys than in girls, the difference being of statistical significance after 13 years of age.

SNB Mandibular prognathism (Figure 21)

SNB is an angle reflecting the sagittal position of the mandible in relation to the anterior cranial base. It increases in both genders with age, on average 4.9 degrees from 5 years in boys and 2.1 degrees from 4 years in girls. This angle increases more than SNA does, especially in boys. Thus, boys finish with more prognathic mandibles than girls do. The gender difference starts only after 13 years of age, being thereafter statistically significant.

ANB Antero-posterior jaw base relationship (Figure 22)

ANB is an angular measure describing how the jaws are related to each other antero-posteriorly. In both sexes, ANB decreases with age, especially between the ages 4 and 9 years. During ageing from 4 to 25 years, the angle decreases from 5.0 to 2.5 degrees in boys, and from 4.4 to 2.4 degrees in girls, with no statistical difference between genders.

The forward growth of the mandible is the main reason for the decrease in this relationship.

NAPg Facial convexity (hard tissue) (Figure 23)

NAPg, the facial convexity angle of the hard tissue profile, increases with age and approaches 180 degrees; the profile thus straightens with age. The change in facial convexity is similar in both sexes, the angle increasing on average by 9.1 degrees in boys and by 7.6 degrees in girls during growth from the age 4 years onwards.

ArTgoMe Gonial angle (Figure 24)

ArTgoMe is one of the many gonial angle measurements described. Differing from the majority of cephalometric measures, it is not in the midsagittal plane but is bilateral, demonstrating the angle between the mandibular corpus and ramus. ArTgoMe diminishes with age, becoming more acute by 14 degrees in boys; from 131.5 to 117.5 degrees, and by 10.6 degrees in girls; from 131.0 to 120.4 degrees. The gender difference in this measure is statistically significant from age 21 to 24 years, and its associated annual change, from age 11 to 21 years.

Cd-Sp' Maxillary length from condylion by Harvold (Figure 25)

Cd-Sp' is a linear measure of the sagittal depth of the face at the maxillary level, and measured from an anterior hard tissue point of the nasal floor to the upper outermost point in the condylar head. In boys, this measure starts to grow in an accelerated fashion at the age of 10 years, and exhibits a growth spurt from 10 to 19 years. In 25-year-olds, the Cd-Sp' distance is 7.1 mm longer in boys than in girls.

Cd-Sp' has similar changes as those observed in mandibular length (Cd-Pgn).

Cd-A Maxillary length from condylion by McNamara (Figure 26)

Cd-A, like Cd-Sp', is a linear measure of the sagittal depth of the face, but measured from the deepest anterior hard tissue point in the maxilla to the upper outermost point in the condylar head. Consistently, Cd-A is approximately 0.5 mm longer than Cd-Sp', but otherwise the growth curves and the growth velocity curves of these two measures are more or less identical. The growth in this measure accelerates in boys at 11 years of age and they have a similar growth spurt as in Cd-Sp' from 10 to 19 years.

Cd-Pgn Mandibular length (Figure 27)

Cd-Pgn, the total length of the mandible, increases in a pattern following the growth curve of statural height. The mandibles of boys and girls are of similar length until the age of 9 years. Thereafter the boys' mandibles start growing much more, with a total mean increase of 36.5 mm between ages 4 and 25 years, whereas in girls the mean increase is 28.2 mm. On average, the mandible is 9.3 mm longer in adult males than in adult females. Boys exhibit a growth spurt in their mandibular growth between the ages of 9 and 16 years, whereas no clear spurt in mandibular growth occurs in girls.

Cd-Pgn – Cd-Sp' Difference in jaw lengths by Harvold (Figure 28)

Cd-Pgn – Cd-Sp' is a calculated difference between the mandibular and maxillary jaw lengths, both jaws being measured from condylion (Cd). This measure increases evenly by on average 1 mm per year until the age of 16 years in boys and 12 years in girls. Between 11 and 20 years of age, the annual increase in the measure remains at a statistically significantly higher level in boys than in girls, although it gradually diminishes in both genders, from 1.05 to 0.38 mm in boys and from 0.87 to 0.21 mm in girls. Between ages 4 and 25 years, the mean jaw length difference increases in boys from 14.7 to 29.7 mm and in girls from 15.6 to 27.5 mm.

Cd-Pgn – Cd-A Difference in jaw lengths by McNamara (Figure 29)

Cd-Pgn – Cd-A, the McNamara difference, also depicts the difference of the jaw lengths; it uses the same mandibular length as in the Harvold difference, but the maxillary length from condylion measured to the point A instead of the point Sp'. The growth curve and the magnitude of change curve of this measure predictably follow those of the Harvold difference. Yet, the McNamara difference is shorter by the same amount that the Cd-A distance is longer than Cd-Sp' (Table 10). Between ages 4 and 25 years, the mean jaw length difference by McNamara increases in boys from 14.0 to 28.9 mm and in girls from 14.5 to 26.9 mm. The annual change in this difference is statistically significantly higher in boys than in girls between 11 and 20 years of age.

In Finland, the Harvold difference in jaw length was much used earlier and still is valid (Harvold 1974), but nowadays, the McNamara difference in jaw length finds increased popularity (McNamara 1984). Our comparison show that they do not differ from each other significantly and both can be used similarly (Table 10).

Table 10. *Comparison between Harvold and McNamara analyses; group means and standard deviations. Based on 270 cephalograms of boys and 281 cephalograms of girls.*

	Boys, mean (SD)	Girls, mean (SD)	All, mean (SD)	
Cd-Pgn mandibular length in both analyses	106.3 (12.21)	102.5 (8.91)	104.4 (10.82)	
Cd-Sp' Harvold maxillary length	82.5 (7.29)	78.9 (5.37)	80.6 (6.62)	
Cd-A McNamara maxillary length	82.9 (7.37)	79.3 (5.33)	81.0 (6.65)	
Harvold jaw length difference	23.9 (6.24)	23.6 (5.15)	23.7 (5.71)	
McNamara jaw length difference	23.5 (6.11)	23.2 (5.17)	23.3 (6.65)	
Difference between Harvold and McNamara analyses	0.40 (0.87)	0.42 (0.71)	0.41 (0.79)	n.s.*

*non-significant. Anova.

Cd-Tgo Ramus height with condyle (Figure 30)

Cd-Tgo, the vertical mandibular ramus height, follows the growth pattern of statural height. The mandibular ramus is of equal height in boys and girls until the age of 12 years. Thereafter boys grow statistically significantly more, resulting in a ramus that is on average 6.8 mm higher in adult males than in adult females. Boys also exhibit a clear growth spurt between the ages of 10 and 17 years.

5.2.2.3 HORIZONTAL PLANE ANGLES

SN/FH Angle between sella-nasion and Frankfurt horizontal planes (Figure 31)

SN/FH, the angle between the anterior cranial base (N-S) and Frankfurt horizontal (Or-Po) planes shows by how many degrees the anterior cranial base differs from the Frankfurt horizontal plane, which is often used a reference plane, and is parallel to the floor. The angle is fairly stable. In boys, it increases from 6.1 degrees (age 5) to 6.5 degrees (age 14) and thereafter slightly decreases to 5.8 degrees (age 25). In girls, the increase is from 5.8 degrees (age 4) to 7.9 degrees (age 19), and thereafter a slight decrease takes place to 7.5 degrees (age 25). The angle is statistically significantly larger in girls than in boys from age 10 onwards.

Both of these planes, the sella-nasion and the Frankfurt horizontal, have been used as reference planes in many cephalometric studies over many years. The difference between the two measures is relatively constant; in boys on average 6 degrees and in girls 7.5 degrees. There has been debate, whether the Frankfurt horizontal is an optimal reference plane in cases of extreme skeletal divergence. The Natural Head Position (NHP) or the Natural Head Orientation (NHO) have been suggested instead (Bjerin 1957; Lundstrom and Lundstrom 1995). However, differing opinions on their usage have been aired (Halazonetis 2002).

SN/Max Angle between sella-nasion and maxillary planes (Figure 32)

SN/Max, describes the angulation of the maxilla to the anterior cranial base. This angle remains quite stable throughout growth. Between the ages 6 and 24 years this angle is statistically significantly larger in girls than in boys by 1.5 degrees on average. The mean value for the angle is 6.3 degrees in girls and 4.8 degrees in boys.

SN/Mand Angle between sella-nasion and mandibular planes (Figure 33)

SN/Mand is the angle between the lower border of the mandibular corpus and the anterior cranial base. This angle is often also referred to as the posterior facial angle. It diminishes in both genders with age, on average by 8 degrees in boys and by 5 degrees in girls. Boys have a smaller angle than girls do at all ages. In boys, the mean angle diminishes from 32.1 degrees at age 4 to 23.9 degrees at age 24, the respective mean angles in girls being 34.2 and 28.7 degrees. The gender difference is statistically significant from 8 years onwards, and highly significant after 18 years of age.

These values show that boys exhibit a more closing growth pattern than girls do.

Max/Mand Angle between maxillary and mandibular planes (Figure 34)

Max/Mand shows the relationship between the maxillary and the mandibular planes. In both genders, Max/Mand is on average 28 degrees at the age of 5 years. The angle decreases in both genders, but more extensively in boys than in girls, resulting in a mean angle of 19.3 degrees for boys and 22.7 degrees for girls at growth completion.

In this angle as well as in the one above, boys exhibit a more closing growth pattern than girls.

5.2.2.4 VERTICAL FACE HEIGHTS

N-Me Anterior face height AFH (Figure 35)

N-Me is the measure of anterior facial height. Its increment largely follows the timing and pattern of growth of statural height and mandibular length. Both genders show similar anterior face height until the age of 9 years. After that, boys have a growth spurt of 2 mm per year until the age of 15 years. Girls do not have a growth spurt. Finally, the mean anterior face height of boys (116.4 mm) is 17.4 mm longer than that of girls (109.0 mm). This statistically significant gender difference starts at the age of 11 years, and is highly significant at the age of 13 years.

S-Tgo Posterior face height PFH (Figure 36)

S-Tgo, the posterior face height, has the same growth pattern as the anterior face height. The mean total amount of its growth between ages 4 and 25 years is 29.0 mm in boys and 20.7 mm in girls, resulting in a posterior facial height of 84.8 mm in adult males and 74.4 mm in adult females. Boys exhibit a growth spurt between 9 and 17 years, and girls also have a small growth spurt between 8 and 10 years of age. Statistically highly significant gender differences start at the age of 6 years.

Posterior face height being greater and growing more in boys is the result of their more prominent appositional growth in the gonial area, as well as the result of the fact that during growth the whole mandible, in relation to sella, will move a little more caudally in boys than in girls.

S-Tgo/N-Me PFH/AFH % Ratio of posterior to anterior face height (Figure 37)

S-Tgo/N-Me calculates the ratio of the posterior face height (S-Tgo) from the anterior face height (N-Me). Depending on age, this ratio ranges between mean values 63.8% and 73.3% in boys and between 62.7% and 68.8% in girls. This ratio increases with age, and more notably in boys than in girls, the difference in annual change being statistically significant between ages 13 and 23 years. Yet at all times, boys have a higher ratio between their posterior and anterior face heights than girls. This sexual dimorphism already reaches statistical significance at the age of 8 years and becomes highly significant after the age of 18 years.

Boys have a longer posterior face height in relation to anterior face height than girls. This is mainly due to the amount of appositional growth in gonial area and the more closing rotation during mandibular growth .This affects the facial form, boys being more square.

N-Sp' Upper anterior face height (Figure 38)

N-Sp' shows the distance from nasion to a frontal point Sp' of the maxillary plane. Both genders grow similarly, at about 1 mm per year, until the age of 8 years. The upper anterior face height increases until the age of 21 with a pace that gradually decreases without any growth spurts in both genders, and decreases sooner in girls than in boys. The mean end height for boys is 52.1 mm and for girls 48.8 mm. Standard deviations for this measure are low in both gender groups, less than 2.6 mm for any age, indicating little inter-individual variation.

Sp'-Me Lower anterior face height LAFH (Figure 39)

Sp'-Me, the lower part of the anterior face height from a maxillary anterior point Sp' to Menton exhibits a clear growth spurt around puberty in boys, with notable enhancement in growth velocity of the lower anterior face height in 12 to 15 year olds. This is then reflected as a boys' growth spurt in the total height of the anterior face from Nasion to Menton. In girls, Sp' to Menton shows a growth spurt

two years earlier than in boys. This remains very modest, however, and is not likely to cause any notable change in the growth velocity in the girls' total anterior face height. Significant difference in the lower anterior face height between boys and girls appears from the age of 14 years onwards. Between ages 4 and 25 years, Sp'-Me increases on average from 50.3 mm to 64.7 mm in boys, and from 49.8 to 60.6 mm in girls.

Sp'-Me/N-Me LAFH/AFH % Ratio of lower anterior face height to total anterior face height (Figure 40)

Sp'-Me/N-Me, the ratio between the lower anterior face height Sp'-Me and the total anterior face height N-Me**,** is almost constant in both genders, approximately 55%. From the mean level of 58% in 4-year-old boys and girls, it rapidly declines to the afore-mentioned level by the age of 9. Thus, the lower anterior face height exhibits more than half of the total anterior face height in all age groups.

5.2.2.5 DENTO-CRANIAL/DENTO-ALVEOLAR MEASUREMENTS

Upp/SN Inclination of upper incisors to sella-nasion plane (Figure 41)

Upp/SN is the angle between the upper incisor axis and the anterior skull base. At an early age, in all children having deciduous upper incisors, the angle is small. This reflects the fact that the upper deciduous incisors are very upright in relation to the anterior cranial base. Later on, this angle reaches 100 degrees by the age of 7 years when most children have their permanent incisors erupted, but with some still have deciduous incisors in place and in occlusion. Thereafter, it remains nearly stable with a maximum of 105.9 degrees in boys and 103.3 degrees in girls at the age of 8 years, and then slowly decreasing by about 2 degrees. At 25 years of age it is 103.3 degrees in boys and 100.1 degrees in girls. The difference between boys and girls is statistically significant between the ages of 8 and 13 years.

Upp/Max Upper incisor angle (Figure 42)

Upp/Max, the inclination of upper incisors to the maxillary plane follows the same pattern as the previous angle, only being about 5 degrees larger than the Upp/SN angle. From the maximum mean of 110.3 degrees it decreases to 108.3 degrees in boys, and respectively from the mean of 108.9 degrees to 106.5 degrees in girls.

Low/Mand Lower incisor angle (Figure 43)

Low/Mand, the inclination of lower incisors to the mandibular plane, slightly exceeds a right angle at 6 years of age in both genders. Before that, at 5 years of age, only a few individuals had measureable lower incisors, and those present, whether deciduous or permanent, were lingually inclined. After the eruption of the permanent lower incisors, this angle reaches a maximum of 97.3 degrees in boys and then diminishes by one degree to the 25 year mean of 96.3 degrees. In girls, the respective angulations are from 95.3 degrees to 94.9 degrees. The change per year is less in boys than in girls between the ages of 16 to 19 years.

Upp/Low Inter-incisal angle (Figure 44)

Upp/Low, the angle between the upper and lower incisors, is large at early ages due to the upright upper and lower deciduous incisors. It then decreases until 8 years of age, after which it starts to increase again from 128.0 degrees to 137.1 degrees in boys and from 129.9 degrees to 136.1 degrees in girls. The standard deviation in both boys and girls was high, meaning that this angle shows considerable variation. The annual change in boys is statistically significantly bigger than in girls between the ages of 13 to 21 years.

In these four incisal angles, it is notable that the first three (the angle between the upper incisors in relation to the anterior cranial base or to the maxillary plane as well as the angle between the lower incisors in relation to the mandibular plane) have exactly the same type of pattern in the developmental curves of the measure and in their annual change. In these here mentioned, the incisal axis, either upper or lower, constructs the other arm of the inter-incisal angle that exhibits exactly the opposite type of pattern. There, the angle is formed by the two incisal axes, both upper and lower.

Is from A-Pg Upper incisor protrusion (Figure 45)

Is from A-Pg shows how far the upper incisal edge is situated anterior to the line formed by the deepest anterior point in the maxilla (point A) and the most prominent point of the chin (pogonion). At ages 5 and 6 years, this distance is at its minimum mean due to the upright deciduous incisors among the permanent ones. In both genders, the upper-incisor prominence is growing until 11 years of age, when it reaches its highest mean value, in boys 5.2 mm and in girls 4.7 mm. Thereafter, the upper incisal edge gradually becomes less protrusive, being 3.4 mm in boys and 4.0 mm in girls at the age of 24 years. At all ages analyzed the measure is positive, which means that the incisal edge is in front of the A-Pg line. The annual decrease is statistically significantly more pronounced in boys after puberty, between the ages of 13 and 21 years, as compared to the decrease in girls.

Ii from A-Pg Lower incisor protrusion (Figure 46)

Ii from A-Pg depicts the distance of the lower incisal edge from the A-pogonion line analogous to the upper incisal edge from the A-pogonion line in the growth-curve format, but the values are much lower in both sexes. In boys, the mean value at the ages of 5 and 6 years is negative, meaning that then the lower incisal edge lies behind the A-Pg line. There is an increase in the lower-incisor prominence in boys up to a mean of 1.70 mm at the age of 11 years, and in girls up to 1.67 mm at the age of 20 years. The lower incisal edge mean is only 0.5 mm in front of the A-Pg line in boys and 1.2 mm in girls at the age of 24 years.

The finding that the value in boys reaches its peak already at the age of 11 may be explained by increased mandibular growth during puberty and thus an anterior shift of the mandibular reference point in relation to point A. The decrease in the lower incisor protrusiveness between ages 20 and 24 in girls eventually goes hand in hand with clinical signs of lower-incisor crowding in young adult females.

Wits appraisal Antero-posterior jaw base relationship (Figure 47)

Wits appraisal assays the difference between projections of the deepest anterior points of the maxilla and the mandible, points A and B, on the functional occlusal plain Fop. In both girls and boys the mean value of the measure is at all time points negative, except in boys at the ages of 4 and 25 years, when it is mildly positive. The negative values show that point A lies slightly behind point B, when projected to functional occlusal plane. In boys, the mean values range from -1.03 mm to 0.27 mm and in girls from -1.51 mm to -0.57 mm.

Wits appraisal is dependent on the definition of the occlusal plane. In this study, the functional occlusal plane was used excluding the incisors. Because the Mf point of the maxillary first permanent molars is located more cranially than the point Fo in premolars, using an occlusal plane that intersects these points tends to make the Wits appraisal more negative compared to the situation in which the incisal edges are taken into account instead of the functional point Fo.

Wits appraisal and ANB angle can be used in parallel to achieve a better understanding of the antero-posterior jaw-base relationship.

5.2.2.6 SOFT TISSUES

sn'snspg Facial convexity without nose (Figure 48)

sn'snspg, the angle between the lines from sn' (the point at the intersection between the continuation of the sella-nasion line and the soft tissue profile) to subnasale and from subnasale to soft tissue pogonion, was measured to evaluate the convexity of the soft tissue profile, with the nose and forehead excluded. This is equal, 164.7 degrees, in both genders at the age of 6 years. At a low pace, the angle then decreases, making the profile most convex in both boys and girls at the time of puberty, thereafter it again slowly straightens. After the age of 6 years, girls are always one or two degrees less convex than boys, but the difference is statistically significant only between the ages of 17 and 18 years.

Both hard tissue profile and soft tissue profile straighten with age due to growth, but they can also be affected by orthodontic treatment in a favorable or less favorable direction. Most cephalometric analyses yield the result that males have a straighter profile than females do. This is most likely explained by the fact that they measure the convexity from the soft tissue or hard-tissue point Glabella, which shows a more marked anterior movement during growth in males than females, largely due to the formation and growth of the frontal sinus.

susnul Nasolabial angle (Figure 49)

susnul, the nasolabial angle, is here defined by points su (the inferior prominence point of columella), sn (subnasale), and ul (upper lip). It becomes less obtuse with age, ending on average at 104 degrees in adult males and at 106 degrees in adult females. Differences in this angle between genders do not, however, reach statistical difference at any age. Also the annual changes are similar from the age of 10 years onwards in both genders.

The nasolabial angle is very important in planning orthodontic treatment, because it affects appearance. However, the adult size and form of the nose are often difficult to predict and undergo slow changes throughout life.

EstU Upper lip from esthetic line (Figure 50)

EstU measures the distance of the upper lip from the esthetic line, drawn from the nasal tip to soft tissue pogonion. In small children the lip nearly touches the line, but due to overriding growth of the nose and chin the upper lip becomes relatively more retrusive in a progressive fashion. The change is most rapid around puberty in both sexes, and more rapid in boys than girls during ages 14 to 21 years. In 25-year-olds the upper lip is behind the esthetic line on the average by -4.8 mm in males and by -5.2 in females. Perhaps associated with a later growth spurt of the nose and mandible in boys than girls, the upper lip of the boys is situated closer to the esthetic line than that of the girls from age 9 to 15 years. The figures also indicate that the upper lip is thicker in boys than in girls.

EstL Lower lip from esthetic line (Figure 51)

EstL, the distance of the lower lip from the esthetic line, shows analogous results during growth to the distance of the upper lip from this reference line, only the millimeters vary. The lower lip of boys is on average slightly in front or at the esthetic line up to age 12. After this age, the lower lip

remains behind the line, the distance progressively increasing to -3.0 mm at the end of growth. In girls at all ages, the lower lip lies behind the esthetic line, the distance increasing to -3.3 mm by the age of 24 years. Annual changes follow the pattern described for the upper lip.

Analysis of the distance of the lips from the esthetic line shows that the lips of boys are relatively more protrusive or thicker than are the lips of girls, particularly the lower lip. These gender differences at all ages do not reach statistical significance, however, probably due to notable inter-individual variation.

Lip position and strain during the radiographic exposure may vary, particularly in young children, and thus affect the results of the analysis.

The protrusiveness of the lips depends both on the thickness of the lip and on the underlying support from the teeth and alveolus. It is notable that the lips of small children, who still have primary incisors that are more upright than their permanent incisors, are at a very short distance from the esthetic line. Support from the labially inclined permanent incisors in later years does not compensate for the drift of the esthetic line itself when the nose and chin surpass in their growth beyond the lips, and the lips become relatively more retrusive.

Ethnic populations have different thicknesses and protrusiveness of the lips. African-American ethnic groups often have thicker and more protrusive lips than do ethnic groups of European or Asian origin. These types of measures should be taken into consideration in treatment planning. Particularly when considering visibility of the teeth in relation to the lips and whether the lips are strained to cover the teeth. This is important, for example, when planning extraction versus non-extraction treatment modalities.

5.2.3. INDIVIDUAL CRANIOFACIAL GROWTH

Six individuals (3 boys and 3 girls) serve as examples to illustrate how individual growth changes differ in timing and extent. Their individual growth velocities regarding six craniofacial measurements are compared to their own statural-height growth-velocity curve.

Short boy: Peak height velocity is reached early, at 12.5 years, and growth peaks in craniofacial variables are noted at approximately 11.5 years, except for the mandibular ramus with condyle (Cd-Tgo), showing increased growth velocity at the age of 14 years. The annual growth of the craniofacial variables at its peak are approximately 1.5-2.5 mm except N-S, which is less than 1 mm (Figure 52).

Boy of medium height: Peak height velocity occurs at 14.5 years, but the craniofacial variables fail to show any clear period of enhanced growth, with the exception of the vertical craniofacial variables N-Me and S-Tgo that slightly speed up between 10 and 14 years at a 2-mm level. In mandibular length (Cd-Pgn), the maximum of annual increase of 3 mm takes place already at the age of 7 years (Figure 53).

Tall boy: A notable peak is observed in height velocity at the age of 14 years and a small one at 6 years. Clear peaks in the lower jaw variables Cd-Pgn and Cd-Tgo, and a mild one in effective length of the maxilla Cd-Sp', can be detected at about 14.5 years. The highest annual increment in Cd-Pgn is 3 mm (Figure 54).

Short girl: Peaks in height velocity are seen at 7 years and 12 years, but no peaks are present in the craniofacial variables. The highest annual growth increments, 1-3 mm, in all of the craniofacial variables are observed already at the age of 5 years (Figure 55).

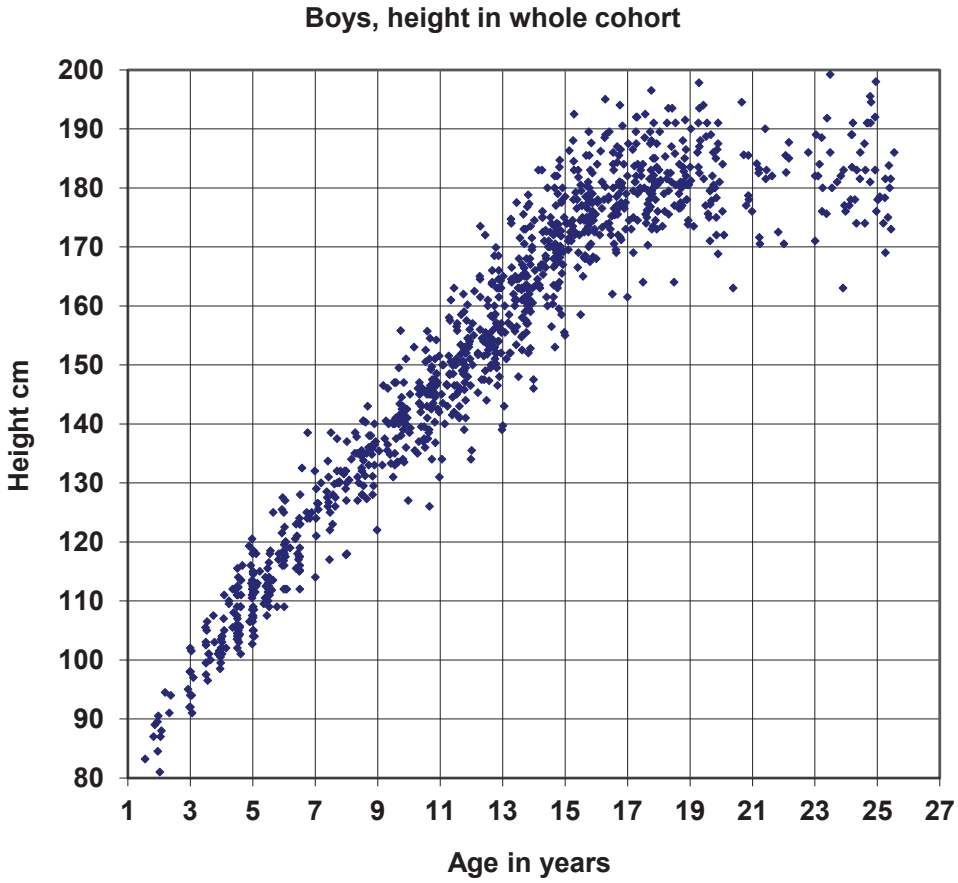
Girl of medium height: Peak height velocity is observed at 12.5 years, and moderate growth peaks, extending over a longer time period, in craniofacial variables, Cd-Pgn mandibular length and N-Me anterior face height at 7-11 years, S-Tgo posterior face height at 12-16 years and Cd-Tgo mandibular ramus with condyle at 13-17 years (Figure 56).

Tall girl: A notable peak in height velocity is seen at 12.8 years. The craniofacial variables display a clear peak in Cd-Pgn at 10-14 years (2 mm yearly), and a mild one in N-Me early at 4 to 8 years at a 2 mm level (Figure 57).

In these individuals, the highest growth velocities regarding craniofacial growth were observed in the mandibular length, with a yearly maximum of 2.5 to 3 mm in four of these children and of 2 mm in the remaining two.

Boys Height

Figure 7



Girls Height

Figure 8

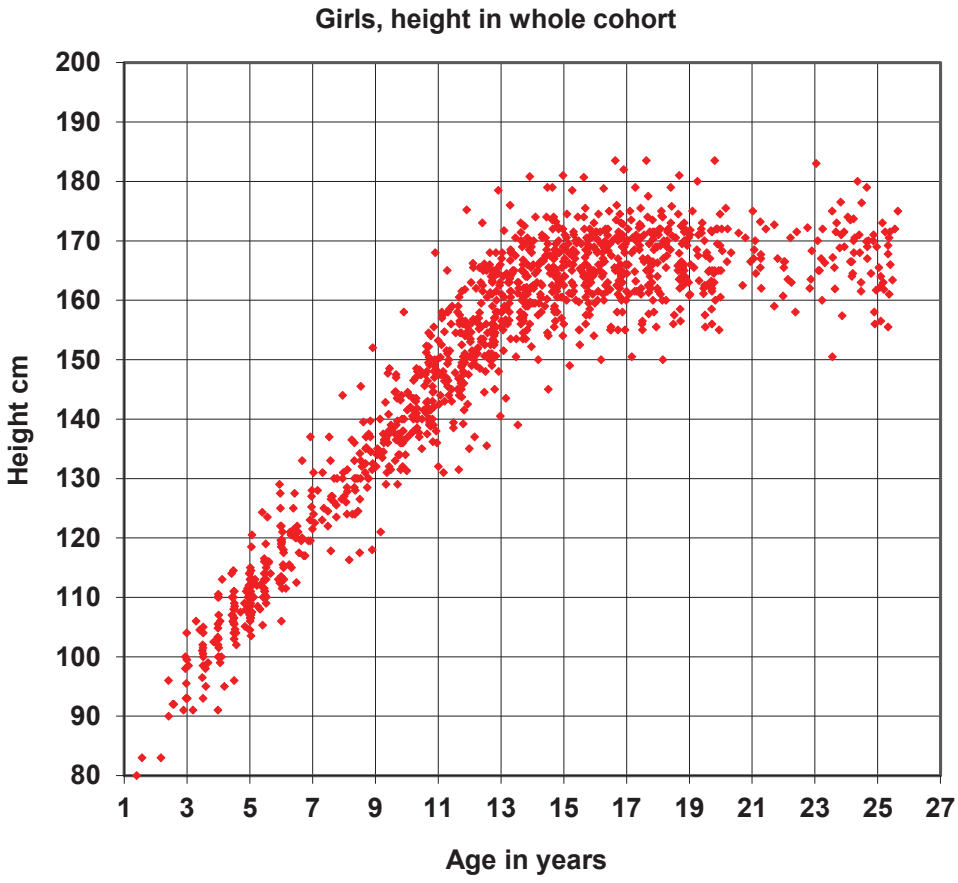


Figure 9

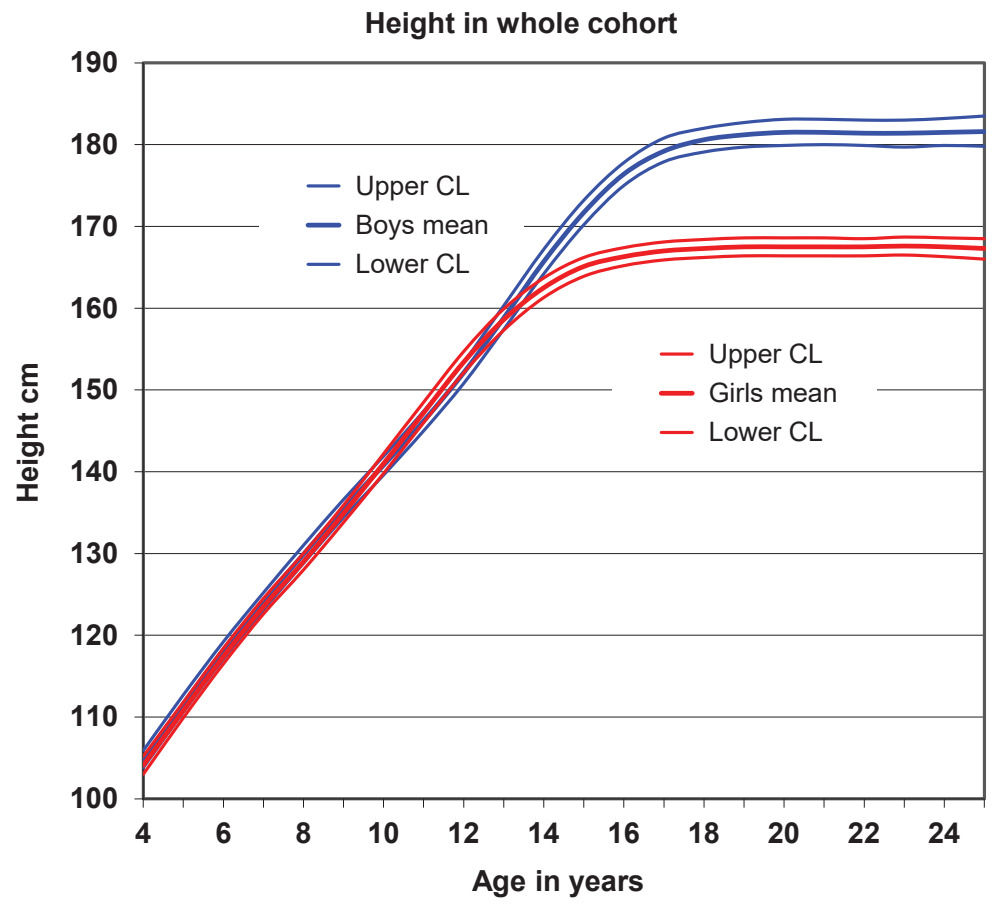
Height (cm)

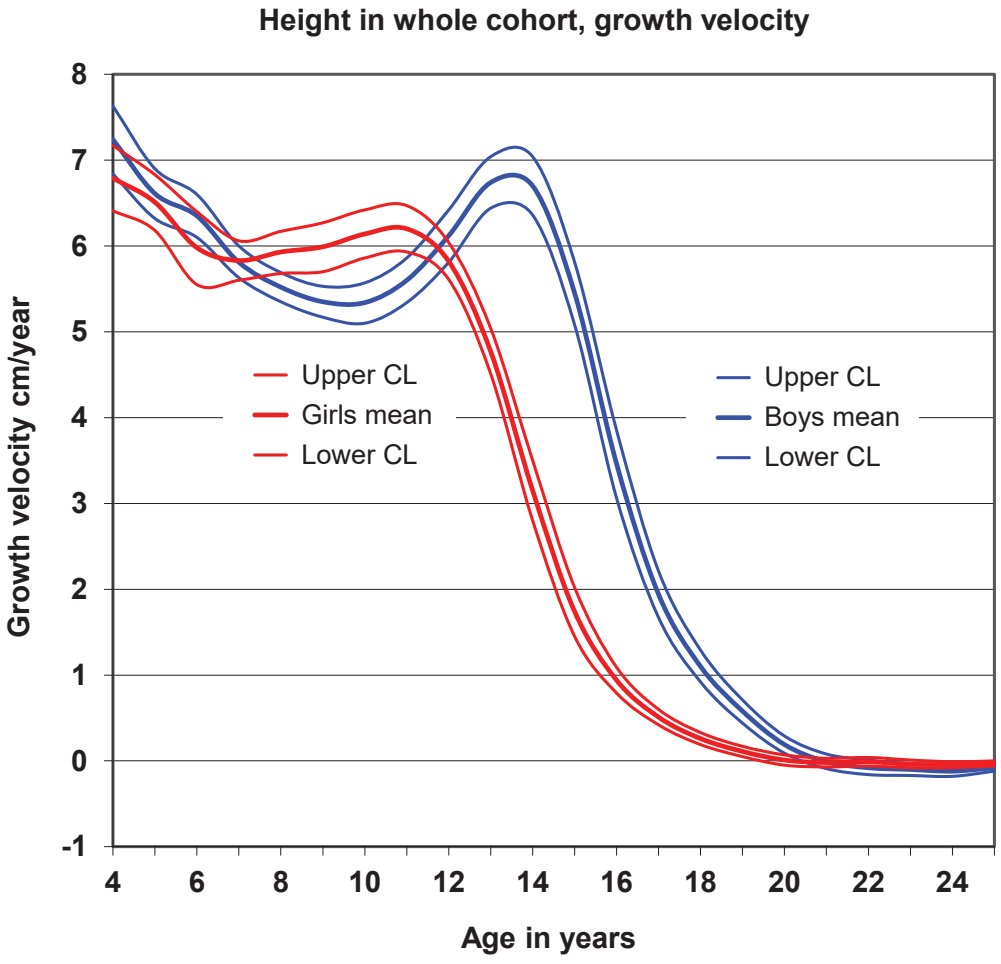
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	103.7	104.8	105.9	4.04	0.86		59	103.0	104.1	105.2	4.38
5	69	110.6	111.6	112.7	4.50	1.12		87	109.9	110.8	111.8	4.52
6	76	117.2	118.3	119.3	4.75	1.13		93	116.5	117.4	118.4	4.63
7	82	123.2	124.3	125.4	4.93	0.99		96	122.6	123.6	124.5	4.76
8	83	128.8	129.9	131.0	5.12	1.11		100	128.0	129.0	130.1	5.22
9	84	134.3	135.4	136.5	5.18	0.69		102	133.8	134.9	136.0	5.57
10	85	139.5	140.7	141.9	5.53	-0.34		103	139.8	141.0	142.1	6.07
11	85	145.0	146.2	147.4	5.70	-1.07		105	145.9	147.2	148.5	6.64
12	85	150.9	152.2	153.5	6.14	-1.19		105	152.0	153.3	154.6	6.91
13	85	157.4	158.8	160.3	6.78	0.20		105	157.3	158.6	159.9	6.71
14	85	164.2	165.7	167.2	7.00	3.29	p<0.01	105	161.3	162.5	163.7	6.21
15	85	170.3	171.8	173.3	6.87	7.35	p<0.001	105	163.9	165.1	166.2	5.80
16	85	175.0	176.4	177.8	6.67	11.15	p<0.001	105	165.2	166.3	167.4	5.73
17	85	177.7	179.2	180.6	6.83	13.28	p<0.001	105	165.9	167.0	168.1	5.78
18	85	179.1	180.6	182.0	6.97	14.32	p<0.001	105	166.2	167.3	168.4	5.79
19	85	179.7	181.2	182.7	7.20	14.61	p<0.001	105	166.4	167.5	168.6	5.78
20	85	179.9	181.5	183.1	7.36	14.72	p<0.001	105	166.4	167.5	168.6	5.74
21	85	180.0	181.5	183.1	7.36	14.84	p<0.001	105	166.4	167.5	168.6	5.71
22	85	179.9	181.4	183.0	7.36	14.82	p<0.001	105	166.4	167.5	168.5	5.64
23	82	179.7	181.4	183.0	7.49	14.05	p<0.001	99	166.5	167.6	168.7	5.65
24	74	179.9	181.5	183.2	7.31	13.89	p<0.001	92	166.3	167.5	168.6	5.71
25	66	179.8	181.6	183.5	7.57	12.97	p<0.001	81	166.0	167.3	168.5	5.87

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	6.84	7.24	7.63	1.46	1.59		59	6.41	6.79	7.17	1.49
5	69	6.32	6.61	6.90	1.23	0.44		87	6.19	6.51	6.84	1.55
6	76	6.10	6.35	6.60	1.11	1.40		93	5.55	5.98	6.40	2.08
7	82	5.63	5.81	6.00	0.84	-0.11		96	5.61	5.83	6.06	1.13
8	83	5.35	5.52	5.69	0.78	-2.55	p<0.05	100	5.68	5.92	6.17	1.25
9	84	5.17	5.35	5.53	0.84	-3.51	p<0.001	102	5.70	5.99	6.27	1.47
10	85	5.10	5.34	5.57	1.09	-4.24	p<0.001	103	5.86	6.14	6.42	1.44
11	85	5.34	5.60	5.86	1.22	-3.08	p<0.01	105	5.93	6.20	6.47	1.42
12	85	5.81	6.12	6.42	1.43	1.60		105	5.61	5.82	6.04	1.11
13	85	6.44	6.74	7.04	1.42	9.64	p<0.001	105	4.51	4.77	5.04	1.39
14	85	6.36	6.70	7.04	1.59	14.02	p<0.001	105	2.80	3.15	3.50	1.84
15	85	5.08	5.45	5.81	1.72	16.00	p<0.001	105	1.45	1.74	2.02	1.48
16	85	3.06	3.46	3.85	1.84	12.68	p<0.001	105	0.79	0.94	1.09	0.78
17	85	1.67	1.94	2.21	1.28	10.54	p<0.001	105	0.42	0.51	0.60	0.48
18	85	0.92	1.10	1.29	0.87	9.02	p<0.001	105	0.19	0.26	0.33	0.35
19	85	0.44	0.58	0.71	0.62	6.63	p<0.001	105	0.05	0.11	0.17	0.32
20	85	0.09	0.19	0.29	0.46	3.26	p<0.01	105	-0.05	0.01	0.07	0.31
21	85	-0.09	-0.01	0.08	0.39	0.26		105	-0.07	-0.02	0.03	0.27
22	85	-0.16	-0.08	0.01	0.38	-1.32		105	-0.06	-0.01	0.04	0.27
23	82	-0.17	-0.10	-0.03	0.32	-1.49		99	-0.08	-0.04	0.01	0.23
24	74	-0.18	-0.12	-0.05	0.29	-1.93		92	-0.08	-0.04	-0.01	0.19
25	66	-0.12	-0.08	-0.04	0.17	-2.24	p<0.05	81	-0.06	-0.03	0.00	0.12

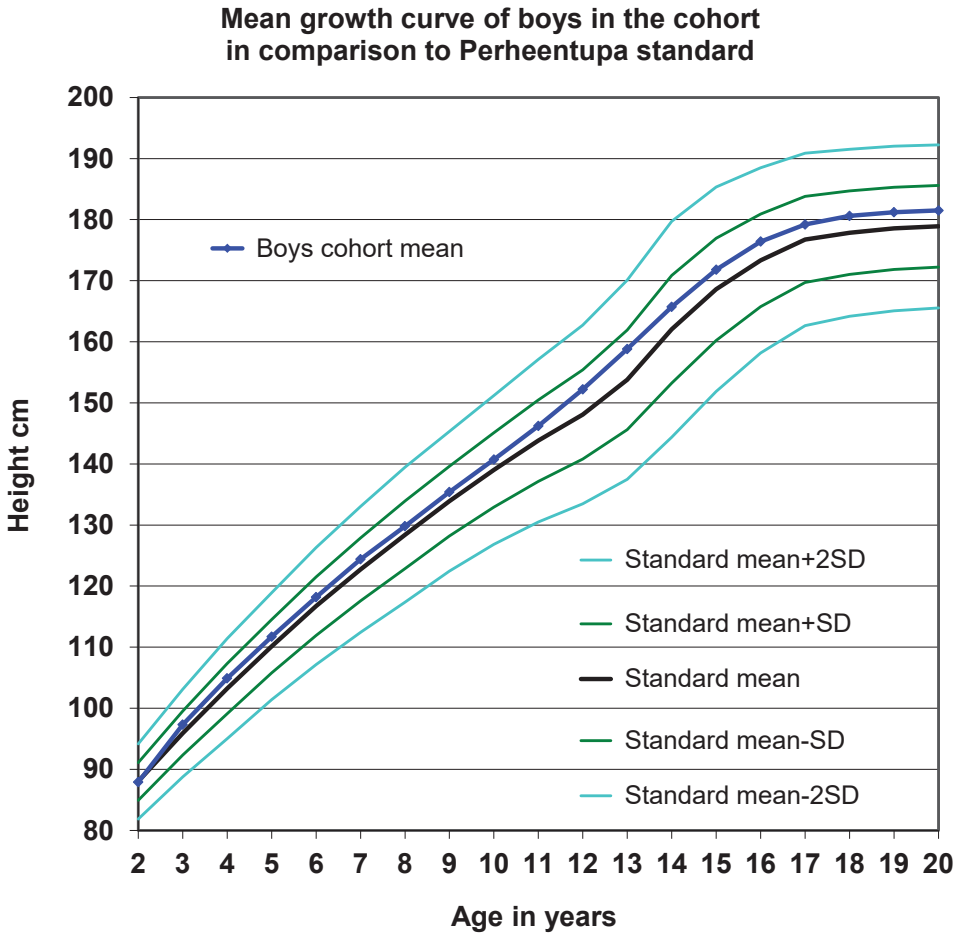
Figure 9


Height in whole cohort
Height cm
190
180
170
160
150
140
130
120
110
100
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Height in whole cohort, growth velocity
Growth velocity cm/year
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

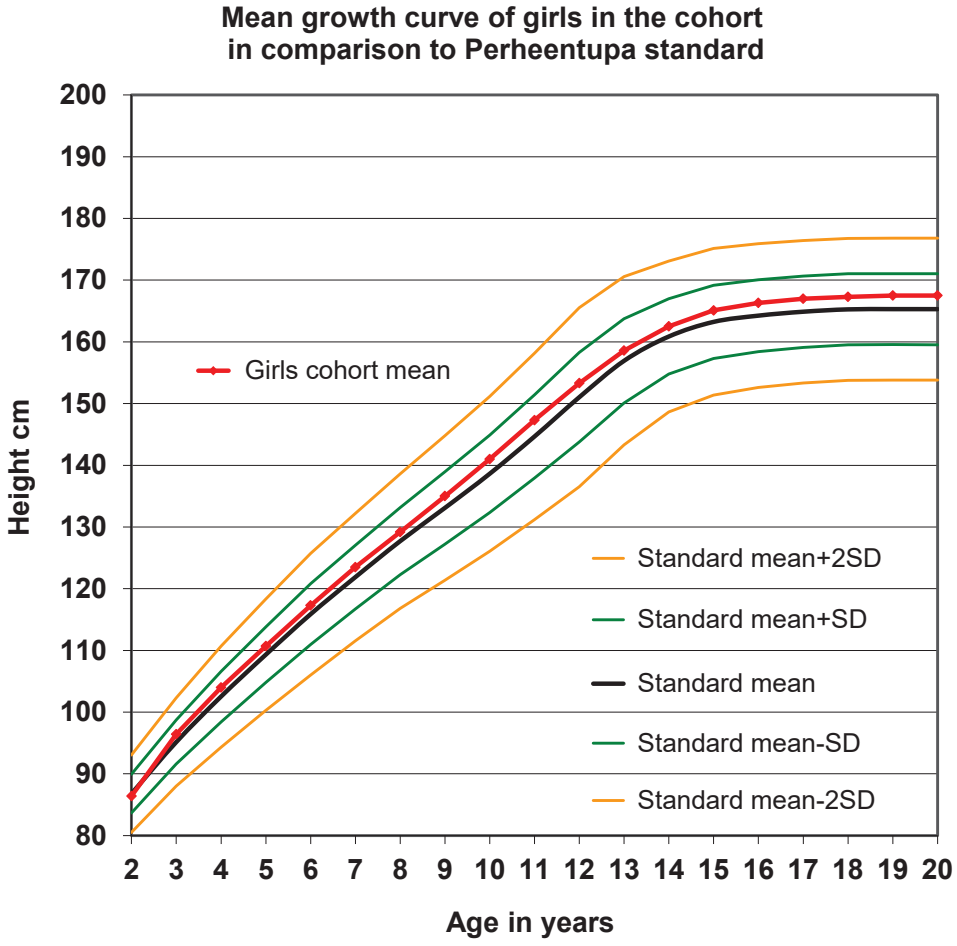
Mean Boys

Figure 10



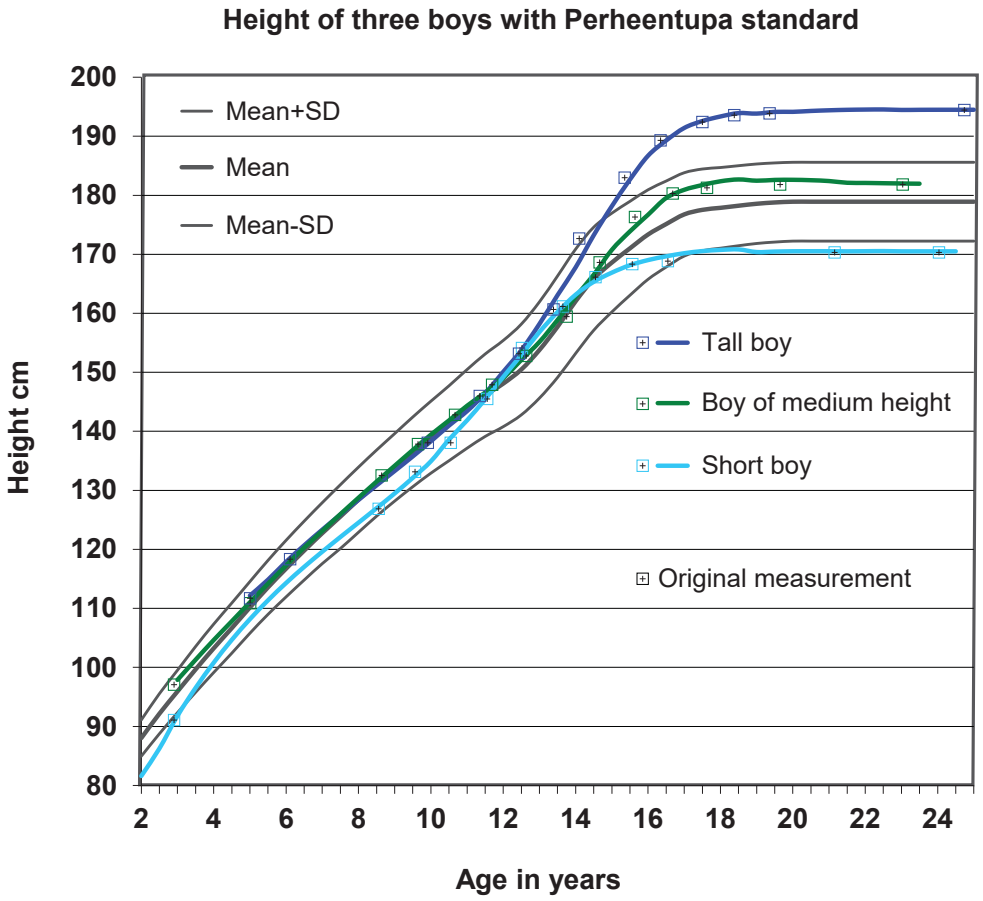
Mean Girls

Figure 11



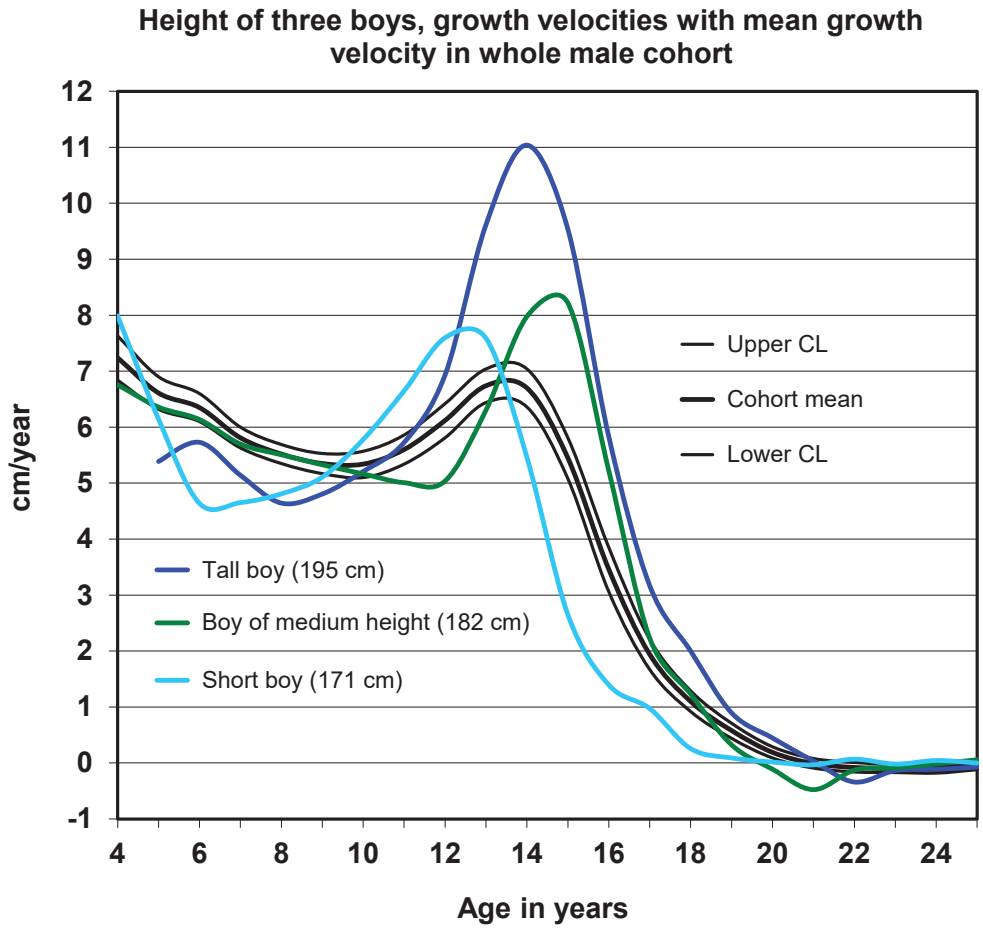
Three BH

Figure 12



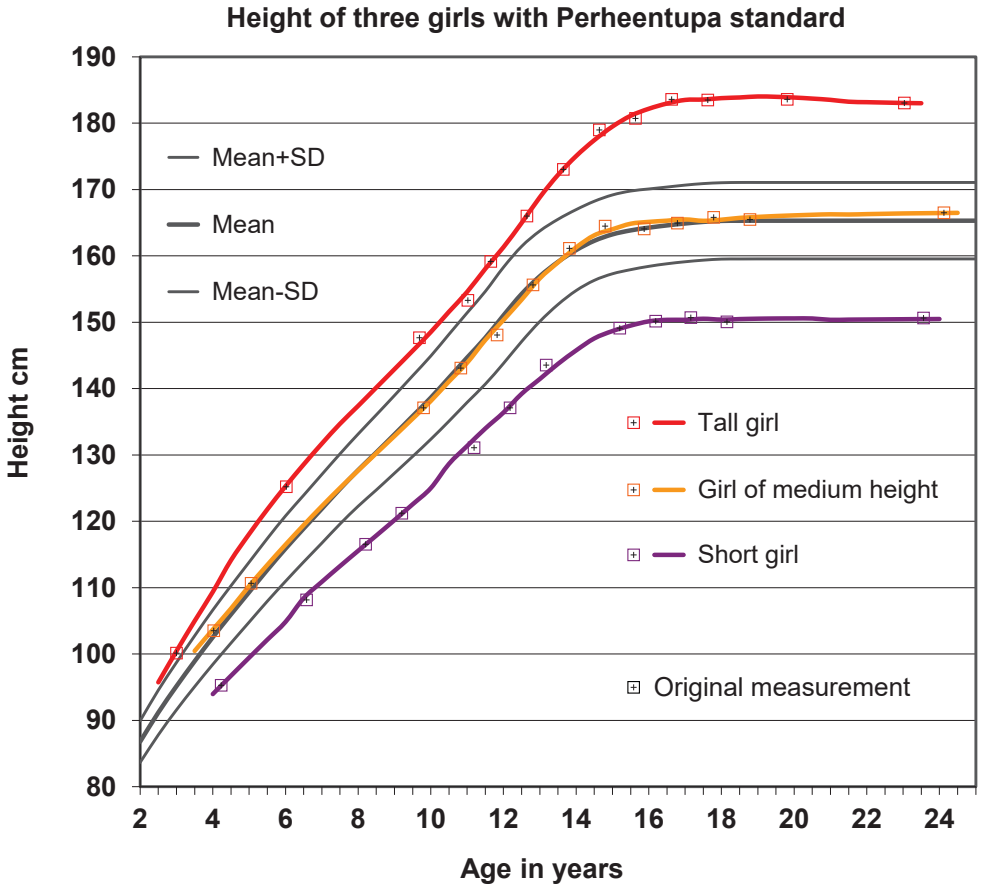
Three Boys

Figure 13



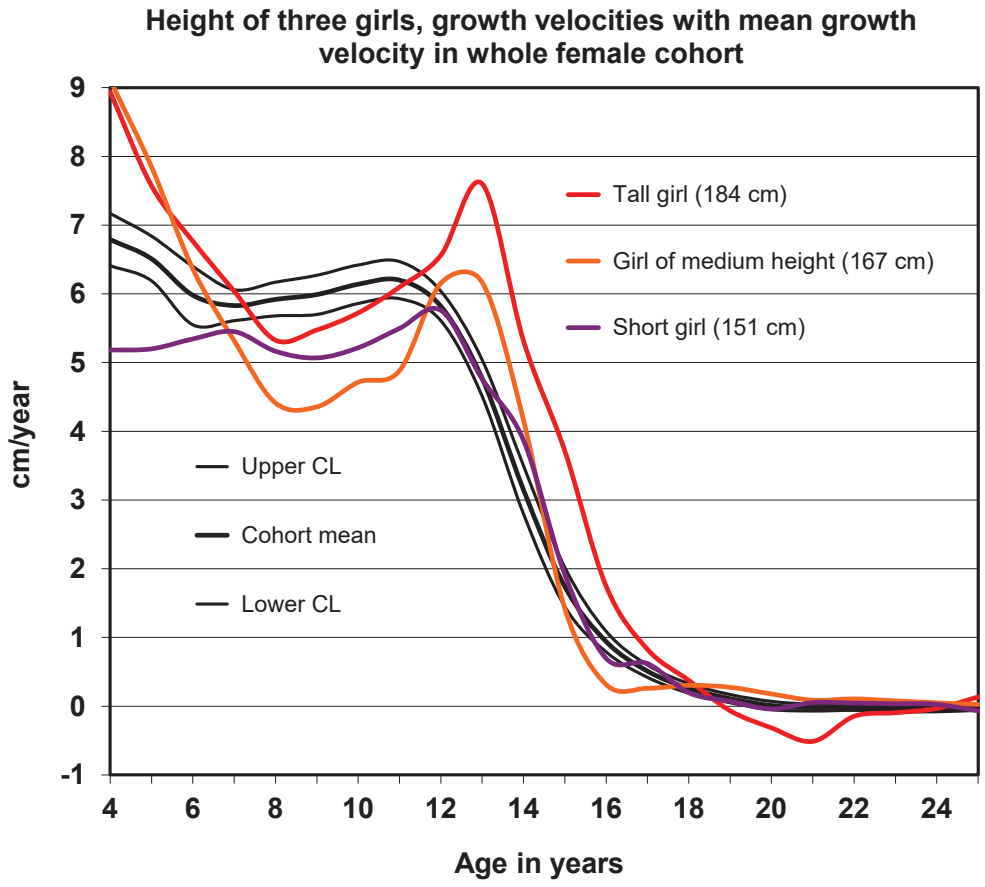
Three GH

Figure 14



Three Girls

Figure 15



BMI

Figure 16

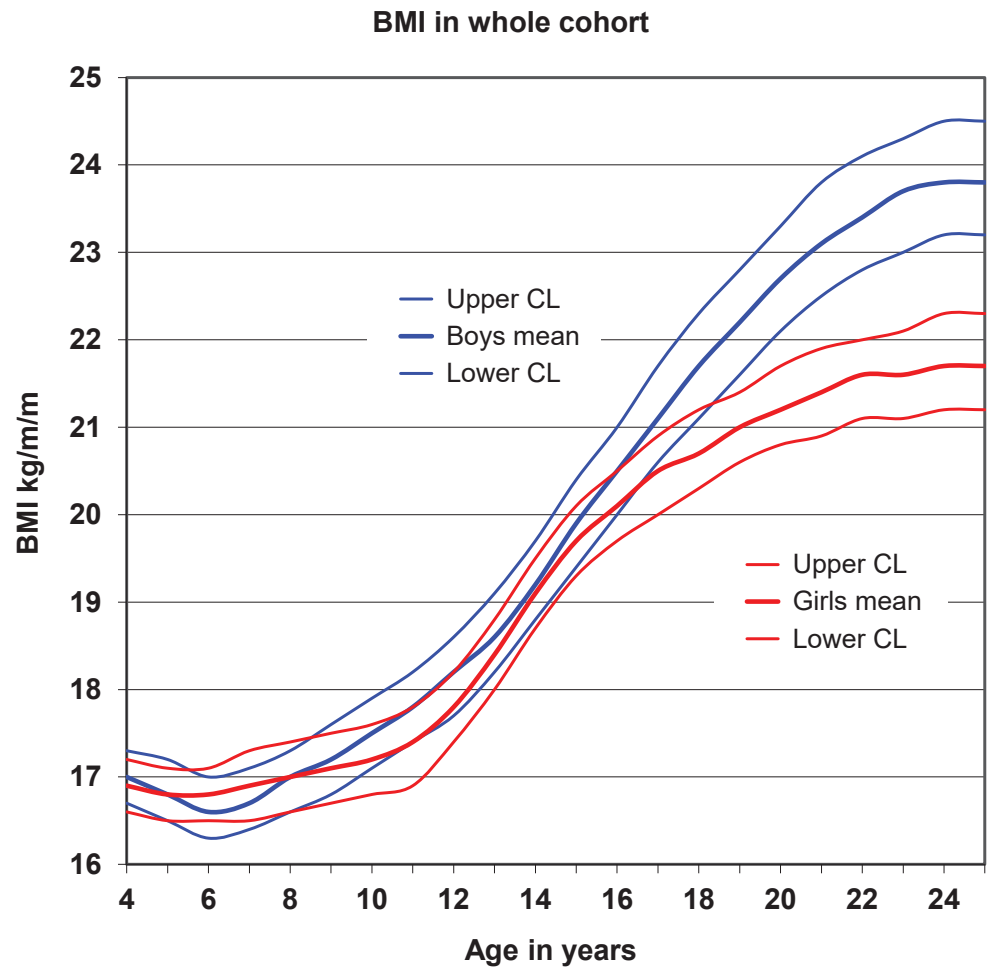
BMI (kg/m/m)

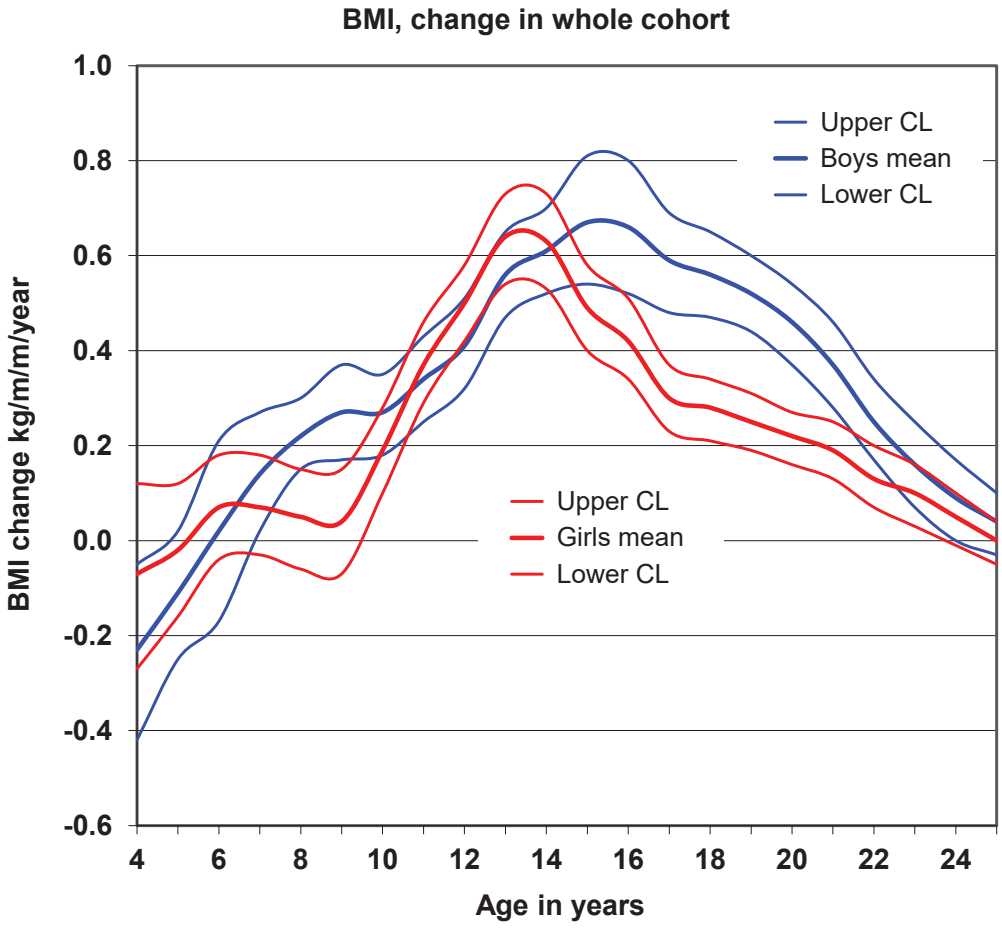
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	16.7	17.0	17.3	1.22	0.28		59	16.6	16.9	17.2	1.24
5	69	16.5	16.8	17.2	1.48	0.24		87	16.5	16.8	17.1	1.35
6	75	16.3	16.6	17.0	1.53	-0.82		93	16.5	16.8	17.1	1.61
7	81	16.4	16.7	17.1	1.58	-0.54		96	16.5	16.9	17.3	1.93
8	83	16.6	17.0	17.3	1.73	-0.09		100	16.6	17.0	17.4	2.06
9	84	16.8	17.2	17.6	1.77	0.52		102	16.7	17.1	17.5	2.07
10	85	17.1	17.5	17.9	1.87	1.12		103	16.8	17.2	17.6	2.08
11	85	17.4	17.8	18.2	1.92	1.37		105	16.9	17.4	17.8	2.18
12	85	17.7	18.2	18.6	2.03	1.10		105	17.4	17.8	18.2	2.14
13	85	18.2	18.6	19.1	2.13	0.68		105	18.0	18.4	18.8	2.15
14	85	18.8	19.2	19.7	2.20	0.46		105	18.7	19.1	19.5	2.14
15	85	19.4	19.9	20.4	2.32	0.57		105	19.3	19.7	20.1	2.15
16	85	20.0	20.5	21.0	2.44	1.25		105	19.7	20.1	20.5	2.12
17	85	20.6	21.1	21.7	2.58	1.99	p<0.05	105	20.0	20.5	20.9	2.12
18	85	21.1	21.7	22.3	2.74	2.62	p<0.01	105	20.3	20.7	21.2	2.19
19	85	21.6	22.2	22.8	2.88	3.29	p<0.01	105	20.6	21.0	21.4	2.26
20	85	22.1	22.7	23.3	2.97	3.84	p<0.001	105	20.8	21.2	21.7	2.36
21	85	22.5	23.1	23.8	2.98	4.40	p<0.001	105	20.9	21.4	21.9	2.42
22	85	22.8	23.4	24.1	2.94	4.74	p<0.001	105	21.1	21.6	22.0	2.48
23	82	23.0	23.7	24.3	2.91	5.22	p<0.001	99	21.1	21.6	22.1	2.41
24	74	23.2	23.8	24.5	2.90	4.96	p<0.001	92	21.2	21.7	22.3	2.51
25	66	23.2	23.8	24.5	2.71	4.71	p<0.001	81	21.2	21.7	22.3	2.56

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	-0.42	-0.23	-0.05	0.68	-1.14		59	-0.27	-0.07	0.12	0.78
5	69	-0.25	-0.11	0.02	0.57	-0.90		87	-0.16	-0.02	0.12	0.68
6	75	-0.17	0.02	0.21	0.85	-0.47		93	-0.04	0.07	0.18	0.56
7	81	0.02	0.14	0.27	0.57	0.86		96	-0.03	0.07	0.18	0.51
8	83	0.15	0.22	0.30	0.35	2.63	p<0.01	100	-0.06	0.05	0.15	0.53
9	84	0.17	0.27	0.37	0.49	2.93	p<0.01	102	-0.07	0.04	0.15	0.56
10	85	0.18	0.27	0.35	0.41	1.16		103	0.10	0.19	0.28	0.48
11	85	0.25	0.34	0.43	0.43	-0.50		105	0.29	0.37	0.46	0.45
12	85	0.32	0.41	0.51	0.44	-1.35		105	0.42	0.50	0.58	0.42
13	85	0.47	0.56	0.65	0.43	-1.10		105	0.54	0.64	0.73	0.49
14	85	0.52	0.61	0.70	0.44	-0.26		105	0.53	0.63	0.73	0.52
15	85	0.54	0.67	0.81	0.63	2.26	p<0.05	105	0.40	0.49	0.58	0.48
16	85	0.52	0.66	0.80	0.64	3.00	p<0.01	105	0.34	0.42	0.51	0.44
17	85	0.48	0.59	0.69	0.50	4.55	p<0.001	105	0.23	0.30	0.37	0.38
18	85	0.47	0.56	0.65	0.42	5.18	p<0.001	105	0.21	0.28	0.34	0.33
19	85	0.44	0.52	0.60	0.39	5.21	p<0.001	105	0.19	0.25	0.31	0.31
20	85	0.37	0.46	0.54	0.41	4.69	p<0.001	105	0.16	0.22	0.27	0.30
21	85	0.28	0.37	0.46	0.41	3.48	p<0.001	105	0.13	0.19	0.25	0.30
22	85	0.17	0.25	0.34	0.41	2.20	p<0.05	105	0.07	0.13	0.20	0.34
23	82	0.07	0.16	0.25	0.41	1.24		99	0.03	0.10	0.16	0.32
24	74	0.00	0.09	0.17	0.38	0.78		92	-0.01	0.05	0.10	0.27
25	66	-0.03	0.04	0.10	0.27	0.97		81	-0.05	0.00	0.04	0.20

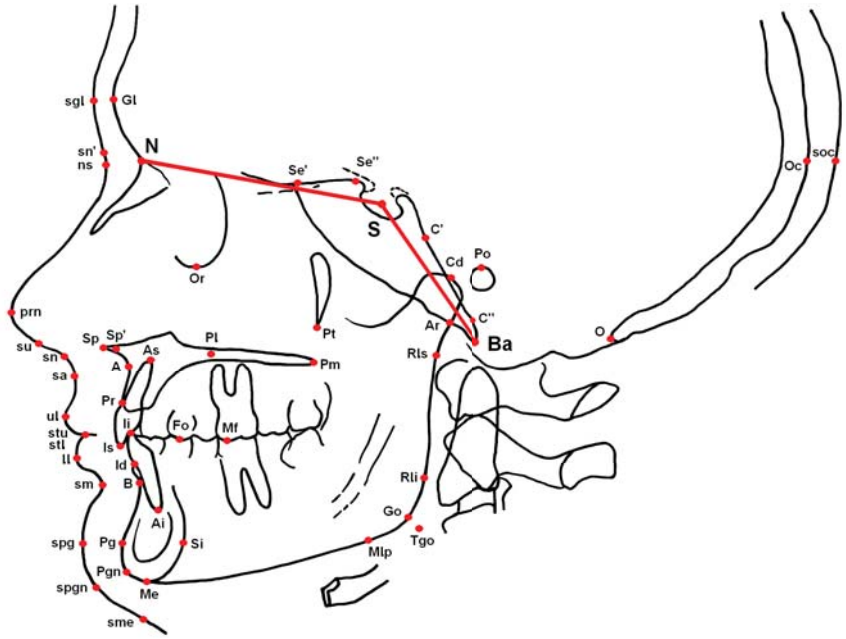
Figure 16


BMI in whole cohort
BMI kg/m/m
25
24
23
22
21
20
19
18
17
16
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


BMI, change in whole cohort
BMI change kg/m/m/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

NSBa

Figure 17

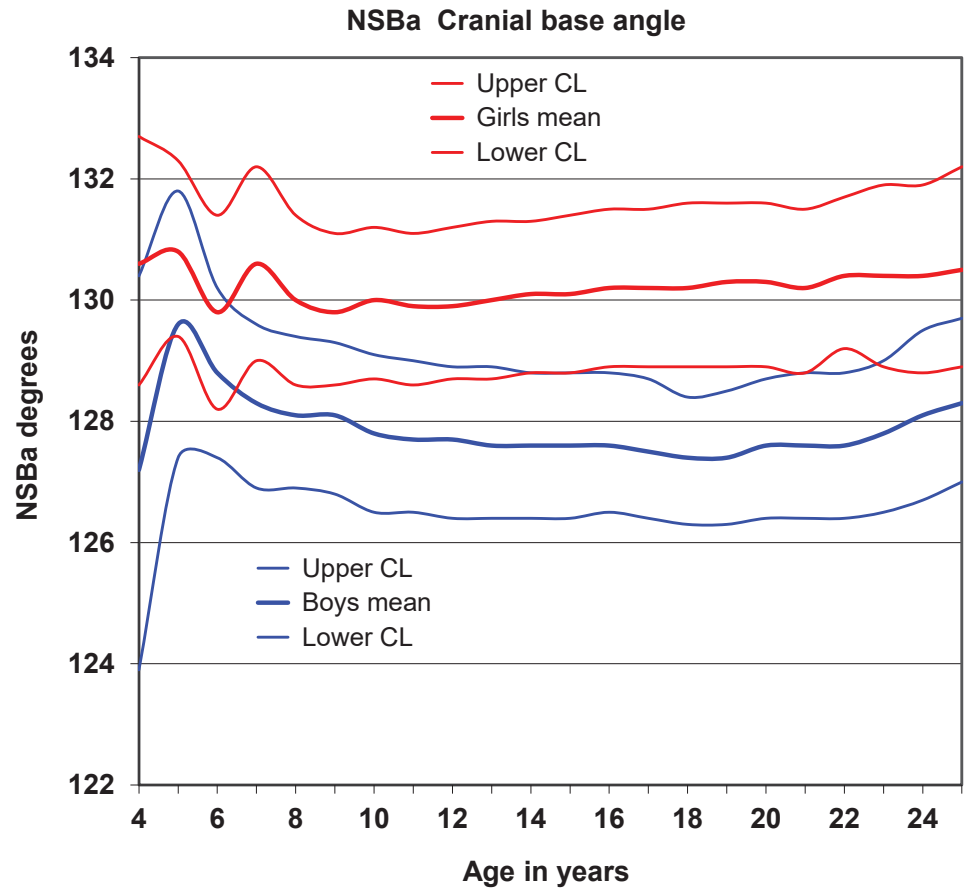


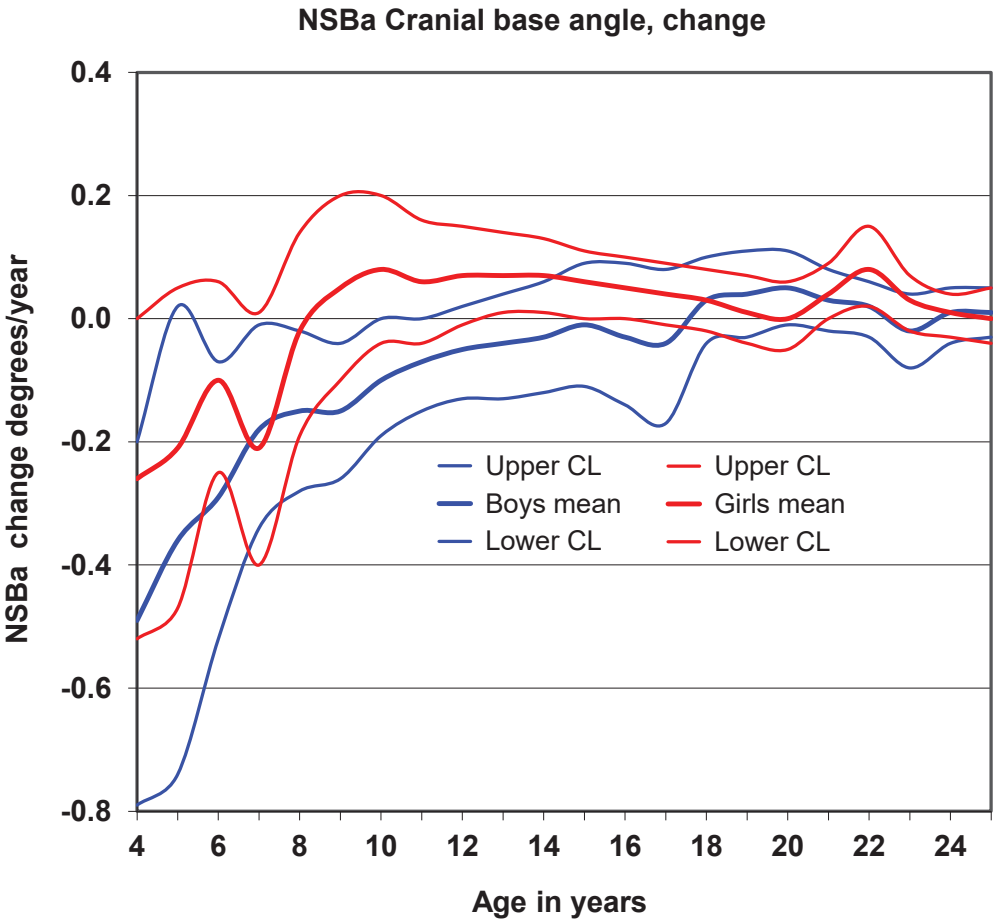
NSBa (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	123.9	127.1	130.4	4.36	1.79		7	128.6	130.6	132.7	2.78
5	18	127.4	129.6	131.8	4.83	0.90		19	129.4	130.8	132.3	3.21
6	35	127.4	128.8	130.2	4.24	0.89		27	128.2	129.8	131.4	4.15
7	43	126.9	128.3	129.6	4.46	2.25	p<0.05	39	129.0	130.6	132.2	5.00
8	48	126.9	128.1	129.4	4.43	1.98		49	128.6	130.0	131.4	4.92
9	49	126.8	128.1	129.3	4.51	1.94		53	128.6	129.8	131.1	4.73
10	50	126.5	127.8	129.1	4.54	2.41	p<0.05	54	128.7	130.0	131.2	4.58
11	50	126.5	127.8	129.0	4.53	2.33	p<0.05	55	128.6	129.9	131.1	4.79
12	50	126.4	127.7	128.9	4.50	2.46	p<0.05	55	128.7	129.9	131.2	4.78
13	50	126.4	127.6	128.9	4.47	2.59	p<0.05	55	128.7	130.0	131.3	4.80
14	50	126.4	127.6	128.8	4.39	2.72	p<0.01	55	128.8	130.1	131.3	4.84
15	50	126.4	127.6	128.8	4.25	2.82	p<0.01	55	128.8	130.1	131.4	4.89
16	50	126.5	127.6	128.7	4.14	2.88	p<0.01	55	128.9	130.2	131.5	4.91
17	50	126.4	127.5	128.6	4.03	3.02	p<0.01	55	128.9	130.2	131.5	4.95
18	49	126.2	127.3	128.4	3.91	3.27	p<0.01	55	128.9	130.2	131.6	4.98
19	49	126.3	127.4	128.5	3.94	3.22	p<0.01	55	128.9	130.3	131.6	4.98
20	46	126.4	127.6	128.7	4.04	2.92	p<0.01	55	128.9	130.3	131.6	5.00
21	46	126.4	127.6	128.8	4.10	2.75	p<0.01	54	128.8	130.2	131.5	4.98
22	46	126.4	127.6	128.8	4.12	3.18	p<0.01	53	129.2	130.4	131.7	4.67
23	41	126.5	127.8	129.0	4.17	2.62	p<0.05	42	128.9	130.4	131.9	4.93
24	35	126.7	128.1	129.5	4.18	2.15	p<0.05	41	128.8	130.4	131.9	5.00
25	30	126.9	128.3	129.7	3.85	2.00		35	128.9	130.5	132.2	4.95

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.79	-0.49	-0.20	0.40	1.16		7	-0.52	-0.26	0.00	0.35
5	18	-0.74	-0.36	0.02	0.82	0.66		19	-0.47	-0.21	0.05	0.58
6	35	-0.52	-0.29	-0.06	0.68	1.30		27	-0.25	-0.10	0.06	0.42
7	43	-0.34	-0.18	-0.01	0.55	-0.23		39	-0.40	-0.21	-0.01	0.63
8	48	-0.28	-0.15	-0.02	0.46	1.16		49	-0.19	-0.02	0.14	0.58
9	49	-0.26	-0.15	-0.04	0.39	2.08	p<0.05	53	-0.10	0.05	0.20	0.54
10	50	-0.19	-0.10	-0.00	0.34	2.17	p<0.05	54	-0.04	0.08	0.20	0.46
11	50	-0.16	-0.08	0.00	0.29	2.04	p<0.05	55	-0.04	0.06	0.16	0.39
12	50	-0.13	-0.05	0.02	0.27	2.22	p<0.05	55	-0.01	0.07	0.15	0.30
13	50	-0.13	-0.05	0.03	0.29	2.29	p<0.05	55	0.01	0.07	0.14	0.25
14	50	-0.12	-0.03	0.06	0.32	1.83		55	0.01	0.07	0.13	0.23
15	50	-0.12	-0.01	0.09	0.37	1.22		55	0.00	0.06	0.11	0.20
16	50	-0.14	-0.03	0.08	0.41	1.30		55	0.00	0.05	0.10	0.18
17	50	-0.17	-0.04	0.08	0.45	1.21		55	-0.01	0.04	0.09	0.19
18	49	-0.04	0.03	0.10	0.25	-0.11		55	-0.02	0.03	0.08	0.19
19	49	-0.04	0.04	0.11	0.26	-0.48		55	-0.04	0.01	0.07	0.20
20	46	-0.01	0.05	0.11	0.21	-1.02		55	-0.05	0.00	0.06	0.20
21	46	-0.02	0.03	0.08	0.18	0.33		54	-0.00	0.04	0.09	0.18
22	46	-0.03	0.02	0.06	0.16	1.58		53	0.02	0.08	0.15	0.24
23	41	-0.07	-0.02	0.04	0.19	1.10		42	-0.02	0.03	0.07	0.15
24	35	-0.03	0.01	0.05	0.13	-0.09		41	-0.03	0.01	0.04	0.11
25	30	-0.02	0.02	0.06	0.11	-0.46		35	-0.04	0.00	0.05	0.13

NSBa

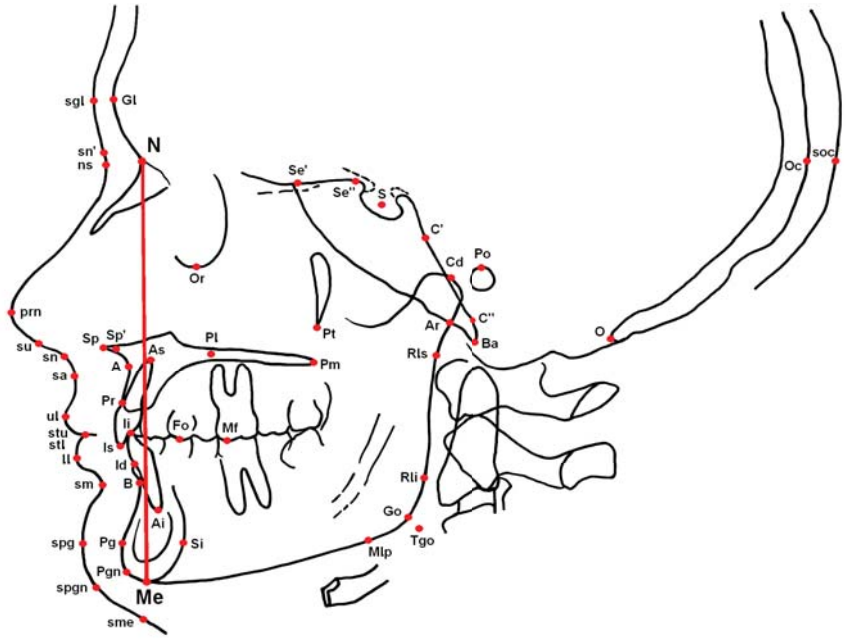
Figure 17





N-Me

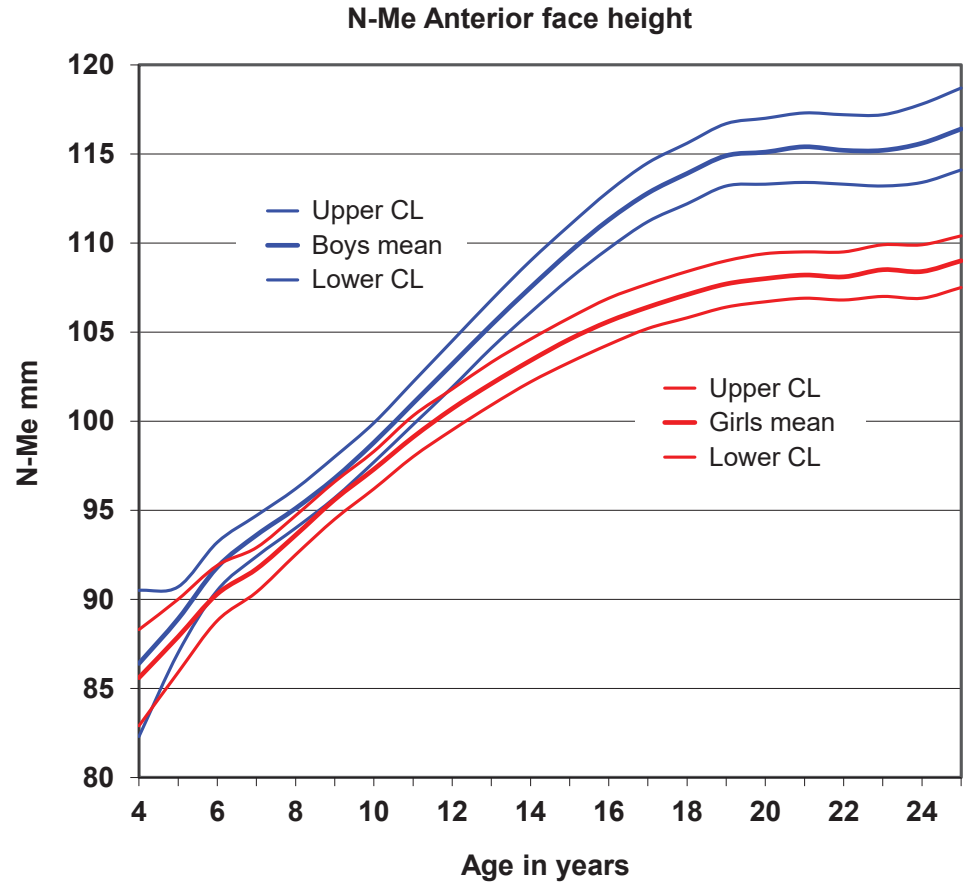
Figure 18

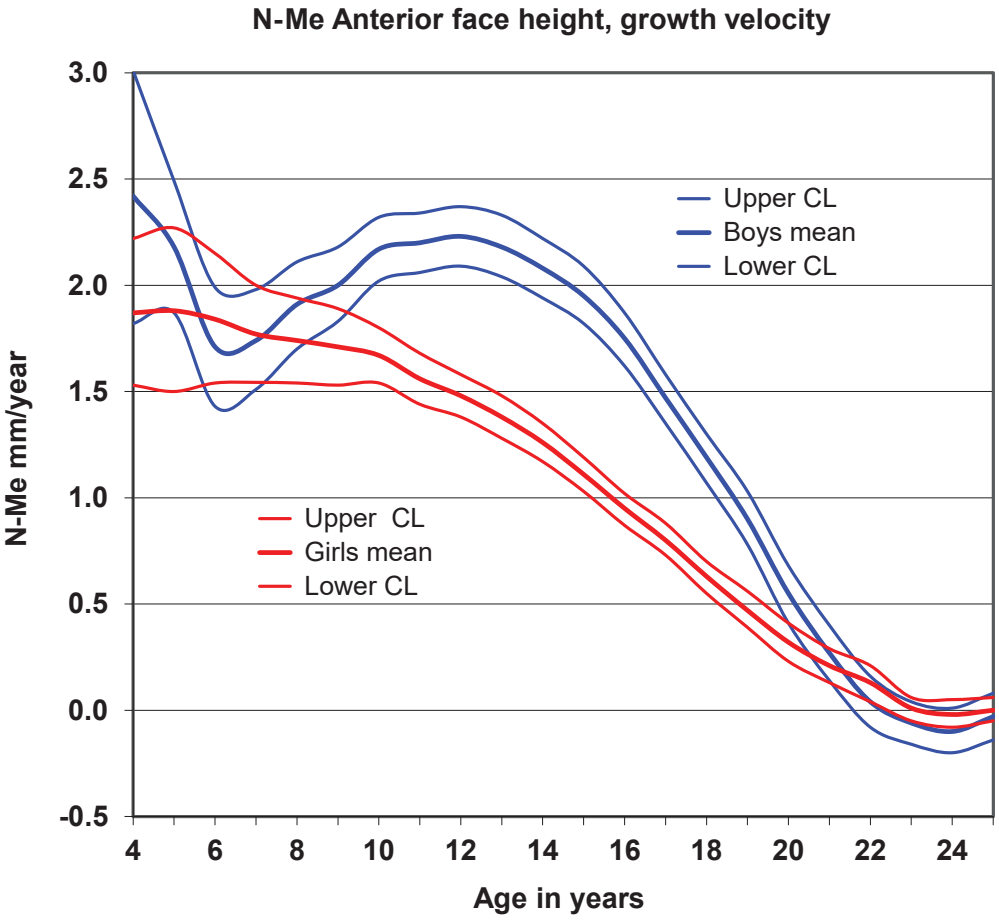


N-Me (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	82.3	86.4	90.5	5.49	0.33		7	82.9	85.6	88.3	3.66
5	18	87.0	88.9	90.7	3.94	0.66		19	85.9	87.9	90.0	4.59
6	35	90.5	91.8	93.2	4.11	1.43		27	88.8	90.3	91.9	4.15
7	43	92.4	93.6	94.8	3.90	2.20	p<0.05	39	90.4	91.7	92.9	3.97
8	48	94.0	95.1	96.2	4.00	1.89		49	92.5	93.6	94.7	3.84
9	49	95.7	96.8	98.0	4.00	1.62		53	94.5	95.6	96.6	3.96
10	50	97.7	98.8	99.9	4.12	1.91		54	96.2	97.3	98.3	4.04
11	50	99.8	101.0	102.2	4.42	2.18	p<0.05	55	98.0	99.1	100.3	4.39
12	50	101.9	103.2	104.5	4.64	2.87	p<0.01	55	99.5	100.7	101.8	4.48
13	50	104.1	105.4	106.8	4.92	3.60	p<0.001	55	100.9	102.1	103.3	4.56
14	50	106.1	107.5	109.0	5.21	4.27	p<0.001	55	102.2	103.4	104.6	4.66
15	50	108.0	109.5	111.0	5.49	4.91	p<0.001	55	103.3	104.6	105.8	4.74
16	50	109.7	111.3	112.9	5.75	5.55	p<0.001	55	104.3	105.6	106.9	4.82
17	50	111.2	112.8	114.5	6.00	6.02	p<0.001	55	105.2	106.4	107.7	4.88
18	49	112.2	113.9	115.6	6.06	6.27	p<0.001	55	105.8	107.1	108.4	4.92
19	49	113.2	114.9	116.7	6.30	6.56	p<0.001	55	106.4	107.7	109.0	4.96
20	46	113.3	115.1	117.0	6.36	6.28	p<0.001	55	106.7	108.0	109.4	5.00
21	46	113.5	115.4	117.3	6.47	6.24	p<0.001	54	106.9	108.2	109.5	5.03
22	46	113.3	115.2	117.1	6.50	6.22	p<0.001	53	106.8	108.1	109.4	4.88
23	41	113.2	115.2	117.2	6.53	5.40	p<0.001	42	107.0	108.5	109.9	4.77
24	35	113.4	115.6	117.8	6.60	5.48	p<0.001	41	106.9	108.4	109.9	4.79
25	30	114.1	116.4	118.7	6.38	5.53	p<0.001	35	107.5	109.0	110.4	4.47

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.82	2.42	3.01	0.80	1.55		7	1.53	1.87	2.22	0.47
5	18	1.87	2.18	2.49	0.68	1.16		19	1.50	1.88	2.27	0.86
6	35	1.43	1.71	1.99	0.83	-0.65		27	1.54	1.84	2.15	0.80
7	43	1.51	1.74	1.98	0.80	-0.14		39	1.54	1.77	2.00	0.73
8	48	1.70	1.91	2.11	0.74	1.15		49	1.54	1.74	1.94	0.71
9	49	1.83	2.00	2.18	0.61	2.32	p<0.05	53	1.53	1.71	1.89	0.67
10	50	2.02	2.17	2.32	0.53	4.93	p<0.001	54	1.54	1.67	1.80	0.50
11	50	2.06	2.20	2.34	0.51	6.82	p<0.001	55	1.44	1.56	1.68	0.45
12	50	2.09	2.23	2.37	0.52	8.42	p<0.001	55	1.38	1.48	1.58	0.38
13	50	2.04	2.18	2.33	0.53	9.16	p<0.001	55	1.28	1.38	1.48	0.36
14	50	1.94	2.08	2.22	0.51	9.72	p<0.001	55	1.17	1.26	1.35	0.34
15	50	1.82	1.95	2.09	0.49	10.64	p<0.001	55	1.03	1.11	1.19	0.31
16	50	1.62	1.75	1.87	0.45	10.94	p<0.001	55	0.87	0.95	1.02	0.29
17	50	1.35	1.47	1.58	0.41	9.86	p<0.001	55	0.73	0.80	0.88	0.28
18	49	1.07	1.19	1.30	0.40	8.33	p<0.001	55	0.55	0.63	0.70	0.27
19	49	0.78	0.90	1.03	0.44	5.81	p<0.001	55	0.39	0.47	0.56	0.31
20	46	0.41	0.55	0.68	0.47	2.86	p<0.01	55	0.23	0.32	0.41	0.33
21	46	0.14	0.27	0.40	0.45	0.71		54	0.13	0.21	0.29	0.30
22	46	-0.08	0.04	0.16	0.42	-1.22		53	0.04	0.13	0.21	0.31
23	41	-0.16	-0.06	0.04	0.33	-1.10		42	-0.05	0.01	0.06	0.19
24	35	-0.20	-0.10	0.01	0.31	-1.31		41	-0.08	-0.02	0.05	0.21
25	30	-0.14	-0.03	0.08	0.31	-0.55		35	-0.05	0.00	0.06	0.17

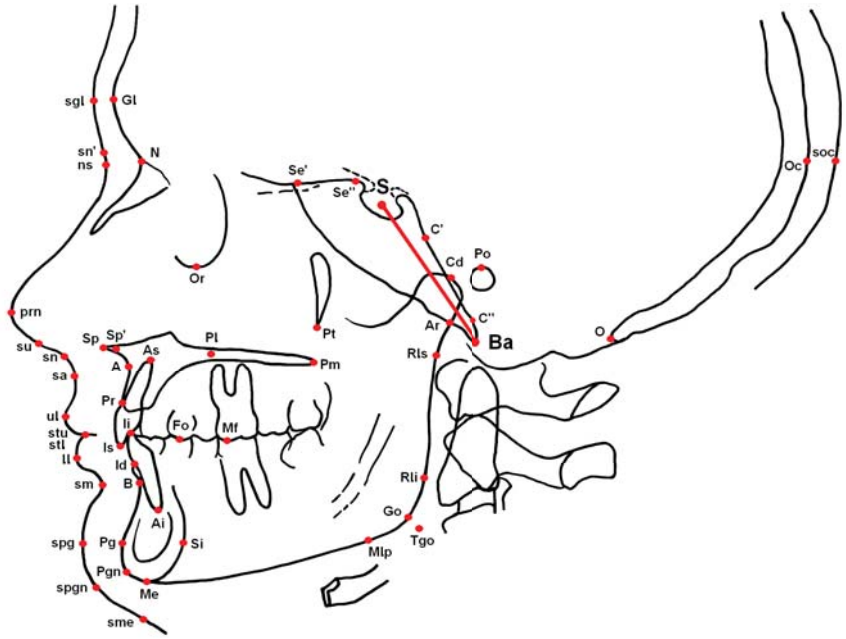
Figure 18


N-Me Anterior face height
N-Me mm
120
115
110
105
100
95
90
85
80
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


N-Me Anterior face height, growth velocity
N-Me mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

S-Ba

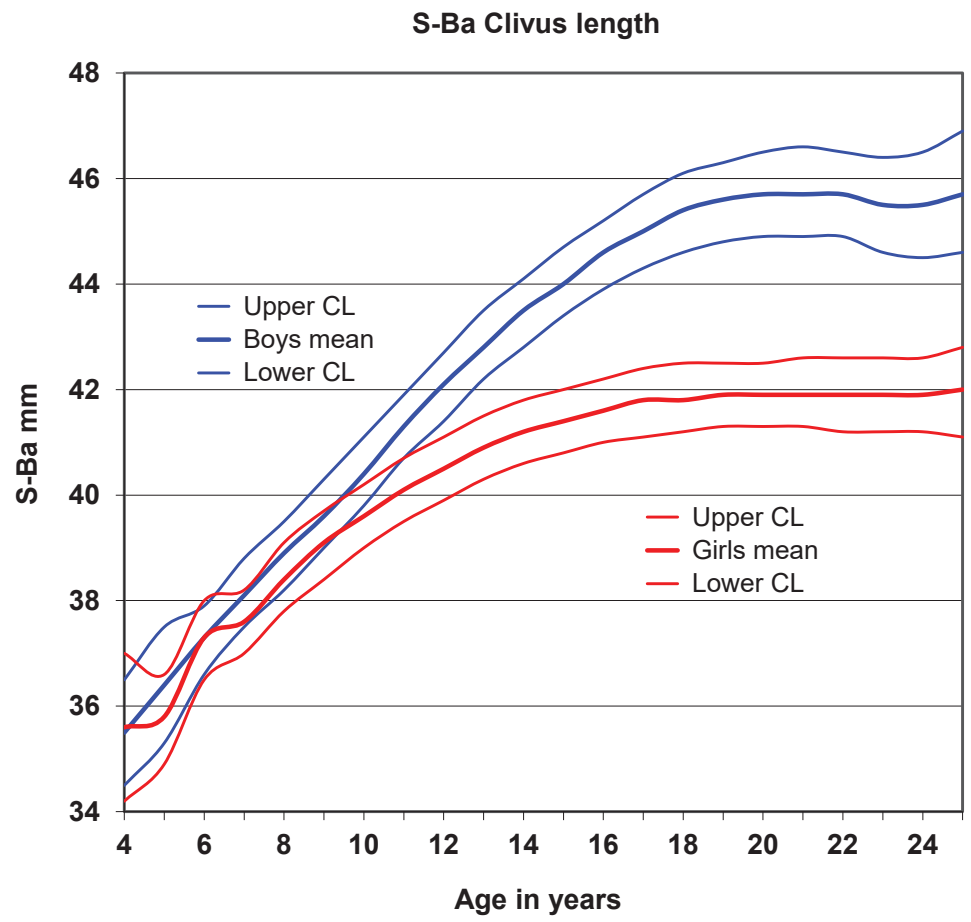
Figure 19



S-Ba (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	34.5	35.5	36.5	1.37	-0.12		7	34.2	35.6	37.0	1.88
5	18	35.3	36.4	37.5	2.33	0.93		19	34.9	35.8	36.6	1.86
6	35	36.6	37.3	38.0	2.01	0.03		27	36.5	37.3	38.0	1.92
7	43	37.5	38.1	38.8	2.11	1.19		39	37.0	37.6	38.2	2.01
8	48	38.2	38.9	39.5	2.23	0.97		49	37.8	38.4	39.1	2.35
9	49	39.0	39.6	40.2	2.27	1.20		53	38.4	39.1	39.7	2.30
10	50	39.8	40.4	41.0	2.28	1.83		54	39.0	39.6	40.2	2.26
11	50	40.6	41.3	41.9	2.29	2.64	p<0.01	55	39.5	40.1	40.7	2.20
12	50	41.4	42.1	42.7	2.31	3.43	p<0.001	55	39.9	40.5	41.1	2.22
13	50	42.2	42.8	43.5	2.32	4.31	p<0.001	55	40.3	40.9	41.5	2.24
14	50	42.8	43.5	44.1	2.37	5.11	p<0.001	55	40.6	41.2	41.8	2.25
15	50	43.4	44.1	44.7	2.42	5.75	p<0.001	55	40.8	41.4	42.0	2.25
16	50	43.9	44.6	45.3	2.49	6.40	p<0.001	55	41.0	41.6	42.2	2.27
17	50	44.3	45.0	45.7	2.54	6.95	p<0.001	55	41.1	41.8	42.4	2.29
18	49	44.7	45.4	46.1	2.60	7.36	p<0.001	55	41.2	41.8	42.5	2.32
19	49	44.9	45.6	46.4	2.66	7.64	p<0.001	55	41.3	41.9	42.5	2.35
20	46	44.9	45.7	46.5	2.79	7.43	p<0.001	55	41.3	41.9	42.5	2.40
21	46	45.0	45.8	46.6	2.84	7.21	p<0.001	54	41.3	41.9	42.6	2.51
22	46	45.0	45.8	46.6	2.79	7.11	p<0.001	53	41.2	41.9	42.6	2.56
23	41	44.7	45.6	46.5	2.92	6.28	p<0.001	42	41.2	41.9	42.6	2.34
24	35	44.5	45.5	46.6	3.12	5.72	p<0.001	41	41.2	41.9	42.6	2.41
25	30	44.6	45.8	46.9	3.18	5.41	p<0.001	35	41.1	42.0	42.8	2.50

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.58	1.14	1.69	0.75	-0.01		7	0.64	1.14	1.64	0.68
5	18	0.88	1.12	1.35	0.50	1.25		19	0.62	0.89	1.16	0.59
6	35	0.64	0.80	0.97	0.50	-0.21		27	0.65	0.83	1.02	0.49
7	43	0.63	0.76	0.88	0.41	0.53		39	0.55	0.70	0.86	0.49
8	48	0.67	0.77	0.88	0.37	1.90		49	0.51	0.62	0.74	0.41
9	49	0.73	0.81	0.90	0.29	3.95	p<0.001	53	0.48	0.57	0.66	0.33
10	50	0.76	0.83	0.90	0.25	6.20	p<0.001	54	0.43	0.51	0.58	0.28
11	50	0.73	0.79	0.85	0.22	7.61	p<0.001	55	0.38	0.44	0.51	0.24
12	50	0.70	0.76	0.81	0.21	9.04	p<0.001	55	0.33	0.39	0.44	0.20
13	50	0.65	0.71	0.77	0.21	10.00	p<0.001	55	0.27	0.32	0.37	0.19
14	50	0.58	0.64	0.70	0.22	9.67	p<0.001	55	0.21	0.26	0.31	0.18
15	50	0.50	0.57	0.63	0.23	8.91	p<0.001	55	0.16	0.21	0.26	0.18
16	50	0.43	0.49	0.56	0.23	8.52	p<0.001	55	0.12	0.16	0.20	0.16
17	50	0.35	0.40	0.45	0.19	8.19	p<0.001	55	0.07	0.11	0.16	0.17
18	49	0.25	0.30	0.35	0.18	6.63	p<0.001	55	0.03	0.07	0.12	0.16
19	49	0.15	0.20	0.25	0.18	4.81	p<0.001	55	-0.01	0.04	0.08	0.17
20	46	0.06	0.11	0.16	0.18	2.71	p<0.01	55	-0.03	0.02	0.06	0.18
21	46	0.01	0.06	0.11	0.17	1.53		54	-0.04	0.00	0.05	0.16
22	46	-0.05	-0.01	0.04	0.17	-0.34		53	-0.05	0.01	0.06	0.19
23	41	-0.12	-0.07	-0.01	0.18	-1.20		42	-0.07	-0.03	0.02	0.14
24	35	-0.08	-0.03	0.02	0.15	-0.86		41	-0.03	-0.01	0.02	0.09
25	30	-0.03	0.01	0.06	0.11	-0.56		35	0.00	0.03	0.06	0.08

Figure 19


S-Ba Clivus length
S-Ba mm
48
46
44
42
40
38
36
34
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

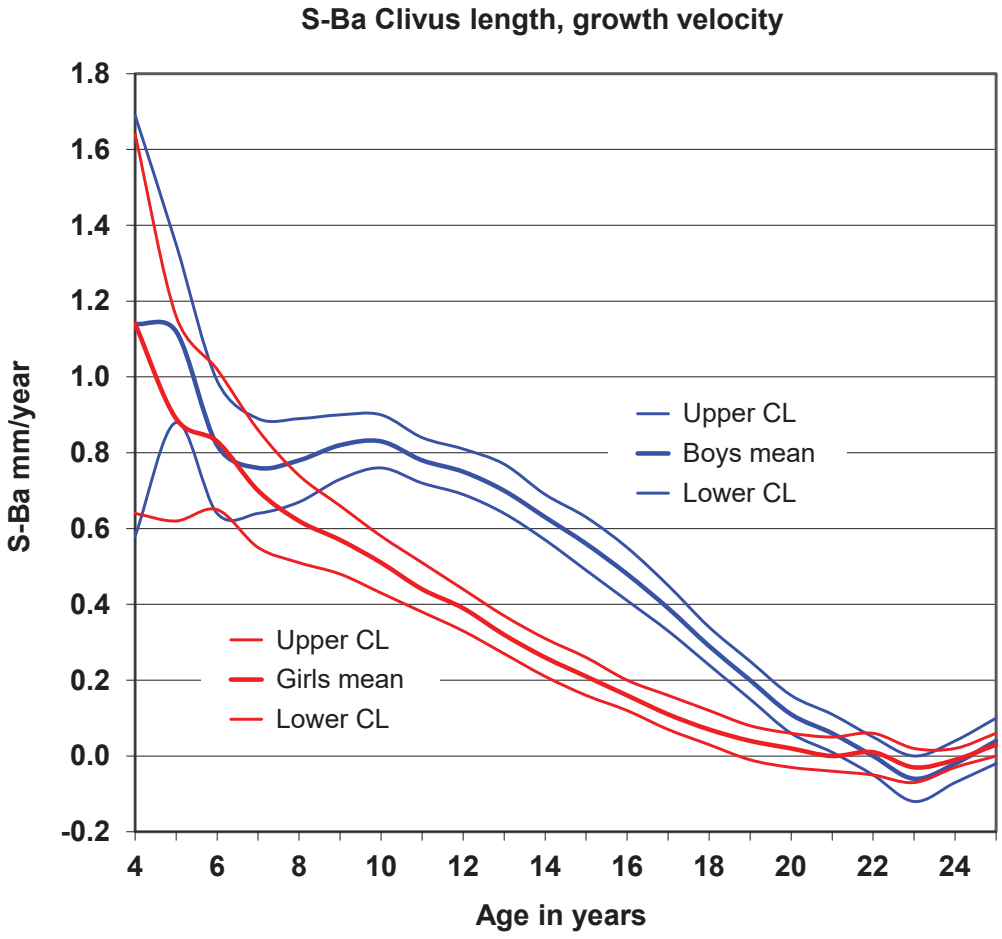
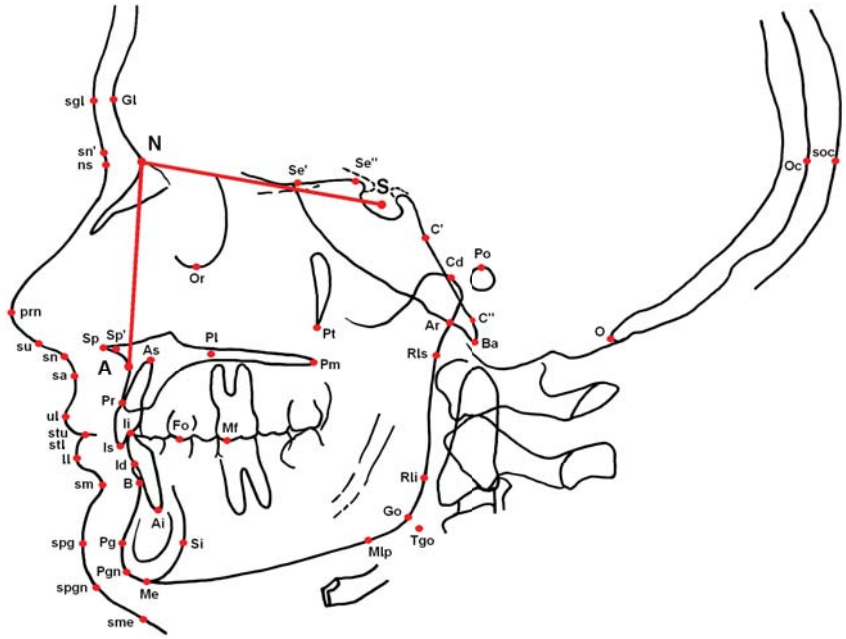

S-Ba Clivus length, growth velocity
S-Ba mm/year
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Figure 20



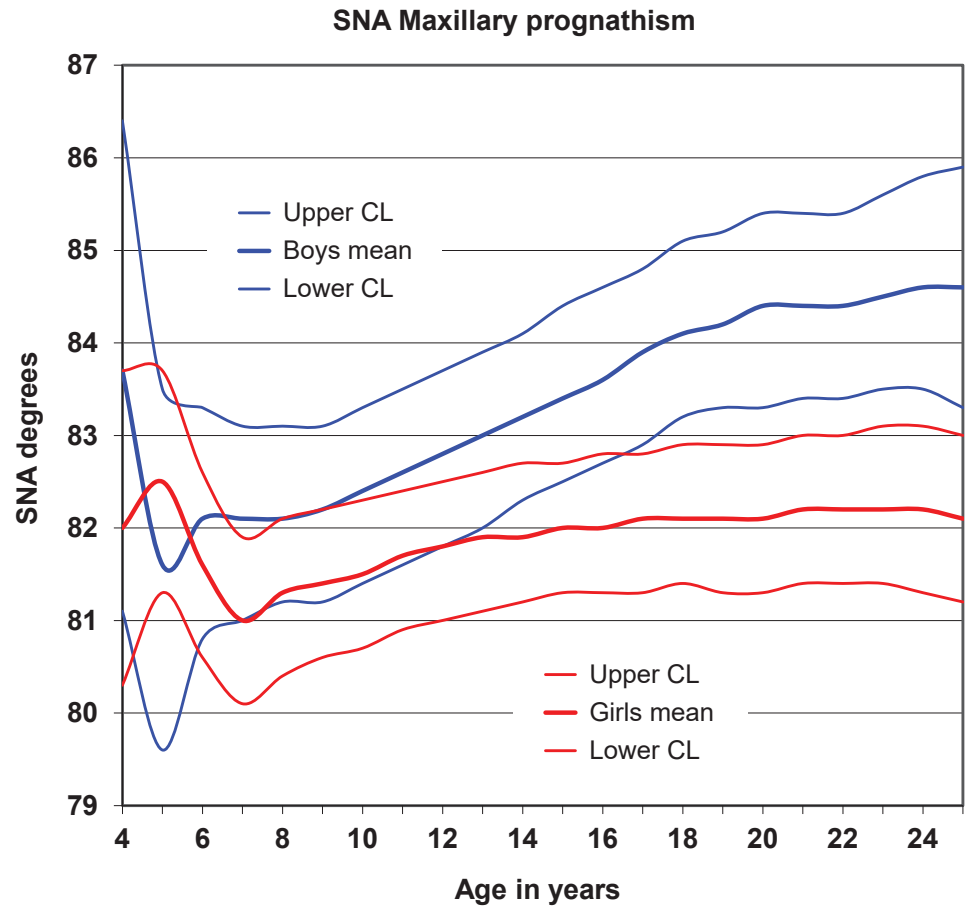
SNA (degrees)

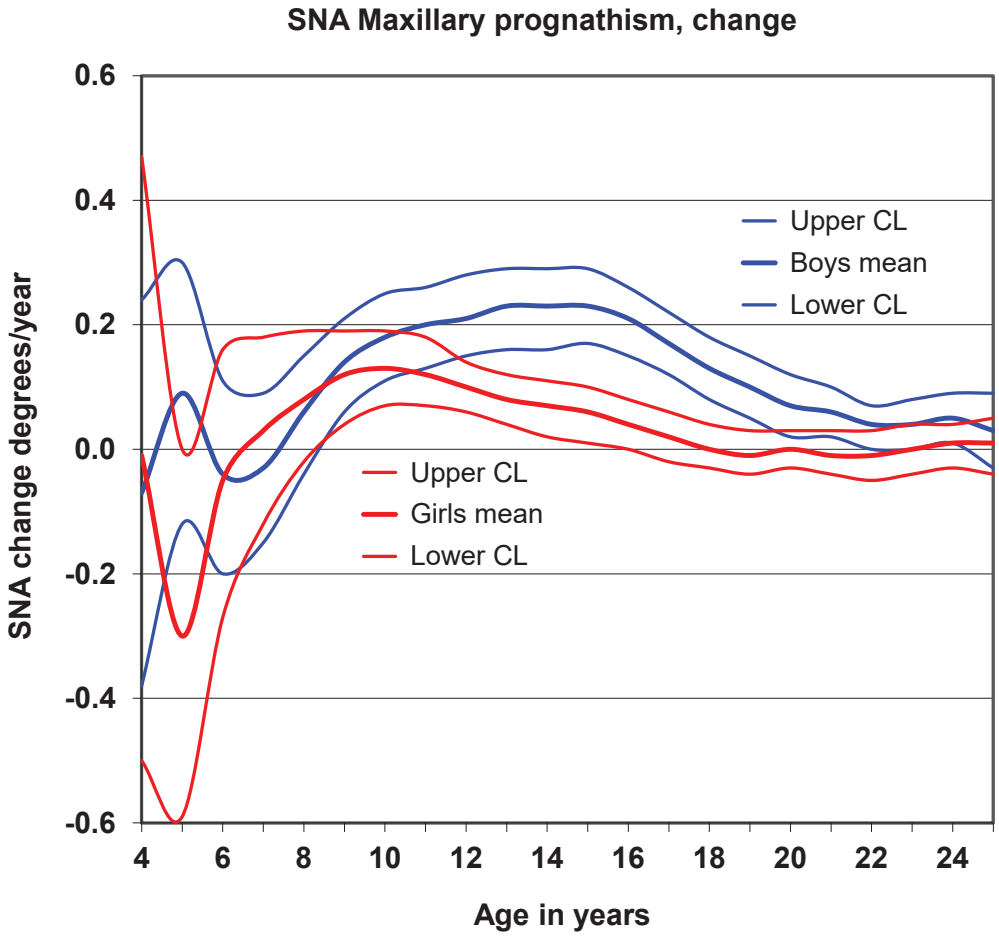
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	81.1	83.7	86.4	3.56	1.08		7	80.3	82.0	83.7	2.29
5	18	79.6	81.6	83.5	4.32	-0.80		19	81.3	82.5	83.7	2.61
6	35	80.8	82.1	83.3	3.75	0.55		27	80.6	81.6	82.6	2.70
7	43	81.0	82.1	83.1	3.57	1.50		39	80.1	81.0	81.9	2.84
8	48	81.2	82.1	83.1	3.42	1.34		49	80.4	81.3	82.1	3.02
9	49	81.2	82.2	83.1	3.39	1.31		53	80.6	81.4	82.2	2.89
10	50	81.4	82.3	83.3	3.35	1.38		54	80.7	81.5	82.3	2.84
11	50	81.6	82.6	83.5	3.33	1.51		55	80.9	81.7	82.4	2.81
12	50	81.8	82.8	83.7	3.34	1.67		55	81.0	81.8	82.5	2.78
13	50	82.0	83.0	83.9	3.38	1.86		55	81.1	81.9	82.6	2.76
14	50	82.3	83.2	84.1	3.40	2.10	p<0.05	55	81.2	81.9	82.7	2.77
15	50	82.5	83.4	84.4	3.44	2.34	p<0.05	55	81.3	82.0	82.7	2.78
16	50	82.7	83.7	84.6	3.47	2.62	p<0.05	55	81.3	82.0	82.8	2.80
17	50	82.9	83.9	84.8	3.50	2.84	p<0.01	55	81.3	82.1	82.8	2.84
18	49	83.2	84.1	85.1	3.39	3.29	p<0.01	55	81.4	82.1	82.9	2.88
19	49	83.3	84.2	85.2	3.41	3.44	p<0.001	55	81.3	82.1	82.9	2.90
20	46	83.3	84.4	85.4	3.53	3.54	p<0.001	55	81.3	82.1	82.9	2.90
21	46	83.4	84.4	85.4	3.52	3.50	p<0.001	54	81.4	82.2	83.0	2.86
22	46	83.4	84.4	85.5	3.53	3.38	p<0.01	53	81.4	82.2	83.0	2.95
23	41	83.5	84.5	85.6	3.52	3.33	p<0.01	42	81.4	82.2	83.1	2.80
24	35	83.5	84.6	85.8	3.44	3.34	p<0.01	41	81.3	82.2	83.1	2.90
25	30	83.3	84.6	85.9	3.65	3.12	p<0.01	35	81.2	82.1	83.0	2.74

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.38	-0.07	0.24	0.42	-0.19		7	-0.50	-0.01	0.47	0.65
5	18	-0.12	0.09	0.30	0.46	2.09	p<0.05	19	-0.59	-0.30	-0.00	0.66
6	35	-0.20	-0.05	0.10	0.46	0.07		27	-0.27	-0.05	0.16	0.56
7	43	-0.15	-0.03	0.09	0.40	-0.62		39	-0.12	0.03	0.18	0.48
8	48	-0.04	0.06	0.15	0.33	-0.38		49	-0.02	0.08	0.19	0.37
9	49	0.06	0.14	0.21	0.26	0.38		53	0.04	0.12	0.19	0.28
10	50	0.12	0.18	0.25	0.25	1.12		54	0.07	0.13	0.19	0.23
11	50	0.14	0.20	0.27	0.23	1.82		55	0.07	0.12	0.18	0.19
12	50	0.15	0.22	0.28	0.24	2.89	p<0.01	55	0.06	0.10	0.14	0.16
13	50	0.16	0.23	0.30	0.24	3.69	p<0.001	55	0.04	0.08	0.12	0.17
14	50	0.17	0.23	0.29	0.23	4.13	p<0.001	55	0.02	0.07	0.11	0.17
15	50	0.17	0.23	0.29	0.22	4.53	p<0.001	55	0.01	0.06	0.10	0.17
16	50	0.15	0.21	0.26	0.20	4.76	p<0.001	55	0.00	0.04	0.08	0.16
17	50	0.12	0.17	0.22	0.18	4.66	p<0.001	55	-0.02	0.02	0.06	0.15
18	49	0.08	0.13	0.18	0.17	4.23	p<0.001	55	-0.03	0.00	0.04	0.13
19	49	0.05	0.10	0.15	0.17	3.63	p<0.001	55	-0.04	-0.01	0.03	0.12
20	46	0.02	0.07	0.12	0.16	2.55	p<0.05	55	-0.03	-0.00	0.03	0.12
21	46	0.03	0.06	0.10	0.13	2.76	p<0.01	54	-0.04	-0.01	0.03	0.12
22	46	-0.00	0.03	0.07	0.13	1.47		53	-0.05	-0.01	0.03	0.16
23	41	-0.01	0.03	0.08	0.14	1.07		42	-0.04	0.00	0.04	0.13
24	35	-0.00	0.04	0.08	0.13	1.23		41	-0.03	0.01	0.04	0.11
25	30	-0.03	0.02	0.07	0.15	0.36		35	-0.04	0.01	0.05	0.14

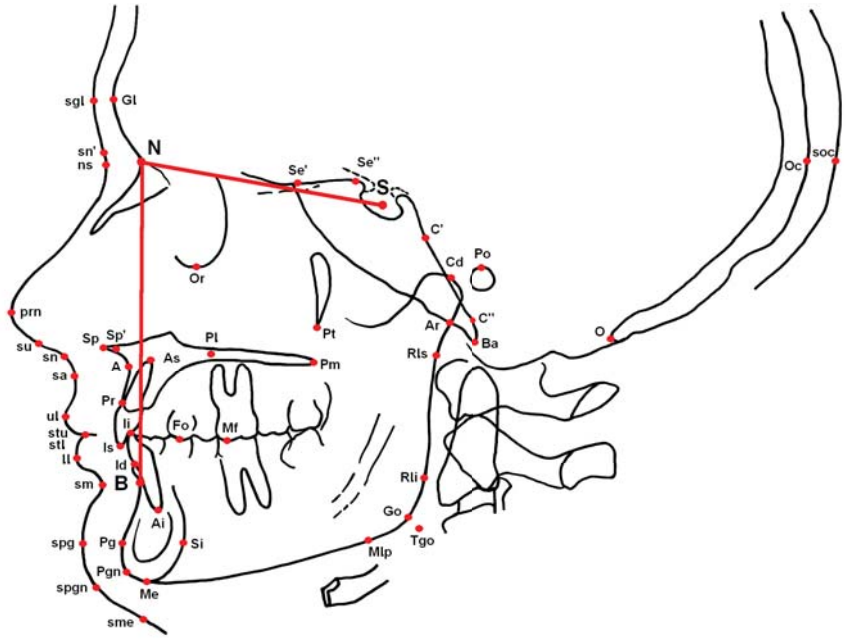
Figure 20


SNA Maxillary prognathism
SNA degrees
87
86
85
84
83
82
81
80
79
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years


SNA Maxillary prognathism, change
SNA change degrees/year
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

SNB

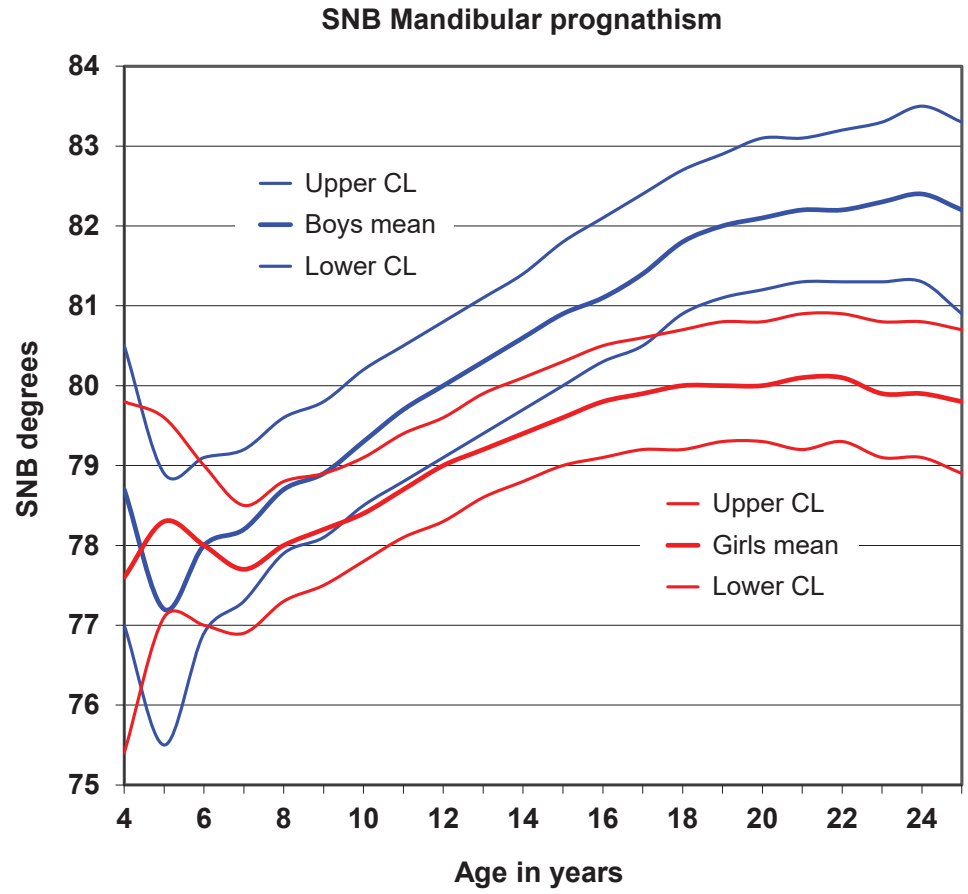
Figure 21

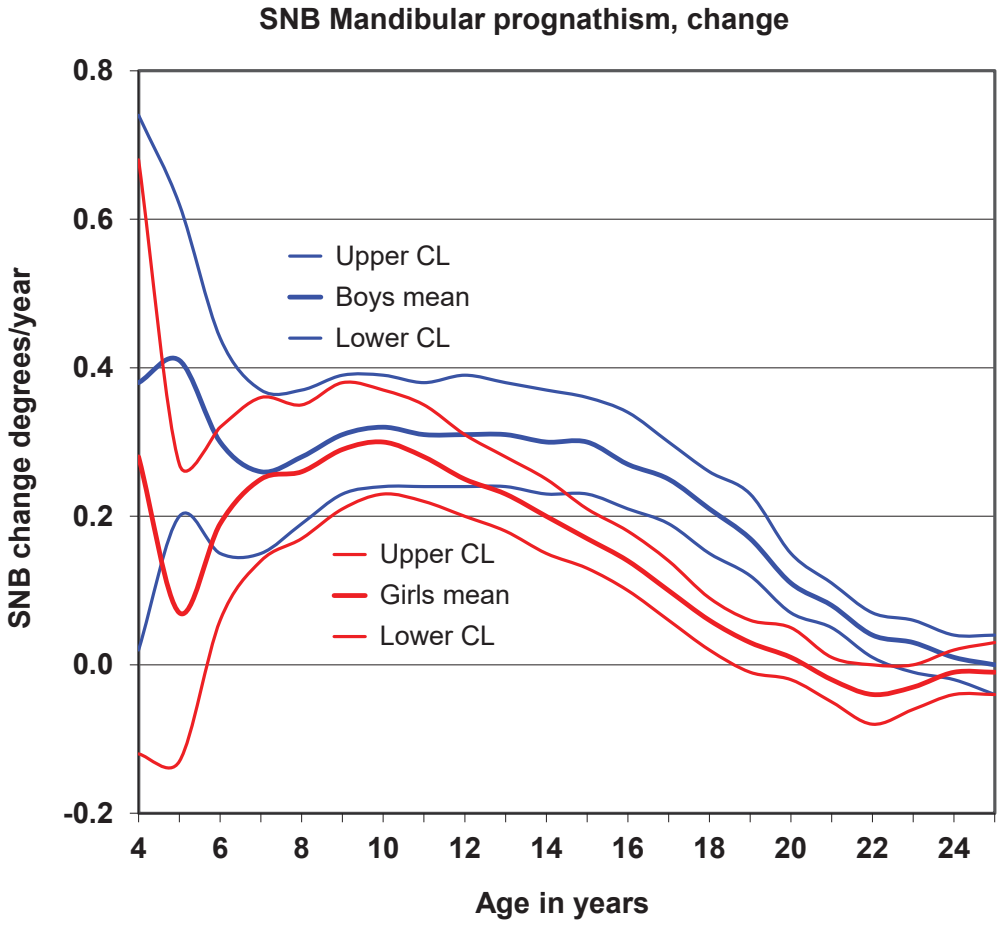


SNB (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	77.0	78.7	80.5	2.38	0.81		7	75.4	77.6	79.8	2.95
5	18	75.5	77.2	78.9	3.66	-1.04		19	77.1	78.3	79.6	2.83
6	35	76.9	78.0	79.1	3.35	0.02		27	77.0	78.0	79.0	2.72
7	43	77.3	78.2	79.2	3.09	0.89		39	76.9	77.7	78.5	2.54
8	48	77.9	78.7	79.6	3.06	1.19		49	77.3	78.0	78.8	2.67
9	49	78.1	79.0	79.8	3.05	1.40		53	77.5	78.2	78.9	2.55
10	50	78.5	79.3	80.2	3.06	1.67		54	77.8	78.4	79.1	2.48
11	50	78.8	79.7	80.5	3.07	1.77		55	78.1	78.7	79.3	2.44
12	50	79.1	80.0	80.8	3.09	1.80		55	78.3	79.0	79.6	2.44
13	50	79.4	80.3	81.1	3.12	1.90		55	78.6	79.2	79.9	2.48
14	50	79.7	80.6	81.4	3.14	2.04	p<0.05	55	78.8	79.4	80.1	2.53
15	50	80.0	80.9	81.7	3.17	2.18	p<0.05	55	78.9	79.6	80.3	2.58
16	50	80.3	81.1	82.0	3.21	2.41	p<0.05	55	79.1	79.8	80.5	2.64
17	50	80.5	81.4	82.3	3.24	2.61	p<0.05	55	79.2	79.9	80.6	2.71
18	49	80.9	81.8	82.7	3.12	3.14	p<0.01	55	79.2	80.0	80.7	2.77
19	49	81.1	82.0	82.9	3.16	3.39	p<0.001	55	79.3	80.0	80.7	2.78
20	46	81.2	82.1	83.1	3.23	3.51	p<0.001	55	79.3	80.0	80.8	2.80
21	46	81.3	82.2	83.1	3.22	3.57	p<0.001	54	79.3	80.1	80.8	2.80
22	46	81.3	82.2	83.2	3.21	3.54	p<0.001	53	79.3	80.1	80.9	2.81
23	41	81.3	82.3	83.3	3.23	3.57	p<0.001	42	79.1	79.9	80.8	2.83
24	35	81.3	82.4	83.5	3.21	3.53	p<0.001	41	79.1	79.9	80.8	2.87
25	30	80.9	82.1	83.2	3.24	3.20	p<0.01	35	78.8	79.7	80.6	2.73

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.02	0.38	0.74	0.49	0.36		7	-0.12	0.28	0.68	0.54
5	18	0.20	0.41	0.62	0.46	2.30	p<0.05	19	-0.13	0.07	0.27	0.45
6	35	0.15	0.30	0.44	0.45	1.04		27	0.06	0.19	0.32	0.35
7	43	0.15	0.26	0.37	0.37	0.18		39	0.14	0.25	0.36	0.35
8	48	0.19	0.28	0.37	0.32	0.36		49	0.17	0.26	0.35	0.31
9	49	0.23	0.31	0.39	0.29	0.30		53	0.21	0.29	0.38	0.30
10	50	0.24	0.32	0.39	0.28	0.28		54	0.23	0.30	0.37	0.27
11	50	0.24	0.31	0.39	0.26	0.57		55	0.22	0.28	0.35	0.24
12	50	0.24	0.31	0.39	0.26	1.29		55	0.20	0.25	0.31	0.21
13	50	0.24	0.31	0.38	0.26	1.89		55	0.18	0.23	0.28	0.19
14	50	0.23	0.30	0.37	0.25	2.43	p<0.05	55	0.15	0.20	0.25	0.18
15	50	0.23	0.30	0.36	0.24	3.19	p<0.01	55	0.13	0.17	0.21	0.16
16	50	0.21	0.28	0.34	0.23	3.75	p<0.001	55	0.10	0.14	0.18	0.15
17	50	0.19	0.25	0.30	0.21	4.22	p<0.001	55	0.06	0.10	0.14	0.15
18	49	0.15	0.21	0.26	0.19	4.60	p<0.001	55	0.02	0.06	0.09	0.14
19	49	0.12	0.17	0.23	0.19	4.62	p<0.001	55	-0.01	0.03	0.06	0.14
20	46	0.07	0.11	0.15	0.14	3.66	p<0.001	55	-0.02	0.01	0.05	0.13
21	46	0.05	0.08	0.11	0.12	4.27	p<0.001	54	-0.05	-0.02	0.01	0.12
22	46	0.01	0.04	0.07	0.11	2.94	p<0.01	53	-0.08	-0.04	0.00	0.15
23	41	-0.01	0.03	0.06	0.11	2.25	p<0.05	42	-0.06	-0.03	0.00	0.10
24	35	-0.02	0.01	0.04	0.10	1.05		41	-0.04	-0.01	0.02	0.10
25	30	-0.04	-0.00	0.04	0.11	0.24		35	-0.04	-0.01	0.03	0.10

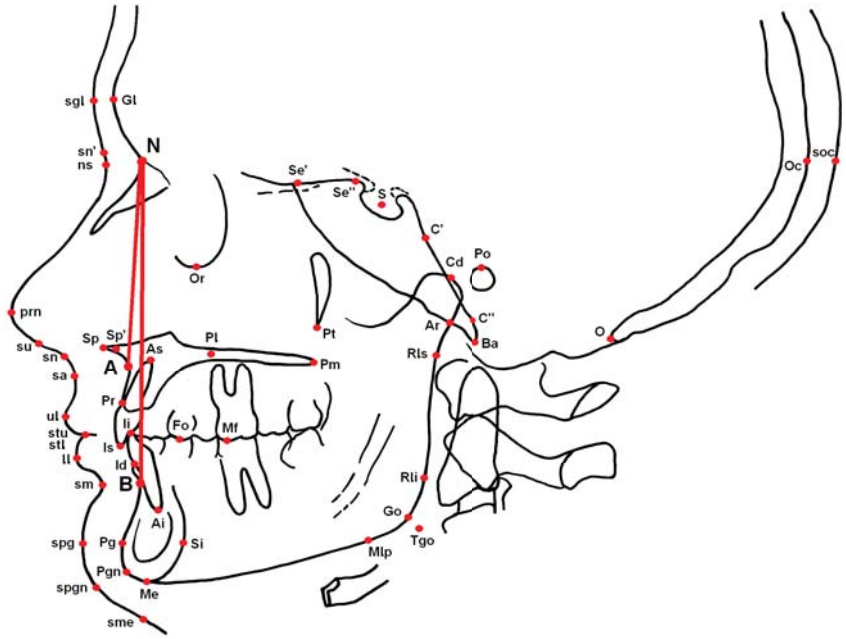
Figure 21


SNB Mandibular prognathism
SNB degrees
84
83
82
81
80
79
78
77
76
75
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years


SNB Mandibular prognathism, change
SNB change degrees/year
0.8
0.6
0.4
0.2
0.0
-0.2
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

ANB

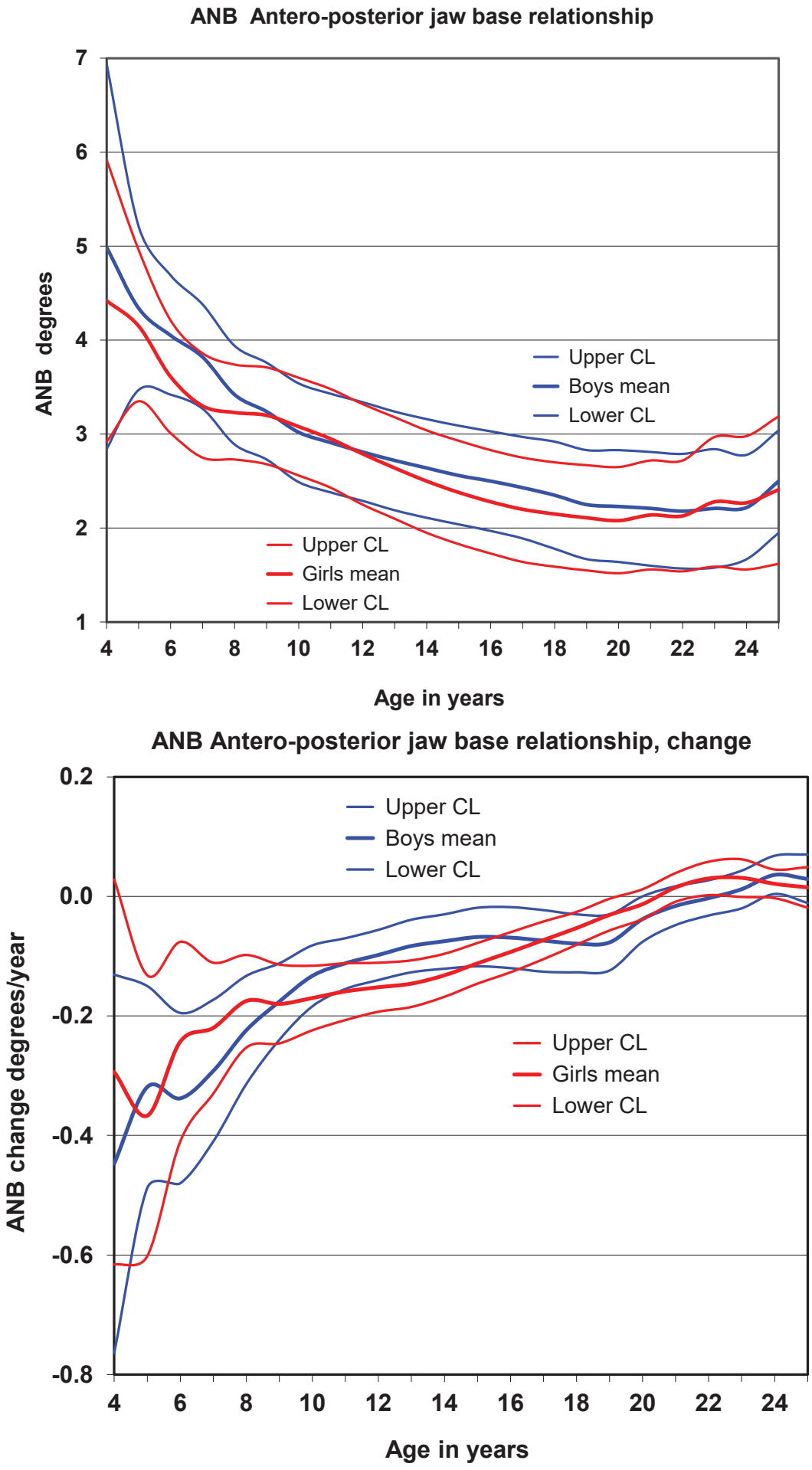
Figure 22



ANB (degrees)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.94	4.99	7.04	2.77	0.44		7	2.92	4.42	5.92	2.02
5	18	3.47	4.34	5.21	1.88	0.31		19	3.35	4.15	4.96	1.80
6	35	3.43	4.06	4.69	1.91	0.99		27	3.01	3.61	4.21	1.59
7	43	3.27	3.82	4.38	1.85	1.30		39	2.75	3.30	3.86	1.75
8	48	2.89	3.41	3.93	1.84	0.49		49	2.73	3.23	3.74	1.81
9	49	2.72	3.24	3.75	1.84	0.11		53	2.68	3.20	3.71	1.90
10	50	2.49	3.01	3.54	1.89	-0.18		54	2.56	3.08	3.60	1.95
11	50	2.38	2.90	3.42	1.88	-0.13		55	2.43	2.95	3.48	1.99
12	50	2.29	2.81	3.33	1.89	0.06		55	2.25	2.79	3.32	2.02
13	50	2.19	2.72	3.24	1.89	0.20		55	2.10	2.64	3.18	2.05
14	50	2.11	2.64	3.17	1.90	0.36		55	1.95	2.50	3.04	2.06
15	50	2.04	2.57	3.10	1.91	0.49		55	1.83	2.38	2.93	2.07
16	50	1.97	2.51	3.04	1.93	0.58		55	1.73	2.28	2.83	2.09
17	50	1.90	2.44	2.98	1.96	0.61		55	1.64	2.20	2.75	2.11
18	49	1.79	2.36	2.93	2.03	0.53		55	1.59	2.15	2.70	2.11
19	49	1.68	2.26	2.85	2.09	0.37		55	1.55	2.11	2.67	2.12
20	46	1.65	2.25	2.84	2.07	0.39		55	1.52	2.08	2.65	2.14
21	46	1.61	2.22	2.83	2.10	0.19		54	1.56	2.14	2.72	2.17
22	46	1.58	2.19	2.80	2.10	0.14		53	1.54	2.13	2.72	2.19
23	41	1.59	2.22	2.85	2.07	-0.12		42	1.59	2.28	2.97	2.28
24	35	1.68	2.24	2.79	1.68	-0.08		41	1.56	2.27	2.98	2.31
25	30	1.96	2.51	3.05	1.52	0.20		35	1.62	2.41	3.19	2.38

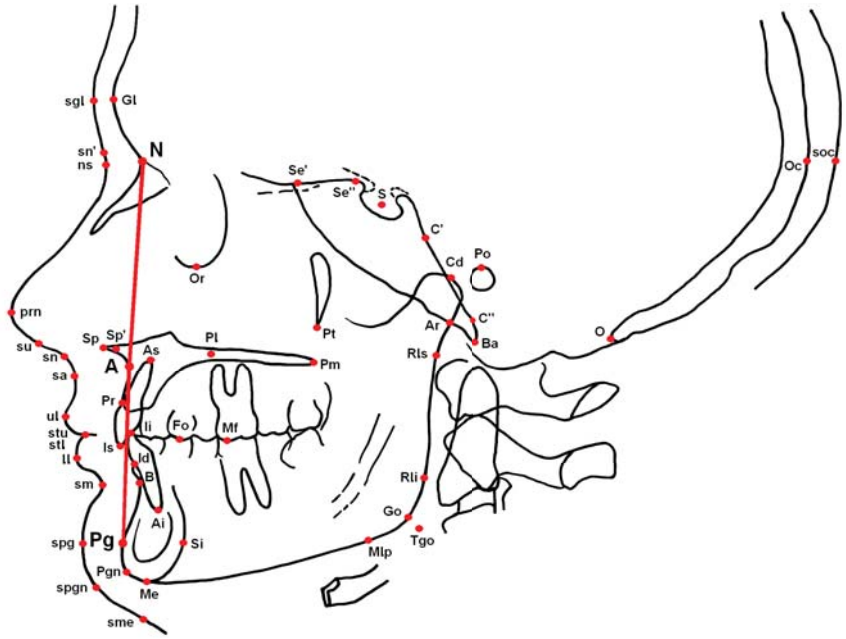
Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.76	-0.45	-0.13	0.43	0.67		7	-0.62	-0.29	0.03	0.43
5	18	-0.49	-0.32	-0.15	0.37	-0.32		19	-0.60	-0.37	-0.13	0.52
6	35	-0.48	-0.34	-0.20	0.43	0.88		27	-0.41	-0.24	-0.08	0.44
7	43	-0.41	-0.29	-0.18	0.40	0.89		39	-0.33	-0.22	-0.11	0.35
8	48	-0.32	-0.23	-0.13	0.32	0.82		49	-0.25	-0.18	-0.10	0.28
9	49	-0.24	-0.18	-0.11	0.23	-0.07		53	-0.25	-0.18	-0.11	0.25
10	50	-0.18	-0.13	-0.08	0.18	-0.99		54	-0.22	-0.17	-0.12	0.20
11	50	-0.15	-0.11	-0.07	0.15	-1.47		55	-0.21	-0.16	-0.11	0.18
12	50	-0.14	-0.10	-0.05	0.15	-1.86		55	-0.19	-0.15	-0.11	0.15
13	50	-0.13	-0.08	-0.04	0.16	-2.18	p<0.05	55	-0.19	-0.15	-0.11	0.15
14	50	-0.12	-0.07	-0.03	0.16	-2.01	p<0.05	55	-0.17	-0.13	-0.10	0.14
15	50	-0.11	-0.07	-0.02	0.18	-1.53		55	-0.15	-0.11	-0.08	0.13
16	50	-0.12	-0.07	-0.02	0.19	-0.87		55	-0.13	-0.09	-0.06	0.13
17	50	-0.12	-0.07	-0.02	0.19	-0.03		55	-0.10	-0.07	-0.04	0.12
18	49	-0.13	-0.08	-0.03	0.17	0.87		55	-0.08	-0.05	-0.03	0.10
19	49	-0.12	-0.08	-0.03	0.17	1.70		55	-0.06	-0.03	-0.00	0.10
20	46	-0.08	-0.04	0.00	0.13	1.10		55	-0.04	-0.01	0.01	0.09
21	46	-0.05	-0.02	0.02	0.11	1.53		54	-0.01	0.01	0.04	0.09
22	46	-0.03	-0.00	0.03	0.10	1.61		53	0.00	0.03	0.06	0.10
23	41	-0.02	0.01	0.04	0.10	0.94		42	-0.00	0.03	0.06	0.11
24	35	-0.00	0.03	0.06	0.09	-0.50		41	-0.00	0.02	0.05	0.08
25	30	-0.02	0.02	0.06	0.11	-0.26		35	-0.02	0.02	0.05	0.10

Figure 22


ANB Antero-posterior jaw base relationship
ANB degrees
7
6
5
4
3
2
1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
ANB Antero-posterior jaw base relationship, change
ANB change degrees/year
0.2
0.0
-0.2
-0.4
-0.6
-0.8
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

NAPg

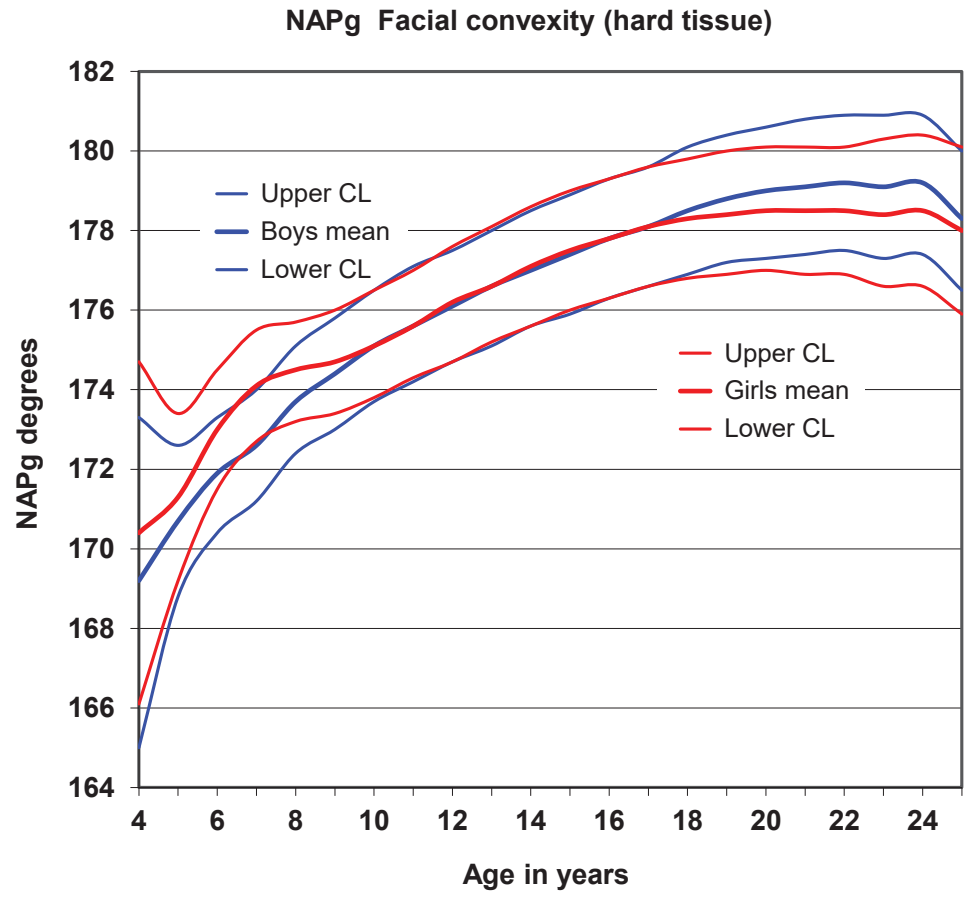
Figure 23



NAPg (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	165.0	169.2	173.3	5.61	0.40		7	166.1	170.4	174.7	5.83
5	18	168.8	170.7	172.6	4.03	0.42		19	169.2	171.3	173.4	4.61
6	35	170.4	171.8	173.3	4.37	1.06		27	171.5	173.0	174.5	4.09
7	43	171.2	172.6	174.0	4.64	1.47		39	172.7	174.1	175.5	4.39
8	48	172.4	173.7	175.1	4.85	0.75		49	173.2	174.5	175.7	4.57
9	49	173.0	174.4	175.8	4.93	0.32		53	173.4	174.7	176.0	4.82
10	50	173.7	175.1	176.5	5.06	-0.02		54	173.8	175.1	176.5	5.09
11	50	174.2	175.7	177.1	5.09	-0.01		55	174.3	175.6	177.0	5.24
12	50	174.7	176.1	177.6	5.16	0.04		55	174.7	176.2	177.6	5.37
13	50	175.1	176.6	178.0	5.21	0.04		55	175.2	176.6	178.1	5.51
14	50	175.6	177.0	178.5	5.28	0.07		55	175.6	177.1	178.6	5.60
15	50	175.9	177.4	178.9	5.35	0.07		55	176.0	177.5	179.0	5.66
16	50	176.3	177.7	179.2	5.40	0.05		55	176.3	177.8	179.3	5.71
17	50	176.6	178.1	179.6	5.51	0.01		55	176.6	178.1	179.6	5.75
18	49	176.9	178.4	180.0	5.67	-0.13		55	176.8	178.3	179.8	5.78
19	49	177.2	178.8	180.4	5.81	-0.32		55	176.9	178.4	180.0	5.80
20	46	177.2	178.9	180.6	5.84	-0.34		55	177.0	178.5	180.1	5.83
21	46	177.3	179.1	180.8	5.92	-0.46		54	176.9	178.5	180.1	5.90
22	46	177.4	179.1	180.8	5.93	-0.51		53	176.9	178.5	180.1	5.97
23	41	177.3	179.1	180.9	5.87	-0.46		42	176.6	178.4	180.3	6.25
24	35	177.4	179.1	180.9	5.38	-0.46		41	176.6	178.5	180.4	6.31
25	30	176.5	178.3	180.0	4.93	-0.17		35	175.9	178.0	180.1	6.41

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.56	1.12	1.68	0.76	-0.18		7	0.33	1.22	2.11	1.20
5	18	0.61	0.94	1.27	0.71	-0.84		19	0.70	1.20	1.70	1.12
6	35	0.72	1.03	1.33	0.92	0.73		27	0.47	0.85	1.23	1.01
7	43	0.66	0.91	1.15	0.82	0.82		39	0.53	0.76	1.00	0.76
8	48	0.57	0.76	0.94	0.65	1.09		49	0.44	0.62	0.79	0.62
9	49	0.52	0.65	0.78	0.47	0.43		53	0.46	0.61	0.76	0.55
10	50	0.44	0.56	0.67	0.41	-0.16		54	0.44	0.57	0.70	0.47
11	50	0.41	0.51	0.61	0.36	-0.14		55	0.41	0.52	0.64	0.42
12	50	0.38	0.48	0.58	0.35	-0.22		55	0.40	0.49	0.59	0.36
13	50	0.34	0.44	0.54	0.36	-0.46		55	0.38	0.47	0.56	0.34
14	50	0.31	0.41	0.51	0.36	-0.26		55	0.34	0.42	0.51	0.31
15	50	0.27	0.37	0.48	0.38	0.10		55	0.29	0.37	0.45	0.30
16	50	0.25	0.36	0.46	0.39	0.58		55	0.24	0.32	0.40	0.30
17	50	0.24	0.35	0.46	0.40	1.38		55	0.18	0.26	0.33	0.28
18	49	0.22	0.33	0.43	0.38	2.14	p<0.05	55	0.13	0.19	0.26	0.24
19	49	0.19	0.30	0.40	0.38	2.90	p<0.01	55	0.06	0.12	0.18	0.23
20	46	0.09	0.19	0.28	0.32	2.13	p<0.05	55	0.02	0.07	0.13	0.20
21	46	0.02	0.10	0.18	0.28	1.90		54	-0.04	0.01	0.06	0.19
22	46	-0.04	0.03	0.11	0.26	1.42		53	-0.09	-0.03	0.03	0.21
23	41	-0.10	-0.03	0.05	0.24	0.61		42	-0.12	-0.06	0.01	0.22
24	35	-0.16	-0.08	-0.01	0.23	-0.69		41	-0.10	-0.05	0.00	0.17
25	30	-0.15	-0.05	0.04	0.26	-0.35		35	-0.11	-0.03	0.04	0.23

Figure 23


NAPg Facial convexity (hard tissue)
NAPg degrees
182
180
178
176
174
172
170
168
166
164
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

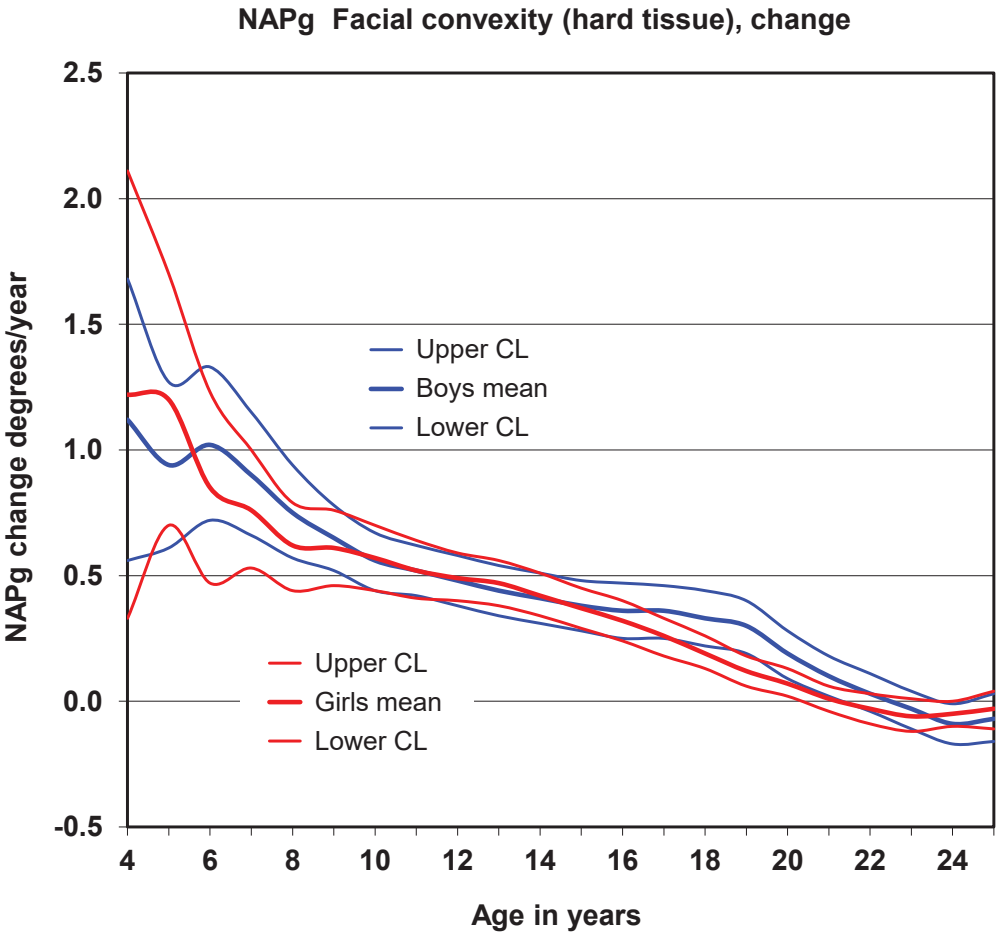
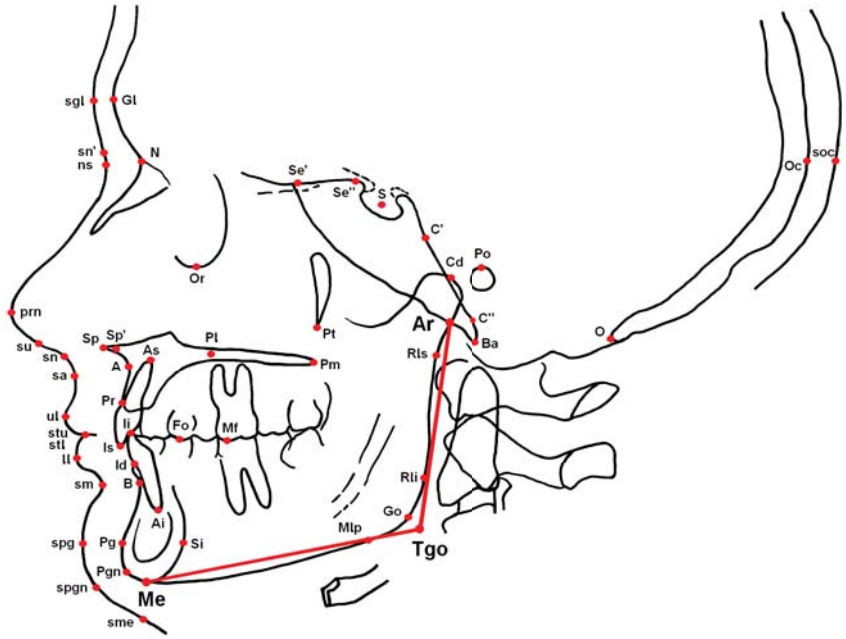

NAPg Facial convexity (hard tissue), change
NAPg change degrees/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

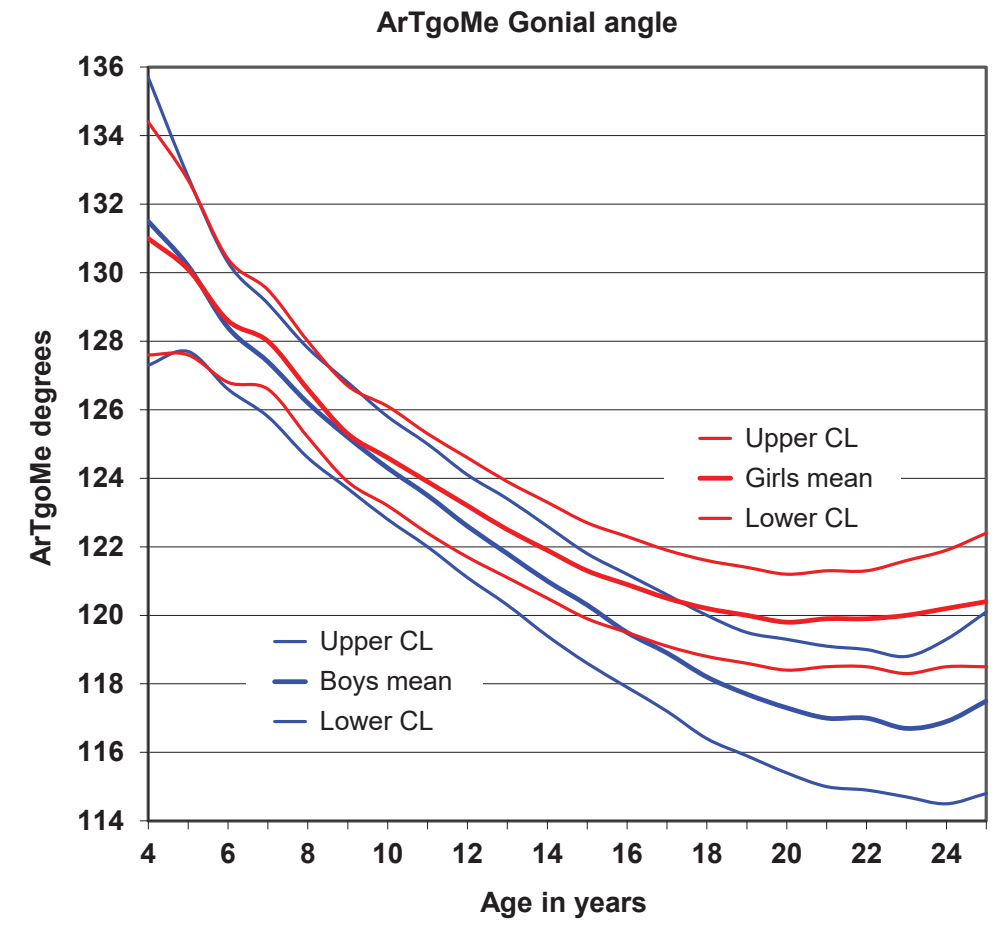
Figure 24

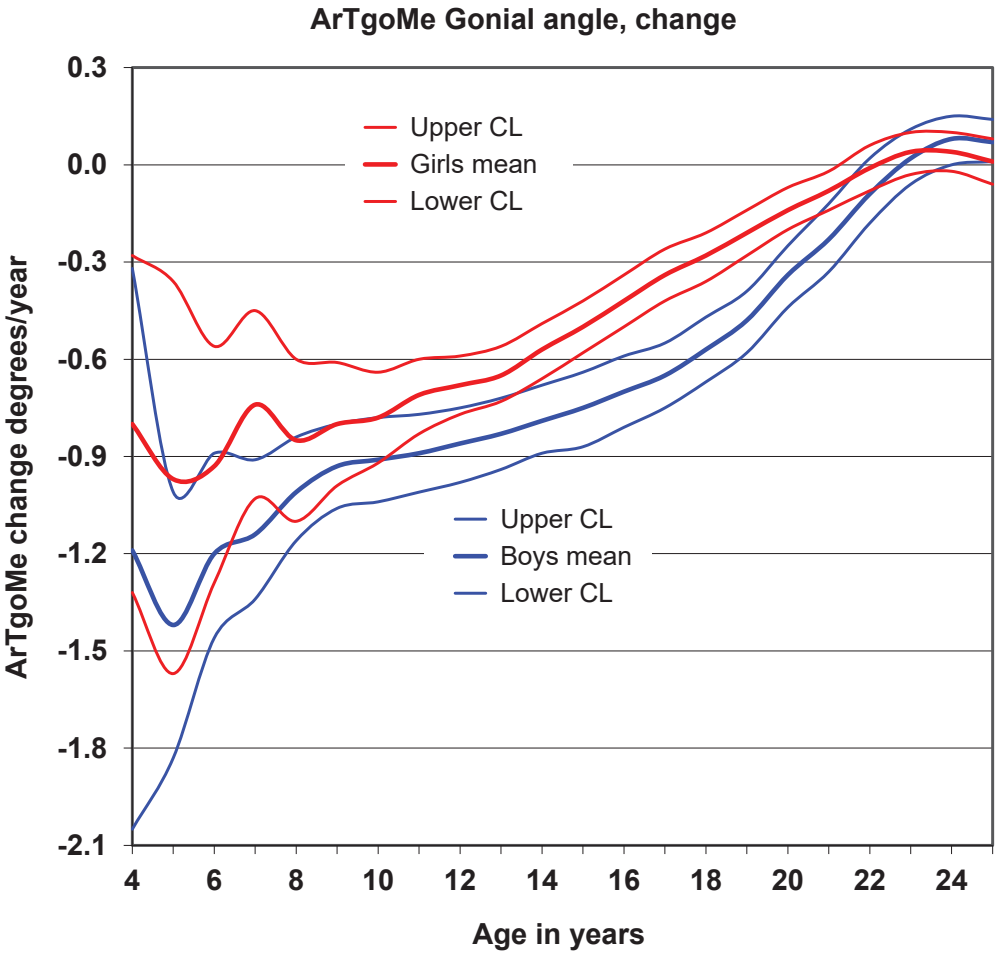


ArTgoMe (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	127.3	131.5	135.7	5.67	-0.18		7	127.6	131.0	134.4	4.55
5	18	127.7	130.2	132.8	5.61	-0.05		19	127.6	130.1	132.7	5.65
6	35	126.5	128.4	130.3	5.60	0.15		27	126.8	128.6	130.4	4.84
7	43	125.8	127.4	129.1	5.52	0.54		39	126.6	128.0	129.5	4.60
8	48	124.6	126.2	127.8	5.61	0.37		49	125.2	126.6	128.0	4.92
9	49	123.7	125.2	126.8	5.51	0.04		53	123.9	125.3	126.7	5.17
10	50	122.8	124.3	125.8	5.43	0.29		54	123.2	124.6	126.1	5.37
11	50	122.0	123.5	125.0	5.45	0.32		55	122.4	123.9	125.3	5.34
12	50	121.1	122.6	124.2	5.49	0.50		55	121.7	123.2	124.6	5.38
13	50	120.3	121.8	123.4	5.54	0.64		55	121.1	122.5	123.9	5.38
14	50	119.4	121.0	122.6	5.64	0.80		55	120.5	121.9	123.3	5.37
15	50	118.6	120.3	121.9	5.79	0.99		55	119.9	121.3	122.7	5.34
16	50	117.9	119.5	121.2	5.95	1.24		55	119.5	120.9	122.3	5.33
17	50	117.2	118.9	120.6	6.13	1.47		55	119.1	120.5	121.9	5.30
18	49	116.4	118.2	120.0	6.31	1.78		55	118.8	120.2	121.6	5.25
19	49	115.9	117.7	119.5	6.48	1.99	p<0.05	55	118.6	120.0	121.4	5.26
20	46	115.4	117.3	119.3	6.84	2.04	p<0.05	55	118.4	119.8	121.2	5.28
21	46	115.0	117.0	119.1	6.97	2.35	p<0.05	54	118.5	119.9	121.3	5.15
22	46	114.9	117.0	119.0	7.12	2.35	p<0.05	53	118.5	119.9	121.3	5.25
23	41	114.7	116.7	118.8	6.83	2.39	p<0.05	42	118.3	120.0	121.6	5.46
24	35	114.5	116.9	119.3	7.20	2.28	p<0.05	41	118.5	120.2	121.9	5.46
25	30	114.8	117.5	120.1	7.46	1.82		35	118.5	120.4	122.4	5.80

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-2.05	-1.19	-0.32	1.16	0.76		7	-1.32	-0.80	-0.28	0.70
5	18	-1.83	-1.42	-1.01	0.89	1.21		19	-1.57	-0.97	-0.36	1.35
6	35	-1.46	-1.17	-0.89	0.87	1.06		27	-1.29	-0.93	-0.56	0.97
7	43	-1.34	-1.12	-0.91	0.73	2.13	p<0.05	39	-1.03	-0.74	-0.45	0.92
8	48	-1.16	-1.00	-0.84	0.58	1.00		49	-1.10	-0.85	-0.60	0.89
9	49	-1.06	-0.93	-0.80	0.48	1.06		53	-0.99	-0.80	-0.61	0.72
10	50	-1.04	-0.91	-0.78	0.46	1.30		54	-0.92	-0.78	-0.64	0.54
11	50	-1.01	-0.89	-0.77	0.42	2.15	p<0.05	55	-0.83	-0.71	-0.60	0.43
12	50	-0.98	-0.86	-0.75	0.41	2.49	p<0.05	55	-0.77	-0.68	-0.59	0.35
13	50	-0.94	-0.83	-0.72	0.39	2.68	p<0.01	55	-0.73	-0.64	-0.56	0.32
14	50	-0.89	-0.79	-0.68	0.39	3.07	p<0.01	55	-0.66	-0.57	-0.49	0.31
15	50	-0.87	-0.75	-0.64	0.40	3.67	p<0.001	55	-0.58	-0.50	-0.42	0.31
16	50	-0.81	-0.70	-0.59	0.39	4.18	p<0.001	55	-0.50	-0.42	-0.34	0.30
17	50	-0.75	-0.65	-0.55	0.37	4.82	p<0.001	55	-0.42	-0.34	-0.26	0.30
18	49	-0.67	-0.57	-0.47	0.36	4.59	p<0.001	55	-0.36	-0.28	-0.21	0.28
19	49	-0.58	-0.48	-0.38	0.37	4.26	p<0.001	55	-0.28	-0.21	-0.14	0.27
20	46	-0.44	-0.34	-0.25	0.33	3.62	p<0.001	55	-0.20	-0.14	-0.07	0.24
21	46	-0.33	-0.23	-0.12	0.36	2.40	p<0.05	54	-0.14	-0.08	-0.02	0.23
22	46	-0.18	-0.08	0.02	0.35	1.21		53	-0.08	-0.01	0.06	0.25
23	41	-0.06	0.02	0.11	0.28	0.27		42	-0.03	0.04	0.10	0.21
24	35	-0.00	0.08	0.15	0.23	-0.65		41	-0.02	0.04	0.10	0.20
25	30	0.01	0.07	0.14	0.18	-1.19		35	-0.06	0.01	0.08	0.21

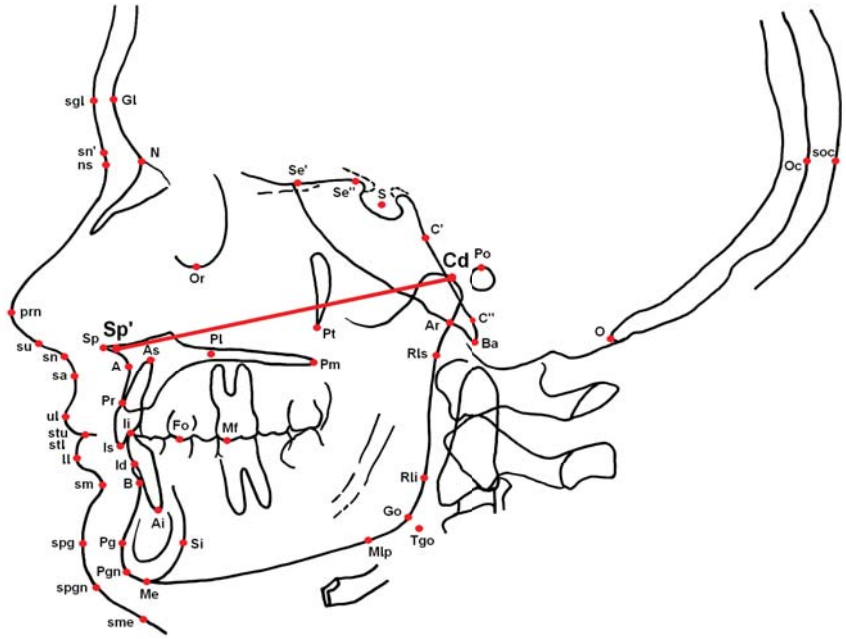
Figure 24


ArTgoMe Gonial angle
ArTgoMe degrees
136
134
132
130
128
126
124
122
120
118
116
114
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


ArTgoMe Gonial angle, change
ArTgoMe change degrees/year
0.3
0.0
-0.3
-0.6
-0.9
-1.2
-1.5
-1.8
-2.1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

Cd-Sp'

Figure 25

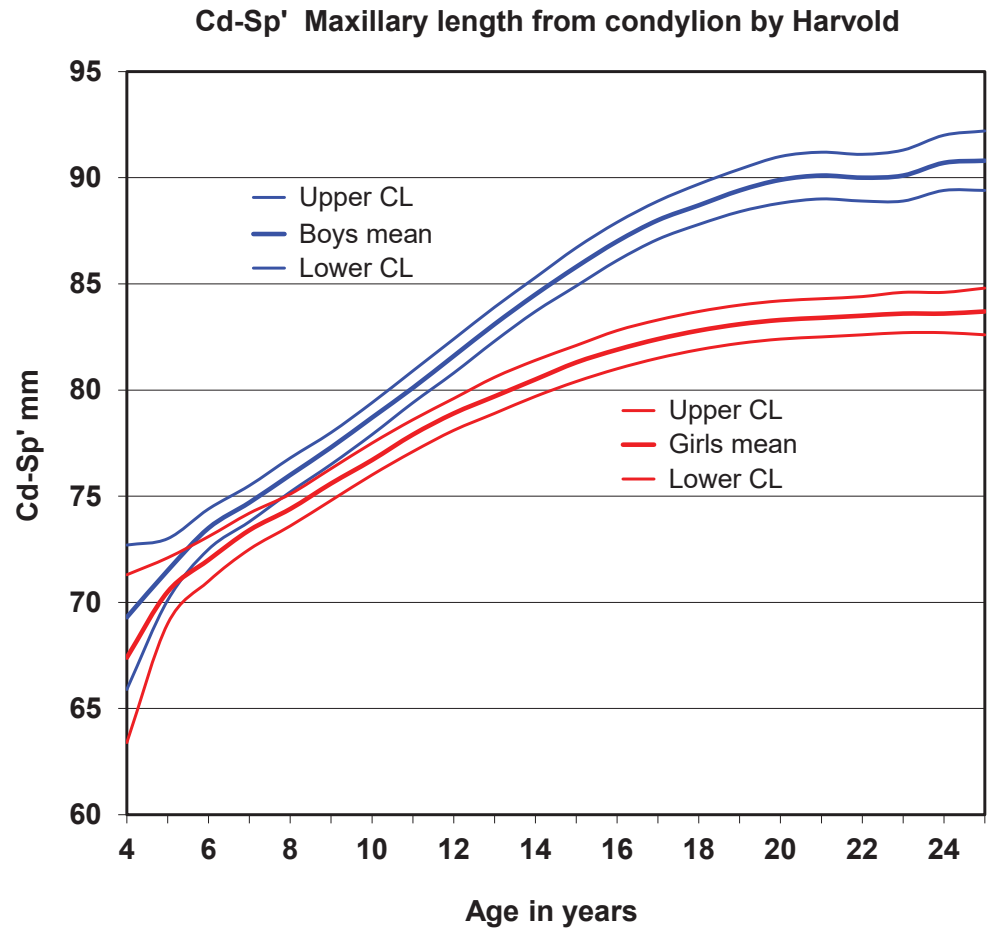


Cd-Sp' (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	65.9	69.3	72.7	4.61	0.74		7	63.4	67.4	71.3	5.33
5	18	70.1	71.5	73.0	3.17	0.90		19	69.0	70.5	72.1	3.53
6	35	72.5	73.5	74.4	2.86	2.00	p<0.05	27	71.0	72.0	73.1	2.85
7	43	73.8	74.7	75.5	2.82	2.15	p<0.05	39	72.5	73.4	74.2	2.77
8	48	75.2	76.0	76.8	2.79	2.93	p<0.01	49	73.6	74.4	75.1	2.77
9	49	76.5	77.3	78.0	2.68	3.14	p<0.01	53	74.8	75.6	76.3	2.76
10	50	77.9	78.6	79.4	2.72	3.46	p<0.001	54	76.0	76.7	77.5	2.84
11	50	79.4	80.1	80.9	2.83	4.06	p<0.001	55	77.1	77.9	78.6	2.89
12	50	80.8	81.6	82.4	2.85	4.81	p<0.001	55	78.1	78.9	79.6	3.00
13	50	82.3	83.1	83.9	2.91	5.66	p<0.001	55	78.9	79.7	80.6	3.12
14	50	83.7	84.5	85.3	3.01	6.45	p<0.001	55	79.7	80.5	81.4	3.24
15	50	84.9	85.8	86.7	3.12	7.17	p<0.001	55	80.4	81.3	82.1	3.31
16	50	86.1	87.0	87.9	3.22	7.96	p<0.001	55	81.0	81.9	82.8	3.35
17	50	87.1	88.0	88.9	3.30	8.60	p<0.001	55	81.5	82.4	83.3	3.38
18	49	87.8	88.8	89.7	3.42	9.05	p<0.001	55	81.9	82.8	83.7	3.33
19	49	88.4	89.4	90.4	3.55	9.36	p<0.001	55	82.2	83.1	84.0	3.35
20	46	88.8	89.9	91.0	3.73	9.36	p<0.001	55	82.4	83.3	84.2	3.33
21	46	89.0	90.1	91.2	3.79	9.37	p<0.001	54	82.5	83.4	84.3	3.40
22	46	88.9	90.0	91.1	3.81	8.94	p<0.001	53	82.6	83.5	84.4	3.42
23	41	88.9	90.1	91.3	4.05	8.15	p<0.001	42	82.7	83.6	84.6	3.15
24	35	89.4	90.7	92.0	3.97	8.60	p<0.001	41	82.7	83.6	84.6	3.15
25	30	89.4	90.8	92.2	3.98	7.86	p<0.001	35	82.6	83.7	84.8	3.32

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.43	2.00	2.57	0.77	-0.20		7	1.13	2.11	3.10	1.32
5	18	1.38	1.71	2.05	0.72	1.23		19	0.90	1.35	1.81	1.02
6	35	1.04	1.27	1.50	0.70	-0.46		27	1.03	1.36	1.69	0.88
7	43	1.08	1.30	1.52	0.73	0.81		39	0.97	1.17	1.38	0.65
8	48	1.16	1.33	1.50	0.59	1.31		49	1.03	1.18	1.33	0.53
9	49	1.25	1.39	1.54	0.51	2.33	p<0.05	53	1.05	1.17	1.29	0.45
10	50	1.37	1.48	1.59	0.41	4.47	p<0.001	54	1.01	1.12	1.23	0.41
11	50	1.39	1.49	1.59	0.36	6.23	p<0.001	55	0.92	1.03	1.13	0.40
12	50	1.41	1.50	1.59	0.33	8.02	p<0.001	55	0.86	0.95	1.05	0.36
13	50	1.36	1.46	1.56	0.35	9.08	p<0.001	55	0.76	0.85	0.94	0.33
14	50	1.28	1.38	1.48	0.36	9.11	p<0.001	55	0.68	0.76	0.85	0.33
15	50	1.20	1.30	1.40	0.36	9.75	p<0.001	55	0.59	0.67	0.75	0.30
16	50	1.05	1.15	1.24	0.35	9.48	p<0.001	55	0.50	0.57	0.64	0.27
17	50	0.86	0.96	1.05	0.35	8.14	p<0.001	55	0.40	0.47	0.54	0.26
18	49	0.68	0.77	0.86	0.32	7.21	p<0.001	55	0.29	0.36	0.43	0.26
19	49	0.48	0.57	0.67	0.35	5.33	p<0.001	55	0.18	0.25	0.32	0.26
20	46	0.29	0.39	0.50	0.35	3.43	p<0.001	55	0.11	0.18	0.25	0.26
21	46	0.10	0.20	0.31	0.36	1.90		54	0.02	0.09	0.15	0.25
22	46	-0.07	0.03	0.12	0.34	-0.01		53	-0.06	0.03	0.11	0.32
23	41	-0.10	-0.02	0.07	0.28	-0.15		42	-0.08	-0.01	0.06	0.24
24	35	-0.13	-0.03	0.07	0.30	-0.16		41	-0.09	-0.02	0.05	0.22
25	30	-0.17	-0.06	0.05	0.31	-1.04		35	-0.06	0.01	0.08	0.21

Figure 25

Cd-Sp'



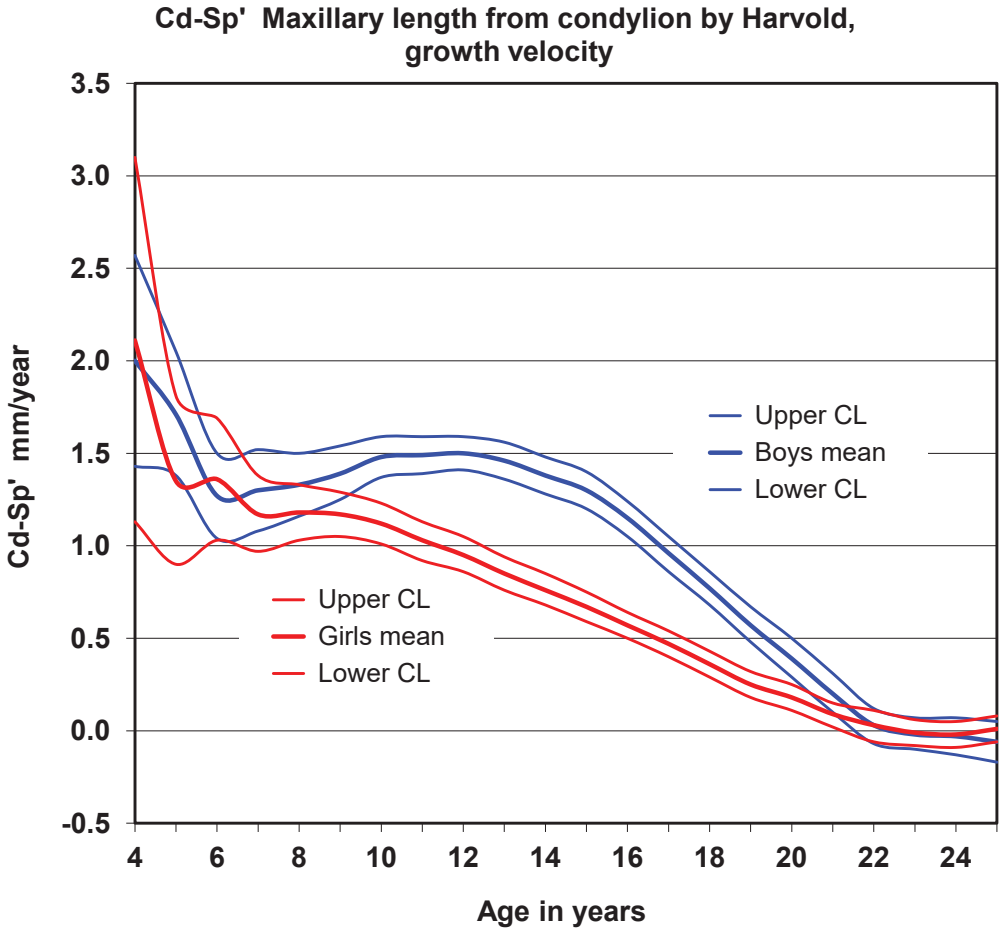
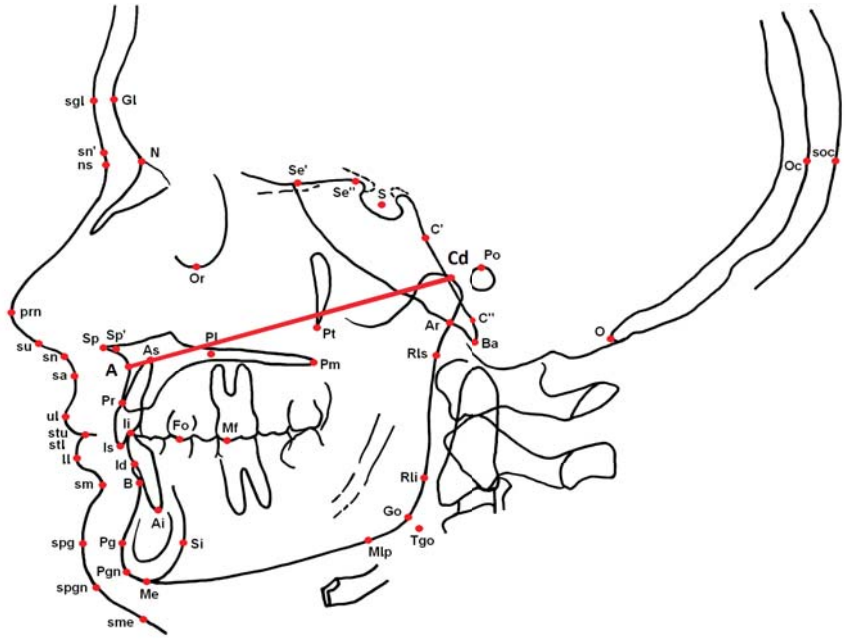


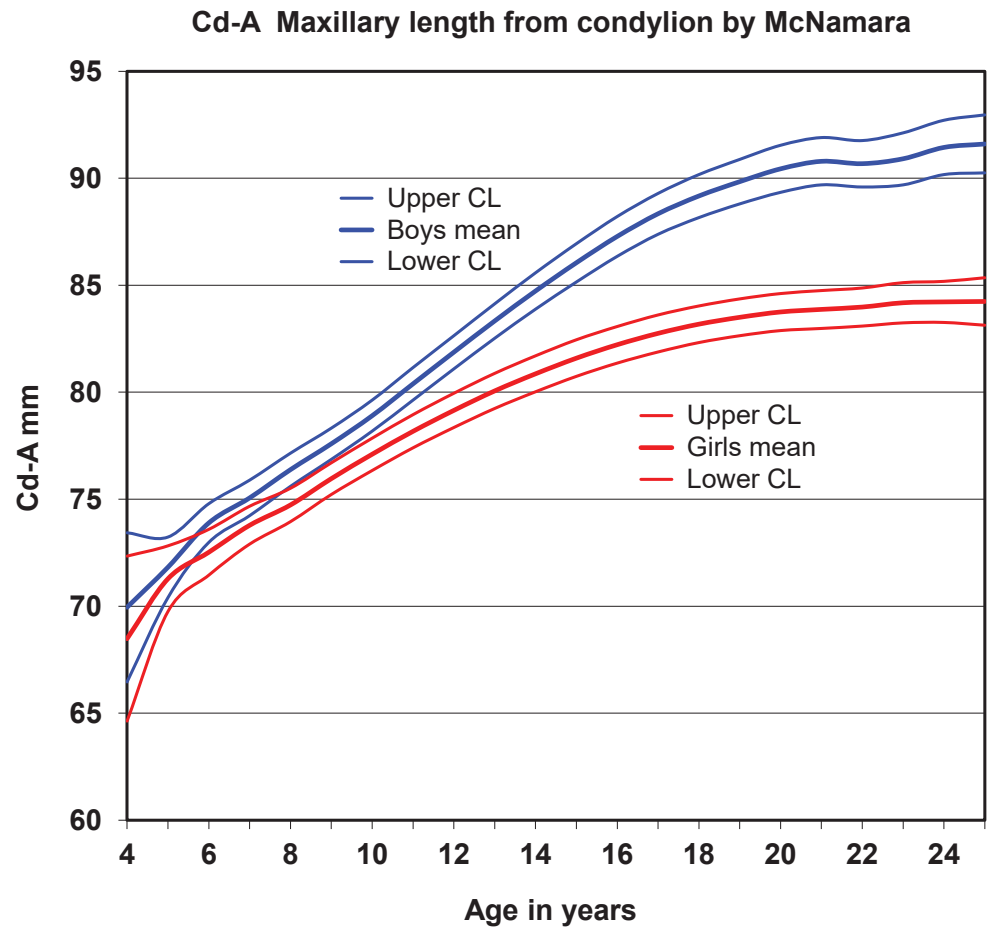
Figure 26



Cd-A (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	66.5	69.9	73.4	4.70	0.55		7	64.6	68.5	72.3	5.20
5	18	70.4	71.8	73.2	3.06	0.50		19	69.7	71.3	72.8	3.42
6	35	73.0	73.9	74.8	2.73	1.92		27	71.5	72.5	73.6	2.84
7	43	74.2	75.1	75.9	2.77	2.06	p<0.05	39	72.9	73.8	74.7	2.83
8	48	75.6	76.4	77.1	2.73	2.94	p<0.01	49	74.0	74.7	75.5	2.78
9	49	76.9	77.6	78.3	2.61	3.08	p<0.01	53	75.2	76.0	76.7	2.76
10	50	78.2	78.9	79.6	2.62	3.37	p<0.01	54	76.3	77.1	77.9	2.83
11	50	79.6	80.4	81.1	2.73	4.00	p<0.001	55	77.4	78.2	78.9	2.93
12	50	81.1	81.9	82.6	2.80	4.76	p<0.001	55	78.4	79.2	79.9	3.02
13	50	82.5	83.3	84.1	2.91	5.55	p<0.001	55	79.2	80.1	80.9	3.10
14	50	83.9	84.7	85.6	3.07	6.32	p<0.001	55	80.0	80.9	81.7	3.19
15	50	85.2	86.0	86.9	3.22	7.08	p<0.001	55	80.7	81.6	82.4	3.22
16	50	86.4	87.3	88.2	3.36	7.86	p<0.001	55	81.4	82.2	83.1	3.25
17	50	87.4	88.3	89.3	3.45	8.51	p<0.001	55	81.9	82.7	83.6	3.28
18	49	88.2	89.2	90.2	3.59	8.95	p<0.001	55	82.3	83.2	84.0	3.24
19	49	88.8	89.8	90.9	3.72	9.28	p<0.001	55	82.6	83.5	84.4	3.25
20	46	89.3	90.4	91.5	3.81	9.51	p<0.001	55	82.9	83.7	84.6	3.27
21	46	89.7	90.8	91.9	3.82	9.70	p<0.001	54	83.0	83.9	84.8	3.32
22	46	89.6	90.7	91.8	3.76	9.42	p<0.001	53	83.1	84.0	84.9	3.30
23	41	89.7	90.9	92.1	3.97	8.61	p<0.001	42	83.2	84.2	85.1	3.11
24	35	90.2	91.4	92.7	3.83	9.03	p<0.001	41	83.3	84.2	85.2	3.14
25	30	90.2	91.6	93.0	3.78	8.34	p<0.001	35	83.1	84.2	85.3	3.34

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.31	1.80	2.29	0.67	-0.21		7	1.03	1.91	2.79	1.19
5	18	1.34	1.70	2.06	0.78	1.63		19	0.83	1.24	1.66	0.92
6	35	1.01	1.27	1.53	0.78	-0.18		27	0.99	1.31	1.62	0.84
7	43	1.07	1.28	1.49	0.71	0.97		39	0.93	1.13	1.34	0.66
8	48	1.12	1.29	1.46	0.60	1.19		49	1.01	1.15	1.30	0.53
9	49	1.22	1.35	1.49	0.49	2.29	p<0.05	53	1.02	1.14	1.26	0.45
10	50	1.34	1.46	1.57	0.41	4.56	p<0.001	54	1.00	1.10	1.21	0.39
11	50	1.37	1.48	1.58	0.38	6.30	p<0.001	55	0.92	1.02	1.12	0.37
12	50	1.38	1.48	1.59	0.37	7.76	p<0.001	55	0.87	0.95	1.04	0.33
13	50	1.34	1.45	1.56	0.39	8.59	p<0.001	55	0.77	0.85	0.94	0.32
14	50	1.28	1.39	1.50	0.39	8.79	p<0.001	55	0.68	0.77	0.85	0.33
15	50	1.21	1.31	1.42	0.39	9.30	p<0.001	55	0.60	0.68	0.76	0.31
16	50	1.07	1.18	1.28	0.37	9.04	p<0.001	55	0.51	0.59	0.67	0.30
17	50	0.89	0.99	1.09	0.35	7.90	p<0.001	55	0.42	0.49	0.57	0.29
18	49	0.73	0.82	0.91	0.31	7.43	p<0.001	55	0.32	0.39	0.46	0.27
19	49	0.53	0.63	0.72	0.34	5.60	p<0.001	55	0.21	0.29	0.36	0.28
20	46	0.36	0.46	0.56	0.36	4.02	p<0.001	55	0.13	0.21	0.28	0.28
21	46	0.15	0.26	0.36	0.36	1.92		54	0.07	0.14	0.21	0.25
22	46	-0.06	0.04	0.15	0.37	-0.56		53	0.00	0.08	0.16	0.29
23	41	-0.10	-0.00	0.09	0.32	-0.22		42	-0.06	0.01	0.08	0.24
24	35	-0.11	-0.01	0.10	0.32	0.07		41	-0.08	-0.01	0.06	0.23
25	30	-0.16	-0.04	0.08	0.33	-0.69		35	-0.07	0.01	0.08	0.22

Figure 26


Cd-A Maxillary length from condylion by McNamara
Cd-A mm
95
90
85
80
75
70
65
60
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

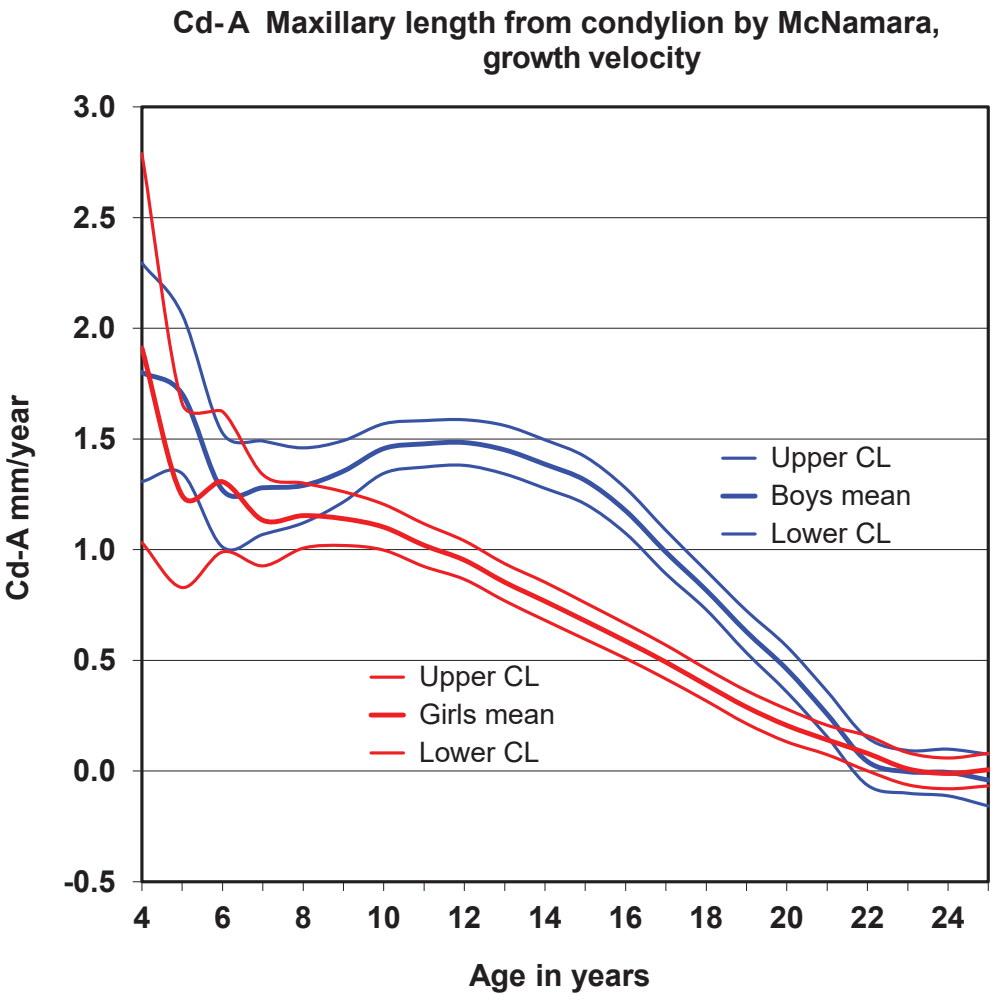
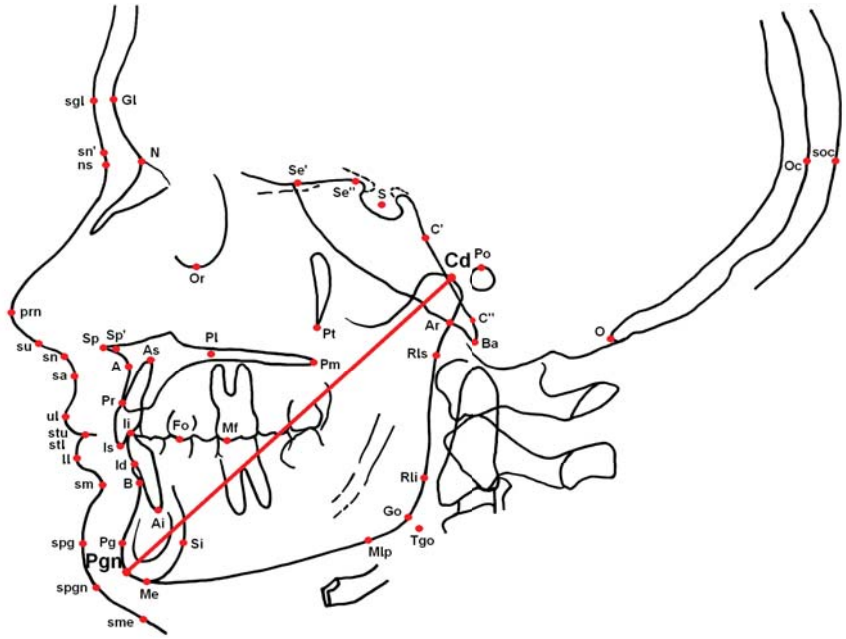

Cd-A Maxillary length from condylion by McNamara, growth velocity
Cd-A mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

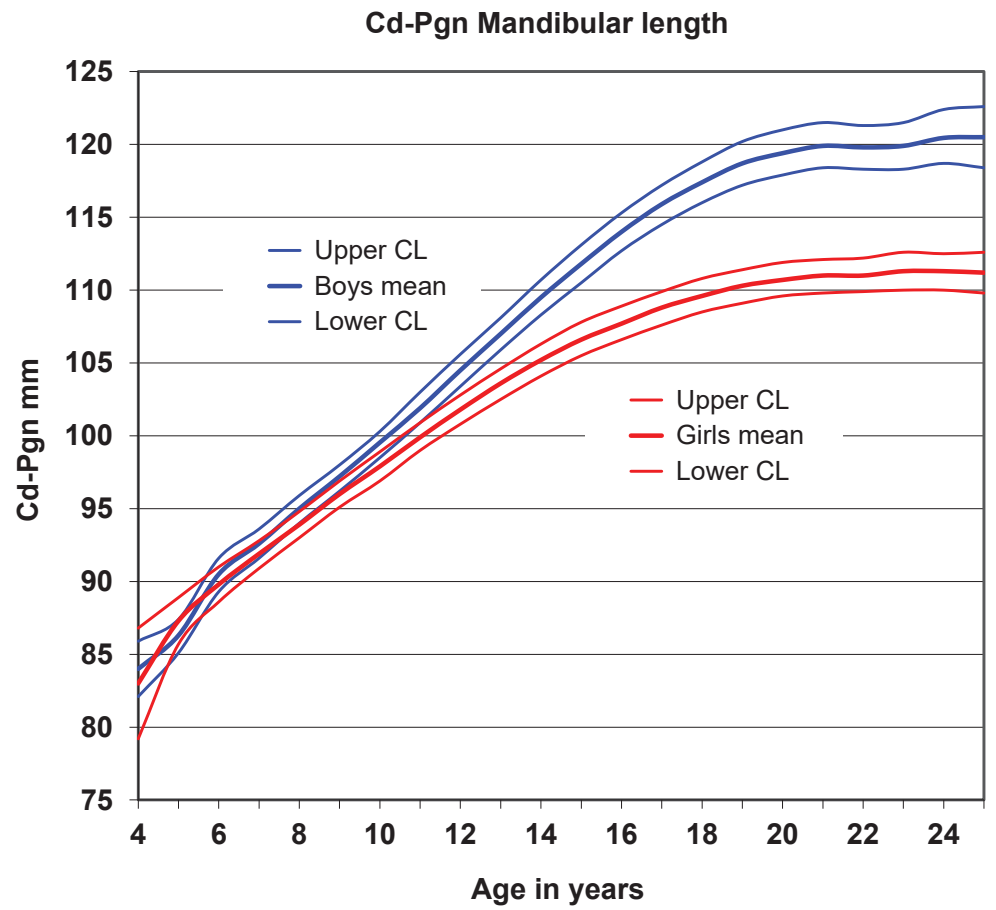
Figure 27



Cd-Pgn (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	82.1	84.0	85.9	2.60	0.45		7	79.2	83.0	86.8	5.12
5	18	85.1	86.3	87.4	2.42	-1.07		19	85.7	87.3	88.9	3.54
6	35	89.3	90.5	91.6	3.34	0.75		27	88.6	89.8	91.0	3.18
7	43	91.6	92.6	93.6	3.43	0.98		39	90.9	91.9	92.8	3.02
8	48	94.0	95.0	95.9	3.36	1.65		49	93.0	93.9	94.8	3.29
9	49	96.2	97.1	98.0	3.24	1.65		53	95.1	96.0	96.9	3.37
10	50	98.5	99.4	100.3	3.38	2.14	p<0.05	54	97.0	97.9	98.9	3.63
11	50	100.9	101.9	103.0	3.71	2.67	p<0.01	55	99.0	100.0	101.0	3.69
12	50	103.4	104.5	105.6	3.91	3.51	p<0.001	55	100.8	101.8	102.8	3.77
13	50	105.9	107.0	108.2	4.10	4.47	p<0.001	55	102.5	103.6	104.6	3.88
14	50	108.3	109.5	110.7	4.29	5.41	p<0.001	55	104.1	105.1	106.2	4.01
15	50	110.6	111.8	113.1	4.50	6.26	p<0.001	55	105.5	106.5	107.6	4.13
16	50	112.7	114.0	115.3	4.72	7.13	p<0.001	55	106.6	107.7	108.9	4.25
17	50	114.5	115.9	117.2	4.94	7.80	p<0.001	55	107.6	108.8	109.9	4.35
18	49	116.0	117.4	118.8	5.07	8.42	p<0.001	55	108.5	109.6	110.8	4.37
19	49	117.2	118.7	120.2	5.25	8.95	p<0.001	55	109.1	110.3	111.4	4.38
20	46	117.9	119.4	121.0	5.32	9.05	p<0.001	55	109.6	110.7	111.9	4.35
21	46	118.4	119.9	121.5	5.35	9.22	p<0.001	54	109.8	111.0	112.1	4.31
22	46	118.3	119.8	121.3	5.26	9.21	p<0.001	53	109.9	111.0	112.2	4.16
23	41	118.3	119.9	121.5	5.37	8.16	p<0.001	42	110.0	111.3	112.6	4.17
24	35	118.7	120.5	122.4	5.49	8.35	p<0.001	41	110.0	111.3	112.5	4.19
25	30	118.4	120.5	122.6	5.84	7.44	p<0.001	35	109.8	111.2	112.6	4.23

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.29	2.74	3.19	0.61	-0.74		7	2.23	3.12	4.01	1.20
5	18	2.50	2.89	3.28	0.84	1.92		19	1.77	2.27	2.77	1.11
6	35	1.98	2.27	2.56	0.88	0.01		27	1.90	2.27	2.63	0.96
7	43	1.99	2.24	2.50	0.86	0.98		39	1.79	2.06	2.32	0.84
8	48	2.06	2.28	2.50	0.78	1.32		49	1.85	2.07	2.29	0.79
9	49	2.13	2.33	2.54	0.73	1.71		53	1.87	2.08	2.28	0.76
10	50	2.31	2.49	2.67	0.64	3.74	p<0.001	54	1.87	2.03	2.19	0.61
11	50	2.38	2.54	2.69	0.55	5.82	p<0.001	55	1.74	1.90	2.05	0.58
12	50	2.44	2.58	2.72	0.52	7.62	p<0.001	55	1.65	1.79	1.93	0.54
13	50	2.39	2.54	2.69	0.54	8.86	p<0.001	55	1.51	1.64	1.78	0.50
14	50	2.29	2.44	2.59	0.55	9.32	p<0.001	55	1.37	1.50	1.62	0.48
15	50	2.16	2.32	2.48	0.58	9.89	p<0.001	55	1.21	1.33	1.45	0.44
16	50	1.93	2.09	2.24	0.55	9.92	p<0.001	55	1.04	1.15	1.26	0.41
17	50	1.65	1.78	1.92	0.49	9.67	p<0.001	55	0.86	0.96	1.06	0.38
18	49	1.35	1.49	1.62	0.48	9.00	p<0.001	55	0.67	0.76	0.85	0.34
19	49	1.02	1.16	1.31	0.53	6.98	p<0.001	55	0.47	0.56	0.65	0.34
20	46	0.63	0.78	0.93	0.52	4.38	p<0.001	55	0.29	0.39	0.49	0.36
21	46	0.28	0.43	0.57	0.51	2.28	p<0.05	54	0.14	0.23	0.32	0.34
22	46	-0.06	0.09	0.24	0.51	-0.08		53	-0.00	0.10	0.20	0.37
23	41	-0.16	-0.04	0.09	0.42	-0.04		42	-0.12	-0.03	0.06	0.29
24	35	-0.22	-0.08	0.06	0.42	-0.44		41	-0.13	-0.04	0.05	0.29
25	30	-0.25	-0.08	0.09	0.48	-0.80		35	-0.09	-0.01	0.08	0.24

Figure 27


Cd-Pgn Mandibular length
Cd-Pgn mm
125
120
115
110
105
100
95
90
85
80
75
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

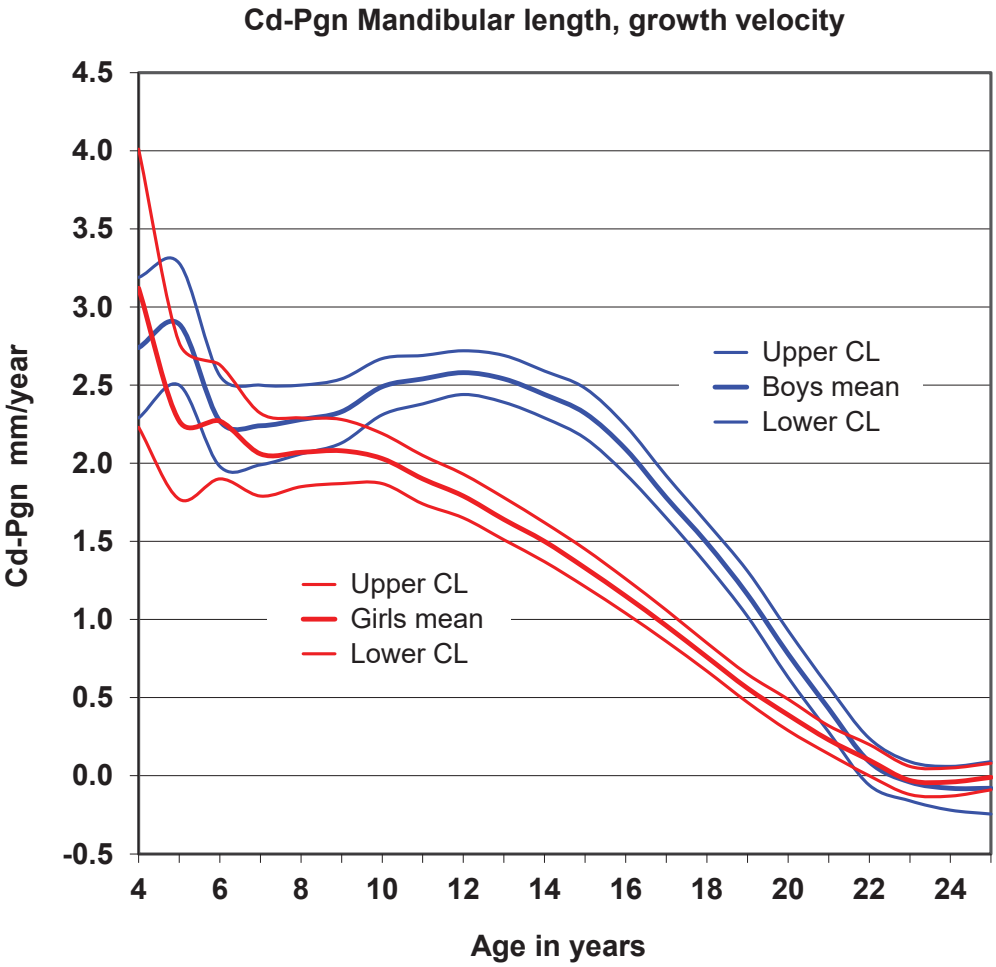
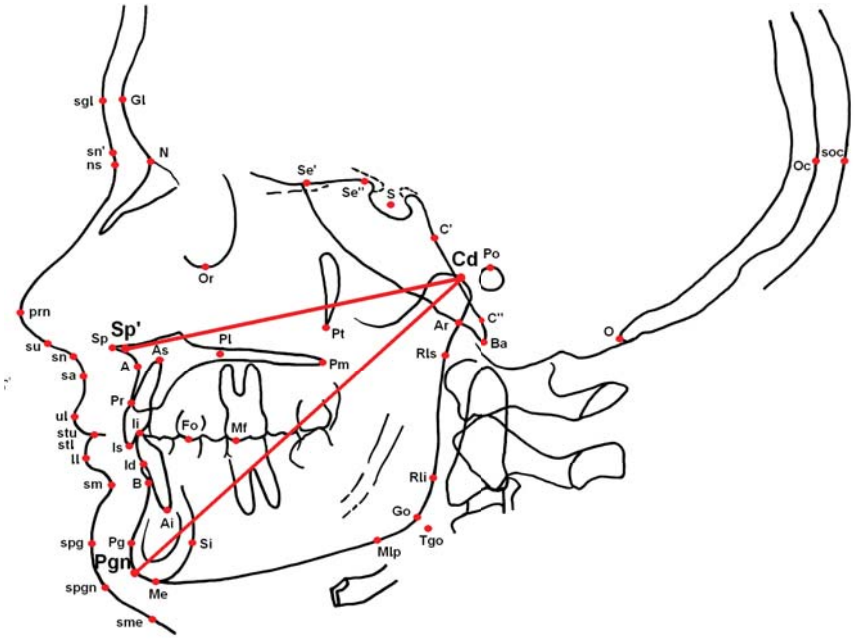

Cd-Pgn Mandibular length, growth velocity
Cd-Pgn mm/year
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Figure 28



Difference, Harvold (mm)

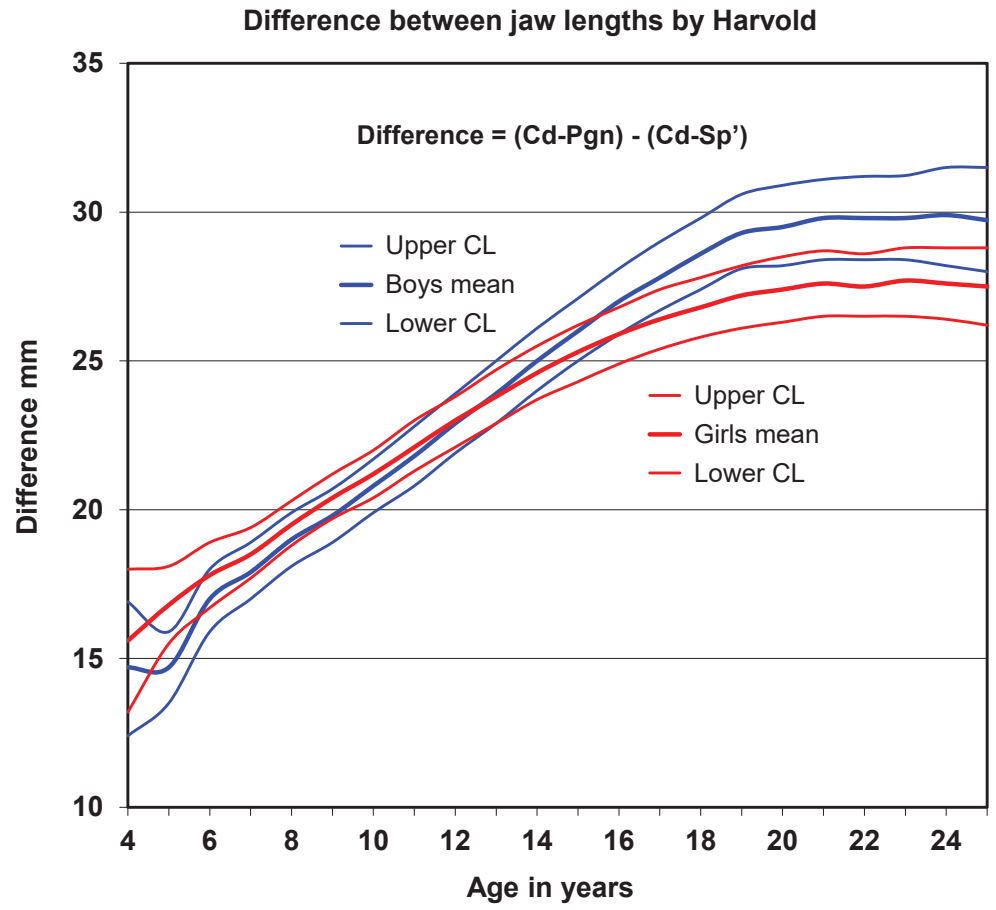
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	12.4	14.7	16.9	3.04	-0.58		7	13.2	15.6	18.0	3.23
5	18	13.5	14.7	15.9	2.62	-2.29	p<0.05	19	15.5	16.8	18.1	2.86
6	35	15.9	17.0	18.0	3.26	-1.06		27	16.7	17.8	18.9	2.84
7	43	17.0	17.9	18.9	3.20	-0.96		39	17.7	18.5	19.4	2.68
8	48	18.1	19.0	19.9	3.18	-0.91		49	18.8	19.5	20.3	2.67
9	49	18.9	19.8	20.7	3.31	-1.01		53	19.7	20.4	21.2	2.78
10	50	19.8	20.8	21.7	3.45	-0.64		54	20.4	21.2	22.0	3.04
11	50	20.8	21.8	22.8	3.55	-0.52		55	21.3	22.1	23.0	3.14
12	50	21.9	22.9	23.9	3.62	-0.17		55	22.1	23.0	23.8	3.22
13	50	22.9	23.9	25.0	3.69	0.21		55	22.9	23.8	24.7	3.31
14	50	24.0	25.0	26.1	3.78	0.62		55	23.7	24.6	25.5	3.40
15	50	25.0	26.0	27.1	3.89	1.06		55	24.3	25.3	26.2	3.51
16	50	25.9	27.0	28.1	4.03	1.52		55	24.9	25.9	26.8	3.63
17	50	26.7	27.8	29.0	4.19	1.88		55	25.4	26.4	27.4	3.74
18	49	27.4	28.6	29.8	4.33	2.25	p<0.05	55	25.8	26.8	27.8	3.84
19	49	28.1	29.3	30.6	4.49	2.57	p<0.05	55	26.1	27.2	28.2	3.93
20	46	28.2	29.5	30.9	4.59	2.49	p<0.05	55	26.3	27.4	28.5	4.00
21	46	28.4	29.8	31.1	4.68	2.50	p<0.05	54	26.5	27.6	28.7	4.01
22	46	28.4	29.8	31.2	4.75	2.55	p<0.05	53	26.5	27.5	28.6	4.00
23	41	28.4	29.8	31.2	4.67	2.25	p<0.05	42	26.5	27.7	28.8	3.86
24	35	28.2	29.9	31.5	5.00	2.20	p<0.05	41	26.4	27.6	28.8	3.95
25	30	28.0	29.7	31.5	4.96	2.00	p<0.05	35	26.2	27.5	28.8	3.93

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.37	0.74	1.10	0.49	-1.00		7	0.63	1.01	1.39	0.51
5	18	0.88	1.18	1.47	0.63	1.26		19	0.63	0.91	1.20	0.63
6	35	0.80	1.00	1.20	0.61	0.60		27	0.67	0.91	1.14	0.63
7	43	0.77	0.94	1.11	0.57	0.46		39	0.70	0.88	1.07	0.60
8	48	0.81	0.95	1.09	0.51	0.56		49	0.72	0.89	1.05	0.59
9	49	0.81	0.94	1.07	0.45	0.34		53	0.76	0.91	1.05	0.53
10	50	0.90	1.01	1.12	0.40	1.32		54	0.80	0.90	1.01	0.41
11	50	0.95	1.05	1.14	0.35	2.67	p<0.01	55	0.78	0.87	0.96	0.35
12	50	0.99	1.08	1.18	0.34	3.81	p<0.001	55	0.75	0.84	0.92	0.31
13	50	0.98	1.08	1.19	0.37	4.42	p<0.001	55	0.72	0.79	0.87	0.30
14	50	0.96	1.06	1.17	0.39	5.05	p<0.001	55	0.66	0.73	0.81	0.28
15	50	0.91	1.02	1.14	0.41	5.44	p<0.001	55	0.59	0.66	0.73	0.26
16	50	0.83	0.94	1.05	0.40	5.65	p<0.001	55	0.51	0.58	0.64	0.25
17	50	0.72	0.82	0.93	0.38	5.51	p<0.001	55	0.43	0.49	0.55	0.23
18	49	0.60	0.72	0.83	0.41	5.24	p<0.001	55	0.35	0.40	0.45	0.19
19	49	0.47	0.59	0.71	0.43	4.30	p<0.001	55	0.25	0.31	0.36	0.21
20	46	0.30	0.38	0.47	0.30	3.42	p<0.001	55	0.15	0.21	0.26	0.22
21	46	0.14	0.22	0.30	0.27	1.64		54	0.09	0.15	0.20	0.20
22	46	-0.01	0.06	0.14	0.26	-0.10		53	-0.00	0.07	0.14	0.27
23	41	-0.09	-0.02	0.05	0.24	0.12		42	-0.09	-0.03	0.04	0.20
24	35	-0.12	-0.05	0.02	0.20	-0.62		41	-0.08	-0.02	0.03	0.17
25	30	-0.09	-0.02	0.05	0.21	-0.13		35	-0.07	-0.01	0.04	0.15

DifferenceHar

Figure 28



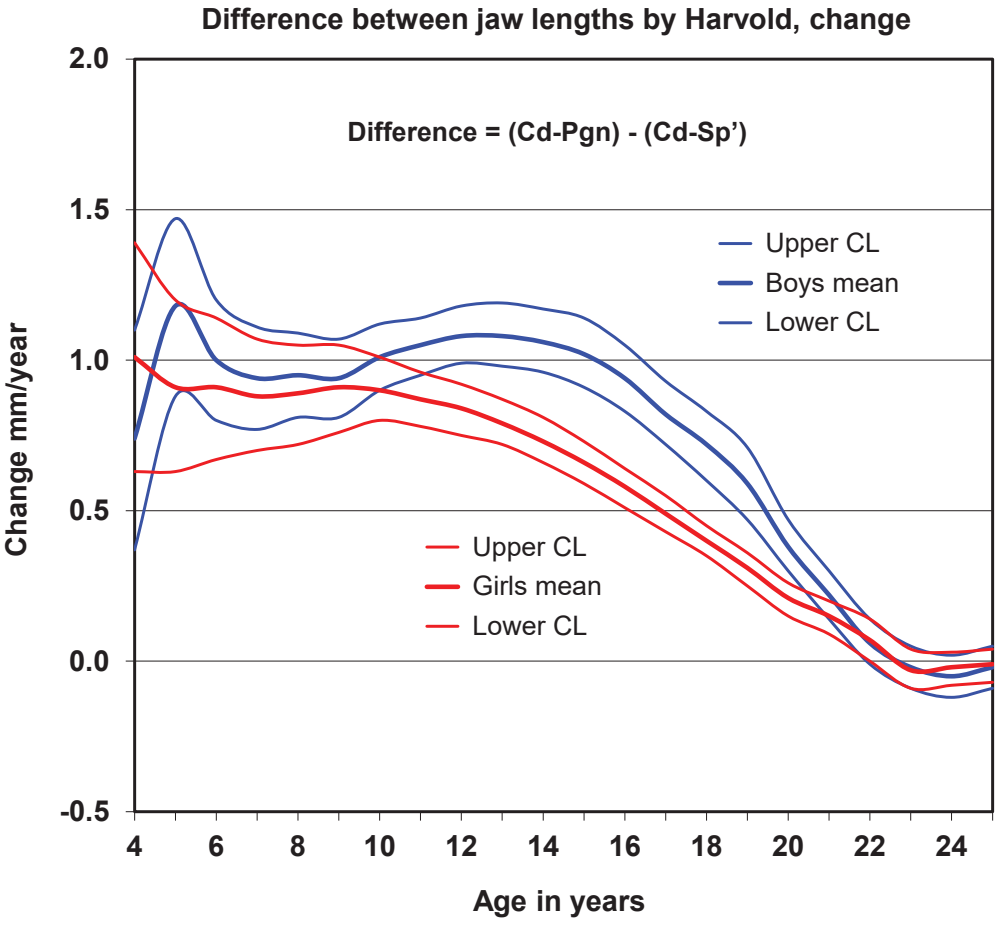
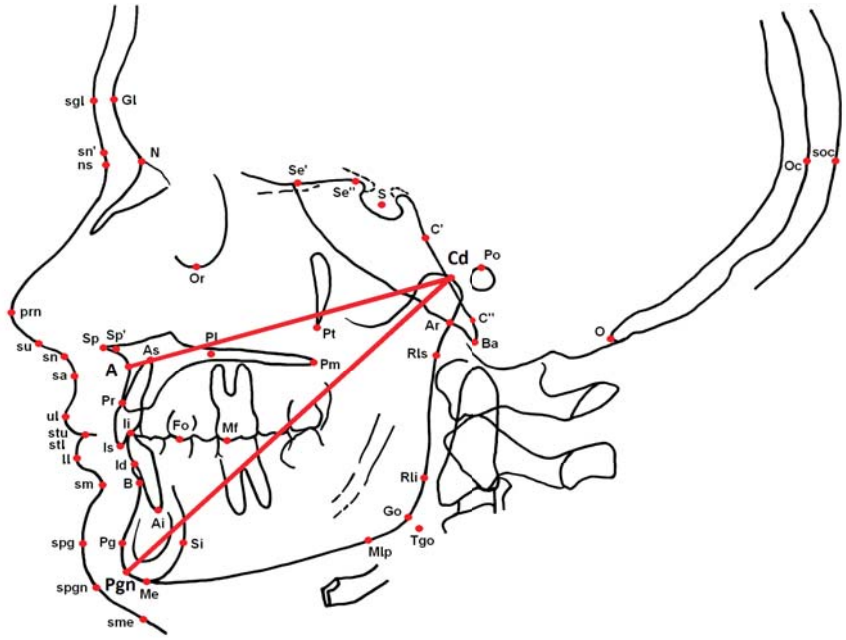


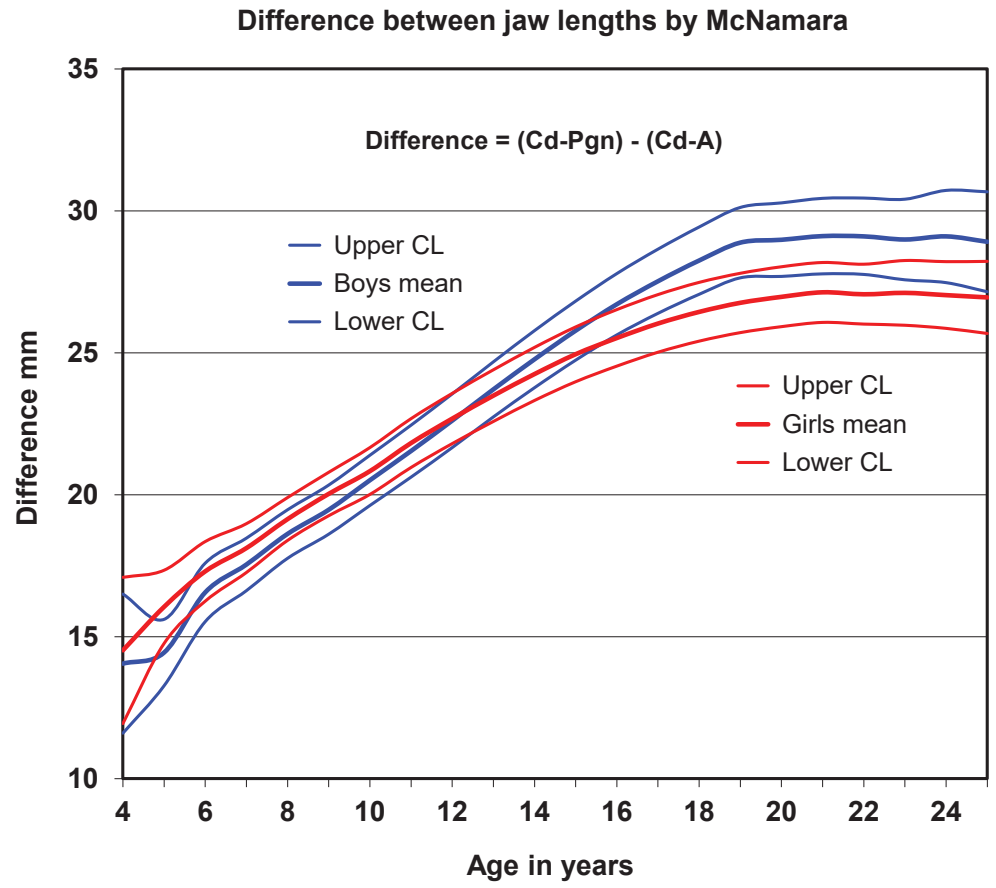
Figure 29

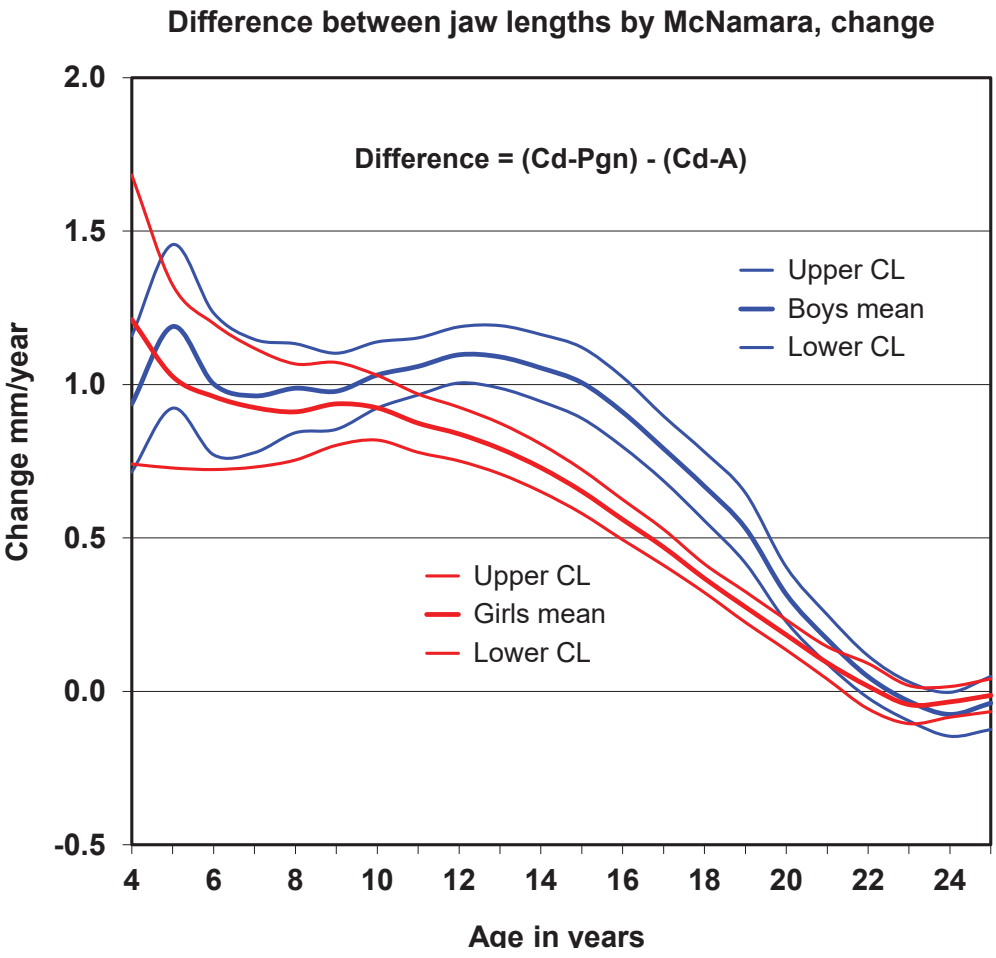


Difference, McNamara (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	11.6	14.0	16.5	3.31	-0.26		7	11.9	14.5	17.1	3.48
5	18	13.3	14.4	15.6	2.53	-1.80		19	14.8	16.0	17.3	2.87
6	35	15.5	16.6	17.6	3.11	-0.96		27	16.2	17.3	18.3	2.78
7	43	16.6	17.5	18.5	3.09	-0.89		39	17.3	18.1	19.0	2.74
8	48	17.8	18.6	19.5	3.02	-0.91		49	18.4	19.1	19.9	2.69
9	49	18.6	19.5	20.3	3.09	-0.95		53	19.3	20.0	20.8	2.84
10	50	19.6	20.5	21.4	3.20	-0.53		54	20.0	20.8	21.7	3.10
11	50	20.6	21.5	22.4	3.30	-0.44		55	21.0	21.8	22.7	3.25
12	50	21.7	22.6	23.6	3.41	-0.11		55	21.8	22.7	23.6	3.35
13	50	22.7	23.7	24.7	3.50	0.32		55	22.6	23.5	24.4	3.45
14	50	23.8	24.8	25.8	3.62	0.74		55	23.3	24.3	25.2	3.54
15	50	24.7	25.8	26.8	3.76	1.15		55	24.0	24.9	25.9	3.65
16	50	25.6	26.7	27.8	3.90	1.59		55	24.5	25.5	26.5	3.76
17	50	26.4	27.5	28.6	4.07	1.92		55	25.0	26.0	27.1	3.85
18	49	27.1	28.2	29.4	4.23	2.26	p<0.05	55	25.4	26.4	27.5	3.92
19	49	27.6	28.9	30.1	4.43	2.58	p<0.05	55	25.7	26.8	27.8	3.96
20	46	27.7	29.0	30.3	4.50	2.38	p<0.05	55	25.9	27.0	28.0	4.00
21	46	27.8	29.1	30.4	4.60	2.32	p<0.05	54	26.1	27.1	28.2	3.95
22	46	27.8	29.1	30.4	4.66	2.37	p<0.05	53	26.0	27.1	28.1	3.93
23	41	27.6	29.0	30.4	4.65	2.02	p<0.05	42	26.0	27.1	28.3	3.77
24	35	27.5	29.1	30.7	4.91	2.06	p<0.05	41	25.9	27.0	28.2	3.83
25	30	27.1	28.9	30.7	4.93	1.80		35	25.7	26.9	28.2	3.83

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.71	0.94	1.16	0.30	-1.04		7	0.74	1.21	1.68	0.64
5	18	0.92	1.19	1.46	0.58	0.80		19	0.73	1.03	1.32	0.66
6	35	0.77	1.00	1.23	0.70	0.24		27	0.72	0.96	1.20	0.63
7	43	0.78	0.96	1.15	0.62	0.28		39	0.73	0.92	1.12	0.62
8	48	0.84	0.99	1.13	0.51	0.71		49	0.75	0.91	1.07	0.56
9	49	0.85	0.98	1.10	0.44	0.44		53	0.80	0.94	1.07	0.50
10	50	0.92	1.03	1.14	0.39	1.39		54	0.82	0.92	1.03	0.40
11	50	0.97	1.06	1.15	0.34	2.72	p<0.01	55	0.78	0.87	0.97	0.36
12	50	1.00	1.10	1.19	0.33	3.98	p<0.001	55	0.75	0.84	0.93	0.33
13	50	0.99	1.09	1.19	0.37	4.49	p<0.001	55	0.71	0.79	0.87	0.31
14	50	0.95	1.05	1.16	0.39	4.83	p<0.001	55	0.65	0.73	0.81	0.29
15	50	0.89	1.01	1.12	0.42	5.21	p<0.001	55	0.58	0.65	0.72	0.27
16	50	0.80	0.91	1.02	0.41	5.36	p<0.001	55	0.49	0.56	0.63	0.25
17	50	0.69	0.79	0.90	0.38	5.37	p<0.001	55	0.41	0.47	0.53	0.22
18	49	0.56	0.67	0.78	0.40	5.05	p<0.001	55	0.32	0.37	0.41	0.18
19	49	0.42	0.53	0.65	0.41	4.21	p<0.001	55	0.23	0.28	0.32	0.19
20	46	0.23	0.32	0.41	0.31	2.65	p<0.01	55	0.13	0.18	0.23	0.19
21	46	0.09	0.17	0.25	0.28	1.62		54	0.04	0.09	0.15	0.20
22	46	-0.02	0.05	0.12	0.24	0.60		53	-0.06	0.02	0.09	0.27
23	41	-0.10	-0.03	0.03	0.21	0.23		42	-0.10	-0.04	0.02	0.21
24	35	-0.15	-0.07	-0.00	0.22	-0.93		41	-0.08	-0.03	0.02	0.16
25	30	-0.12	-0.04	0.05	0.24	-0.50		35	-0.07	-0.01	0.04	0.16

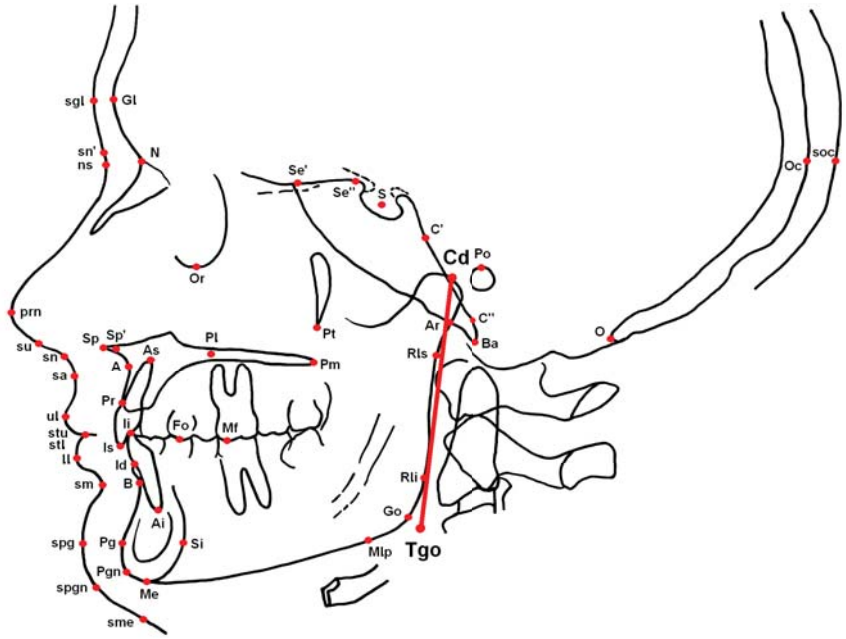
Figure 29


Difference between jaw lengths by McNamara
Difference = (Cd-Pgn) - (Cd-A)
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
Difference mm
35
30
25
20
15
10
4
6
8
10
12
14
16
18
20
22
24
Age in years


Difference between jaw lengths by McNamara, change
Difference = (Cd-Pgn) - (Cd-A)
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
Change mm/year
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years

Cd-Tgo

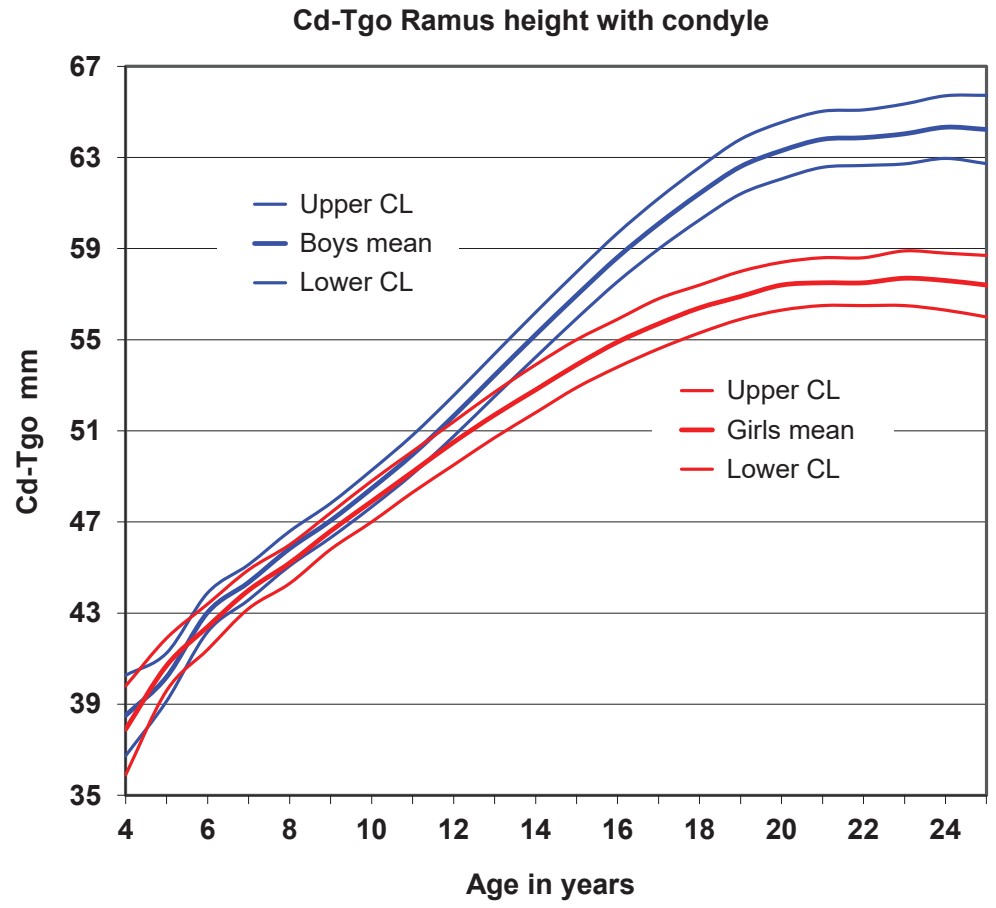
Figure 30

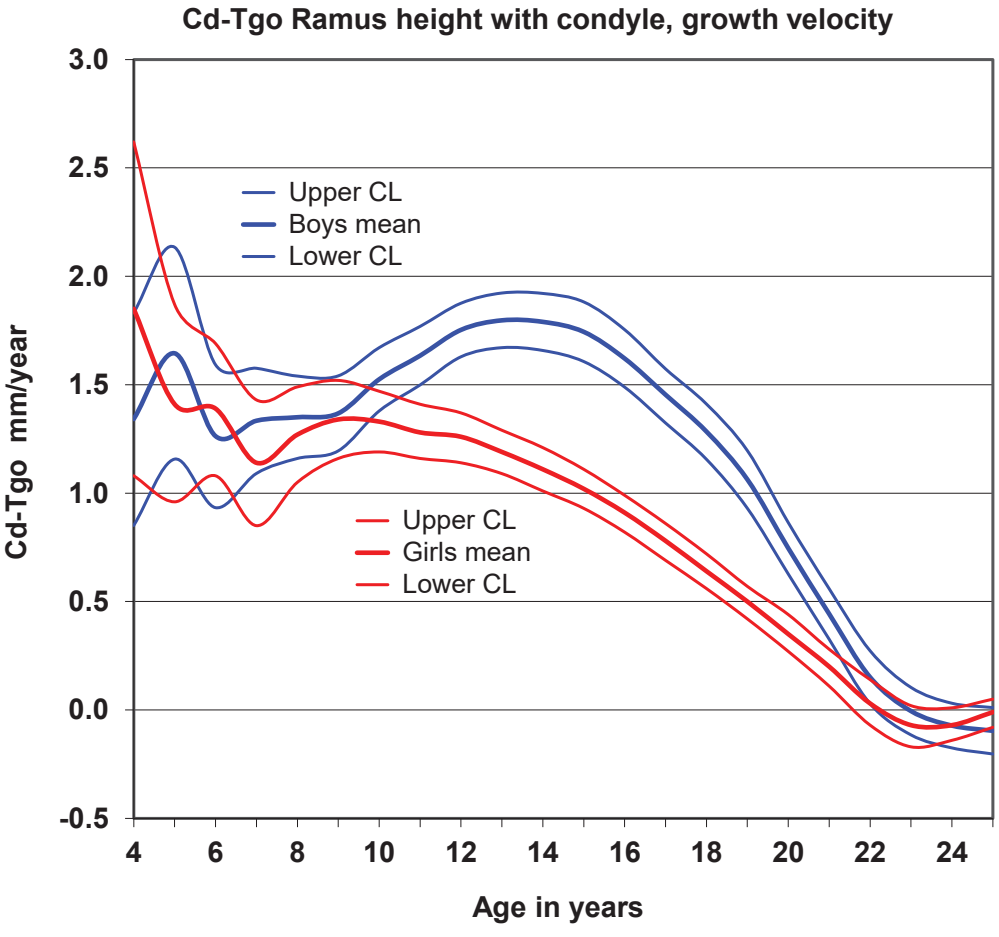


Cd-Tgo (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	36.7	38.5	40.3	2.38	0.48		7	35.9	37.9	39.8	2.58
5	18	39.1	40.2	41.3	2.28	-0.64		19	39.6	40.7	41.9	2.58
6	35	42.2	43.0	43.9	2.60	0.96		27	41.4	42.4	43.4	2.68
7	43	43.6	44.4	45.1	2.59	0.55		39	43.2	44.0	44.9	2.72
8	48	45.1	45.8	46.6	2.69	1.19		49	44.3	45.2	46.0	2.89
9	49	46.3	47.1	47.8	2.71	0.81		53	45.8	46.6	47.4	3.04
10	50	47.7	48.5	49.3	2.91	0.93		54	47.0	47.9	48.8	3.28
11	50	49.1	50.0	50.8	3.06	1.19		55	48.3	49.2	50.1	3.43
12	50	50.8	51.7	52.5	3.23	1.77		55	49.5	50.5	51.4	3.56
13	50	52.5	53.4	54.4	3.37	2.53	p<0.05	55	50.7	51.7	52.7	3.70
14	50	54.2	55.2	56.2	3.55	3.29	p<0.01	55	51.8	52.8	53.9	3.82
15	50	55.9	57.0	58.0	3.69	4.07	p<0.001	55	52.9	53.9	55.0	3.92
16	50	57.6	58.6	59.7	3.84	4.90	p<0.001	55	53.8	54.9	55.9	3.99
17	50	59.0	60.1	61.2	4.00	5.59	p<0.001	55	54.6	55.7	56.8	4.05
18	49	60.3	61.4	62.6	4.13	6.28	p<0.001	55	55.3	56.4	57.4	4.05
19	49	61.4	62.6	63.8	4.30	6.92	p<0.001	55	55.9	56.9	58.0	4.04
20	46	62.1	63.3	64.5	4.29	7.15	p<0.001	55	56.3	57.4	58.4	4.04
21	46	62.6	63.8	65.0	4.25	7.54	p<0.001	54	56.5	57.5	58.6	4.04
22	46	62.7	63.9	65.1	4.22	7.75	p<0.001	53	56.5	57.5	58.6	3.90
23	41	62.7	64.0	65.4	4.30	7.03	p<0.001	42	56.5	57.7	58.9	3.94
24	35	63.0	64.3	65.7	4.15	7.20	p<0.001	41	56.3	57.6	58.8	4.03
25	30	62.7	64.2	65.7	4.19	6.59	p<0.001	35	56.0	57.4	58.7	4.20

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.85	1.34	1.83	0.66	-1.09		7	1.08	1.85	2.62	1.04
5	18	1.16	1.65	2.13	1.06	0.68		19	0.96	1.41	1.87	1.00
6	35	0.93	1.26	1.59	1.00	-0.53		27	1.08	1.39	1.69	0.81
7	43	1.09	1.33	1.58	0.81	0.99		39	0.85	1.14	1.43	0.93
8	48	1.16	1.35	1.54	0.67	0.56		49	1.05	1.27	1.49	0.79
9	49	1.20	1.37	1.54	0.62	0.22		53	1.16	1.34	1.52	0.68
10	50	1.38	1.52	1.67	0.53	1.86		54	1.19	1.33	1.47	0.53
11	50	1.50	1.63	1.77	0.49	3.68	p<0.001	55	1.16	1.28	1.41	0.48
12	50	1.63	1.75	1.88	0.44	5.74	p<0.001	55	1.14	1.26	1.37	0.44
13	50	1.67	1.80	1.92	0.46	7.32	p<0.001	55	1.09	1.19	1.29	0.39
14	50	1.66	1.79	1.92	0.47	8.20	p<0.001	55	1.01	1.11	1.21	0.37
15	50	1.61	1.74	1.88	0.50	8.73	p<0.001	55	0.93	1.02	1.11	0.35
16	50	1.49	1.62	1.75	0.48	9.00	p<0.001	55	0.82	0.91	0.99	0.33
17	50	1.34	1.45	1.57	0.43	9.37	p<0.001	55	0.69	0.78	0.86	0.31
18	49	1.16	1.28	1.41	0.46	8.59	p<0.001	55	0.56	0.64	0.72	0.30
19	49	0.93	1.06	1.20	0.48	7.45	p<0.001	55	0.42	0.50	0.57	0.28
20	46	0.63	0.75	0.86	0.41	5.40	p<0.001	55	0.27	0.35	0.44	0.32
21	46	0.33	0.44	0.56	0.40	3.41	p<0.001	54	0.11	0.20	0.28	0.32
22	46	0.03	0.15	0.27	0.42	1.47		53	-0.07	0.03	0.14	0.39
23	41	-0.11	-0.01	0.10	0.36	0.92		42	-0.17	-0.07	0.02	0.31
24	35	-0.17	-0.07	0.03	0.31	-0.06		41	-0.14	-0.07	0.01	0.25
25	30	-0.20	-0.10	0.01	0.30	-1.31		35	-0.08	-0.01	0.05	0.20

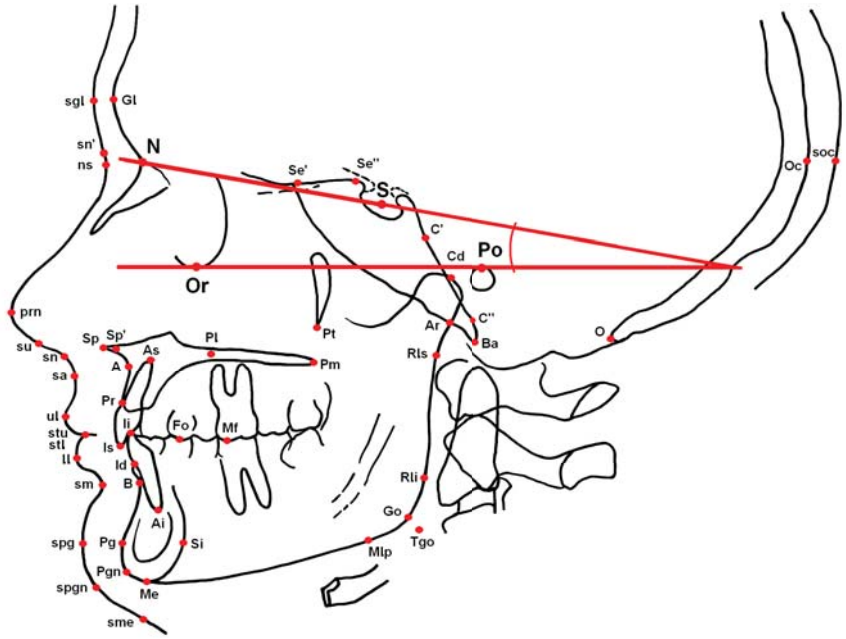
Figure 30


Cd-Tgo Ramus height with condyle
Cd-Tgo mm
67
63
59
55
51
47
43
39
35
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Cd-Tgo Ramus height with condyle, growth velocity
Cd-Tgo mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

SN/FH

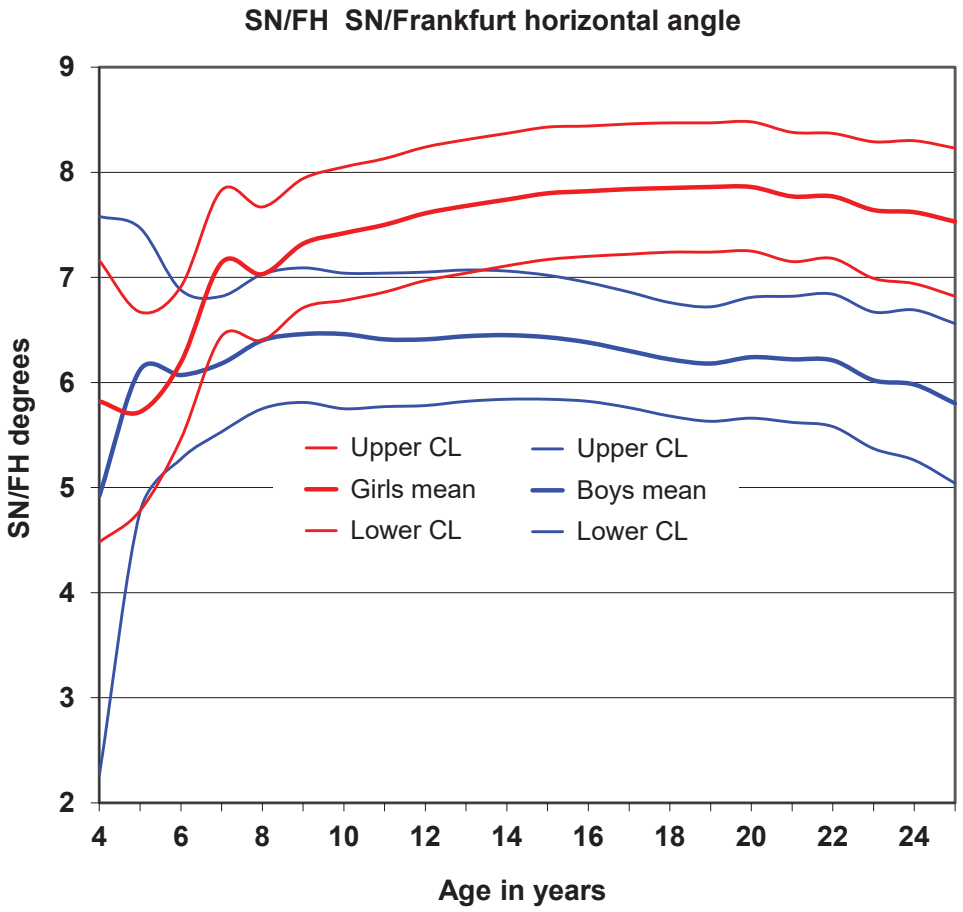
Figure 31



SN/FH (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.26	4.92	7.58	3.59	0.59		7	4.48	5.82	7.16	1.81
5	18	4.77	6.12	7.47	2.92	-0.48		19	4.78	5.72	6.67	2.10
6	35	5.27	6.07	6.87	2.42	0.20		27	5.46	6.19	6.91	1.93
7	43	5.53	6.18	6.82	2.16	1.99		39	6.44	7.14	7.83	2.21
8	48	5.75	6.38	7.00	2.22	1.44		49	6.40	7.03	7.67	2.27
9	49	5.80	6.45	7.09	2.31	1.92		53	6.71	7.32	7.94	2.29
10	50	5.75	6.40	7.04	2.32	2.21	p<0.05	54	6.78	7.42	8.05	2.38
11	50	5.78	6.42	7.06	2.31	2.34	p<0.05	55	6.86	7.50	8.13	2.40
12	50	5.79	6.43	7.08	2.33	2.54	p<0.05	55	6.97	7.61	8.24	2.40
13	50	5.82	6.47	7.11	2.32	2.62	p<0.05	55	7.04	7.68	8.31	2.40
14	50	5.84	6.47	7.10	2.27	2.79	p<0.01	55	7.11	7.74	8.37	2.38
15	50	5.84	6.42	7.00	2.09	3.14	p<0.01	55	7.17	7.80	8.43	2.39
16	50	5.81	6.35	6.89	1.95	3.47	p<0.001	55	7.20	7.82	8.44	2.35
17	50	5.74	6.25	6.75	1.83	3.86	p<0.001	55	7.22	7.84	8.46	2.34
18	49	5.64	6.13	6.62	1.75	4.21	p<0.001	55	7.24	7.85	8.47	2.34
19	49	5.55	6.05	6.55	1.77	4.42	p<0.001	55	7.24	7.86	8.47	2.32
20	46	5.44	6.00	6.56	1.93	4.33	p<0.001	55	7.25	7.86	8.48	2.33
21	46	5.42	6.00	6.57	1.99	4.08	p<0.001	54	7.15	7.77	8.38	2.30
22	46	5.46	6.04	6.62	2.02	4.06	p<0.001	53	7.18	7.77	8.37	2.21
23	41	5.37	6.02	6.67	2.12	3.47	p<0.001	42	6.99	7.64	8.29	2.15
24	35	5.26	5.98	6.69	2.16	3.24	p<0.01	41	6.94	7.62	8.30	2.23
25	30	5.04	5.80	6.56	2.12	3.27	p<0.01	35	6.82	7.53	8.23	2.12

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.87	0.08	1.03	1.28	-0.20		7	-0.81	-0.05	0.71	1.02
5	18	-0.39	0.08	0.54	1.01	0.70		19	-0.09	0.29	0.67	0.84
6	35	-0.22	0.10	0.41	0.94	0.82		27	0.03	0.27	0.51	0.63
7	43	-0.11	0.10	0.32	0.72	0.23		39	-0.05	0.14	0.32	0.60
8	48	-0.13	0.03	0.18	0.56	1.25		49	0.02	0.16	0.30	0.50
9	49	-0.11	0.01	0.13	0.44	1.92		53	0.06	0.18	0.29	0.44
10	50	-0.08	0.03	0.14	0.40	1.62		54	0.06	0.15	0.23	0.33
11	50	-0.07	0.02	0.11	0.34	1.71		55	0.05	0.12	0.20	0.28
12	50	-0.06	0.02	0.10	0.29	1.62		55	0.04	0.10	0.16	0.23
13	50	-0.07	0.01	0.08	0.27	1.53		55	0.03	0.08	0.13	0.20
14	50	-0.10	-0.02	0.05	0.27	1.80		55	0.01	0.06	0.11	0.20
15	50	-0.15	-0.06	0.03	0.31	1.97		55	-0.01	0.04	0.09	0.19
16	50	-0.19	-0.09	0.01	0.36	2.15	p<0.05	55	-0.02	0.02	0.07	0.17
17	50	-0.23	-0.11	0.00	0.43	2.18	p<0.05	55	-0.02	0.02	0.06	0.16
18	49	-0.18	-0.08	0.02	0.36	1.72		55	-0.03	0.01	0.06	0.16
19	49	-0.20	-0.09	0.03	0.41	1.55		55	-0.04	0.00	0.05	0.17
20	46	-0.10	-0.03	0.05	0.27	0.47		55	-0.04	-0.01	0.03	0.13
21	46	-0.06	0.03	0.12	0.30	-1.53		54	-0.08	-0.04	-0.00	0.14
22	46	-0.09	0.08	0.24	0.57	-1.60		53	-0.12	-0.06	0.00	0.22
23	41	-0.09	-0.04	0.01	0.16	0.20		42	-0.07	-0.03	0.01	0.14
24	35	-0.10	-0.04	0.02	0.18	0.45		41	-0.06	-0.03	0.01	0.13
25	30	-0.06	-0.01	0.03	0.12	0.65		35	-0.05	0.01	0.06	0.17

Figure 31


SN/FH SN/Frankfurt horizontal angle
SN/FH degrees
9
8
7
6
5
4
3
2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

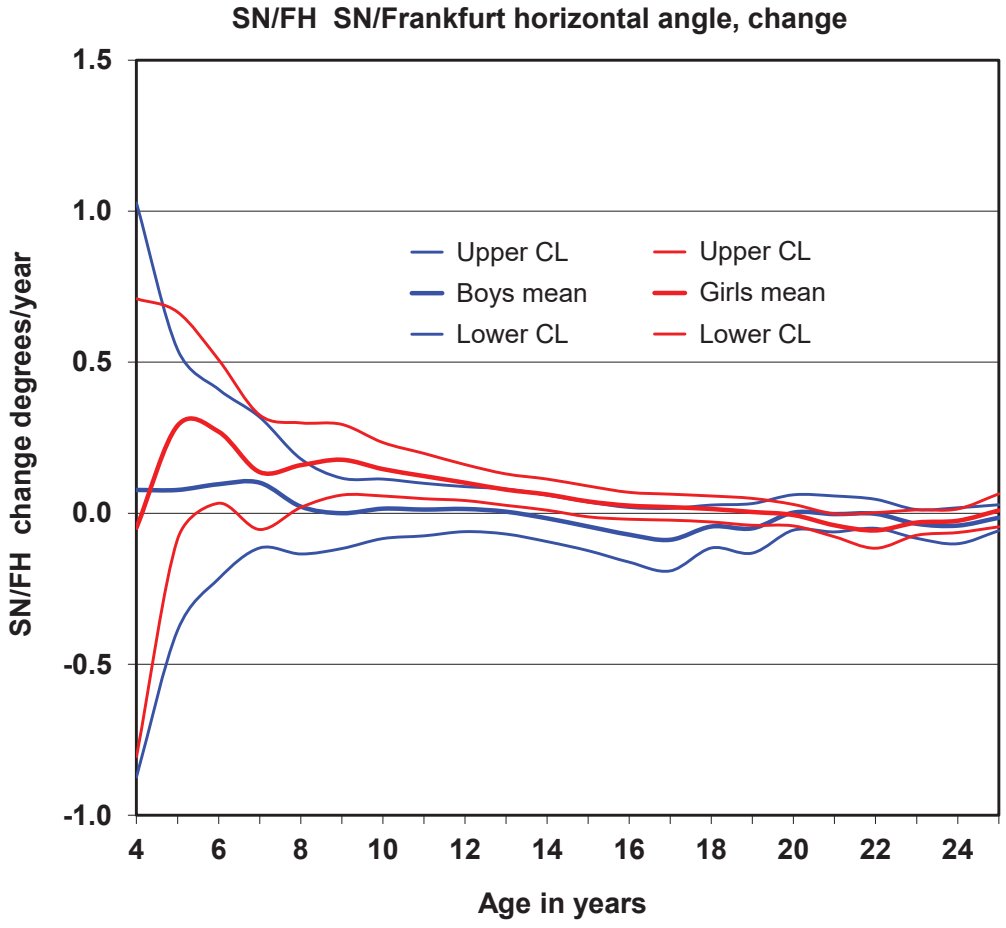
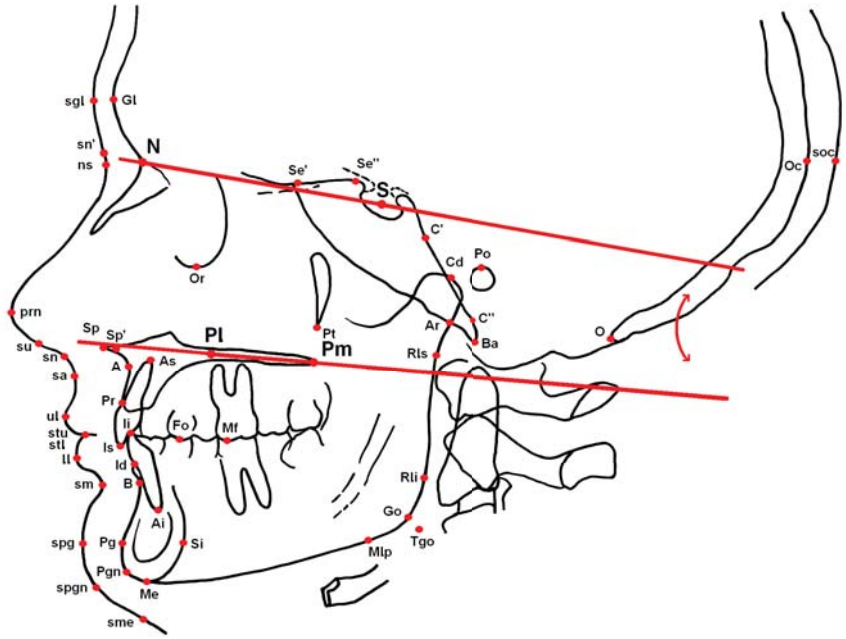

SN/FH SN/Frankfurt horizontal angle, change
SN/FH change degrees/year
1.5
1.0
0.5
0.0
-0.5
-1.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Figure 32



SN/Max (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.34	4.11	5.87	2.38	0.04		7	2.61	4.15	5.69	2.08
5	18	2.93	4.53	6.14	3.47	0.06		19	3.13	4.59	6.06	3.25
6	35	3.27	4.12	4.97	2.58	2.04	p<0.05	27	4.45	5.53	6.60	2.84
7	43	3.87	4.59	5.31	2.41	2.15	p<0.05	39	4.94	5.84	6.74	2.87
8	48	3.99	4.69	5.39	2.46	2.19	p<0.05	49	5.08	5.84	6.59	2.69
9	49	4.05	4.74	5.43	2.47	2.77	p<0.01	53	5.43	6.16	6.89	2.70
10	50	4.01	4.69	5.38	2.47	2.91	p<0.01	54	5.45	6.19	6.92	2.76
11	50	4.13	4.79	5.45	2.38	2.73	p<0.01	55	5.44	6.17	6.90	2.77
12	50	4.21	4.86	5.51	2.34	2.73	p<0.01	55	5.50	6.23	6.97	2.78
13	50	4.29	4.93	5.57	2.31	2.71	p<0.01	55	5.56	6.30	7.05	2.81
14	50	4.32	4.98	5.63	2.37	2.73	p<0.01	55	5.63	6.38	7.14	2.86
15	50	4.35	5.01	5.68	2.40	2.75	p<0.01	55	5.68	6.45	7.21	2.89
16	50	4.34	5.02	5.70	2.46	2.76	p<0.01	55	5.72	6.49	7.26	2.93
17	50	4.31	5.01	5.70	2.51	2.81	p<0.01	55	5.74	6.52	7.30	2.95
18	49	4.16	4.87	5.58	2.53	3.05	p<0.01	55	5.74	6.52	7.30	2.95
19	49	4.09	4.83	5.57	2.64	3.10	p<0.01	55	5.76	6.54	7.31	2.93
20	46	3.96	4.78	5.59	2.81	3.03	p<0.01	55	5.75	6.53	7.31	2.95
21	46	3.94	4.78	5.61	2.89	2.83	p<0.01	54	5.65	6.44	7.23	2.96
22	46	3.93	4.77	5.62	2.93	2.81	p<0.01	53	5.64	6.46	7.27	3.01
23	41	3.80	4.70	5.60	2.94	2.52	p<0.05	42	5.44	6.38	7.33	3.14
24	35	3.84	4.81	5.77	2.92	2.30	p<0.05	41	5.45	6.44	7.42	3.22
25	30	4.01	5.08	6.15	3.00	1.69		35	5.34	6.35	7.36	3.05

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.46	0.08	0.62	0.73	0.32		7	-0.22	0.19	0.61	0.56
5	18	-0.13	0.23	0.58	0.77	0.18		19	-0.04	0.27	0.58	0.68
6	35	-0.02	0.18	0.37	0.59	-0.26		27	-0.07	0.14	0.35	0.56
7	43	-0.03	0.13	0.29	0.54	0.94		39	0.06	0.25	0.44	0.61
8	48	-0.04	0.07	0.17	0.38	1.48		49	0.05	0.21	0.37	0.56
9	49	-0.04	0.04	0.13	0.31	1.02		53	0.01	0.12	0.23	0.41
10	50	-0.00	0.07	0.14	0.25	0.41		54	-0.00	0.09	0.19	0.36
11	50	0.00	0.07	0.13	0.24	0.02		55	-0.02	0.07	0.15	0.32
12	50	-0.01	0.07	0.14	0.25	0.26		55	0.01	0.08	0.15	0.28
13	50	-0.03	0.05	0.13	0.27	0.56		55	0.01	0.08	0.15	0.26
14	50	-0.04	0.04	0.11	0.28	0.56		55	-0.00	0.07	0.13	0.26
15	50	-0.06	0.02	0.09	0.28	0.59		55	-0.02	0.05	0.11	0.25
16	50	-0.08	-0.00	0.07	0.27	0.81		55	-0.02	0.04	0.09	0.20
17	50	-0.10	-0.03	0.04	0.25	1.28		55	-0.02	0.03	0.08	0.20
18	49	-0.09	-0.02	0.04	0.23	0.93		55	-0.04	0.02	0.07	0.20
19	49	-0.09	-0.02	0.04	0.24	0.71		55	-0.06	0.01	0.08	0.25
20	46	-0.07	-0.01	0.04	0.19	0.06		55	-0.06	-0.01	0.04	0.20
21	46	-0.07	-0.02	0.04	0.18	0.45		54	-0.05	-0.00	0.05	0.17
22	46	-0.07	-0.01	0.04	0.20	0.40		53	-0.06	0.01	0.07	0.25
23	41	-0.10	-0.04	0.02	0.20	0.60		42	-0.06	-0.01	0.04	0.17
24	35	-0.09	-0.04	0.01	0.15	1.58		41	-0.03	0.01	0.05	0.13
25	30	-0.10	-0.05	-0.01	0.12	2.84	p<0.01	35	-0.01	0.04	0.08	0.14

Figure 32

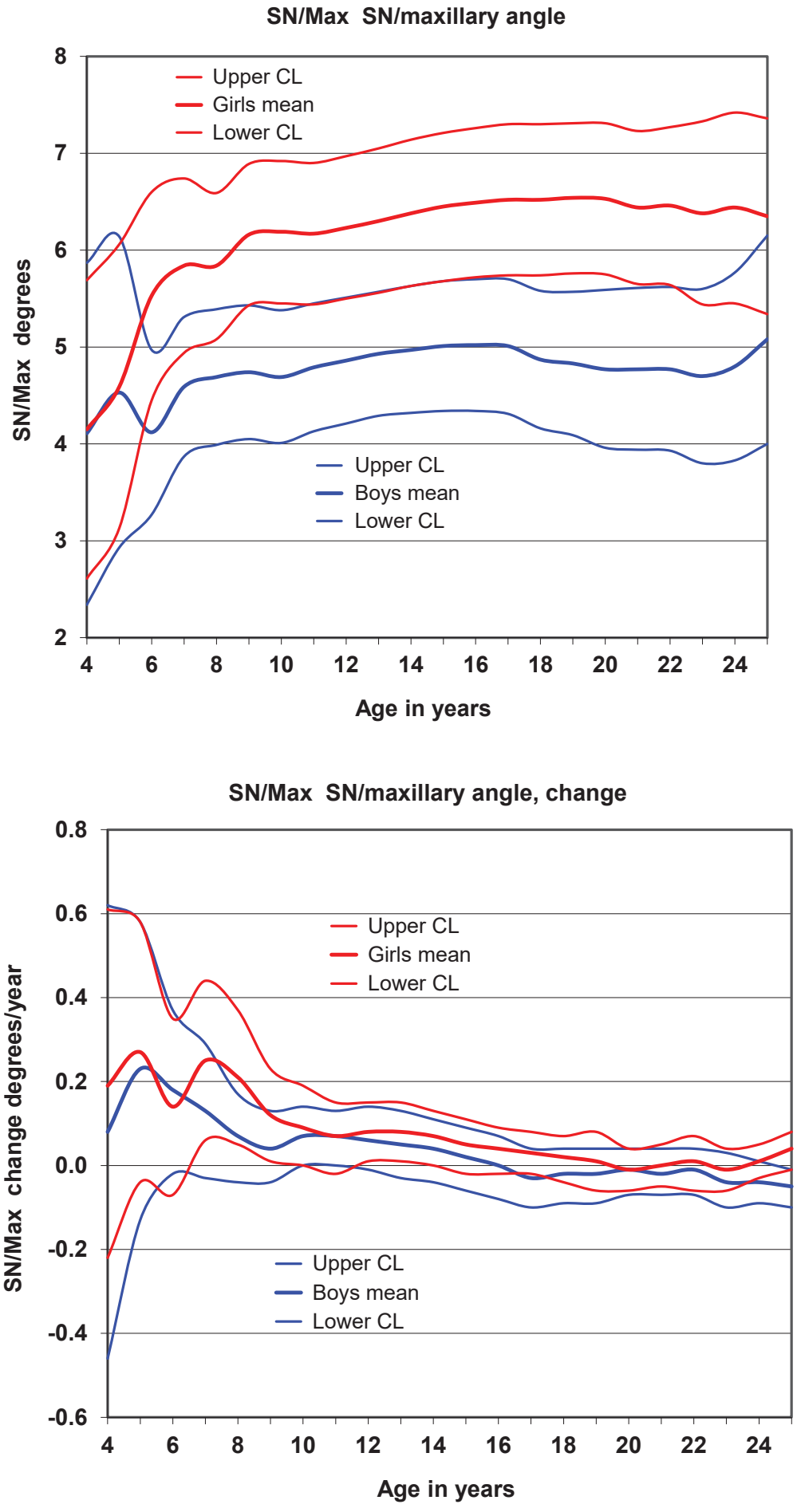
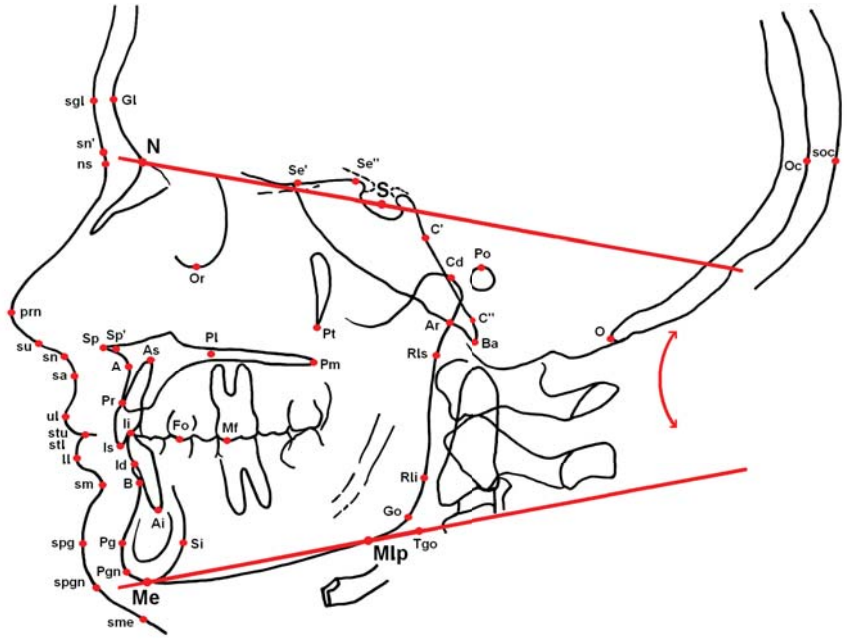

SN/Max SN/maxillary angle
SN/Max degrees
8
7
6
5
4
3
2
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years
SN/Max SN/maxillary angle, change
SN/Max change degrees/year
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

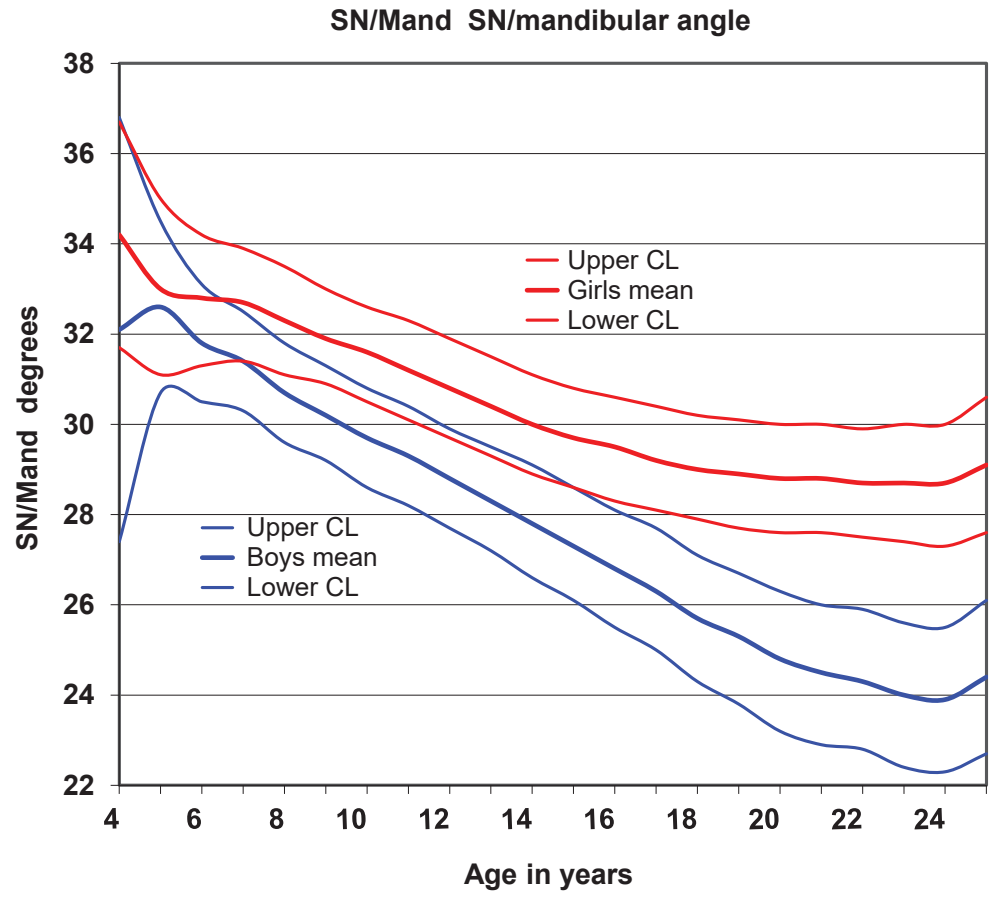
Figure 33



SN/Mand (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	27.4	32.1	36.8	6.37	0.78		7	31.7	34.2	36.7	3.40
5	18	30.7	32.6	34.5	4.09	0.31		19	31.1	33.0	35.0	4.39
6	35	30.5	31.8	33.1	3.90	1.02		27	31.3	32.8	34.2	3.82
7	43	30.3	31.4	32.5	3.60	1.52		39	31.4	32.7	33.9	4.06
8	48	29.6	30.7	31.8	3.75	2.00	p<0.05	49	31.1	32.3	33.5	4.17
9	49	29.2	30.3	31.3	3.75	2.20	p<0.05	53	30.9	31.9	33.0	3.98
10	50	28.6	29.7	30.8	3.84	2.42	p<0.05	54	30.5	31.6	32.6	3.98
11	50	28.2	29.3	30.4	3.97	2.46	p<0.05	55	30.1	31.2	32.3	4.07
12	50	27.7	28.8	29.9	4.12	2.47	p<0.05	55	29.7	30.8	31.9	4.10
13	50	27.2	28.3	29.5	4.26	2.53	p<0.05	55	29.3	30.4	31.5	4.13
14	50	26.6	27.8	29.1	4.43	2.65	p<0.01	55	28.9	30.0	31.1	4.17
15	50	26.0	27.3	28.6	4.62	2.79	p<0.01	55	28.6	29.7	30.8	4.21
16	50	25.5	26.8	28.1	4.77	3.01	p<0.01	55	28.3	29.5	30.6	4.27
17	50	25.0	26.3	27.7	4.91	3.21	p<0.01	55	28.1	29.2	30.4	4.33
18	49	24.3	25.7	27.1	4.98	3.63	p<0.001	55	27.9	29.0	30.2	4.38
19	49	23.8	25.2	26.7	5.11	3.92	p<0.001	55	27.7	28.9	30.1	4.43
20	46	23.2	24.8	26.3	5.32	4.16	p<0.001	55	27.6	28.8	30.0	4.47
21	46	22.9	24.5	26.0	5.35	4.44	p<0.001	54	27.6	28.8	30.0	4.52
22	46	22.8	24.3	25.8	5.32	4.46	p<0.001	53	27.5	28.7	29.9	4.47
23	41	22.4	24.0	25.5	5.16	4.58	p<0.001	42	27.4	28.7	30.0	4.31
24	35	22.3	23.9	25.5	4.78	4.55	p<0.001	41	27.3	28.7	30.0	4.41
25	30	22.7	24.4	26.1	4.81	4.09	p<0.001	35	27.6	29.1	30.6	4.47

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.13	-0.39	0.34	0.99	-0.45		7	-0.94	-0.58	-0.22	0.49
5	18	-0.88	-0.55	-0.22	0.72	1.17		19	-0.59	-0.28	0.03	0.68
6	35	-0.71	-0.51	-0.31	0.60	0.96		27	-0.57	-0.37	-0.17	0.53
7	43	-0.62	-0.47	-0.32	0.52	0.68		39	-0.55	-0.39	-0.23	0.51
8	48	-0.56	-0.44	-0.31	0.43	-0.24		49	-0.59	-0.46	-0.33	0.47
9	49	-0.57	-0.46	-0.34	0.40	-0.31		53	-0.60	-0.48	-0.37	0.43
10	50	-0.57	-0.46	-0.35	0.40	-0.08		54	-0.56	-0.46	-0.37	0.37
11	50	-0.57	-0.47	-0.36	0.38	0.52		55	-0.52	-0.43	-0.35	0.31
12	50	-0.59	-0.49	-0.39	0.37	1.39		55	-0.47	-0.40	-0.33	0.26
13	50	-0.60	-0.50	-0.41	0.35	2.22	p<0.05	55	-0.44	-0.37	-0.31	0.24
14	50	-0.60	-0.51	-0.41	0.34	2.99	p<0.01	55	-0.40	-0.34	-0.28	0.23
15	50	-0.60	-0.51	-0.42	0.33	3.93	p<0.001	55	-0.36	-0.30	-0.24	0.22
16	50	-0.59	-0.51	-0.42	0.31	4.77	p<0.001	55	-0.32	-0.26	-0.21	0.21
17	50	-0.57	-0.49	-0.41	0.28	5.74	p<0.001	55	-0.27	-0.22	-0.16	0.20
18	49	-0.53	-0.45	-0.37	0.28	6.05	p<0.001	55	-0.22	-0.17	-0.12	0.19
19	49	-0.49	-0.41	-0.34	0.28	6.80	p<0.001	55	-0.15	-0.11	-0.06	0.17
20	46	-0.40	-0.33	-0.26	0.24	6.37	p<0.001	55	-0.12	-0.07	-0.03	0.16
21	46	-0.31	-0.23	-0.16	0.25	4.78	p<0.001	54	-0.07	-0.03	0.02	0.17
22	46	-0.20	-0.13	-0.06	0.24	3.03	p<0.01	53	-0.05	0.00	0.06	0.20
23	41	-0.13	-0.07	-0.01	0.19	2.39	p<0.05	42	-0.02	0.02	0.06	0.13
24	35	-0.08	-0.02	0.04	0.19	1.33		41	-0.01	0.03	0.07	0.13
25	30	-0.04	0.01	0.07	0.16	0.62		35	-0.01	0.03	0.08	0.13

Figure 33


SN/Mand SN/mandibular angle
SN/Mand degrees
38
36
34
32
30
28
26
24
22
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

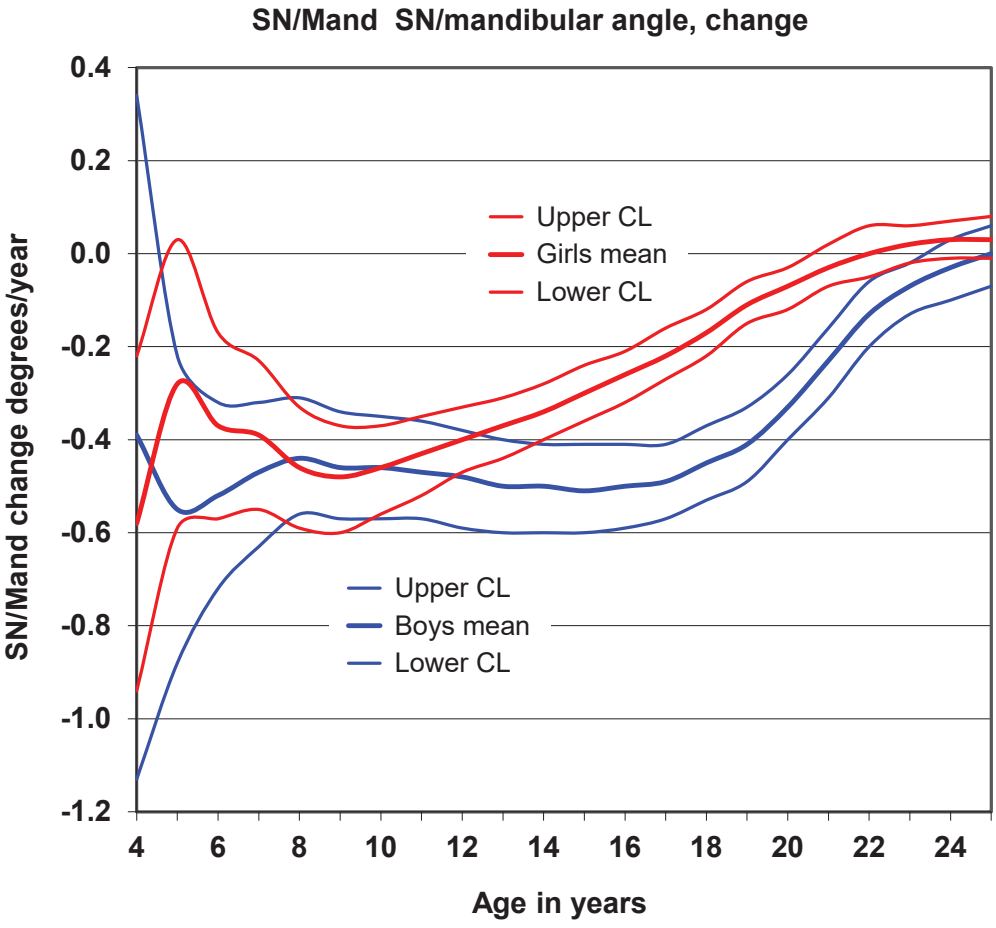
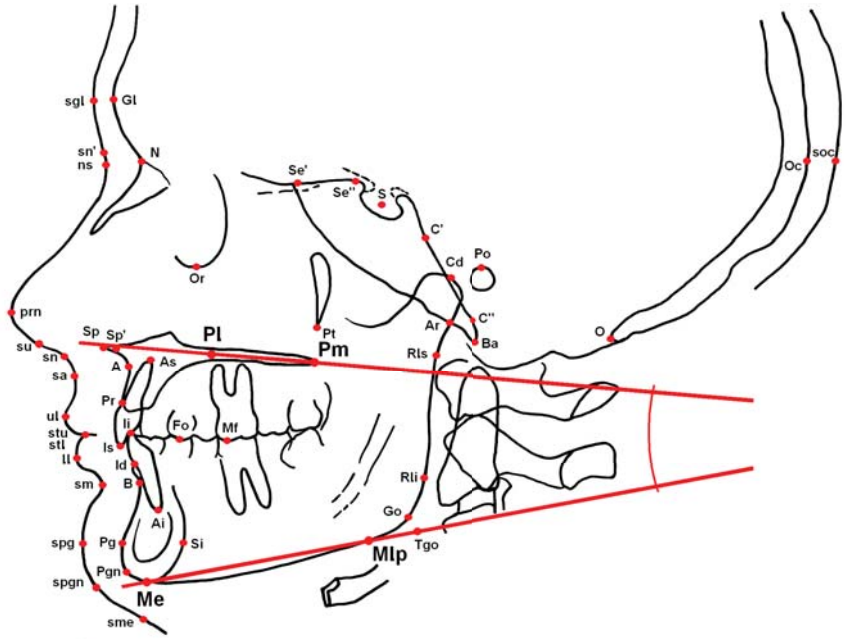

SN/Mand SN/mandibular angle, change
SN/Mand change degrees/year
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

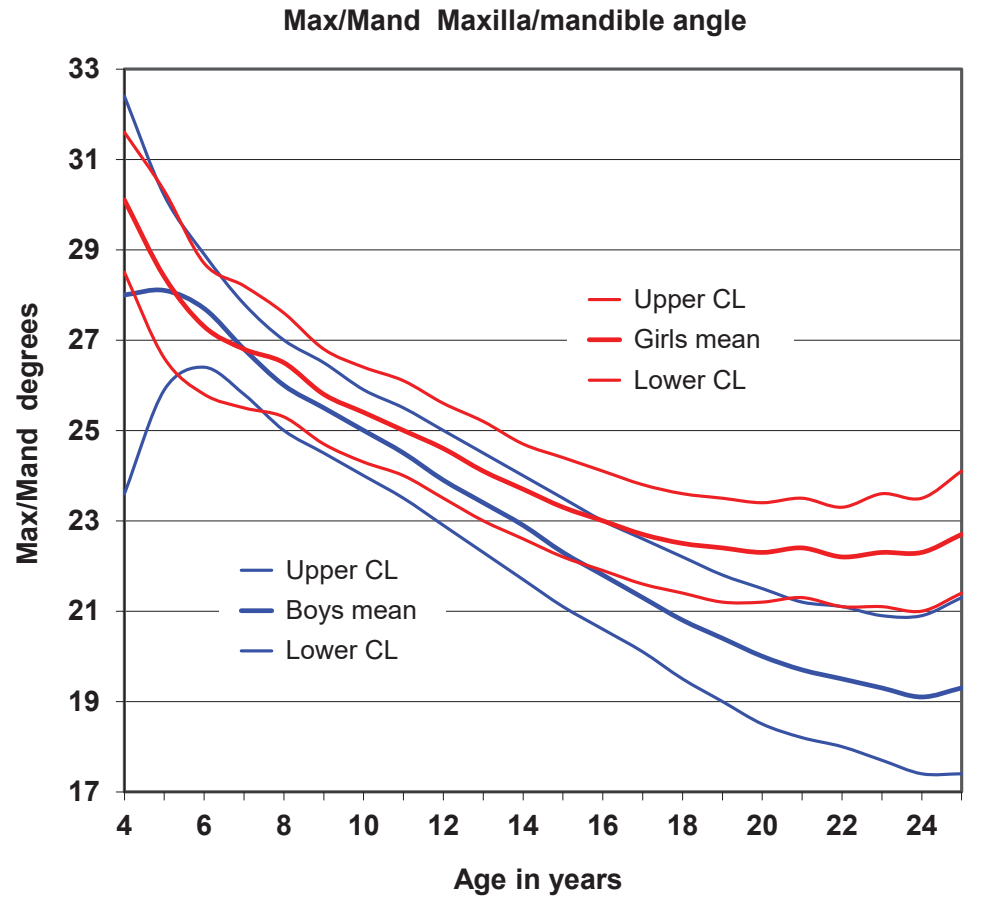
Figure 34

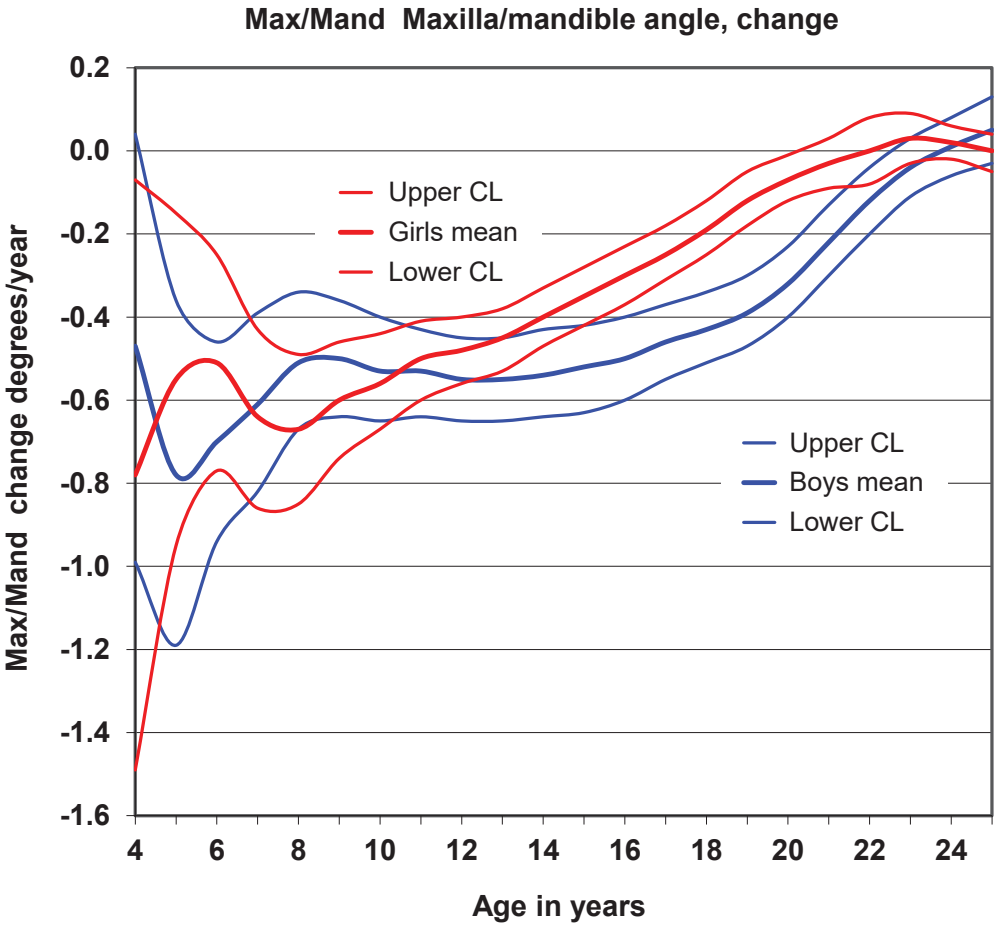


Max/Mand (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	23.6	28.0	32.4	5.94	0.87		7	28.5	30.1	31.6	2.06
5	18	25.9	28.1	30.2	4.61	0.26		19	26.6	28.4	30.3	4.10
6	35	26.4	27.7	28.9	3.69	-0.41		27	25.8	27.3	28.7	3.81
7	43	25.8	26.8	27.8	3.25	0.03		39	25.5	26.8	28.2	4.34
8	48	25.0	26.0	27.0	3.46	0.60		49	25.3	26.5	27.6	4.09
9	49	24.5	25.5	26.5	3.47	0.36		53	24.7	25.8	26.8	3.88
10	50	24.1	25.0	26.0	3.44	0.49		54	24.3	25.4	26.4	3.92
11	50	23.5	24.5	25.5	3.58	0.73		55	24.0	25.0	26.1	4.08
12	50	22.9	23.9	25.0	3.73	0.79		55	23.5	24.6	25.6	4.07
13	50	22.3	23.4	24.5	3.89	0.90		55	23.0	24.1	25.2	4.08
14	50	21.7	22.8	24.0	4.09	1.02		55	22.6	23.7	24.7	4.09
15	50	21.1	22.3	23.5	4.28	1.18		55	22.2	23.3	24.4	4.08
16	50	20.5	21.8	23.0	4.45	1.42		55	21.9	23.0	24.1	4.12
17	50	20.0	21.3	22.6	4.61	1.62		55	21.6	22.7	23.8	4.17
18	49	19.5	20.8	22.2	4.79	1.90		55	21.4	22.5	23.6	4.20
19	49	19.0	20.4	21.8	4.91	2.19	p<0.05	55	21.2	22.4	23.5	4.22
20	46	18.5	20.0	21.5	5.14	2.47	p<0.05	55	21.2	22.3	23.4	4.23
21	46	18.2	19.7	21.2	5.26	2.88	p<0.01	54	21.3	22.4	23.5	4.17
22	46	18.0	19.5	21.1	5.40	2.84	p<0.01	53	21.1	22.2	23.3	4.05
23	41	17.6	19.3	20.9	5.25	3.01	p<0.01	42	21.1	22.3	23.6	4.07
24	35	17.3	19.1	20.9	5.31	2.94	p<0.01	41	21.0	22.3	23.5	4.08
25	30	17.4	19.3	21.3	5.44	2.92	p<0.01	35	21.4	22.7	24.1	4.02

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.99	-0.47	0.04	0.70	-0.67		7	-1.49	-0.78	-0.07	0.96
5	18	-1.19	-0.78	-0.36	0.89	0.78		19	-0.95	-0.55	-0.15	0.88
6	35	-0.92	-0.69	-0.46	0.71	0.99		27	-0.77	-0.51	-0.25	0.69
7	43	-0.82	-0.60	-0.39	0.71	-0.26		39	-0.86	-0.64	-0.43	0.68
8	48	-0.67	-0.50	-0.34	0.58	-1.34		49	-0.85	-0.67	-0.49	0.63
9	49	-0.64	-0.50	-0.36	0.49	-0.99		53	-0.74	-0.60	-0.46	0.52
10	50	-0.65	-0.53	-0.40	0.44	-0.36		54	-0.67	-0.56	-0.44	0.43
11	50	-0.64	-0.54	-0.43	0.38	0.46		55	-0.60	-0.50	-0.41	0.36
12	50	-0.66	-0.55	-0.45	0.38	1.12		55	-0.56	-0.48	-0.40	0.30
13	50	-0.66	-0.55	-0.45	0.37	1.58		55	-0.53	-0.45	-0.38	0.28
14	50	-0.65	-0.54	-0.44	0.38	2.21	p<0.05	55	-0.47	-0.40	-0.33	0.27
15	50	-0.63	-0.53	-0.42	0.38	2.90	p<0.01	55	-0.42	-0.35	-0.28	0.26
16	50	-0.60	-0.50	-0.40	0.36	3.38	p<0.01	55	-0.37	-0.30	-0.23	0.25
17	50	-0.55	-0.46	-0.37	0.33	3.88	p<0.001	55	-0.31	-0.25	-0.18	0.25
18	49	-0.52	-0.43	-0.34	0.31	4.38	p<0.001	55	-0.25	-0.19	-0.12	0.25
19	49	-0.48	-0.39	-0.30	0.31	4.93	p<0.001	55	-0.18	-0.12	-0.05	0.26
20	46	-0.40	-0.32	-0.23	0.29	4.96	p<0.001	55	-0.12	-0.07	-0.01	0.22
21	46	-0.30	-0.22	-0.13	0.30	3.66	p<0.001	54	-0.09	-0.03	0.03	0.21
22	46	-0.20	-0.12	-0.04	0.28	1.97		53	-0.08	-0.00	0.08	0.29
23	41	-0.10	-0.03	0.03	0.22	1.34		42	-0.03	0.03	0.09	0.20
24	35	-0.05	0.02	0.09	0.21	-0.03		41	-0.02	0.02	0.06	0.14
25	30	-0.01	0.07	0.14	0.20	-1.67		35	-0.05	-0.00	0.04	0.14

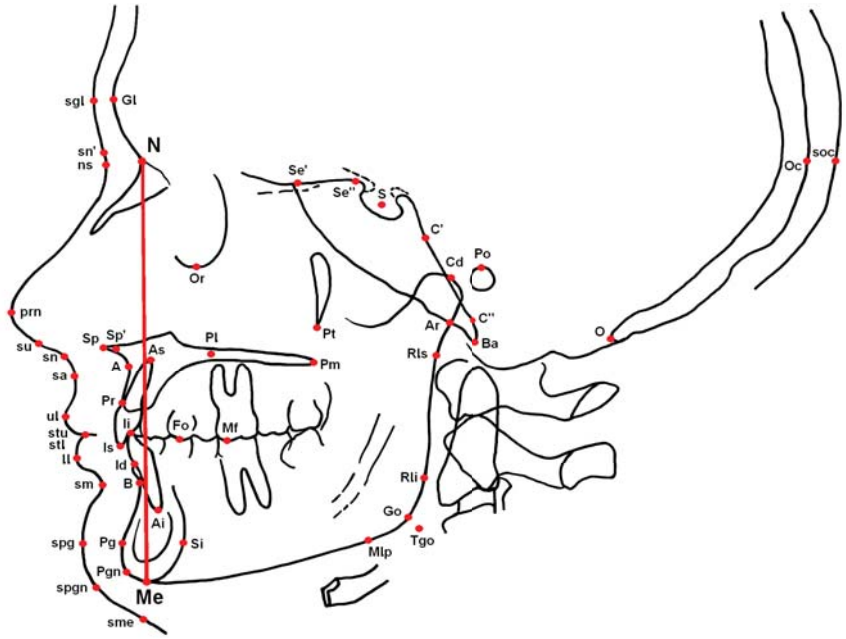
Figure 34


Max/Mand Maxilla/mandible angle
Max/Mand degrees
33
31
29
27
25
23
21
19
17
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


Max/Mand Maxilla/mandible angle, change
Max/Mand change degrees/year
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

N-Me

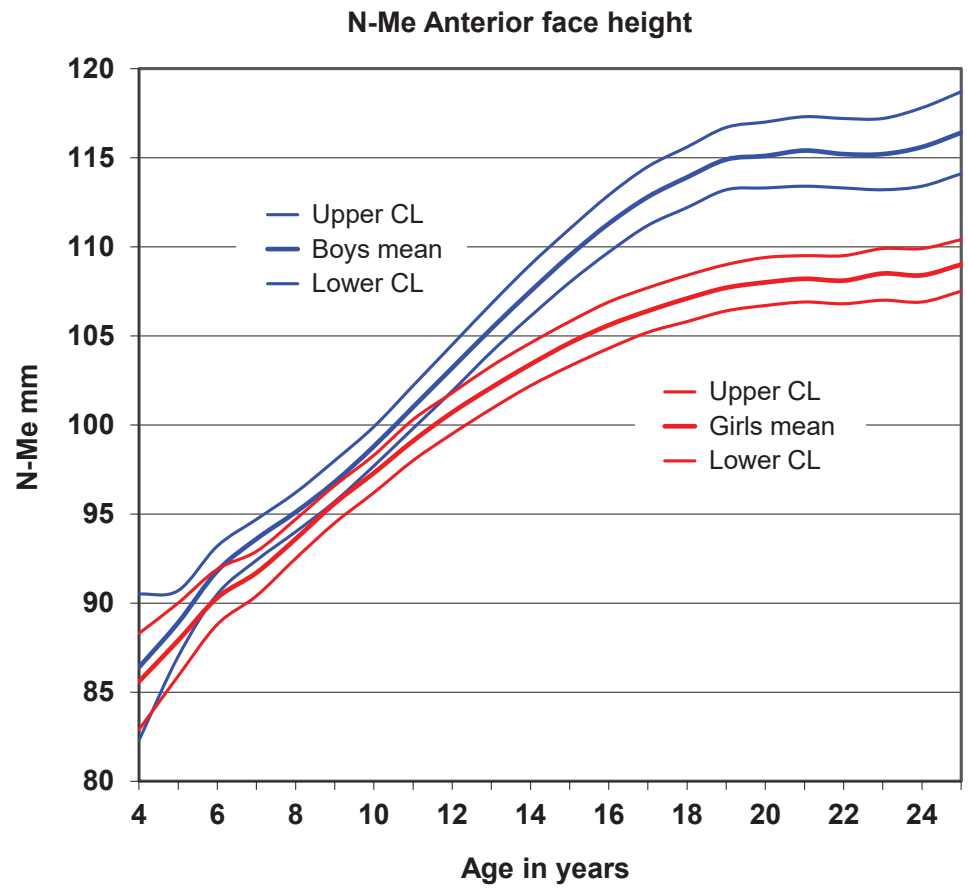
Figure 35

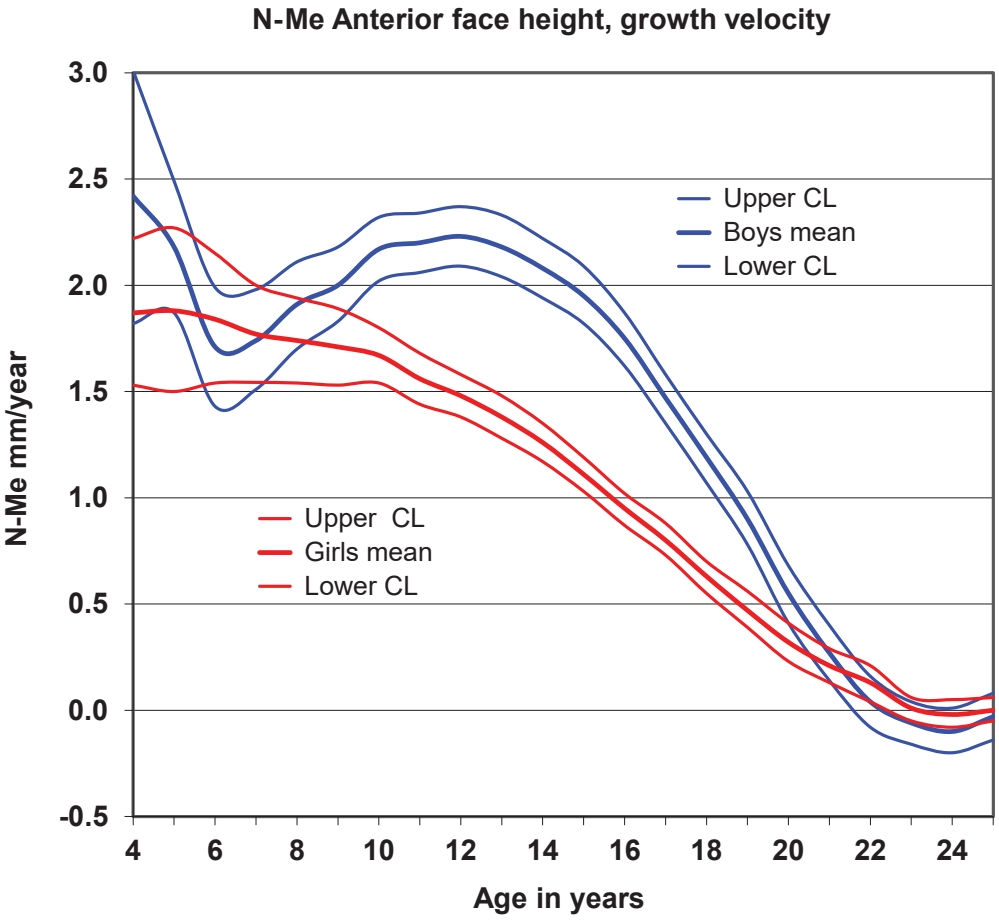


N-Me (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	82.3	86.4	90.5	5.49	0.33		7	82.9	85.6	88.3	3.66
5	18	87.0	88.9	90.7	3.94	0.66		19	85.9	87.9	90.0	4.59
6	35	90.5	91.8	93.2	4.11	1.43		27	88.8	90.3	91.9	4.15
7	43	92.4	93.6	94.8	3.90	2.20	p<0.05	39	90.4	91.7	92.9	3.97
8	48	94.0	95.1	96.2	4.00	1.89		49	92.5	93.6	94.7	3.84
9	49	95.7	96.8	98.0	4.00	1.62		53	94.5	95.6	96.6	3.96
10	50	97.7	98.8	99.9	4.12	1.91		54	96.2	97.3	98.3	4.04
11	50	99.8	101.0	102.2	4.42	2.18	p<0.05	55	98.0	99.1	100.3	4.39
12	50	101.9	103.2	104.5	4.64	2.87	p<0.01	55	99.5	100.7	101.8	4.48
13	50	104.1	105.4	106.8	4.92	3.60	p<0.001	55	100.9	102.1	103.3	4.56
14	50	106.1	107.5	109.0	5.21	4.27	p<0.001	55	102.2	103.4	104.6	4.66
15	50	108.0	109.5	111.0	5.49	4.91	p<0.001	55	103.3	104.6	105.8	4.74
16	50	109.7	111.3	112.9	5.75	5.55	p<0.001	55	104.3	105.6	106.9	4.82
17	50	111.2	112.8	114.5	6.00	6.02	p<0.001	55	105.2	106.4	107.7	4.88
18	49	112.2	113.9	115.6	6.06	6.27	p<0.001	55	105.8	107.1	108.4	4.92
19	49	113.2	114.9	116.7	6.30	6.56	p<0.001	55	106.4	107.7	109.0	4.96
20	46	113.3	115.1	117.0	6.36	6.28	p<0.001	55	106.7	108.0	109.4	5.00
21	46	113.5	115.4	117.3	6.47	6.24	p<0.001	54	106.9	108.2	109.5	5.03
22	46	113.3	115.2	117.1	6.50	6.22	p<0.001	53	106.8	108.1	109.4	4.88
23	41	113.2	115.2	117.2	6.53	5.40	p<0.001	42	107.0	108.5	109.9	4.77
24	35	113.4	115.6	117.8	6.60	5.48	p<0.001	41	106.9	108.4	109.9	4.79
25	30	114.1	116.4	118.7	6.38	5.53	p<0.001	35	107.5	109.0	110.4	4.47

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.82	2.42	3.01	0.80	1.55		7	1.53	1.87	2.22	0.47
5	18	1.87	2.18	2.49	0.68	1.16		19	1.50	1.88	2.27	0.86
6	35	1.43	1.71	1.99	0.83	-0.65		27	1.54	1.84	2.15	0.80
7	43	1.51	1.74	1.98	0.80	-0.14		39	1.54	1.77	2.00	0.73
8	48	1.70	1.91	2.11	0.74	1.15		49	1.54	1.74	1.94	0.71
9	49	1.83	2.00	2.18	0.61	2.32	p<0.05	53	1.53	1.71	1.89	0.67
10	50	2.02	2.17	2.32	0.53	4.93	p<0.001	54	1.54	1.67	1.80	0.50
11	50	2.06	2.20	2.34	0.51	6.82	p<0.001	55	1.44	1.56	1.68	0.45
12	50	2.09	2.23	2.37	0.52	8.42	p<0.001	55	1.38	1.48	1.58	0.38
13	50	2.04	2.18	2.33	0.53	9.16	p<0.001	55	1.28	1.38	1.48	0.36
14	50	1.94	2.08	2.22	0.51	9.72	p<0.001	55	1.17	1.26	1.35	0.34
15	50	1.82	1.95	2.09	0.49	10.64	p<0.001	55	1.03	1.11	1.19	0.31
16	50	1.62	1.75	1.87	0.45	10.94	p<0.001	55	0.87	0.95	1.02	0.29
17	50	1.35	1.47	1.58	0.41	9.86	p<0.001	55	0.73	0.80	0.88	0.28
18	49	1.07	1.19	1.30	0.40	8.33	p<0.001	55	0.55	0.63	0.70	0.27
19	49	0.78	0.90	1.03	0.44	5.81	p<0.001	55	0.39	0.47	0.56	0.31
20	46	0.41	0.55	0.68	0.47	2.86	p<0.01	55	0.23	0.32	0.41	0.33
21	46	0.14	0.27	0.40	0.45	0.71		54	0.13	0.21	0.29	0.30
22	46	-0.08	0.04	0.16	0.42	-1.22		53	0.04	0.13	0.21	0.31
23	41	-0.16	-0.06	0.04	0.33	-1.10		42	-0.05	0.01	0.06	0.19
24	35	-0.20	-0.10	0.01	0.31	-1.31		41	-0.08	-0.02	0.05	0.21
25	30	-0.14	-0.03	0.08	0.31	-0.55		35	-0.05	0.00	0.06	0.17

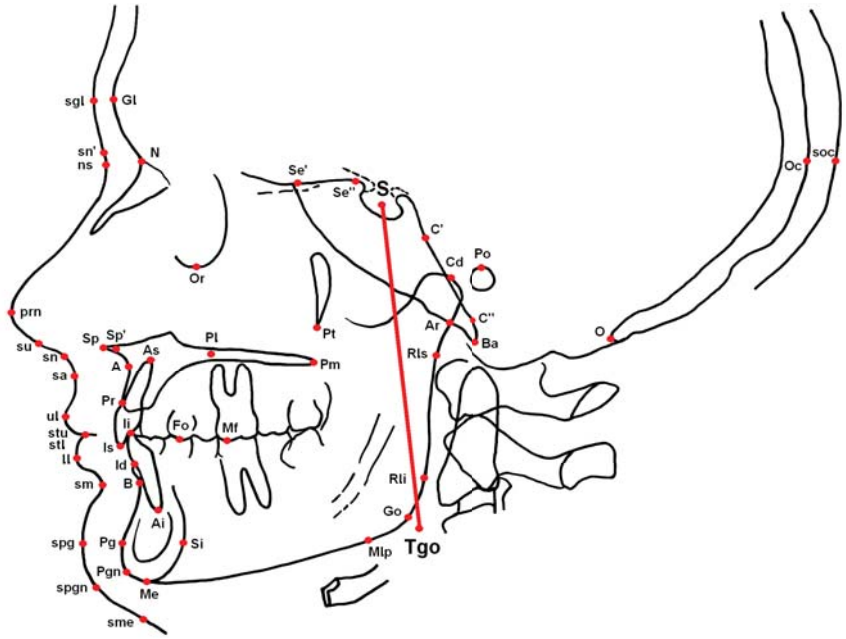
Figure 35


N-Me Anterior face height
N-Me mm
120
115
110
105
100
95
90
85
80
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


N-Me Anterior face height, growth velocity
N-Me mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

S-Tgo

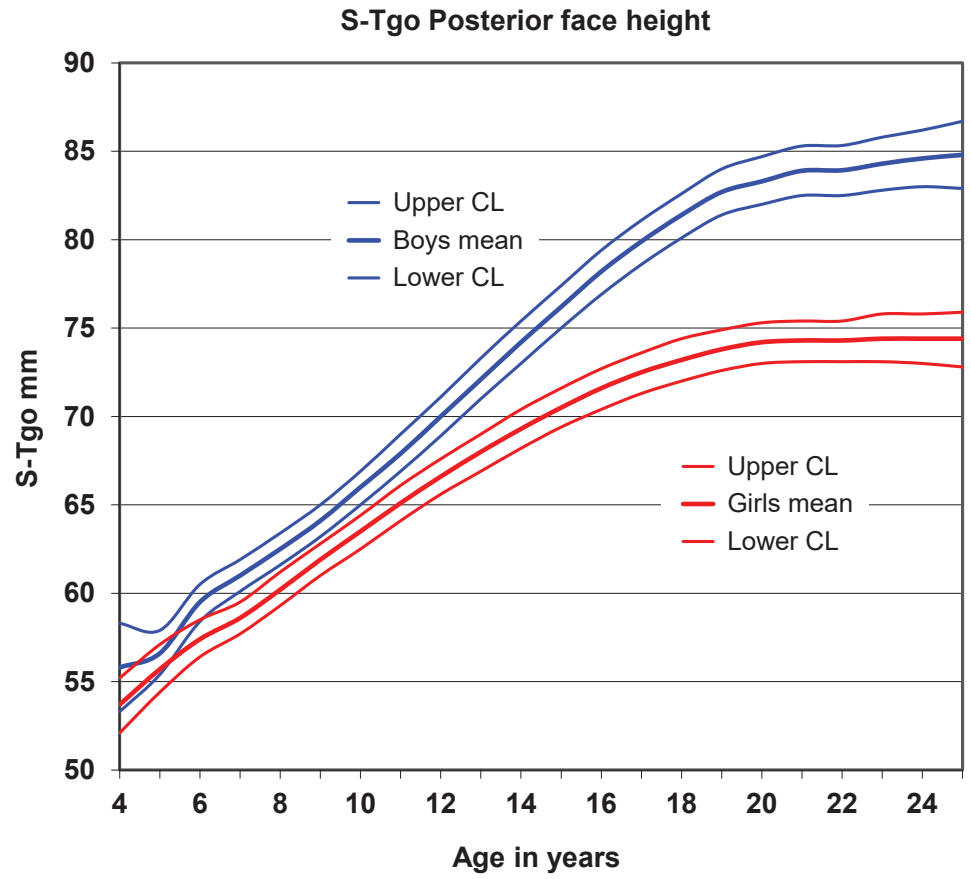
Figure 36



S-Tgo (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	53.3	55.8	58.3	3.33	1.45		7	52.1	53.7	55.2	2.12
5	18	55.4	56.6	57.9	2.73	0.97		19	54.4	55.7	57.1	3.01
6	35	58.4	59.5	60.5	3.19	2.58	p<0.05	27	56.4	57.4	58.5	2.87
7	43	60.1	61.0	61.9	2.98	3.62	p<0.001	39	57.7	58.6	59.5	2.97
8	48	61.6	62.5	63.4	3.17	3.45	p<0.001	49	59.3	60.2	61.2	3.37
9	49	63.2	64.1	65.0	3.30	3.33	p<0.01	53	61.0	61.9	62.8	3.41
10	50	65.0	66.0	66.9	3.59	3.57	p<0.001	54	62.5	63.5	64.4	3.55
11	50	66.9	67.9	69.0	3.76	3.93	p<0.001	55	64.1	65.1	66.1	3.71
12	50	68.9	70.0	71.1	3.94	4.49	p<0.001	55	65.6	66.6	67.6	3.88
13	50	71.0	72.1	73.3	4.09	5.22	p<0.001	55	66.9	68.0	69.0	4.01
14	50	73.0	74.2	75.4	4.25	5.98	p<0.001	55	68.2	69.3	70.4	4.13
15	50	75.0	76.2	77.4	4.37	6.77	p<0.001	55	69.4	70.5	71.6	4.23
16	50	76.9	78.2	79.4	4.45	7.70	p<0.001	55	70.4	71.6	72.7	4.31
17	50	78.6	79.9	81.1	4.51	8.52	p<0.001	55	71.3	72.5	73.6	4.38
18	49	80.1	81.4	82.6	4.59	9.28	p<0.001	55	72.0	73.2	74.4	4.37
19	49	81.4	82.7	84.0	4.69	10.04	p<0.001	55	72.6	73.8	74.9	4.38
20	46	82.0	83.3	84.7	4.78	10.07	p<0.001	55	73.0	74.2	75.3	4.38
21	46	82.5	83.9	85.3	4.85	10.41	p<0.001	54	73.1	74.3	75.4	4.36
22	46	82.5	83.9	85.3	4.87	10.47	p<0.001	53	73.1	74.3	75.4	4.34
23	41	82.8	84.3	85.8	4.87	9.68	p<0.001	42	73.1	74.4	75.8	4.39
24	35	83.0	84.6	86.2	4.95	9.43	p<0.001	41	73.0	74.4	75.8	4.48
25	30	82.9	84.8	86.7	5.31	8.37	p<0.001	35	72.8	74.4	75.9	4.69

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.28	1.81	2.35	0.73	0.64		7	0.77	1.51	2.26	1.00
5	18	1.54	1.83	2.12	0.63	1.30		19	1.22	1.54	1.86	0.71
6	35	1.18	1.47	1.76	0.88	-0.60		27	1.36	1.58	1.80	0.58
7	43	1.30	1.54	1.77	0.79	0.18		39	1.29	1.51	1.73	0.72
8	48	1.49	1.68	1.87	0.69	0.78		49	1.40	1.58	1.75	0.63
9	49	1.65	1.81	1.97	0.57	1.81		53	1.46	1.61	1.76	0.54
10	50	1.84	1.97	2.10	0.47	4.21	p<0.001	54	1.47	1.59	1.71	0.45
11	50	1.92	2.04	2.16	0.42	6.33	p<0.001	55	1.41	1.52	1.63	0.42
12	50	2.02	2.12	2.23	0.38	8.92	p<0.001	55	1.36	1.46	1.56	0.38
13	50	2.03	2.13	2.23	0.37	10.90	p<0.001	55	1.29	1.38	1.47	0.34
14	50	1.99	2.09	2.18	0.33	12.99	p<0.001	55	1.19	1.27	1.35	0.31
15	50	1.93	2.02	2.12	0.34	14.40	p<0.001	55	1.07	1.14	1.22	0.28
16	50	1.79	1.88	1.97	0.34	15.27	p<0.001	55	0.93	0.99	1.06	0.25
17	50	1.59	1.68	1.78	0.34	14.71	p<0.001	55	0.77	0.84	0.90	0.24
18	49	1.33	1.44	1.55	0.38	12.57	p<0.001	55	0.60	0.66	0.73	0.24
19	49	1.06	1.19	1.31	0.45	9.60	p<0.001	55	0.42	0.49	0.57	0.27
20	46	0.67	0.80	0.93	0.45	6.03	p<0.001	55	0.26	0.34	0.42	0.31
21	46	0.33	0.47	0.61	0.47	3.69	p<0.001	54	0.09	0.18	0.26	0.32
22	46	0.03	0.17	0.32	0.51	1.51		53	-0.05	0.04	0.14	0.34
23	41	-0.09	0.02	0.13	0.36	1.07		42	-0.13	-0.05	0.02	0.24
24	35	-0.17	-0.06	0.05	0.33	0.06		41	-0.14	-0.07	0.01	0.24
25	30	-0.17	-0.06	0.05	0.31	-0.64		35	-0.09	-0.02	0.04	0.19

Figure 36


S-Tgo Posterior face height
S-Tgo mm
90
85
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

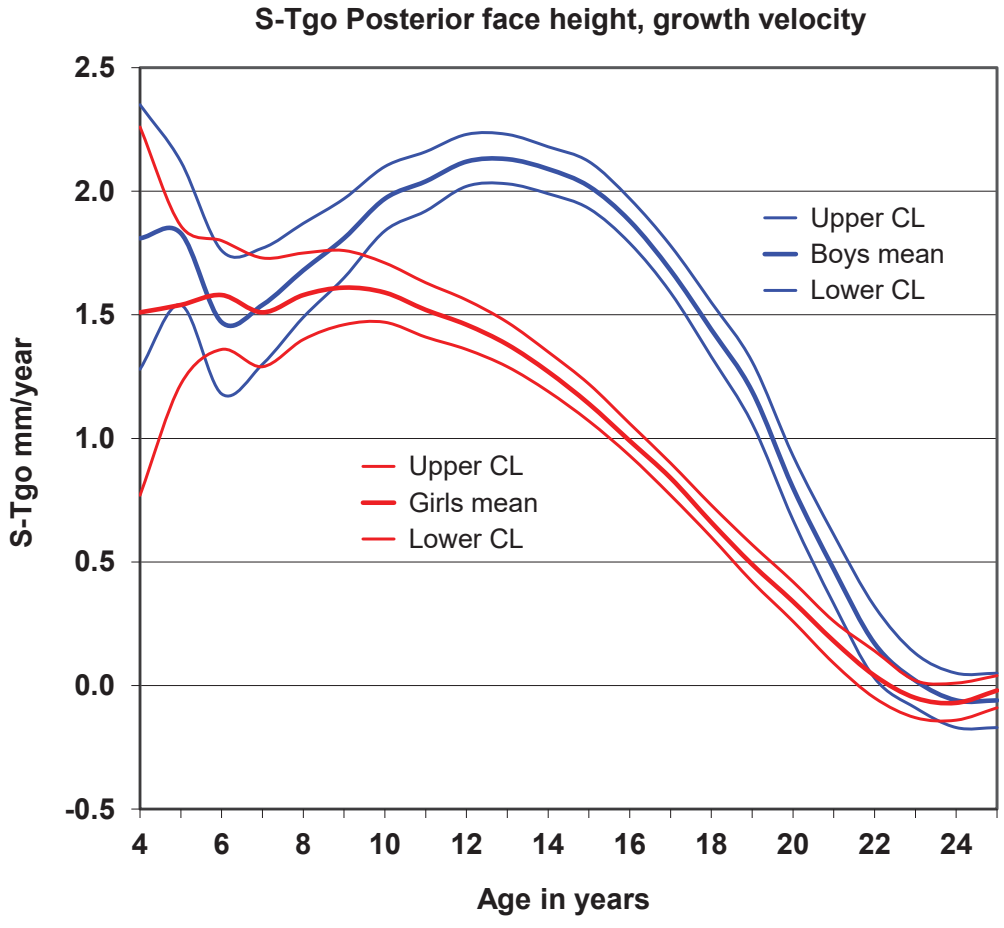
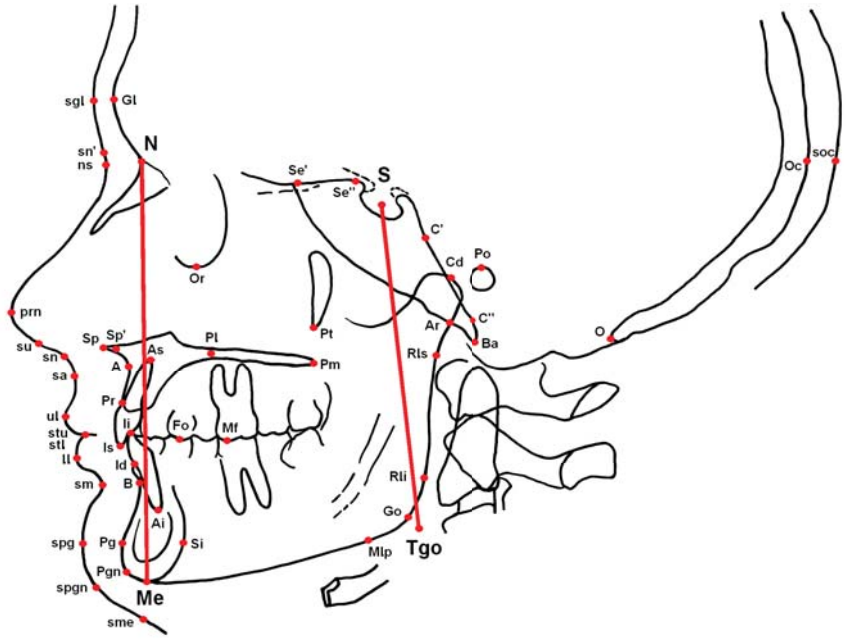

S-Tgo Posterior face height, growth velocity
S-Tgo mm/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

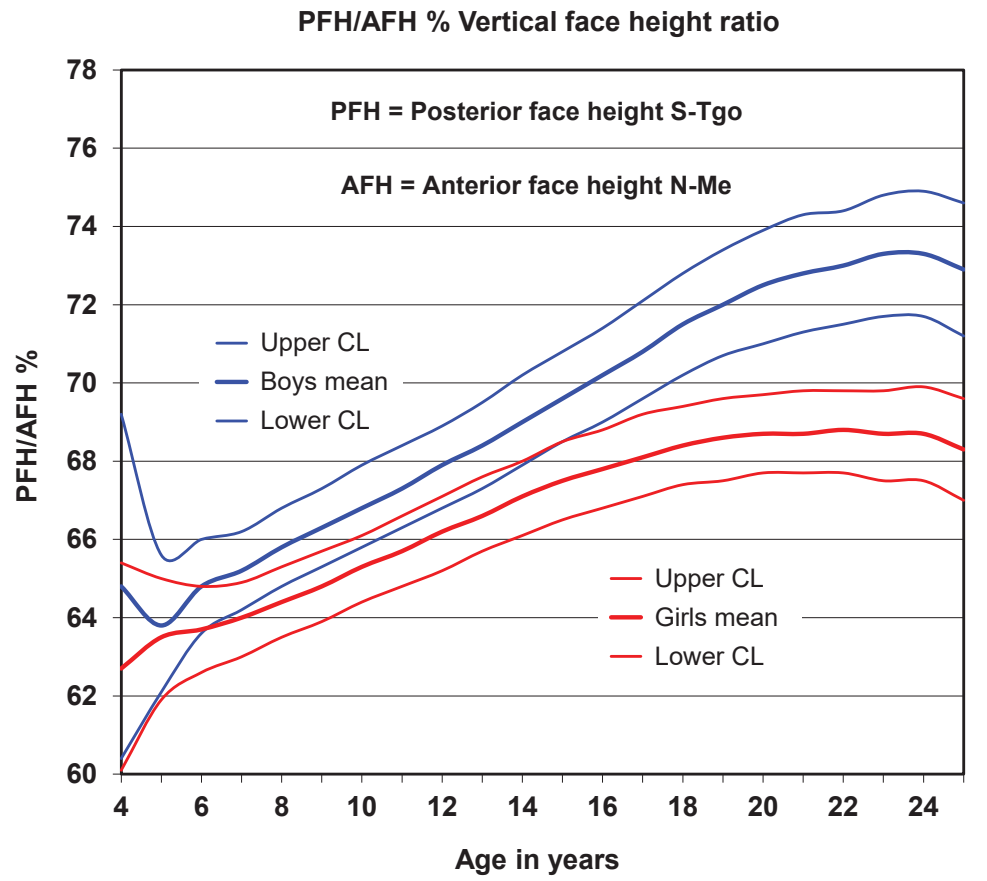
Figure 37

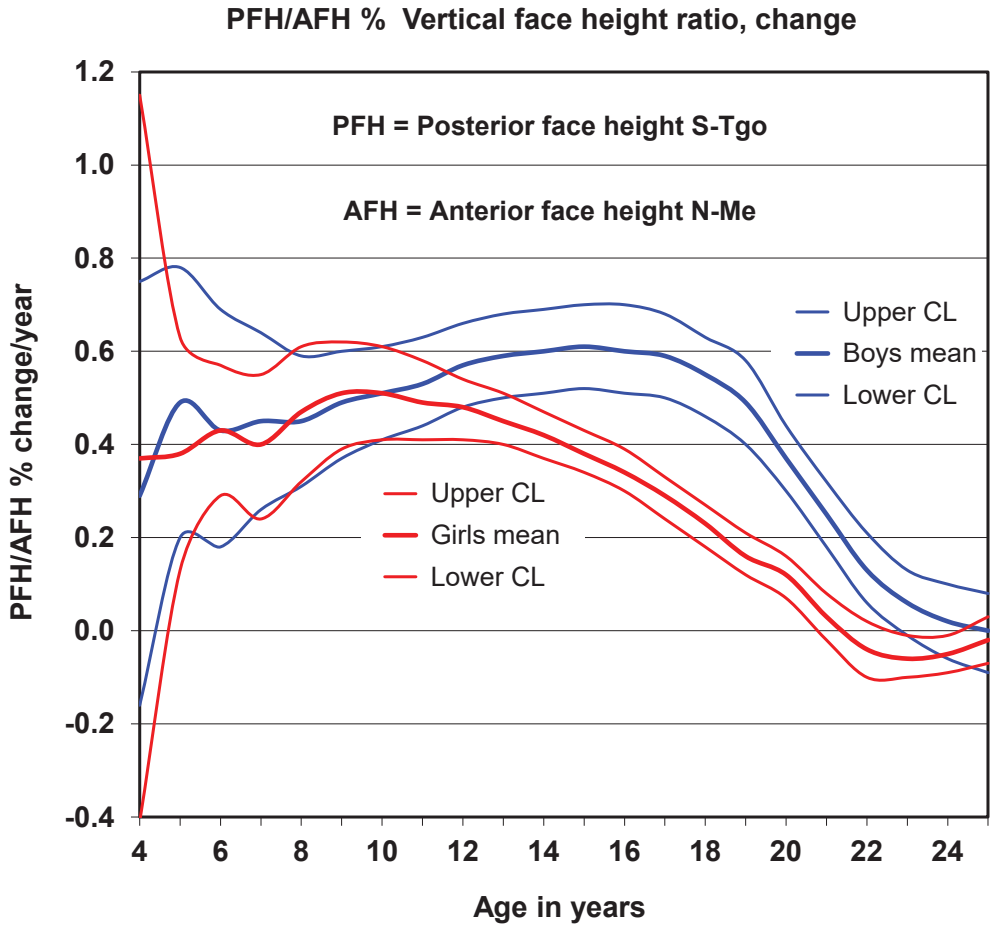


PFH/AFH %												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	60.4	64.8	69.2	5.96	0.78		7	60.1	62.7	65.4	3.59
5	18	62.1	63.8	65.6	3.77	0.31		19	61.9	63.5	65.0	3.38
6	35	63.6	64.8	66.0	3.55	1.33		27	62.6	63.7	64.8	2.97
7	43	64.3	65.2	66.2	3.30	1.77		39	63.0	64.0	64.9	3.04
8	48	64.8	65.8	66.8	3.50	2.06	p<0.05	49	63.5	64.4	65.3	3.33
9	49	65.3	66.3	67.3	3.55	2.21	p<0.05	53	63.9	64.8	65.7	3.24
10	50	65.8	66.8	67.8	3.63	2.31	p<0.05	54	64.4	65.3	66.1	3.29
11	50	66.3	67.3	68.4	3.74	2.35	p<0.05	55	64.8	65.7	66.6	3.44
12	50	66.8	67.9	68.9	3.86	2.36	p<0.05	55	65.2	66.2	67.1	3.54
13	50	67.4	68.5	69.6	3.97	2.48	p<0.05	55	65.7	66.6	67.6	3.63
14	50	67.9	69.1	70.2	4.10	2.63	p<0.01	55	66.1	67.1	68.0	3.70
15	50	68.5	69.7	70.8	4.23	2.82	p<0.01	55	66.5	67.5	68.5	3.76
16	50	69.1	70.3	71.5	4.34	3.09	p<0.01	55	66.8	67.8	68.8	3.80
17	50	69.6	70.9	72.1	4.46	3.37	p<0.01	55	67.1	68.1	69.2	3.86
18	49	70.3	71.6	72.8	4.57	3.82	p<0.001	55	67.4	68.4	69.4	3.88
19	49	70.8	72.1	73.4	4.72	4.17	p<0.001	55	67.5	68.6	69.6	3.90
20	46	71.1	72.5	74.0	4.99	4.33	p<0.001	55	67.7	68.7	69.7	3.92
21	46	71.4	72.9	74.3	5.06	4.59	p<0.001	54	67.7	68.7	69.8	3.96
22	46	71.6	73.0	74.5	5.08	4.69	p<0.001	53	67.7	68.8	69.8	3.94
23	41	71.8	73.3	74.8	5.00	4.76	p<0.001	42	67.5	68.7	69.8	3.78
24	35	71.7	73.3	74.9	4.79	4.69	p<0.001	41	67.5	68.7	69.9	3.86
25	30	71.2	72.9	74.7	4.85	4.31	p<0.001	35	67.0	68.3	69.6	3.81

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.16	0.29	0.75	0.62	-0.17		7	-0.41	0.37	1.15	1.05
5	18	0.20	0.49	0.78	0.63	0.53		19	0.13	0.38	0.63	0.56
6	35	0.18	0.42	0.66	0.72	-0.08		27	0.29	0.43	0.57	0.38
7	43	0.26	0.44	0.62	0.59	0.36		39	0.24	0.40	0.55	0.50
8	48	0.31	0.44	0.58	0.48	-0.25		49	0.32	0.47	0.61	0.52
9	49	0.37	0.48	0.60	0.41	-0.26		53	0.39	0.51	0.62	0.44
10	50	0.41	0.51	0.62	0.37	0.10		54	0.41	0.51	0.61	0.38
11	50	0.44	0.54	0.64	0.36	0.72		55	0.41	0.49	0.58	0.32
12	50	0.48	0.58	0.67	0.34	1.75		55	0.41	0.48	0.54	0.26
13	50	0.51	0.60	0.69	0.32	2.80	p<0.01	55	0.40	0.45	0.51	0.21
14	50	0.53	0.61	0.70	0.31	3.87	p<0.001	55	0.37	0.42	0.47	0.19
15	50	0.53	0.62	0.71	0.32	4.77	p<0.001	55	0.34	0.38	0.43	0.17
16	50	0.52	0.61	0.70	0.32	5.48	p<0.001	55	0.30	0.34	0.39	0.17
17	50	0.52	0.60	0.69	0.31	6.56	p<0.001	55	0.24	0.29	0.33	0.17
18	49	0.47	0.55	0.63	0.30	6.86	p<0.001	55	0.18	0.23	0.27	0.17
19	49	0.41	0.49	0.58	0.30	6.95	p<0.001	55	0.12	0.16	0.21	0.18
20	46	0.30	0.37	0.44	0.25	5.98	p<0.001	55	0.07	0.12	0.16	0.18
21	46	0.18	0.25	0.32	0.25	4.98	p<0.001	54	-0.02	0.03	0.08	0.19
22	46	0.05	0.13	0.20	0.26	3.47	p<0.001	53	-0.10	-0.04	0.02	0.22
23	41	-0.02	0.05	0.11	0.22	2.46	p<0.05	42	-0.10	-0.06	-0.01	0.15
24	35	-0.07	0.00	0.07	0.20	1.35		41	-0.09	-0.05	-0.01	0.13
25	30	-0.09	-0.03	0.02	0.15	-0.38		35	-0.07	-0.02	0.03	0.14

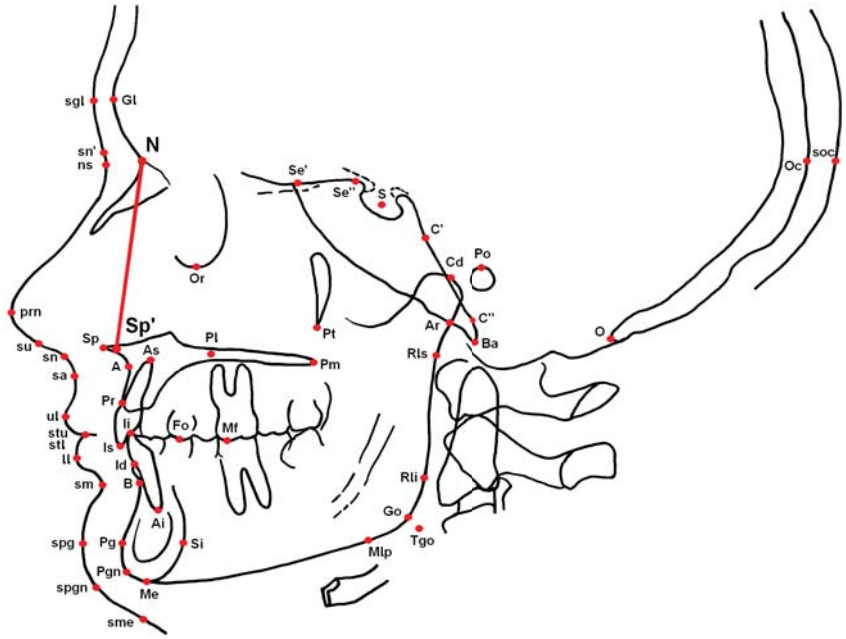
Figure 37


PFH/AFH % Vertical face height ratio
PFH = Posterior face height S-Tgo
AFH = Anterior face height N-Me
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
PFH/AFH %
78
76
74
72
70
68
66
64
62
60
4
6
8
10
12
14
16
18
20
22
24
Age in years


PFH/AFH % Vertical face height ratio, change
PFH = Posterior face height S-Tgo
AFH = Anterior face height N-Me
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
PFH/AFH % change/year
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4
6
8
10
12
14
16
18
20
22
24
Age in years

N-Sp'

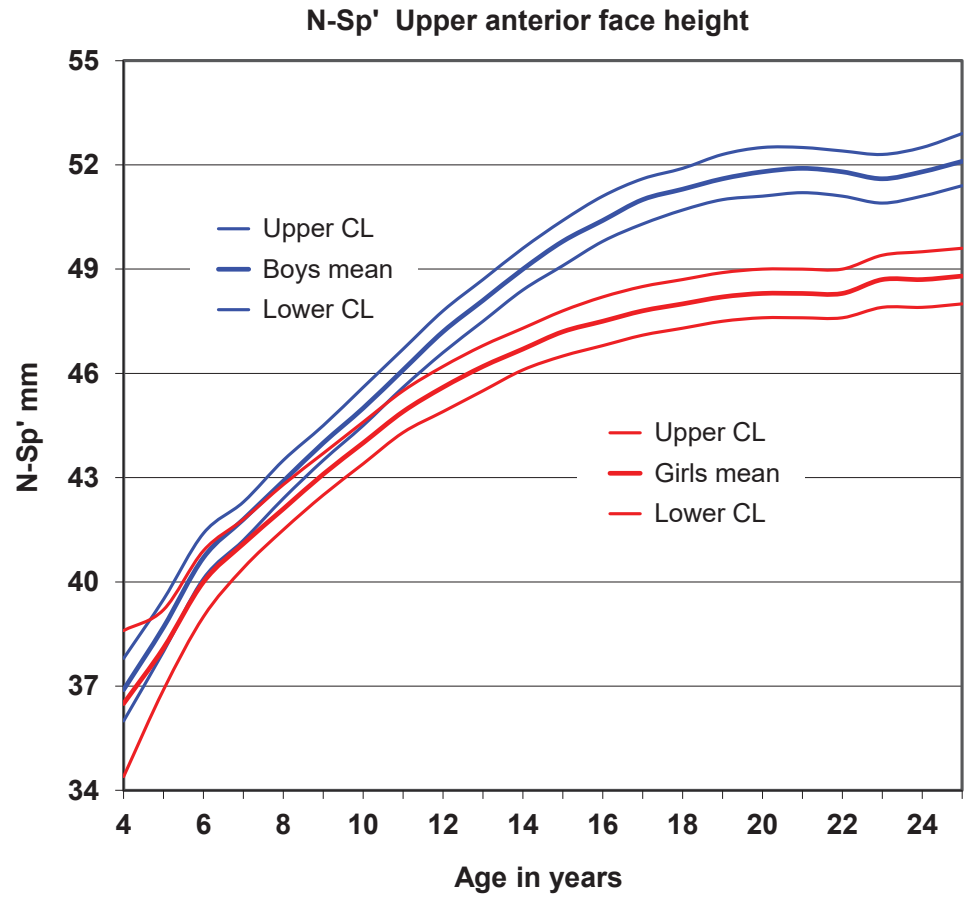
Figure 38

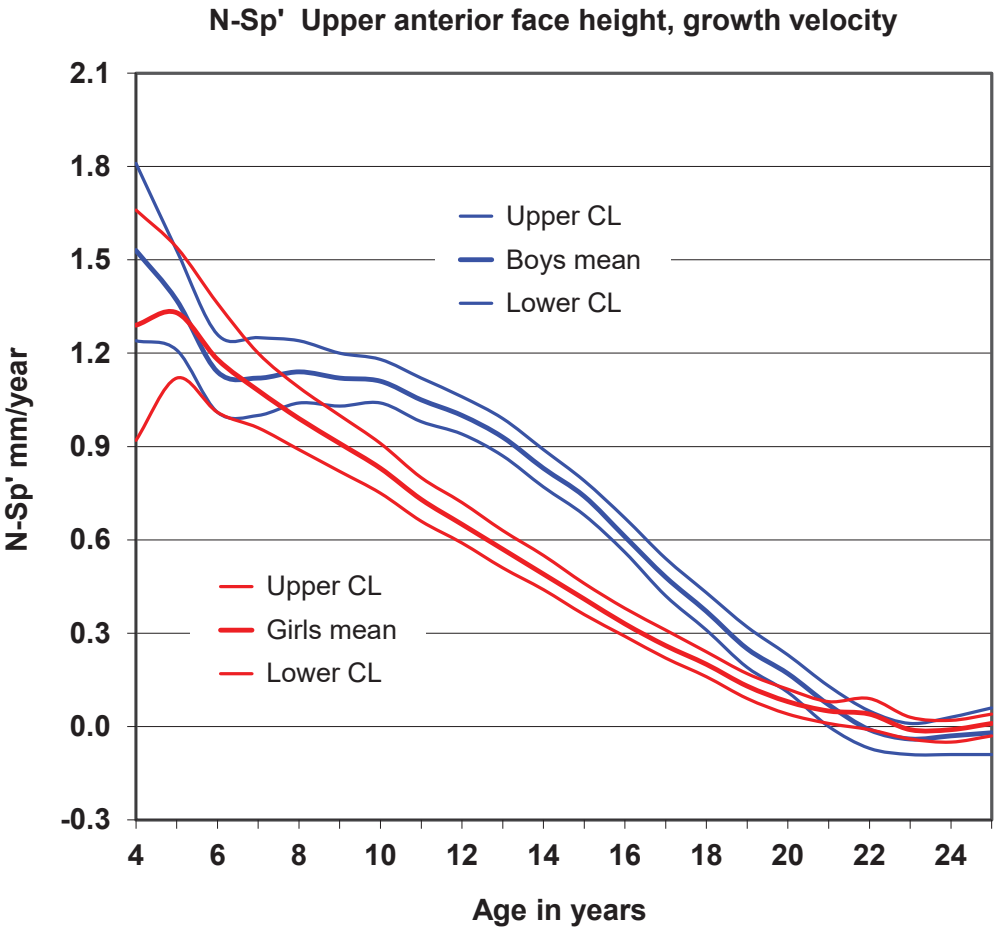


N-Sp' (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	36.0	36.9	37.8	1.21	0.36		7	34.4	36.5	38.6	2.85
5	18	38.0	38.7	39.5	1.59	0.93		19	36.9	38.1	39.2	2.64
6	35	40.1	40.7	41.4	1.88	1.43		27	39.0	40.0	40.9	2.47
7	43	41.2	41.8	42.3	1.85	1.54		39	40.4	41.1	41.8	2.18
8	48	42.4	42.9	43.5	1.93	1.80		49	41.5	42.1	42.8	2.27
9	49	43.5	44.0	44.5	1.91	2.09	p<0.05	53	42.5	43.1	43.7	2.27
10	50	44.5	45.0	45.6	1.93	2.49	p<0.05	54	43.4	44.0	44.6	2.26
11	50	45.6	46.1	46.7	2.07	2.94	p<0.01	55	44.3	44.9	45.5	2.32
12	50	46.6	47.2	47.8	2.13	3.64	p<0.001	55	44.9	45.6	46.2	2.35
13	50	47.5	48.1	48.7	2.18	4.38	p<0.001	55	45.5	46.2	46.8	2.39
14	50	48.4	49.0	49.6	2.22	5.05	p<0.001	55	46.1	46.7	47.3	2.45
15	50	49.1	49.8	50.4	2.25	5.64	p<0.001	55	46.5	47.2	47.8	2.49
16	50	49.8	50.4	51.1	2.26	6.25	p<0.001	55	46.8	47.5	48.2	2.53
17	50	50.3	51.0	51.6	2.25	6.69	p<0.001	55	47.1	47.8	48.5	2.56
18	49	50.7	51.3	51.9	2.23	6.92	p<0.001	55	47.3	48.0	48.7	2.57
19	49	51.0	51.6	52.3	2.26	7.17	p<0.001	55	47.5	48.2	48.9	2.58
20	46	51.1	51.8	52.5	2.29	7.17	p<0.001	55	47.6	48.3	49.0	2.59
21	46	51.2	51.9	52.5	2.28	7.26	p<0.001	54	47.6	48.3	49.0	2.57
22	46	51.1	51.8	52.4	2.30	7.11	p<0.001	53	47.6	48.3	49.0	2.56
23	41	50.9	51.6	52.3	2.32	5.59	p<0.001	42	47.9	48.7	49.4	2.48
24	35	51.1	51.8	52.5	2.12	5.83	p<0.001	41	47.9	48.7	49.5	2.47
25	30	51.4	52.1	52.9	2.09	5.89	p<0.001	35	48.0	48.8	49.6	2.40

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.24	1.53	1.81	0.38	0.99		7	0.92	1.29	1.66	0.50
5	18	1.21	1.37	1.53	0.35	0.27		19	1.12	1.33	1.54	0.47
6	35	1.01	1.14	1.26	0.37	-0.45		27	1.01	1.18	1.36	0.47
7	43	1.00	1.12	1.25	0.41	0.49		39	0.96	1.08	1.20	0.39
8	48	1.04	1.14	1.24	0.36	1.98		49	0.89	0.99	1.09	0.36
9	49	1.03	1.12	1.20	0.32	3.16	p<0.01	53	0.82	0.91	1.00	0.34
10	50	1.04	1.11	1.18	0.27	5.12	p<0.001	54	0.75	0.83	0.91	0.29
11	50	0.99	1.05	1.12	0.24	6.36	p<0.001	55	0.66	0.73	0.80	0.27
12	50	0.94	1.00	1.06	0.22	7.76	p<0.001	55	0.59	0.65	0.72	0.24
13	50	0.87	0.93	0.99	0.22	8.20	p<0.001	55	0.51	0.57	0.63	0.22
14	50	0.78	0.83	0.89	0.21	8.23	p<0.001	55	0.44	0.49	0.55	0.21
15	50	0.68	0.74	0.79	0.20	8.50	p<0.001	55	0.36	0.41	0.46	0.19
16	50	0.56	0.61	0.67	0.21	7.67	p<0.001	55	0.29	0.33	0.38	0.17
17	50	0.42	0.48	0.54	0.22	5.80	p<0.001	55	0.22	0.26	0.31	0.16
18	49	0.31	0.37	0.43	0.21	4.99	p<0.001	55	0.16	0.20	0.24	0.15
19	49	0.19	0.25	0.32	0.23	3.19	p<0.01	55	0.09	0.13	0.17	0.15
20	46	0.11	0.17	0.23	0.21	2.51	p<0.05	55	0.04	0.08	0.12	0.15
21	46	0.00	0.07	0.13	0.22	0.51		54	0.01	0.05	0.08	0.14
22	46	-0.07	-0.01	0.05	0.21	-1.25		53	-0.01	0.04	0.09	0.19
23	41	-0.09	-0.04	0.01	0.17	-1.09		42	-0.04	-0.01	0.03	0.11
24	35	-0.09	-0.03	0.03	0.18	-0.64		41	-0.05	-0.01	0.02	0.12
25	30	-0.09	-0.02	0.05	0.21	-0.61		35	-0.03	0.01	0.04	0.11

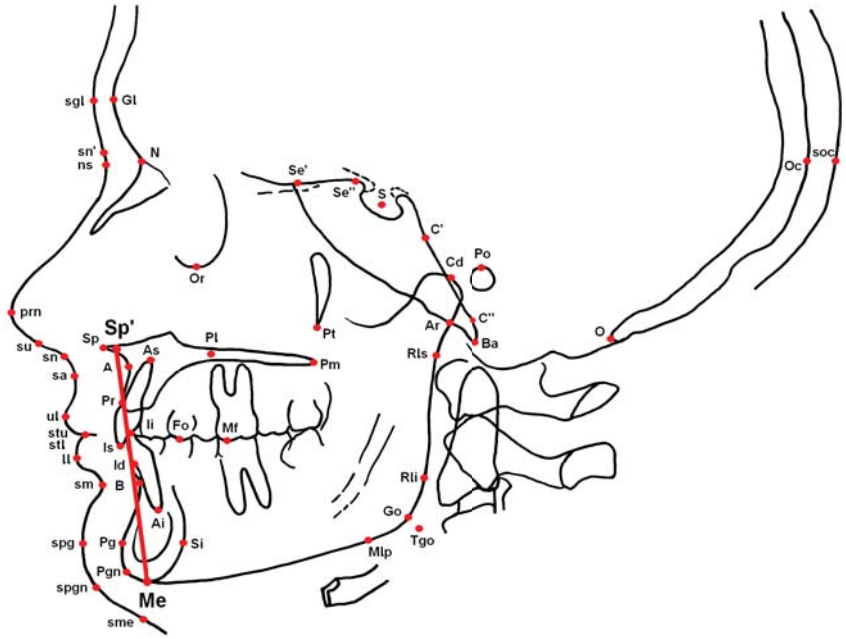
Figure 38


N-Sp' Upper anterior face height
55
52
49
46
43
40
37
34
N-Sp' mm
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years


N-Sp' Upper anterior face height, growth velocity
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.0
-0.3
N-Sp' mm/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

Sp'-Me

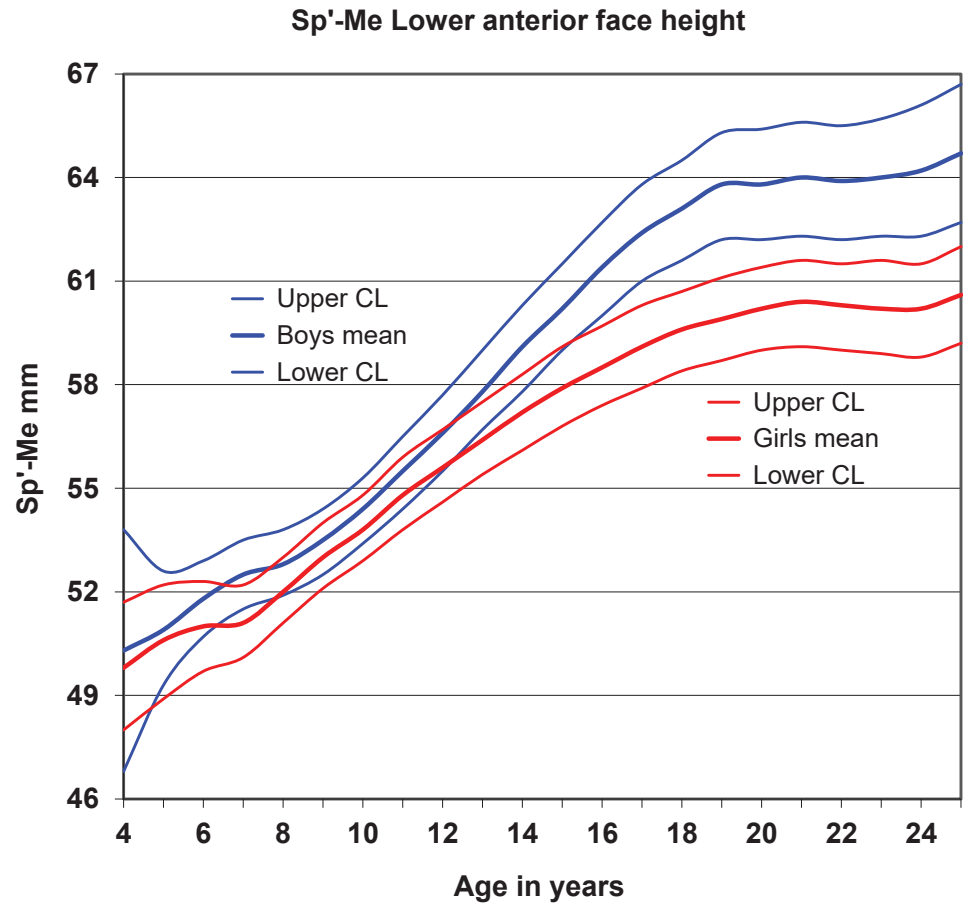
Figure 39



Sp'-Me (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	46.8	50.3	53.8	4.70	0.24		7	48.0	49.8	51.7	2.53
5	18	49.3	50.9	52.6	3.59	0.30		19	48.9	50.6	52.2	3.63
6	35	50.7	51.8	52.9	3.39	0.96		27	49.7	51.0	52.3	3.47
7	43	51.5	52.5	53.5	3.35	1.81		39	50.1	51.1	52.2	3.40
8	48	51.9	52.8	53.8	3.36	1.18		49	51.1	52.0	53.0	3.34
9	49	52.5	53.5	54.4	3.37	0.63		53	52.1	53.0	54.0	3.57
10	50	53.4	54.4	55.3	3.47	0.72		54	52.9	53.8	54.8	3.70
11	50	54.4	55.5	56.5	3.67	0.84		55	53.8	54.8	55.9	3.91
12	50	55.5	56.6	57.7	3.87	1.26		55	54.6	55.6	56.7	4.01
13	50	56.7	57.8	59.0	4.10	1.74		55	55.4	56.4	57.5	4.10
14	50	57.8	59.1	60.3	4.36	2.21	p<0.05	55	56.1	57.2	58.3	4.19
15	50	59.0	60.2	61.5	4.61	2.67	p<0.01	55	56.8	57.9	59.1	4.27
16	50	60.0	61.4	62.7	4.89	3.14	p<0.01	55	57.4	58.5	59.7	4.36
17	50	61.0	62.4	63.8	5.15	3.50	p<0.001	55	57.9	59.1	60.3	4.43
18	49	61.6	63.1	64.5	5.29	3.64	p<0.001	55	58.4	59.6	60.7	4.47
19	49	62.2	63.8	65.3	5.52	3.89	p<0.001	55	58.7	59.9	61.1	4.52
20	46	62.2	63.8	65.4	5.57	3.56	p<0.001	55	59.0	60.2	61.4	4.56
21	46	62.3	64.0	65.6	5.70	3.49	p<0.001	54	59.1	60.4	61.6	4.63
22	46	62.2	63.9	65.5	5.71	3.47	p<0.001	53	59.0	60.3	61.5	4.58
23	41	62.3	64.0	65.7	5.48	3.43	p<0.001	42	58.9	60.2	61.6	4.52
24	35	62.3	64.2	66.1	5.69	3.43	p<0.001	41	58.8	60.2	61.5	4.55
25	30	62.7	64.7	66.7	5.63	3.36	p<0.01	35	59.2	60.6	62.0	4.21

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.41	0.89	1.36	0.64	1.17		7	0.10	0.51	0.92	0.56
5	18	0.54	0.77	1.01	0.51	1.24		19	0.18	0.51	0.84	0.73
6	35	0.30	0.52	0.74	0.67	-0.69		27	0.41	0.63	0.86	0.60
7	43	0.40	0.58	0.76	0.61	-0.65		39	0.49	0.67	0.85	0.57
8	48	0.59	0.74	0.89	0.53	0.14		49	0.57	0.72	0.87	0.53
9	49	0.75	0.87	0.99	0.44	0.99		53	0.66	0.78	0.90	0.46
10	50	0.93	1.04	1.15	0.41	3.03	p<0.01	54	0.73	0.82	0.91	0.35
11	50	1.02	1.13	1.24	0.40	4.75	p<0.001	55	0.73	0.81	0.89	0.29
12	50	1.10	1.22	1.33	0.42	6.06	p<0.001	55	0.74	0.81	0.88	0.26
13	50	1.13	1.24	1.36	0.42	6.85	p<0.001	55	0.72	0.79	0.85	0.25
14	50	1.12	1.23	1.35	0.41	7.44	p<0.001	55	0.69	0.75	0.81	0.24
15	50	1.09	1.20	1.32	0.40	8.26	p<0.001	55	0.63	0.69	0.74	0.22
16	50	1.01	1.12	1.22	0.38	8.75	p<0.001	55	0.55	0.60	0.66	0.21
17	50	0.87	0.97	1.06	0.35	8.17	p<0.001	55	0.47	0.52	0.57	0.19
18	49	0.69	0.79	0.89	0.35	6.91	p<0.001	55	0.37	0.42	0.47	0.18
19	49	0.52	0.63	0.74	0.38	5.04	p<0.001	55	0.28	0.33	0.39	0.19
20	46	0.27	0.37	0.47	0.34	2.33	p<0.05	55	0.19	0.24	0.29	0.20
21	46	0.10	0.19	0.28	0.30	0.60		54	0.11	0.16	0.21	0.19
22	46	-0.03	0.04	0.12	0.26	-0.93		53	0.03	0.08	0.13	0.18
23	41	-0.08	-0.02	0.05	0.21	-0.90		42	-0.02	0.01	0.05	0.12
24	35	-0.12	-0.06	0.00	0.19	-1.63		41	-0.04	-0.00	0.04	0.12
25	30	-0.06	-0.01	0.04	0.14	-0.53		35	-0.02	0.00	0.03	0.09

Figure 39


Sp'-Me Lower anterior face height
Sp'-Me mm
67
64
61
58
55
52
49
46
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

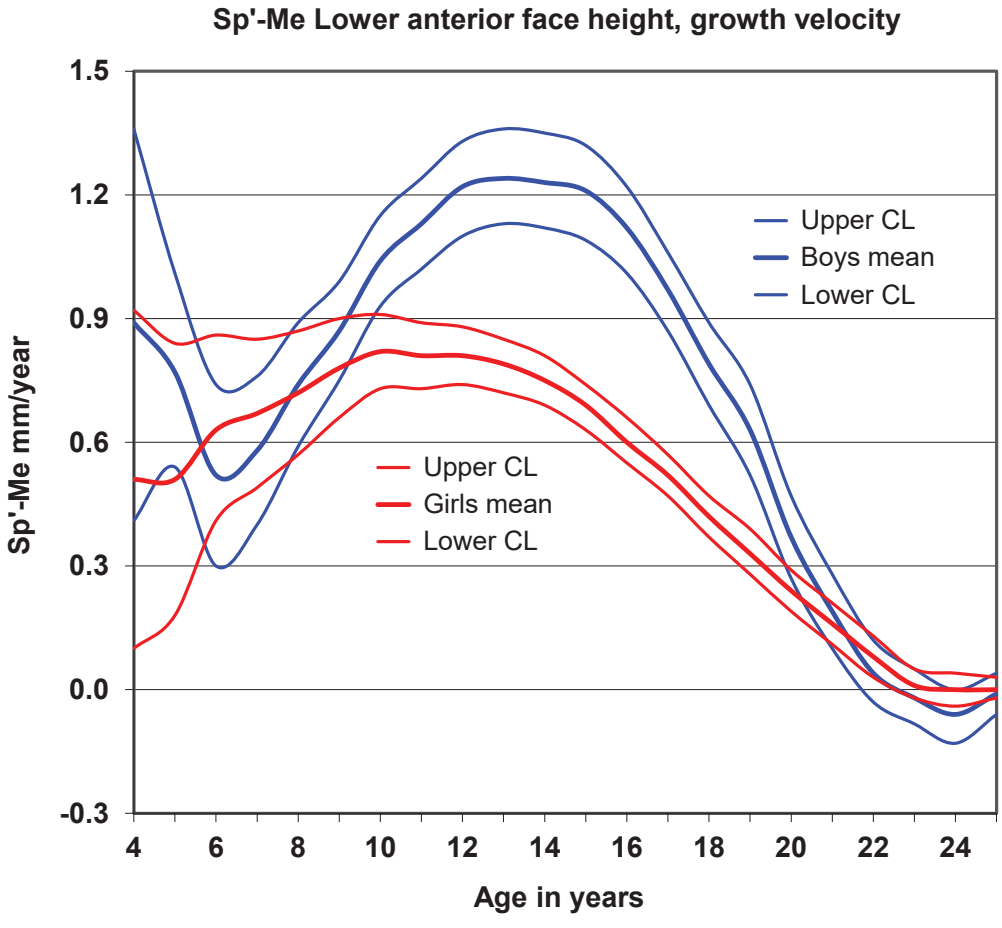
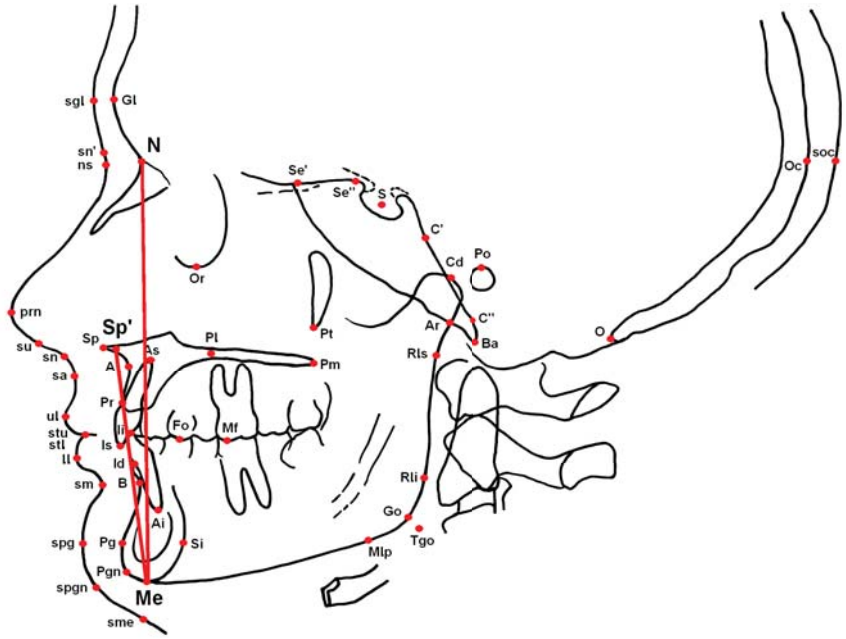

Sp'-Me Lower anterior face height, growth velocity
Sp'-Me mm/year
1.5
1.2
0.9
0.6
0.3
0.0
-0.3
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

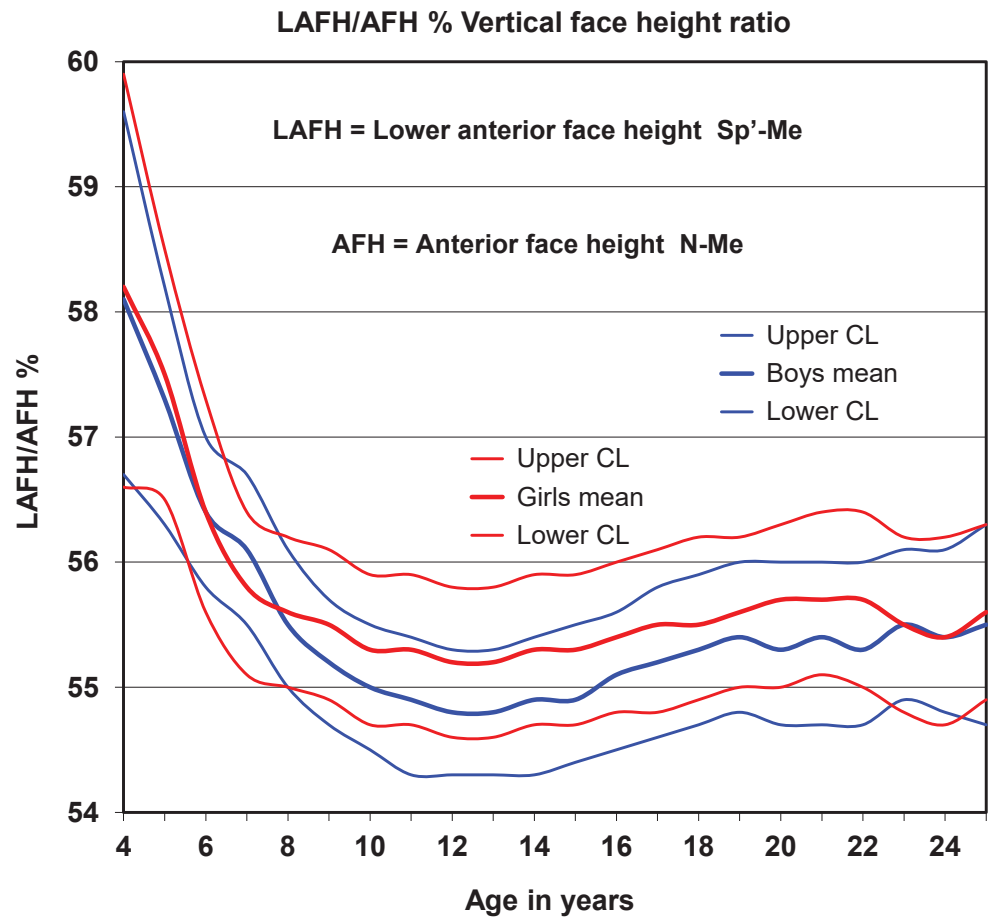
Figure 40



LAFH/AFH %												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	56.7	58.1	59.6	1.97	0.08		7	56.6	58.2	59.9	2.20
5	18	56.3	57.3	58.2	2.01	0.32		19	56.5	57.5	58.5	2.23
6	35	55.8	56.4	57.0	1.88	0.05		27	55.6	56.4	57.3	2.25
7	43	55.5	56.1	56.7	1.95	-0.68		39	55.1	55.8	56.4	2.09
8	48	55.0	55.5	56.1	1.91	0.08		49	55.0	55.6	56.2	2.15
9	49	54.7	55.2	55.7	1.87	0.66		53	54.9	55.5	56.1	2.22
10	50	54.5	55.0	55.5	1.84	0.81		54	54.7	55.3	55.9	2.26
11	50	54.3	54.9	55.4	1.87	0.98		55	54.7	55.3	55.9	2.25
12	50	54.3	54.8	55.3	1.89	1.03		55	54.6	55.2	55.8	2.27
13	50	54.3	54.8	55.3	1.91	1.04		55	54.6	55.2	55.8	2.30
14	50	54.3	54.8	55.4	1.94	1.00		55	54.7	55.3	55.9	2.32
15	50	54.4	54.9	55.5	1.97	0.90		55	54.7	55.3	55.9	2.34
16	50	54.5	55.1	55.6	2.01	0.76		55	54.8	55.4	56.0	2.36
17	50	54.6	55.2	55.8	2.06	0.61		55	54.8	55.5	56.1	2.38
18	49	54.7	55.3	55.9	2.11	0.57		55	54.9	55.5	56.2	2.39
19	49	54.8	55.4	56.0	2.16	0.44		55	55.0	55.6	56.2	2.39
20	46	54.7	55.3	56.0	2.17	0.75		55	55.0	55.7	56.3	2.39
21	46	54.7	55.4	56.0	2.22	0.79		54	55.1	55.7	56.4	2.40
22	46	54.7	55.3	56.0	2.23	0.76		53	55.0	55.7	56.4	2.43
23	41	54.9	55.5	56.1	2.00	0.02		42	54.8	55.5	56.2	2.37
24	35	54.8	55.4	56.1	2.08	-0.01		41	54.7	55.4	56.2	2.37
25	30	54.7	55.5	56.3	2.12	0.16		35	54.9	55.6	56.3	2.18

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.77	-0.55	-0.33	0.29	-0.44		7	-1.06	-0.65	-0.24	0.55
5	18	-0.60	-0.50	-0.39	0.23	-0.97		19	-0.83	-0.62	-0.40	0.48
6	35	-0.57	-0.46	-0.36	0.32	0.23		27	-0.60	-0.44	-0.29	0.40
7	43	-0.51	-0.42	-0.32	0.33	0.92		39	-0.46	-0.35	-0.24	0.34
8	48	-0.41	-0.33	-0.26	0.26	1.27		49	-0.34	-0.26	-0.18	0.29
9	49	-0.32	-0.25	-0.19	0.22	1.55		53	-0.24	-0.18	-0.13	0.22
10	50	-0.22	-0.17	-0.11	0.20	1.27		54	-0.17	-0.12	-0.07	0.19
11	50	-0.14	-0.09	-0.04	0.17	0.80		55	-0.11	-0.06	-0.02	0.17
12	50	-0.07	-0.02	0.02	0.16	0.14		55	-0.06	-0.02	0.02	0.15
13	50	-0.01	0.03	0.08	0.16	-0.41		55	-0.02	0.02	0.06	0.14
14	50	0.03	0.08	0.12	0.16	-1.00		55	0.01	0.05	0.09	0.14
15	50	0.07	0.12	0.16	0.16	-1.73		55	0.04	0.07	0.10	0.13
16	50	0.10	0.14	0.19	0.16	-2.43	p<0.05	55	0.04	0.07	0.11	0.12
17	50	0.10	0.14	0.19	0.17	-2.45	p<0.05	55	0.05	0.08	0.10	0.10
18	49	0.08	0.12	0.17	0.16	-2.11	p<0.05	55	0.05	0.07	0.09	0.09
19	49	0.07	0.12	0.17	0.18	-1.77		55	0.05	0.07	0.09	0.08
20	46	0.02	0.06	0.10	0.13	0.08		55	0.04	0.06	0.08	0.07
21	46	0.00	0.04	0.07	0.11	0.17		54	0.02	0.04	0.06	0.07
22	46	-0.01	0.02	0.04	0.10	-0.31		53	-0.01	0.01	0.04	0.09
23	41	-0.02	0.01	0.04	0.09	0.05		42	-0.01	0.01	0.03	0.06
24	35	-0.04	-0.01	0.02	0.09	0.91		41	-0.01	0.01	0.02	0.05
25	30	-0.03	0.00	0.04	0.10	-0.12		35	-0.02	0.00	0.02	0.05

Figure 40


LAFH/AFH % Vertical face height ratio
LAFH = Lower anterior face height Sp'-Me
AFH = Anterior face height N-Me
LAFH/AFH %
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
60
59
58
57
56
55
54
4
6
8
10
12
14
16
18
20
22
24

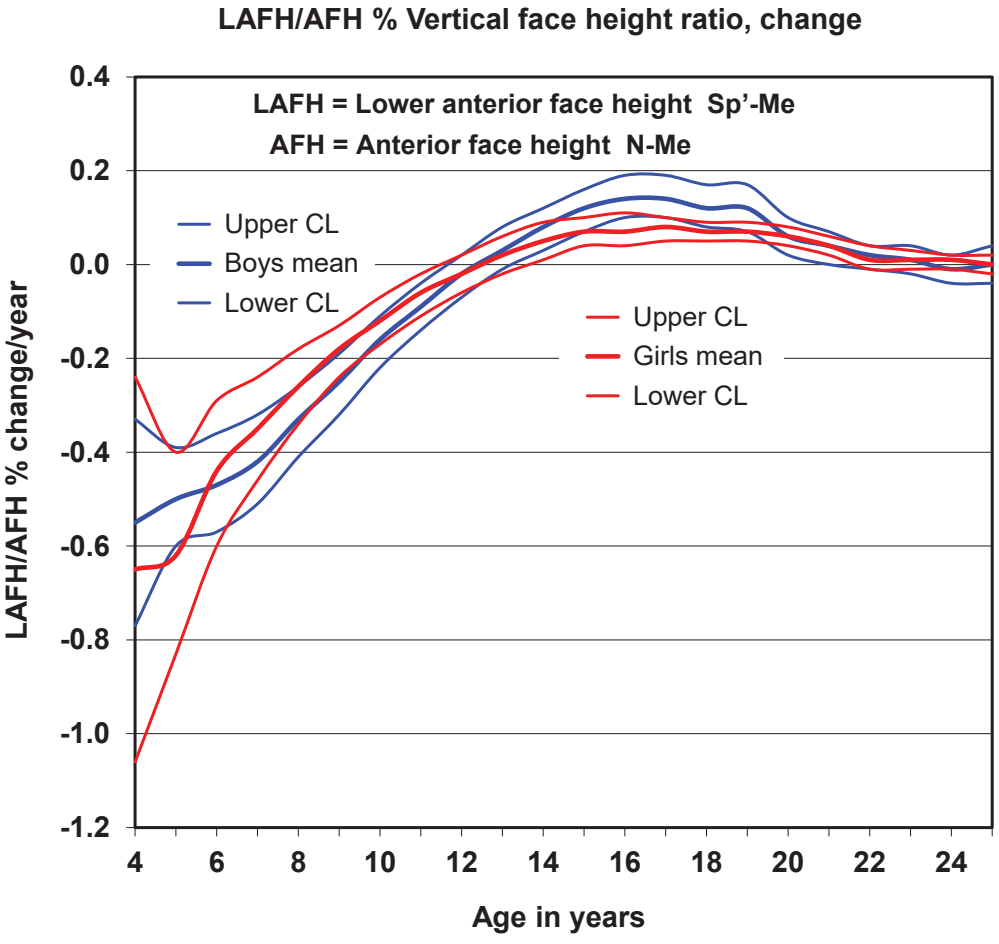
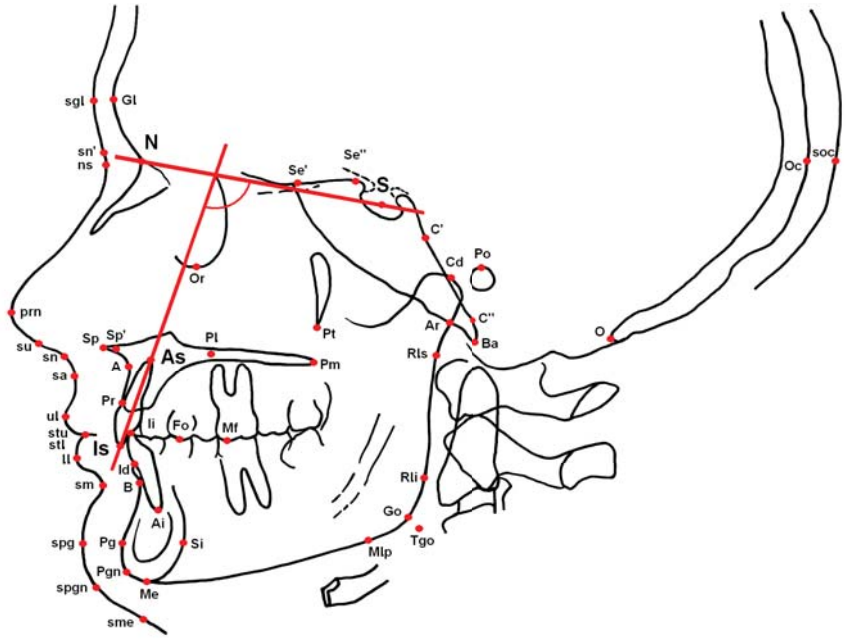

LAFH/AFH % Vertical face height ratio, change
LAFH = Lower anterior face height Sp'-Me
AFH = Anterior face height N-Me
LAFH/AFH % change/year
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
4
6
8
10
12
14
16
18
20
22
24

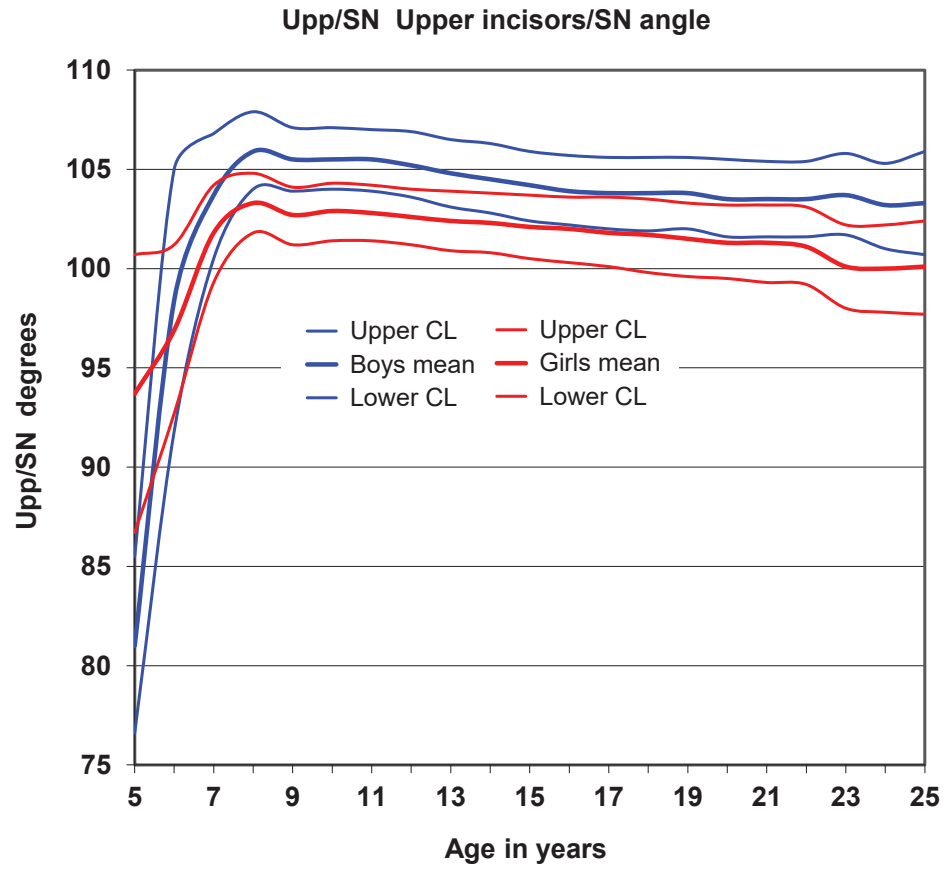
Figure 41



Upp/SN (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	76.6	81.0	85.5	4.54	-3.16	p<0.05	3	86.7	93.7	100.7	6.16
6	9	91.8	98.4	105.0	10.08	0.34		7	92.7	96.9	101.2	5.73
7	17	100.5	103.7	106.8	6.65	0.87		19	99.3	101.9	104.4	5.76
8	32	104.0	105.9	107.9	5.70	2.07	p<0.05	37	101.8	103.3	104.9	4.78
9	46	103.9	105.5	107.1	5.45	2.58	p<0.05	48	101.2	102.7	104.1	5.20
10	48	104.0	105.5	107.1	5.46	2.48	p<0.05	50	101.4	102.9	104.3	5.14
11	48	103.9	105.5	107.0	5.61	2.48	p<0.05	53	101.4	102.8	104.2	5.16
12	48	103.6	105.2	106.9	5.78	2.46	p<0.05	54	101.2	102.6	104.0	5.26
13	49	103.1	104.8	106.5	6.11	2.09	p<0.05	54	100.9	102.4	103.9	5.50
14	49	102.8	104.5	106.3	6.24	1.92		55	100.7	102.3	103.8	5.73
15	49	102.4	104.2	105.9	6.32	1.71		55	100.5	102.1	103.7	6.03
16	49	102.2	103.9	105.7	6.38	1.58		55	100.3	102.0	103.6	6.34
17	49	102.0	103.8	105.6	6.43	1.52		55	100.1	101.8	103.6	6.62
18	48	101.9	103.8	105.6	6.51	1.60		55	99.8	101.7	103.5	6.86
19	49	102.0	103.8	105.6	6.52	1.71		55	99.6	101.5	103.3	7.02
20	46	101.6	103.5	105.4	6.61	1.59		55	99.5	101.3	103.2	7.13
21	46	101.6	103.5	105.4	6.60	1.61		54	99.3	101.3	103.2	7.25
22	45	101.6	103.5	105.4	6.53	1.65		53	99.2	101.1	103.1	7.31
23	40	101.7	103.7	105.8	6.63	2.43	p<0.05	40	98.0	100.1	102.2	6.80
24	35	101.0	103.1	105.3	6.45	1.98		38	97.8	100.0	102.2	7.04
25	28	100.7	103.3	105.9	7.08	1.83		34	97.7	100.1	102.4	6.92

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	3.49	8.29	13.09	4.90	1.88		3	1.51	2.75	3.99	1.10
6	9	0.88	3.55	6.23	4.10	1.29		7	0.42	1.46	2.50	1.41
7	17	0.41	1.89	3.36	3.09	1.61		19	0.15	0.66	1.17	1.14
8	32	-0.21	0.42	1.06	1.83	0.83		37	-0.25	0.12	0.50	1.16
9	46	-0.19	0.14	0.48	1.16	0.47		48	-0.23	0.04	0.31	0.97
10	48	-0.28	-0.00	0.27	0.98	0.18		50	-0.27	-0.04	0.19	0.83
11	48	-0.36	-0.14	0.09	0.80	-0.24		53	-0.30	-0.10	0.10	0.74
12	48	-0.40	-0.21	-0.01	0.68	-0.53		54	-0.32	-0.14	0.05	0.68
13	49	-0.44	-0.26	-0.09	0.63	-1.02		54	-0.31	-0.13	0.05	0.68
14	49	-0.45	-0.29	-0.12	0.58	-1.09		55	-0.33	-0.15	0.04	0.69
15	49	-0.42	-0.26	-0.10	0.58	-0.88		55	-0.32	-0.15	0.02	0.64
16	49	-0.37	-0.21	-0.06	0.55	-0.65		55	-0.29	-0.14	0.01	0.57
17	49	-0.29	-0.15	0.00	0.52	-0.11		55	-0.26	-0.13	-0.01	0.49
18	48	-0.26	-0.13	0.01	0.48	0.17		55	-0.25	-0.14	-0.03	0.40
19	49	-0.21	-0.08	0.04	0.45	0.73		55	-0.23	-0.14	-0.05	0.33
20	46	-0.18	-0.07	0.04	0.38	0.98		55	-0.21	-0.13	-0.06	0.29
21	46	-0.13	-0.03	0.07	0.34	1.55		54	-0.19	-0.12	-0.05	0.26
22	45	-0.12	-0.01	0.10	0.37	1.80		53	-0.21	-0.13	-0.05	0.30
23	40	-0.11	-0.02	0.07	0.30	1.09		40	-0.18	-0.09	-0.01	0.28
24	35	-0.13	-0.04	0.06	0.30	0.54		38	-0.16	-0.07	0.01	0.27
25	28	-0.16	-0.05	0.06	0.30	0.24		34	-0.16	-0.07	0.03	0.27

Figure 41


Upp/SN Upper incisors/SN angle
Upp/SN degrees
110
105
100
95
90
85
80
75
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

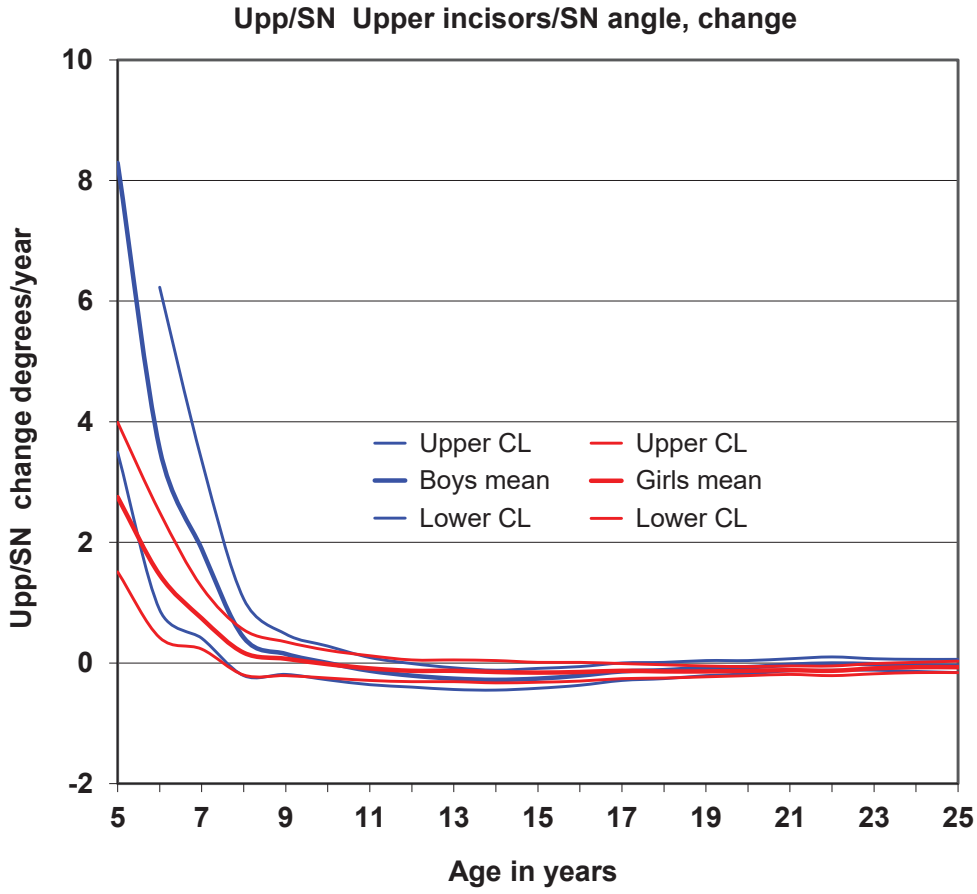
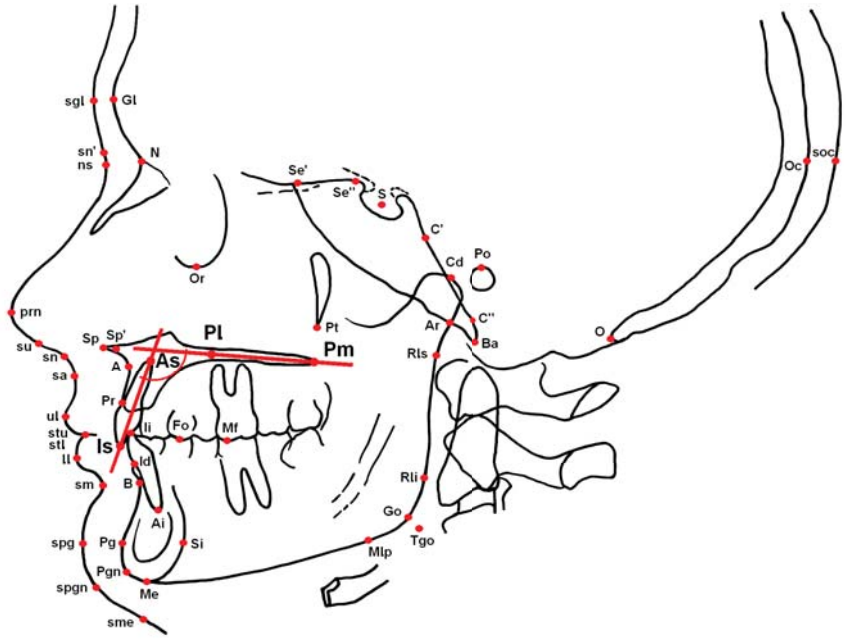

Upp/SN Upper incisors/SN angle, change
Upp/SN change degrees/year
10
8
6
4
2
0
-2
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

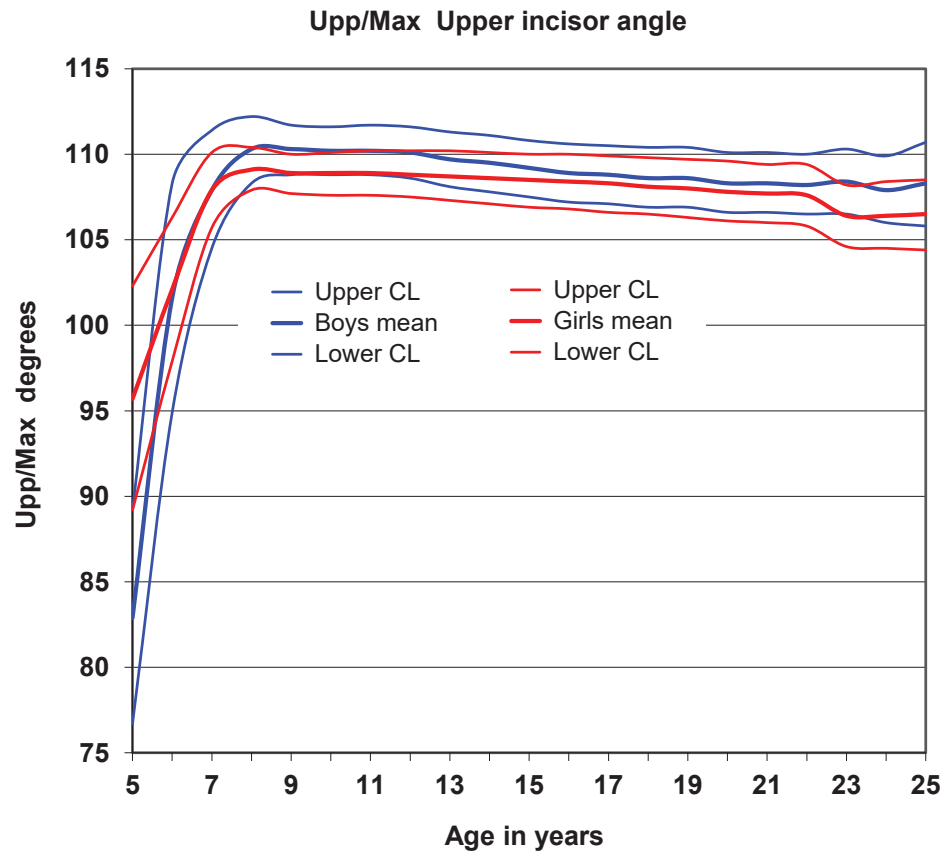
Figure 42



Upp/Max (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	76.7	82.9	89.2	6.35	-2.73	p<0.05	3	89.2	95.7	102.3	5.82
6	9	94.9	101.6	108.3	10.25	-0.11		7	97.9	102.1	106.3	5.66
7	17	104.5	107.9	111.4	7.23	0.03		19	105.6	107.9	110.2	5.12
8	32	108.3	110.3	112.2	5.61	1.02		37	107.8	109.1	110.4	4.01
9	46	108.8	110.3	111.7	4.94	1.47		48	107.7	108.9	110.1	4.24
10	48	108.8	110.2	111.6	4.90	1.41		50	107.6	108.9	110.1	4.48
11	48	108.8	110.2	111.7	5.11	1.32		53	107.6	108.9	110.2	4.83
12	48	108.6	110.1	111.6	5.33	1.21		54	107.5	108.8	110.2	5.11
13	49	108.1	109.7	111.3	5.69	0.91		54	107.3	108.7	110.1	5.39
14	49	107.8	109.5	111.1	5.91	0.78		55	107.1	108.6	110.1	5.60
15	49	107.5	109.2	110.8	5.98	0.60		55	106.9	108.5	110.0	5.83
16	49	107.2	108.9	110.6	6.06	0.47		55	106.8	108.4	110.0	6.05
17	49	107.1	108.8	110.5	6.09	0.39		55	106.6	108.3	109.9	6.22
18	48	106.9	108.6	110.4	6.17	0.39		55	106.5	108.1	109.8	6.35
19	49	106.9	108.6	110.4	6.17	0.51		55	106.3	108.0	109.7	6.45
20	46	106.6	108.3	110.1	6.19	0.39		55	106.1	107.8	109.6	6.47
21	46	106.6	108.3	110.1	6.13	0.49		54	106.0	107.7	109.4	6.51
22	45	106.5	108.2	110.0	6.04	0.49		53	105.8	107.6	109.4	6.59
23	40	106.5	108.4	110.3	6.01	1.49		40	104.6	106.4	108.2	5.84
24	35	105.9	107.9	109.9	6.00	1.06		38	104.5	106.4	108.4	5.99
25	28	105.8	108.3	110.7	6.62	1.12		34	104.4	106.5	108.5	6.18

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	4.24	9.46	14.67	5.32	1.75		3	1.54	3.73	5.92	1.94
6	9	1.13	4.10	7.07	4.54	1.26		7	0.13	1.73	3.34	2.17
7	17	0.45	2.07	3.69	3.41	1.53		19	-0.03	0.72	1.47	1.67
8	32	-0.04	0.61	1.26	1.88	1.15		37	-0.31	0.15	0.61	1.43
9	46	-0.18	0.16	0.51	1.20	0.61		48	-0.31	0.02	0.34	1.15
10	48	-0.23	0.05	0.34	1.02	0.35		50	-0.27	-0.02	0.24	0.93
11	48	-0.31	-0.08	0.15	0.81	-0.15		53	-0.28	-0.06	0.16	0.82
12	48	-0.35	-0.15	0.04	0.68	-0.45		54	-0.28	-0.09	0.10	0.71
13	49	-0.39	-0.22	-0.05	0.62	-1.18		54	-0.25	-0.07	0.11	0.66
14	49	-0.40	-0.25	-0.10	0.54	-1.40		55	-0.25	-0.09	0.08	0.64
15	49	-0.39	-0.24	-0.09	0.54	-1.31		55	-0.25	-0.09	0.06	0.60
16	49	-0.35	-0.21	-0.06	0.52	-1.13		55	-0.23	-0.09	0.06	0.54
17	49	-0.30	-0.16	-0.02	0.49	-0.80		55	-0.21	-0.08	0.04	0.48
18	48	-0.27	-0.15	-0.02	0.45	-0.52		55	-0.21	-0.10	0.01	0.42
19	49	-0.23	-0.11	0.02	0.45	0.12		55	-0.21	-0.12	-0.02	0.35
20	46	-0.18	-0.08	0.03	0.37	0.71		55	-0.20	-0.12	-0.04	0.30
21	46	-0.16	-0.05	0.06	0.39	0.84		54	-0.18	-0.10	-0.03	0.28
22	45	-0.16	-0.03	0.10	0.46	1.05		53	-0.19	-0.11	-0.03	0.29
23	40	-0.18	-0.06	0.05	0.37	0.47		40	-0.19	-0.10	-0.01	0.29
24	35	-0.18	-0.08	0.02	0.30	-0.26		38	-0.15	-0.06	0.02	0.27
25	28	-0.23	-0.11	0.01	0.32	-1.13		34	-0.11	-0.03	0.06	0.25

Figure 42


Upp/Max Upper incisor angle
Upp/Max degrees
115
110
105
100
95
90
85
80
75
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

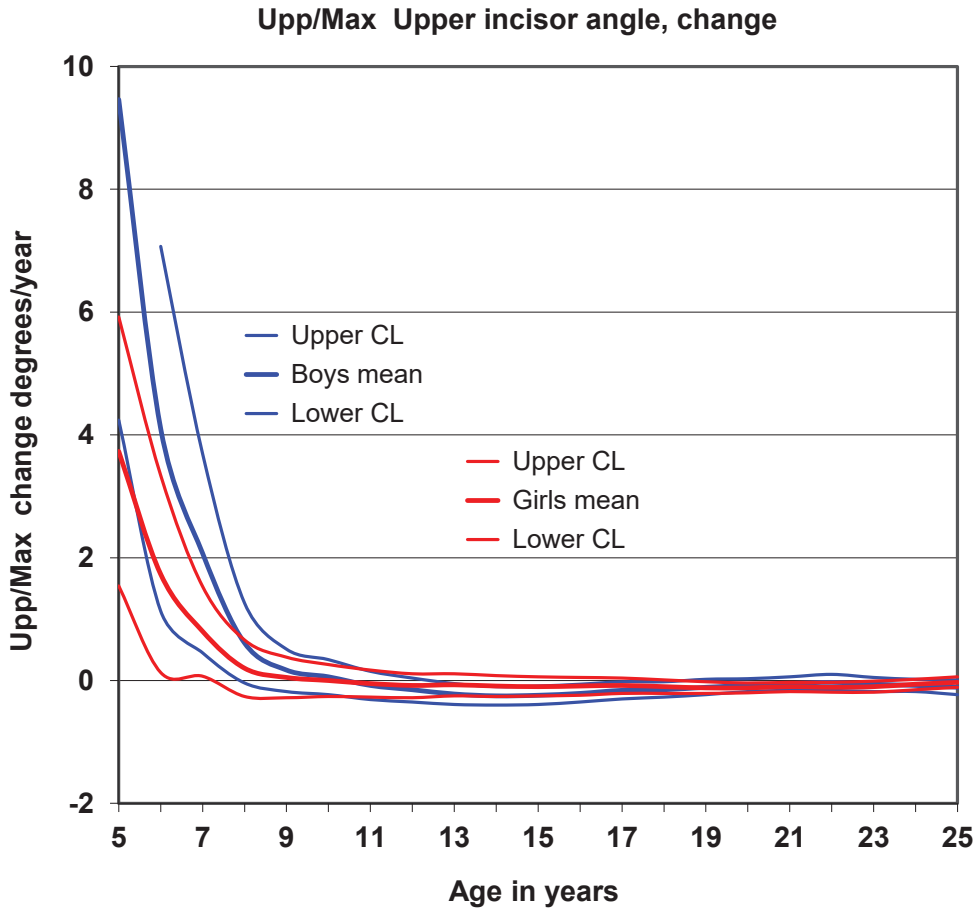
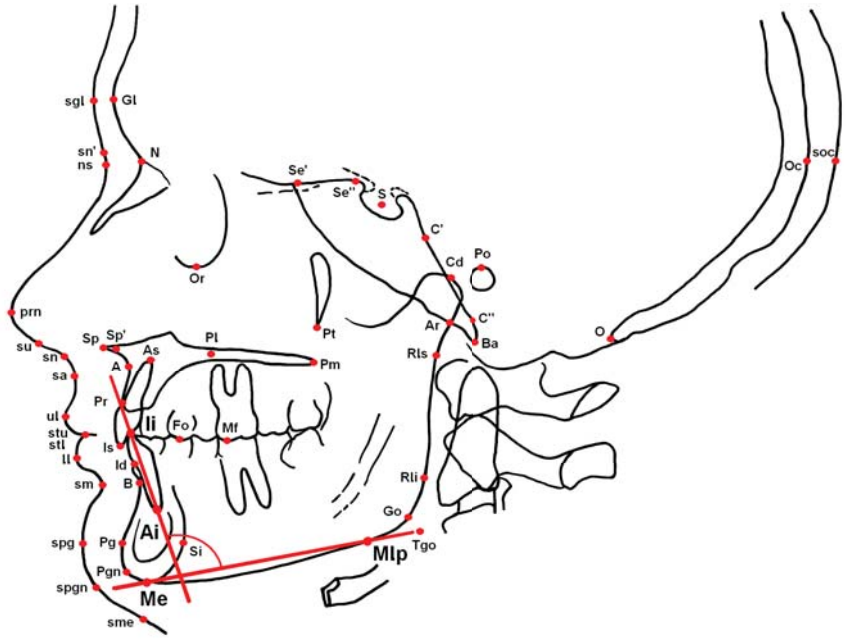

Upp/Max Upper incisor angle, change
Upp/Max change degrees/year
10
8
6
4
2
0
-2
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

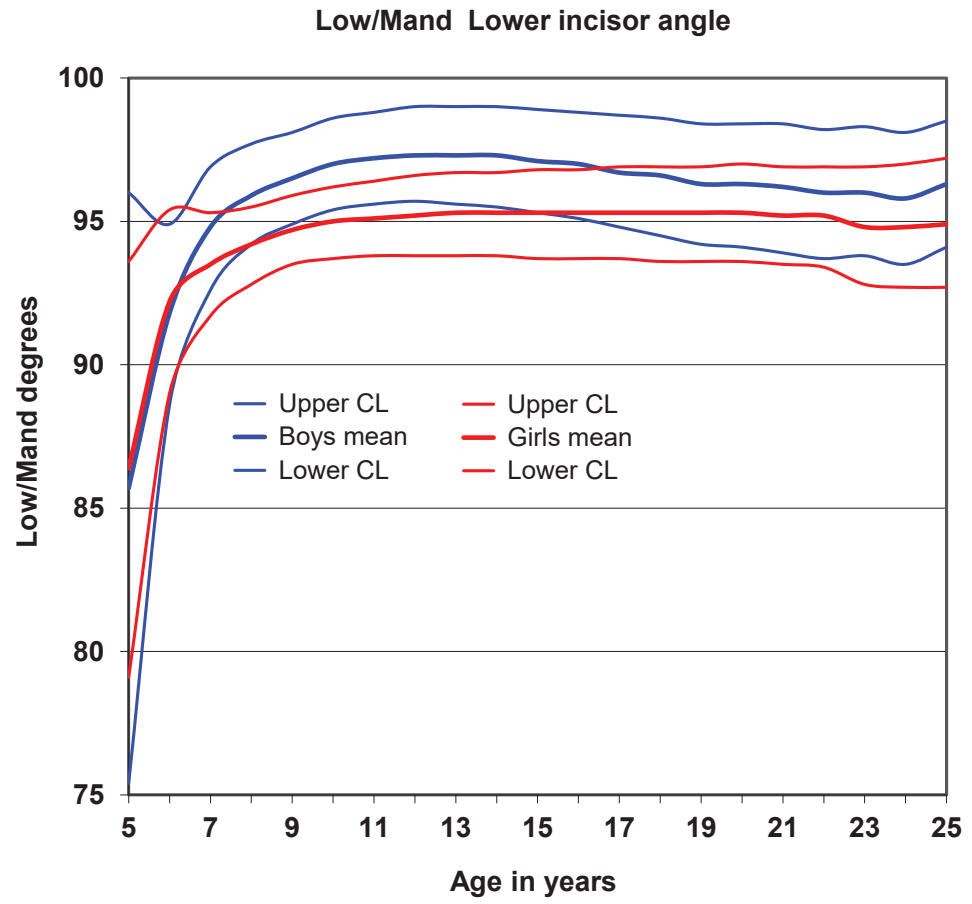
Figure 43



Low/Mand (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	75.4	85.7	96.0	12.89	-0.10		5	79.1	86.4	93.6	8.28
6	20	88.6	91.8	95.0	7.26	-0.17		14	89.0	92.2	95.4	6.12
7	31	92.6	94.8	96.9	6.16	0.88		34	91.7	93.5	95.3	5.24
8	40	94.2	95.9	97.7	5.69	1.58		47	92.8	94.2	95.5	4.71
9	48	94.9	96.5	98.1	5.69	1.79		52	93.5	94.7	95.9	4.42
10	49	95.4	97.0	98.6	5.68	1.94		53	93.7	95.0	96.2	4.75
11	49	95.6	97.2	98.8	5.82	1.96		54	93.8	95.1	96.4	4.98
12	49	95.7	97.3	99.0	5.93	1.93		54	93.8	95.2	96.6	5.22
13	49	95.6	97.3	99.0	6.06	1.81		54	93.8	95.3	96.7	5.50
14	49	95.5	97.3	99.0	6.26	1.74		55	93.8	95.3	96.7	5.64
15	49	95.4	97.2	99.0	6.45	1.57		55	93.7	95.3	96.8	5.81
16	49	95.1	97.0	98.9	6.66	1.38		55	93.7	95.3	96.8	5.91
17	49	94.8	96.8	98.7	6.92	1.18		55	93.7	95.3	96.9	6.05
18	48	94.6	96.6	98.6	7.22	1.01		55	93.6	95.3	96.9	6.21
19	49	94.3	96.4	98.4	7.40	0.81		55	93.6	95.3	96.9	6.28
20	46	94.1	96.3	98.5	7.52	0.74		55	93.6	95.3	97.0	6.31
21	46	94.0	96.2	98.4	7.73	0.72		54	93.5	95.2	96.9	6.35
22	45	93.8	96.0	98.3	7.78	0.58		53	93.4	95.2	96.9	6.50
23	40	93.9	96.1	98.3	7.18	0.81		41	92.8	94.8	96.9	6.65
24	35	93.6	95.9	98.2	6.96	0.65		39	92.7	94.8	97.0	6.81
25	29	94.1	96.3	98.6	6.10	0.86		34	92.7	94.9	97.2	6.73
25	30	54.7	55.5	56.3	2.12	0.16		35	54.9	55.6	56.3	2.18

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	0.62	2.67	4.72	2.56	0.56		5	0.83	1.96	3.09	1.29
6	20	1.30	1.95	2.60	1.48	2.07	p<0.05	14	0.55	1.02	1.50	0.91
7	31	0.97	1.46	1.94	1.38	2.84	p<0.01	34	0.21	0.58	0.95	1.10
8	40	0.57	0.99	1.41	1.34	2.54	p<0.05	47	0.09	0.36	0.64	0.96
9	48	0.31	0.59	0.88	1.01	2.32	p<0.05	52	-0.00	0.19	0.38	0.71
10	49	0.16	0.38	0.61	0.79	1.80		53	-0.03	0.13	0.30	0.61
11	49	0.00	0.19	0.38	0.68	0.67		54	-0.03	0.11	0.25	0.52
12	49	-0.08	0.08	0.24	0.58	0.00		54	-0.05	0.08	0.21	0.50
13	49	-0.18	-0.02	0.14	0.58	-0.87		54	-0.05	0.07	0.19	0.44
14	49	-0.28	-0.11	0.06	0.60	-1.39		55	-0.08	0.04	0.16	0.46
15	49	-0.32	-0.15	0.01	0.59	-1.63		55	-0.11	0.02	0.14	0.46
16	49	-0.34	-0.18	-0.02	0.57	-1.99	p<0.05	55	-0.10	0.02	0.13	0.44
17	49	-0.33	-0.17	-0.02	0.55	-1.94		55	-0.10	0.01	0.12	0.41
18	48	-0.32	-0.17	-0.02	0.52	-2.06	p<0.05	55	-0.09	0.01	0.11	0.37
19	49	-0.29	-0.15	-0.02	0.48	-2.00	p<0.05	55	-0.08	0.01	0.10	0.33
20	46	-0.23	-0.11	0.02	0.43	-1.86		55	-0.05	0.03	0.11	0.30
21	46	-0.18	-0.07	0.04	0.38	-1.33		54	-0.06	0.02	0.09	0.29
22	45	-0.15	-0.05	0.06	0.36	-0.77		53	-0.09	0.01	0.12	0.40
23	40	-0.15	-0.03	0.08	0.36	-0.64		41	-0.08	0.01	0.10	0.30
24	35	-0.10	0.00	0.10	0.29	0.53		39	-0.13	-0.04	0.06	0.29
25	29	-0.06	0.01	0.08	0.19	0.95		34	-0.16	-0.06	0.05	0.31
25	30	-0.03	0.00	0.04	0.10	-0.12		35	-0.02	0.00	0.02	0.05

Figure 43


Low/Mand Lower incisor angle
Low/Mand degrees
100
95
90
85
80
75
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

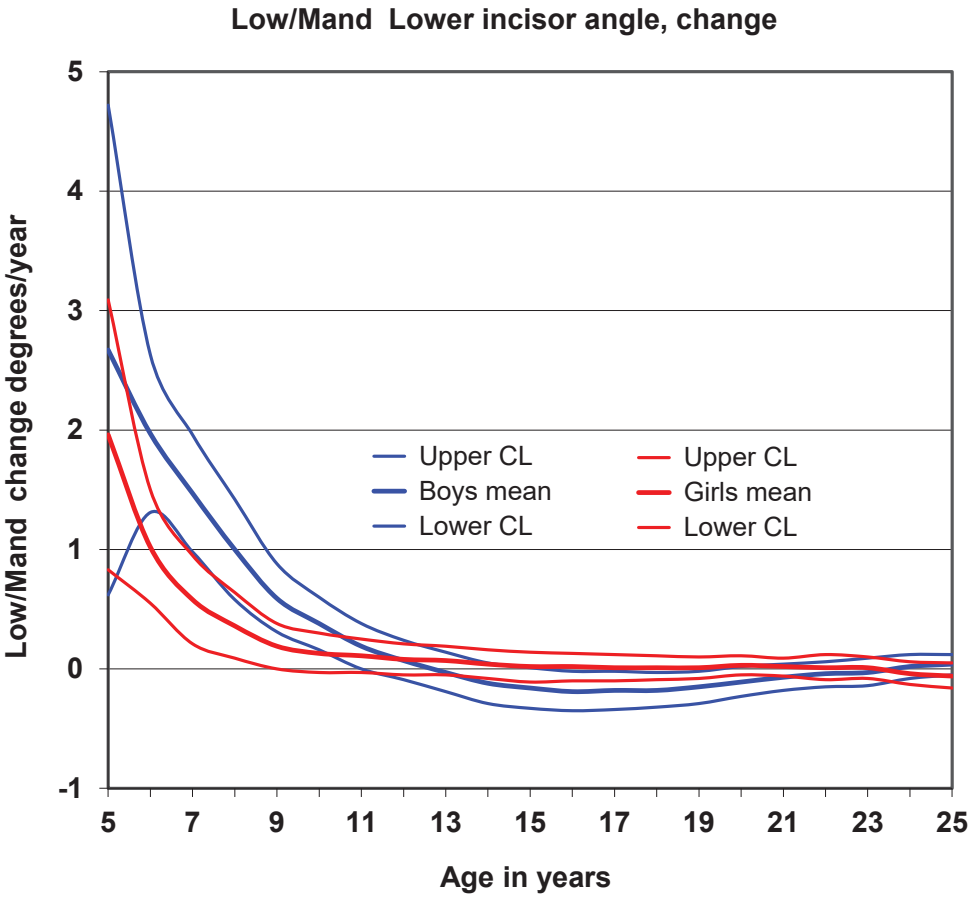
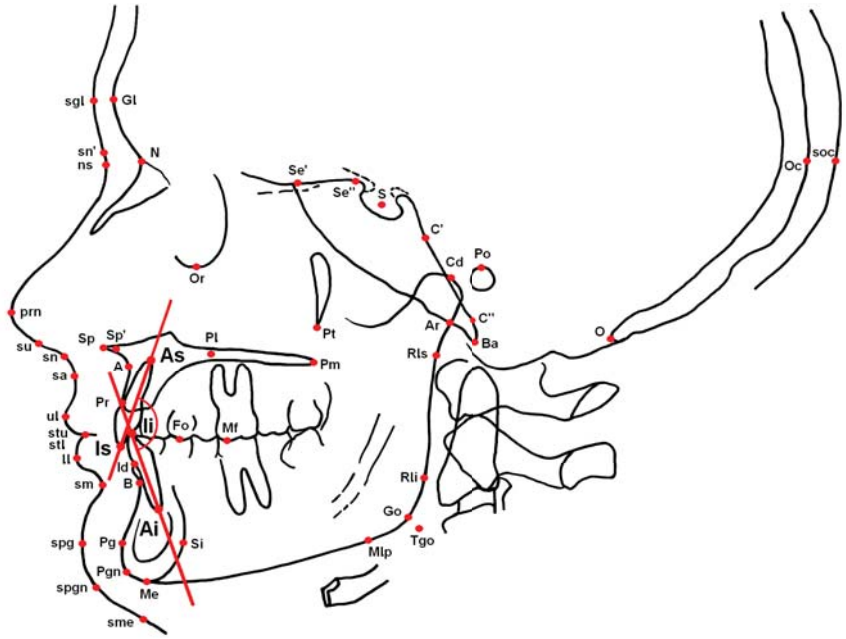

Low/Mand Lower incisor angle, change
Low/Mand change degrees/year
5
4
3
2
1
0
-1
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

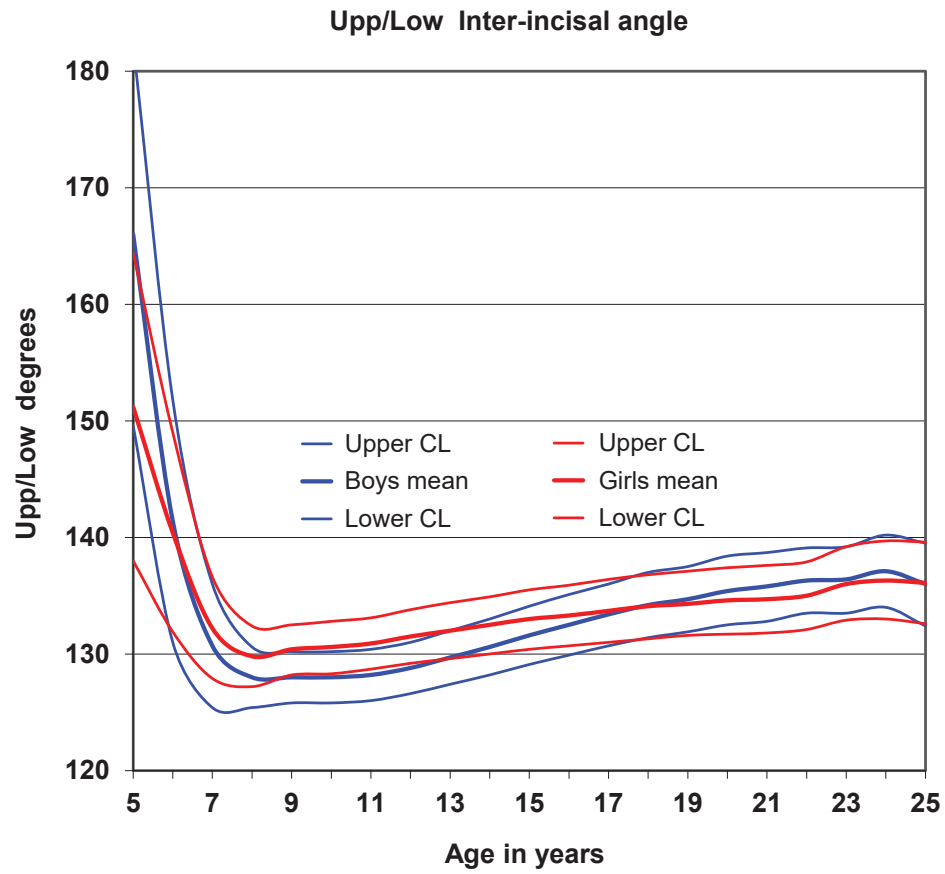
Figure 44



Upp/Low (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	149.6	166.0	182.4	16.75	1.30		3	138.0	151.2	164.4	11.63
6	9	131.0	141.4	151.8	15.96	0.14		7	131.9	140.4	149.0	11.56
7	17	125.4	130.7	136.0	11.15	-0.49		19	127.9	132.4	137.0	10.06
8	32	125.4	128.0	130.6	7.53	-0.99		37	127.3	129.9	132.6	8.25
9	46	125.8	128.0	130.2	7.58	-1.48		48	128.2	130.3	132.5	7.70
10	48	125.8	128.0	130.2	7.78	-1.59		50	128.3	130.6	132.8	8.04
11	48	126.0	128.2	130.4	7.81	-1.66		53	128.7	130.9	133.1	8.31
12	48	126.5	128.8	131.0	7.93	-1.65		54	129.2	131.5	133.8	8.59
13	49	127.4	129.7	132.0	8.21	-1.36		54	129.6	132.0	134.4	8.98
14	49	128.2	130.6	133.0	8.59	-1.09		55	130.1	132.5	134.9	9.25
15	49	129.1	131.6	134.1	8.97	-0.76		55	130.4	133.0	135.5	9.56
16	49	129.9	132.5	135.1	9.29	-0.45		55	130.8	133.4	136.0	9.85
17	49	130.7	133.4	136.0	9.54	-0.19		55	131.0	133.7	136.4	10.12
18	48	131.4	134.2	136.9	9.87	0.04		55	131.3	134.1	136.8	10.34
19	49	131.8	134.7	137.5	10.05	0.15		55	131.6	134.3	137.1	10.52
20	46	132.4	135.4	138.3	10.23	0.40		55	131.7	134.6	137.4	10.66
21	46	132.8	135.7	138.7	10.28	0.50		54	131.8	134.7	137.6	10.83
22	45	133.4	136.3	139.1	9.74	0.61		53	132.1	135.0	137.9	10.87
23	40	133.5	136.4	139.2	9.23	0.15		40	132.9	136.0	139.2	10.29
24	35	134.0	137.1	140.2	9.45	0.33		38	133.0	136.3	139.7	10.58
25	28	132.4	135.9	139.5	9.52	-0.05		34	132.6	136.1	139.6	10.42

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-18.68	-11.32	-3.97	7.50	1.50		3	-5.59	-4.66	-3.73	0.82
6	9	-8.88	-5.22	-1.57	5.60	1.40		7	-3.76	-2.06	-0.36	2.30
7	17	-4.83	-2.80	-0.76	4.29	1.86		19	-1.60	-0.79	0.01	1.79
8	32	-1.71	-0.83	0.05	2.54	1.84		37	-0.44	0.13	0.71	1.78
9	46	-0.57	-0.11	0.35	1.58	1.54		48	-0.03	0.36	0.75	1.39
10	48	-0.23	0.14	0.50	1.30	1.10		50	0.10	0.40	0.71	1.09
11	48	0.13	0.42	0.72	1.04	0.08		53	0.20	0.44	0.68	0.89
12	48	0.38	0.64	0.90	0.92	-0.86		54	0.28	0.49	0.70	0.79
13	49	0.57	0.83	1.09	0.92	-2.29	p<0.05	54	0.25	0.45	0.65	0.75
14	49	0.68	0.94	1.19	0.90	-2.88	p<0.01	55	0.26	0.46	0.67	0.77
15	49	0.70	0.94	1.18	0.86	-3.27	p<0.01	55	0.25	0.44	0.62	0.70
16	49	0.67	0.90	1.13	0.83	-3.67	p<0.001	55	0.20	0.37	0.54	0.65
17	49	0.59	0.80	1.00	0.73	-3.68	p<0.001	55	0.17	0.32	0.48	0.58
18	48	0.56	0.74	0.91	0.61	-4.31	p<0.001	55	0.14	0.27	0.40	0.49
19	49	0.46	0.62	0.77	0.55	-4.29	p<0.001	55	0.12	0.22	0.32	0.39
20	46	0.34	0.47	0.60	0.45	-3.90	p<0.001	55	0.07	0.16	0.25	0.35
21	46	0.18	0.30	0.42	0.41	-2.54	p<0.05	54	0.03	0.12	0.20	0.32
22	45	0.05	0.18	0.31	0.45	-0.79		53	0.00	0.11	0.23	0.42
23	40	-0.01	0.13	0.27	0.45	-0.89		40	-0.05	0.06	0.16	0.33
24	35	-0.05	0.07	0.20	0.38	0.12		38	-0.02	0.08	0.19	0.33
25	28	-0.11	0.02	0.15	0.36	0.69		34	-0.04	0.08	0.20	0.37

Figure 44


Upp/Low Inter-incisal angle
Upp/Low degrees
180
170
160
150
140
130
120
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

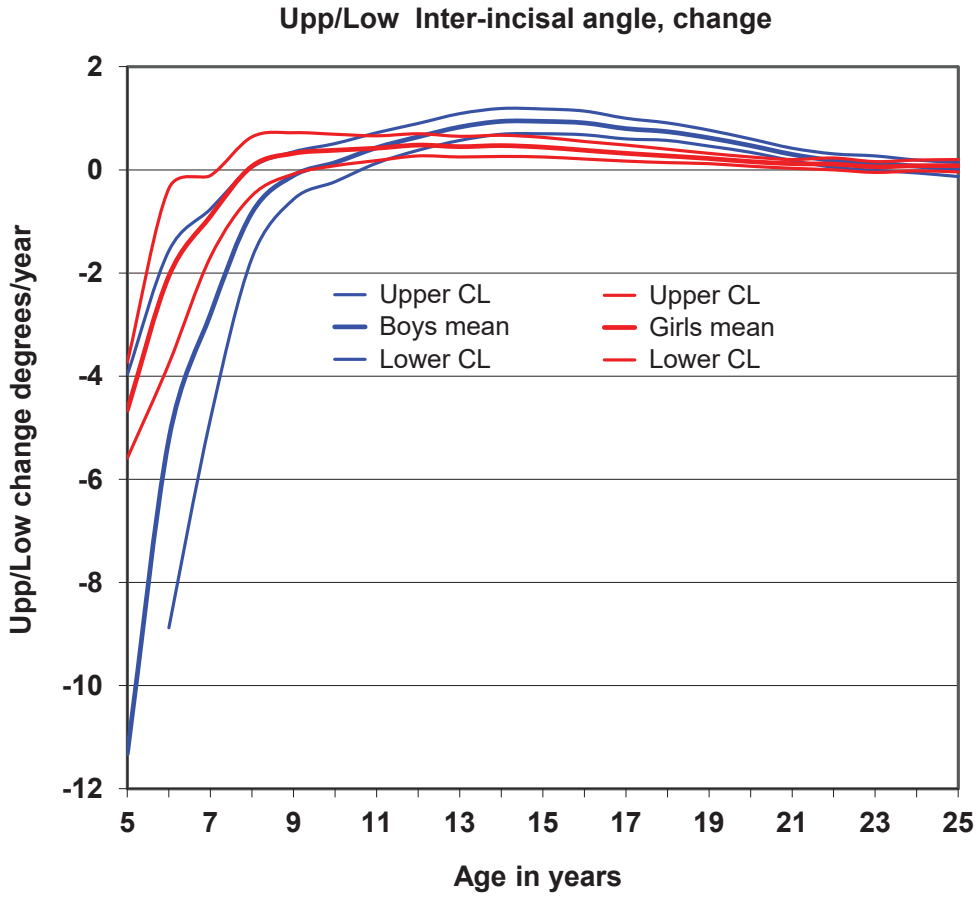
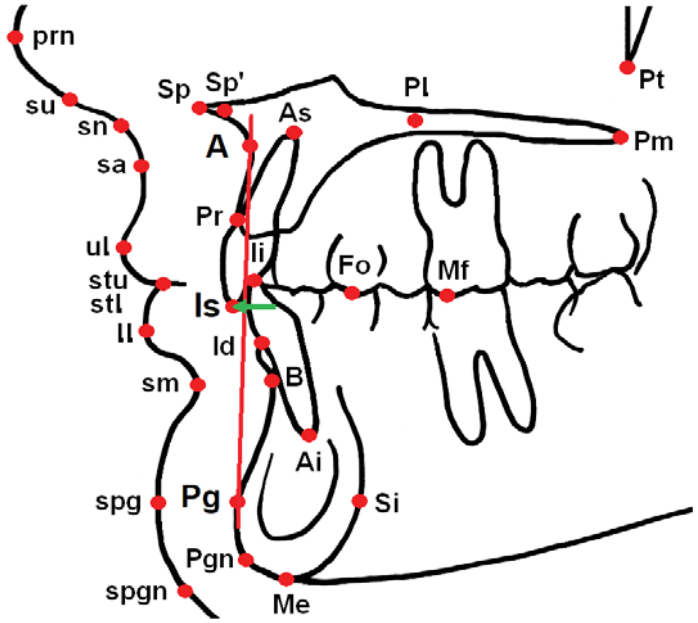

Upp/Low Inter-incisal angle, change
Upp/Low change degrees/year
2
0
-2
-4
-6
-8
-10
-12
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Figure 45



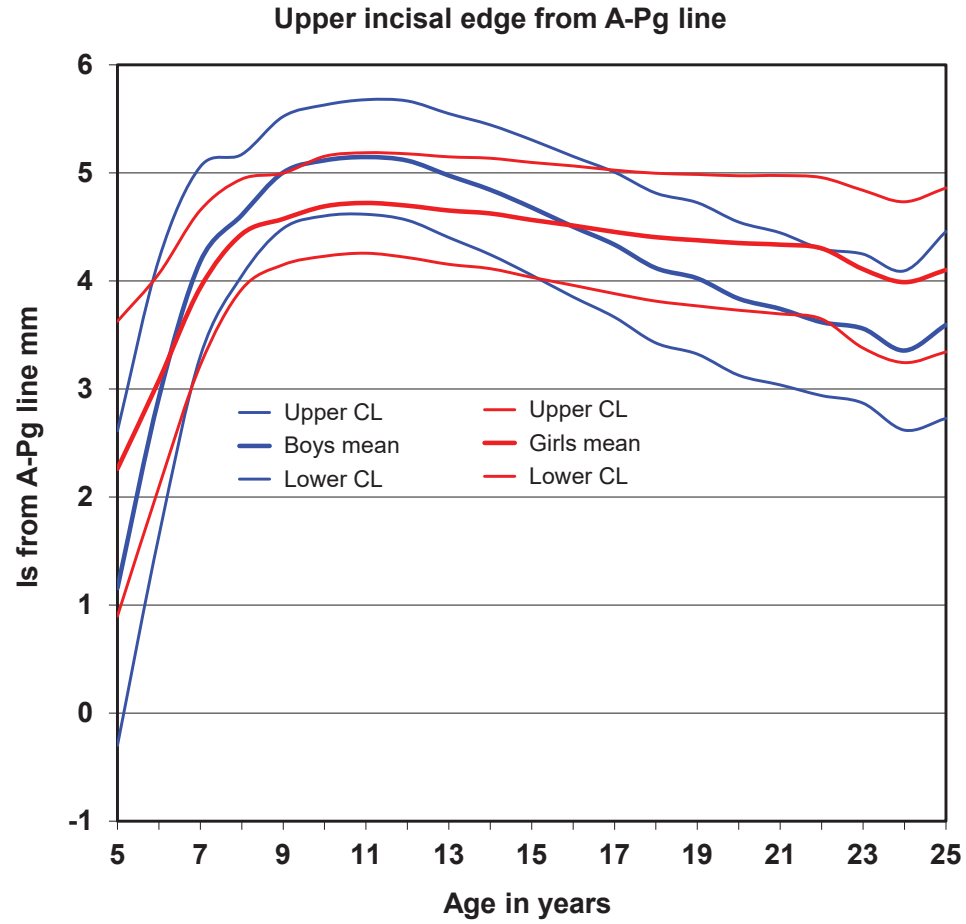
Is from A-Pg (mm)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-0.30	1.16	2.61	1.49	1.05		3	0.90	2.26	3.63	1.21
6	9	1.64	2.92	4.20	1.96	0.19		8	2.09	3.08	4.07	1.43
7	17	3.30	4.18	5.06	1.85	-0.42		22	3.22	3.94	4.65	1.72
8	32	4.05	4.61	5.17	1.62	-0.45		40	3.92	4.43	4.94	1.65
9	46	4.49	5.00	5.52	1.79	-1.27		51	4.15	4.57	5.00	1.54
10	48	4.60	5.12	5.63	1.81	-1.21		53	4.23	4.69	5.15	1.72
11	48	4.62	5.15	5.68	1.88	-1.19		54	4.26	4.72	5.19	1.74
12	48	4.56	5.11	5.67	1.95	-1.12		54	4.22	4.70	5.18	1.80
13	49	4.40	4.98	5.55	2.05	-0.84		54	4.15	4.65	5.15	1.86
14	49	4.24	4.84	5.44	2.14	-0.55		55	4.11	4.62	5.14	1.93
15	49	4.05	4.68	5.31	2.24	-0.27		55	4.03	4.57	5.10	2.01
16	49	3.85	4.50	5.15	2.32	0.02		55	3.96	4.51	5.06	2.09
17	49	3.66	4.34	5.01	2.40	0.27		55	3.88	4.45	5.03	2.16
18	48	3.43	4.12	4.81	2.45	0.62		55	3.81	4.40	5.00	2.24
19	49	3.32	4.02	4.72	2.50	0.75		55	3.77	4.38	4.99	2.30
20	46	3.13	3.84	4.55	2.45	1.07		55	3.73	4.35	4.97	2.35
21	46	3.04	3.74	4.45	2.44	1.22		54	3.70	4.34	4.98	2.40
22	45	2.94	3.62	4.30	2.32	1.42		53	3.65	4.30	4.96	2.43
23	40	2.87	3.56	4.25	2.23	1.07		40	3.38	4.11	4.84	2.36
24	35	2.62	3.36	4.09	2.23	1.18		38	3.24	3.99	4.73	2.34
25	28	2.73	3.59	4.46	2.33	0.87		34	3.34	4.10	4.86	2.26
25	29	188.4	190.6	192.8	6.01	6.16	p<0.001	35	179.7	181.6	183.4	5.68

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	0.25	0.56	0.88	0.32	0.36		3	0.28	0.65	1.03	0.33
6	9	0.46	0.82	1.18	0.55	-2.00		8	0.21	0.39	0.57	0.26
7	17	0.33	0.54	0.75	0.45	-2.11	p<0.05	22	0.22	0.31	0.40	0.22
8	32	0.14	0.27	0.41	0.40	-1.41		40	0.07	0.16	0.25	0.28
9	46	0.05	0.14	0.23	0.31	-0.99		51	0.02	0.09	0.15	0.25
10	48	-0.01	0.06	0.13	0.25	-0.54		53	-0.02	0.03	0.09	0.20
11	48	-0.07	-0.01	0.05	0.22	0.17		54	-0.05	-0.00	0.04	0.18
12	48	-0.12	-0.07	-0.01	0.21	0.99		54	-0.07	-0.03	0.01	0.16
13	49	-0.17	-0.12	-0.06	0.20	2.08	p<0.05	54	-0.09	-0.05	-0.01	0.15
14	49	-0.20	-0.15	-0.10	0.19	2.95	p<0.01	55	-0.09	-0.06	-0.02	0.15
15	49	-0.23	-0.18	-0.13	0.18	3.58	p<0.001	55	-0.10	-0.06	-0.03	0.14
16	49	-0.23	-0.18	-0.13	0.17	3.99	p<0.001	55	-0.10	-0.06	-0.03	0.13
17	49	-0.20	-0.16	-0.12	0.15	4.14	p<0.001	55	-0.09	-0.06	-0.02	0.12
18	48	-0.20	-0.16	-0.13	0.13	4.93	p<0.001	55	-0.08	-0.05	-0.02	0.11
19	49	-0.18	-0.14	-0.11	0.12	5.22	p<0.001	55	-0.06	-0.03	-0.00	0.10
20	46	-0.14	-0.11	-0.08	0.10	4.59	p<0.001	55	-0.05	-0.03	-0.01	0.08
21	46	-0.10	-0.08	-0.05	0.10	3.25	p<0.01	54	-0.04	-0.02	-0.01	0.07
22	45	-0.07	-0.04	-0.01	0.11	1.08		53	-0.04	-0.02	0.00	0.08
23	40	-0.06	-0.03	0.01	0.11	1.14		40	-0.02	-0.00	0.02	0.07
24	35	-0.05	-0.02	0.01	0.09	1.03		38	-0.02	-0.00	0.01	0.06
25	28	-0.03	0.00	0.03	0.07	-0.19		34	-0.02	-0.00	0.02	0.06
25	29	-0.18	-0.08	0.02	0.27	-1.53		35	-0.05	0.02	0.09	0.21

Figure 45


Upper incisal edge from A-Pg line
Is from A-Pg line mm
6
5
4
3
2
1
0
-1
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

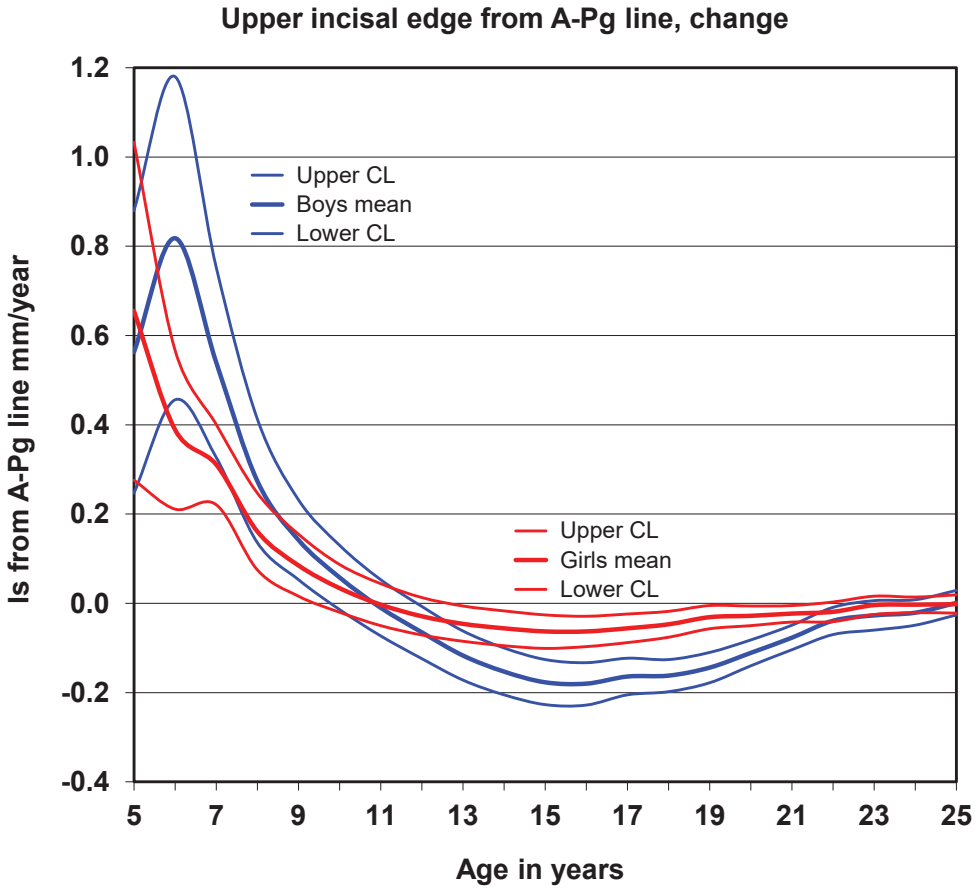
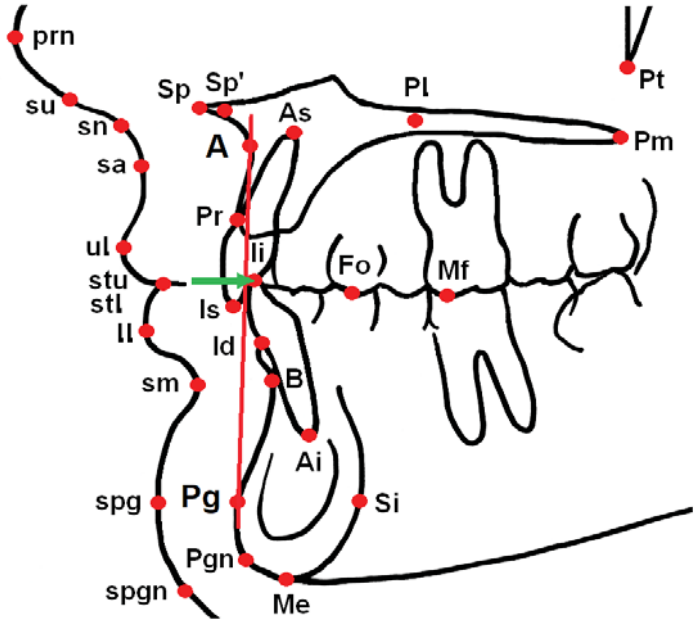

Upper incisal edge from A-Pg line, change
Is from A-Pg line mm/year
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Figure 46



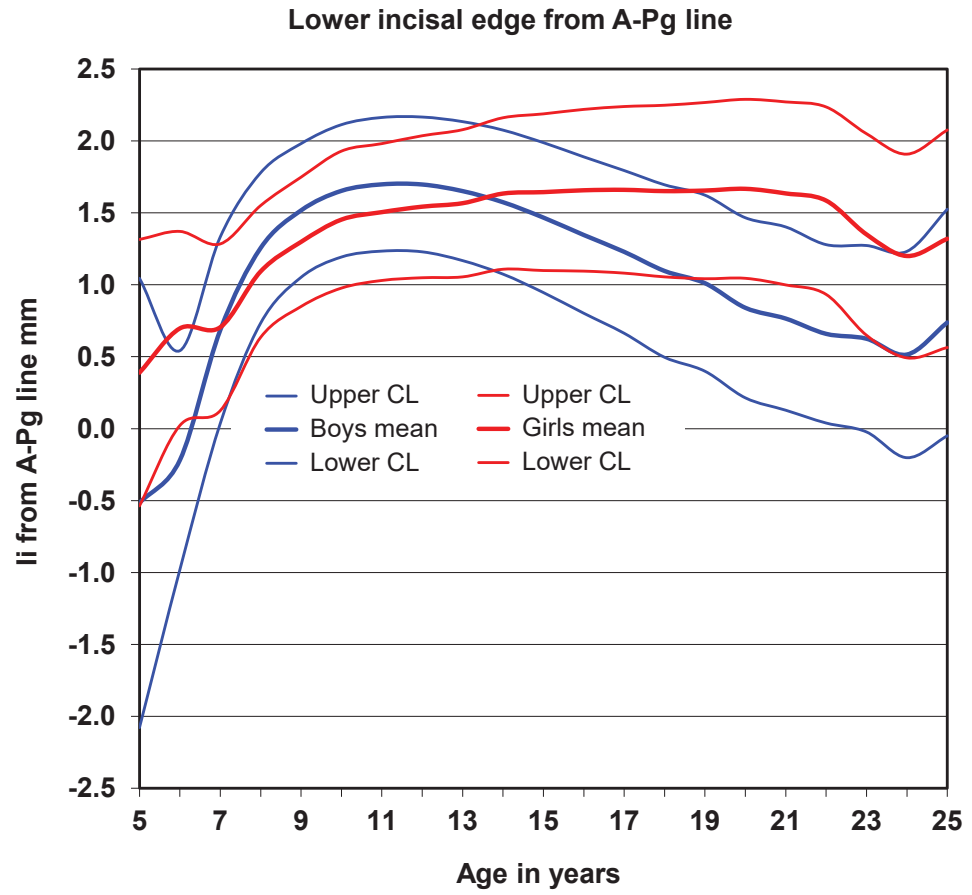
li from A-Pg (mm)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	-2.08	-0.52	1.05	1.95	0.93		5	-0.54	0.39	1.31	1.06
6	20	-0.98	-0.22	0.54	1.74	1.67		14	0.02	0.70	1.37	1.29
7	31	0.04	0.68	1.33	1.84	0.04		34	0.12	0.70	1.28	1.73
8	40	0.73	1.26	1.78	1.69	-0.46		47	0.63	1.09	1.55	1.60
9	48	1.05	1.52	1.98	1.64	-0.66		52	0.85	1.30	1.75	1.65
10	49	1.19	1.65	2.11	1.64	-0.59		53	0.98	1.45	1.93	1.77
11	49	1.23	1.70	2.16	1.66	-0.57		54	1.03	1.51	1.98	1.78
12	49	1.23	1.70	2.17	1.67	-0.44		54	1.05	1.54	2.04	1.85
13	49	1.17	1.65	2.13	1.72	-0.23		54	1.06	1.57	2.08	1.92
14	49	1.07	1.57	2.07	1.79	0.16		55	1.11	1.63	2.16	1.99
15	49	0.95	1.47	1.99	1.86	0.46		55	1.10	1.64	2.19	2.06
16	49	0.80	1.35	1.89	1.94	0.78		55	1.09	1.66	2.22	2.13
17	49	0.66	1.23	1.79	2.02	1.04		55	1.08	1.66	2.24	2.19
18	48	0.50	1.10	1.70	2.12	1.28		55	1.05	1.65	2.25	2.26
19	49	0.40	1.01	1.62	2.19	1.45		55	1.04	1.65	2.27	2.32
20	46	0.21	0.84	1.47	2.17	1.82		55	1.05	1.67	2.29	2.35
21	46	0.13	0.77	1.40	2.20	1.88		54	1.00	1.64	2.27	2.38
22	45	0.04	0.66	1.28	2.12	2.00	p<0.05	53	0.93	1.58	2.24	2.42
23	40	-0.02	0.63	1.27	2.09	1.49		41	0.65	1.35	2.05	2.29
24	35	-0.20	0.52	1.23	2.16	1.33		39	0.49	1.20	1.91	2.26
25	29	-0.05	0.74	1.53	2.16	1.04		34	0.56	1.32	2.08	2.25
25	29	188.4	190.6	192.8	6.01	6.16	p<0.001	35	179.7	181.6	183.4	5.68

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	0.27	0.43	0.60	0.20	0.64		5	0.21	0.55	0.88	0.38
6	20	0.42	0.59	0.75	0.37	-2.12	p<0.05	14	0.12	0.31	0.51	0.37
7	31	0.32	0.44	0.55	0.33	-1.35		34	0.18	0.31	0.45	0.41
8	40	0.19	0.29	0.39	0.33	-1.32		47	0.09	0.19	0.29	0.35
9	48	0.11	0.17	0.24	0.23	-1.04		52	0.05	0.12	0.19	0.25
10	49	0.04	0.09	0.14	0.18	-0.64		53	0.02	0.07	0.12	0.19
11	49	-0.02	0.02	0.07	0.17	0.65		54	0.00	0.05	0.09	0.16
12	49	-0.07	-0.02	0.03	0.17	1.66		54	-0.01	0.03	0.07	0.15
13	49	-0.11	-0.06	-0.02	0.16	3.16	p<0.01	54	-0.01	0.03	0.06	0.13
14	49	-0.14	-0.10	-0.05	0.16	3.93	p<0.001	55	-0.02	0.02	0.05	0.13
15	49	-0.17	-0.12	-0.07	0.17	4.22	p<0.001	55	-0.03	0.01	0.04	0.13
16	49	-0.17	-0.12	-0.07	0.17	4.46	p<0.001	55	-0.03	0.01	0.04	0.12
17	49	-0.16	-0.11	-0.06	0.16	4.20	p<0.001	55	-0.03	0.00	0.03	0.11
18	48	-0.15	-0.11	-0.07	0.15	4.51	p<0.001	55	-0.02	0.00	0.03	0.10
19	49	-0.14	-0.10	-0.06	0.15	4.27	p<0.001	55	-0.02	0.00	0.03	0.09
20	46	-0.12	-0.09	-0.06	0.11	5.02	p<0.001	55	-0.02	0.00	0.03	0.08
21	46	-0.09	-0.06	-0.03	0.09	3.41	p<0.001	54	-0.02	-0.00	0.01	0.07
22	45	-0.06	-0.04	-0.01	0.09	1.55		53	-0.04	-0.01	0.01	0.09
23	40	-0.05	-0.03	-0.00	0.08	1.06		41	-0.03	-0.01	0.02	0.08
24	35	-0.05	-0.02	0.00	0.07	0.60		39	-0.04	-0.01	0.01	0.07
25	29	-0.04	-0.01	0.02	0.08	-0.72		34	-0.05	-0.02	0.00	0.08
25	29	-0.18	-0.08	0.02	0.27	-1.53		35	-0.05	0.02	0.09	0.21

Figure 46


Lower incisal edge from A-Pg line
li from A-Pg line mm
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

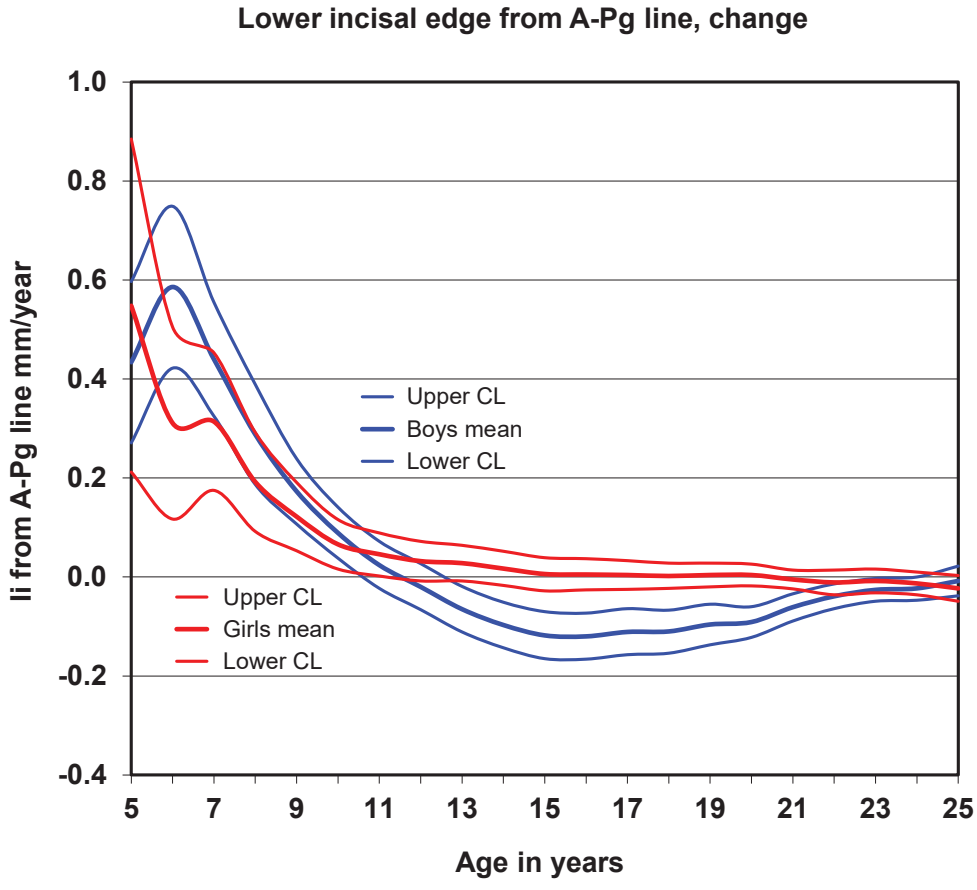
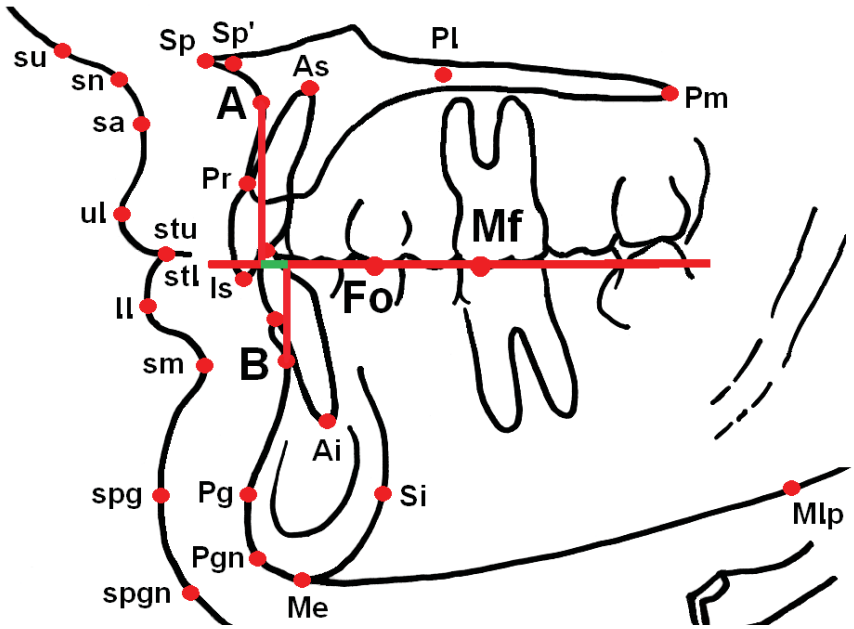

Lower incisal edge from A-Pg line, change
li from A-Pg line mm/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Figure 47



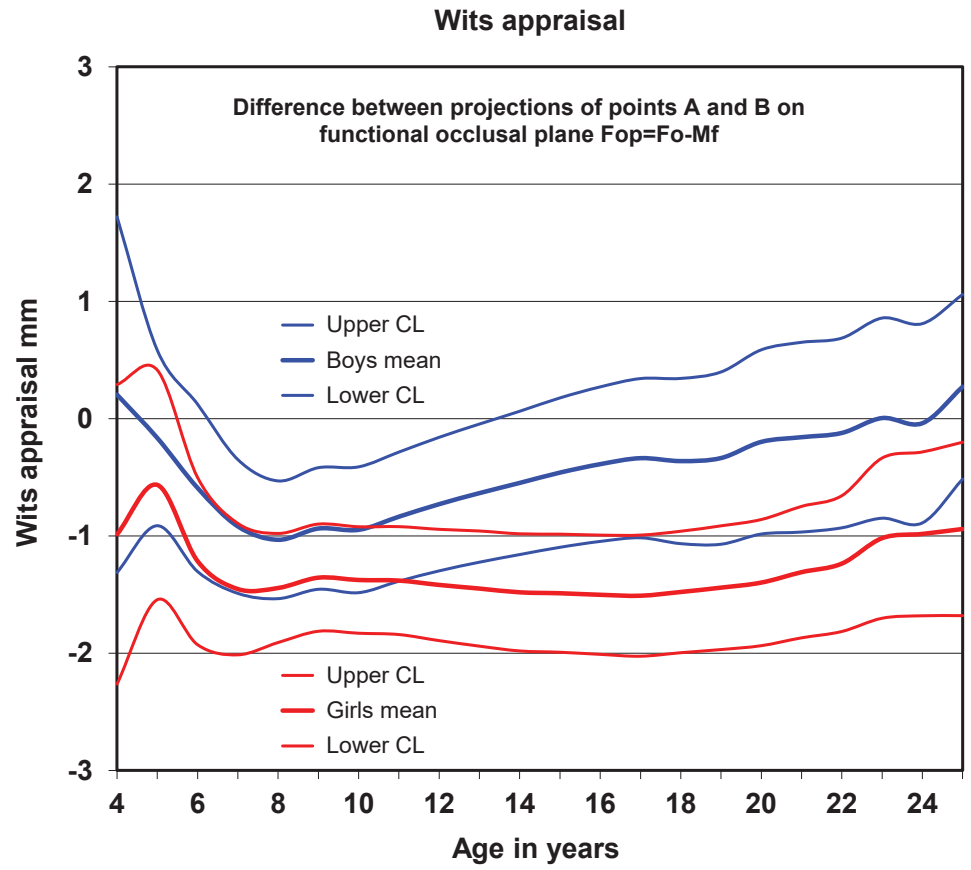
Wits appraisal (mm)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.31	0.20	1.72	2.05	1.18		7	-2.26	-0.99	0.29	1.72
5	18	-0.91	-0.17	0.58	1.62	0.63		19	-1.54	-0.57	0.41	2.18
6	35	-1.30	-0.59	0.12	2.15	1.19		27	-1.93	-1.21	-0.50	1.89
7	43	-1.49	-0.92	-0.35	1.91	1.30		39	-2.01	-1.45	-0.89	1.78
8	48	-1.53	-1.03	-0.53	1.77	1.18		49	-1.91	-1.44	-0.98	1.66
9	49	-1.46	-0.94	-0.42	1.85	1.19		53	-1.81	-1.36	-0.90	1.70
10	50	-1.48	-0.95	-0.41	1.93	1.20		54	-1.83	-1.38	-0.92	1.70
11	50	-1.39	-0.84	-0.29	1.99	1.50		55	-1.84	-1.38	-0.92	1.74
12	50	-1.30	-0.73	-0.16	2.06	1.84		55	-1.89	-1.42	-0.94	1.80
13	50	-1.22	-0.64	-0.05	2.13	2.09	p<0.05	55	-1.94	-1.45	-0.96	1.86
14	50	-1.16	-0.55	0.06	2.20	2.34	p<0.05	55	-1.98	-1.48	-0.98	1.89
15	50	-1.10	-0.46	0.18	2.30	2.51	p<0.05	55	-1.99	-1.49	-0.99	1.91
16	50	-1.05	-0.39	0.27	2.38	2.65	p<0.01	55	-2.01	-1.50	-0.99	1.92
17	50	-1.02	-0.34	0.34	2.45	2.72	p<0.01	55	-2.03	-1.51	-0.99	1.95
18	49	-1.07	-0.36	0.34	2.52	2.54	p<0.05	55	-2.00	-1.48	-0.96	1.96
19	49	-1.07	-0.34	0.40	2.62	2.43	p<0.05	55	-1.97	-1.44	-0.91	1.99
20	46	-0.98	-0.20	0.59	2.72	2.53	p<0.05	55	-1.94	-1.40	-0.86	2.04
21	46	-0.97	-0.16	0.65	2.80	2.34	p<0.05	54	-1.87	-1.31	-0.75	2.10
22	46	-0.93	-0.12	0.69	2.80	2.24	p<0.05	53	-1.82	-1.24	-0.66	2.15
23	41	-0.85	0.00	0.86	2.79	1.84		42	-1.70	-1.02	-0.34	2.26
24	35	-0.89	-0.04	0.81	2.56	1.70		41	-1.68	-0.98	-0.28	2.28
25	30	-0.51	0.27	1.06	2.20	2.20	p<0.05	35	-1.68	-0.94	-0.20	2.23

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.53	-0.31	-0.10	0.29	-0.30		7	-0.66	-0.24	0.18	0.57
5	18	-0.47	-0.18	0.10	0.62	1.61		19	-0.70	-0.48	-0.25	0.50
6	35	-0.39	-0.17	0.04	0.65	0.52		27	-0.45	-0.25	-0.06	0.52
7	43	-0.22	-0.06	0.10	0.54	0.46		39	-0.25	-0.11	0.04	0.47
8	48	-0.14	-0.01	0.11	0.45	0.50		49	-0.17	-0.06	0.05	0.40
9	49	-0.06	0.03	0.13	0.33	1.45		53	-0.15	-0.06	0.03	0.32
10	50	0.00	0.08	0.16	0.28	2.52	p<0.05	54	-0.12	-0.05	0.02	0.26
11	50	0.03	0.10	0.17	0.26	2.82	p<0.01	55	-0.10	-0.03	0.03	0.23
12	50	0.03	0.09	0.16	0.24	2.95	p<0.01	55	-0.09	-0.03	0.02	0.20
13	50	0.02	0.09	0.16	0.25	2.99	p<0.01	55	-0.09	-0.04	0.01	0.19
14	50	0.02	0.08	0.15	0.25	2.75	p<0.01	55	-0.08	-0.03	0.02	0.18
15	50	0.00	0.08	0.15	0.26	2.21	p<0.05	55	-0.06	-0.02	0.03	0.17
16	50	-0.01	0.06	0.13	0.26	1.67		55	-0.06	-0.01	0.04	0.18
17	50	-0.03	0.04	0.11	0.26	0.95		55	-0.05	-0.00	0.05	0.18
18	49	-0.03	0.04	0.10	0.25	0.38		55	-0.03	0.02	0.07	0.18
19	49	-0.05	0.02	0.10	0.25	-0.11		55	-0.02	0.03	0.08	0.19
20	46	-0.01	0.05	0.10	0.19	0.22		55	-0.01	0.04	0.09	0.18
21	46	0.00	0.05	0.09	0.16	-0.28		54	0.01	0.06	0.11	0.19
22	46	0.01	0.05	0.08	0.14	-0.04		53	-0.02	0.05	0.11	0.25
23	41	-0.00	0.04	0.08	0.14	-0.01		42	-0.02	0.04	0.10	0.20
24	35	-0.00	0.03	0.07	0.11	0.53		41	-0.03	0.01	0.06	0.16
25	30	-0.07	-0.02	0.04	0.14	-0.80		35	-0.04	0.02	0.08	0.18

Figure 47


Wits appraisal
Difference between projections of points A and B on functional occlusal plane Fop=Fo-Mf
Wits appraisal mm
3
2
1
0
-1
-2
-3
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

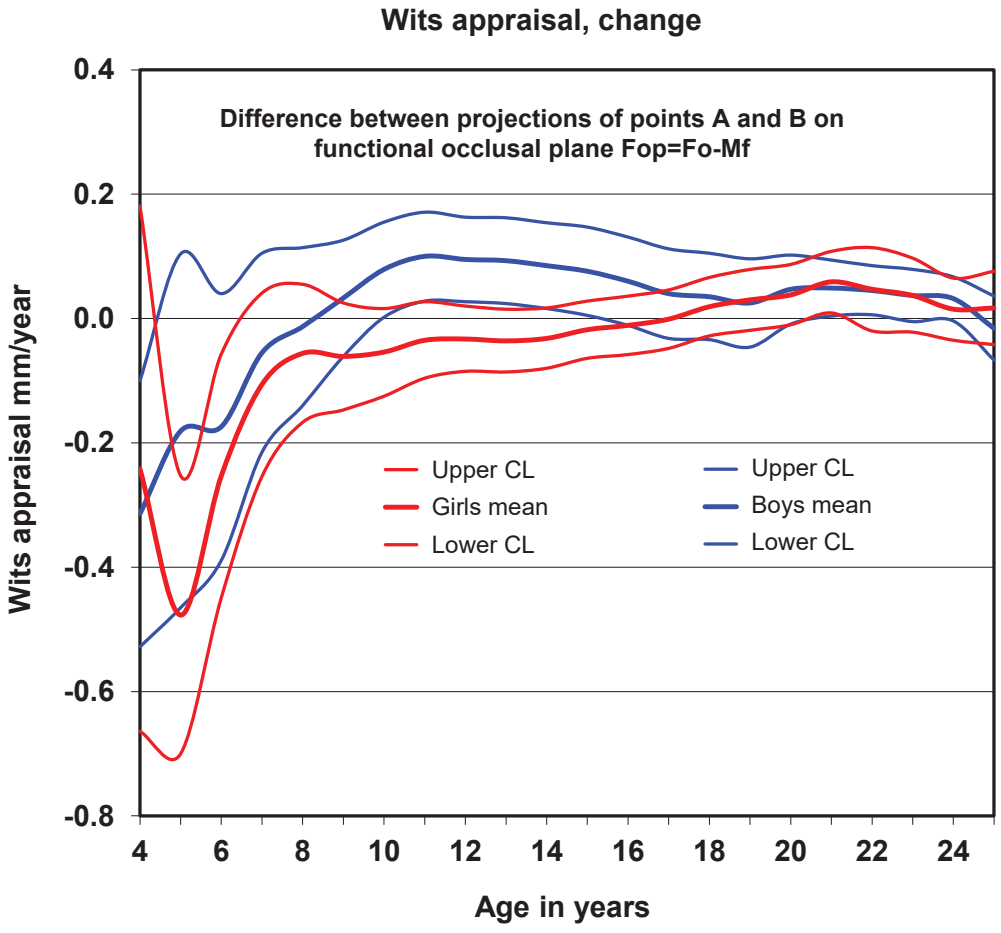
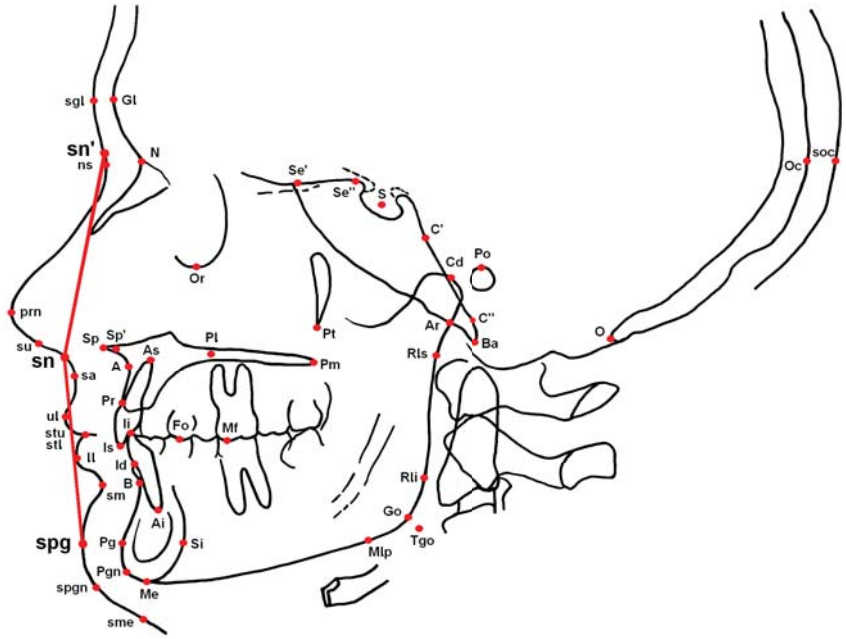

Wits appraisal, change
Difference between projections of points A and B on functional occlusal plane Fop=Fo-Mf
Wits appraisal mm/year
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

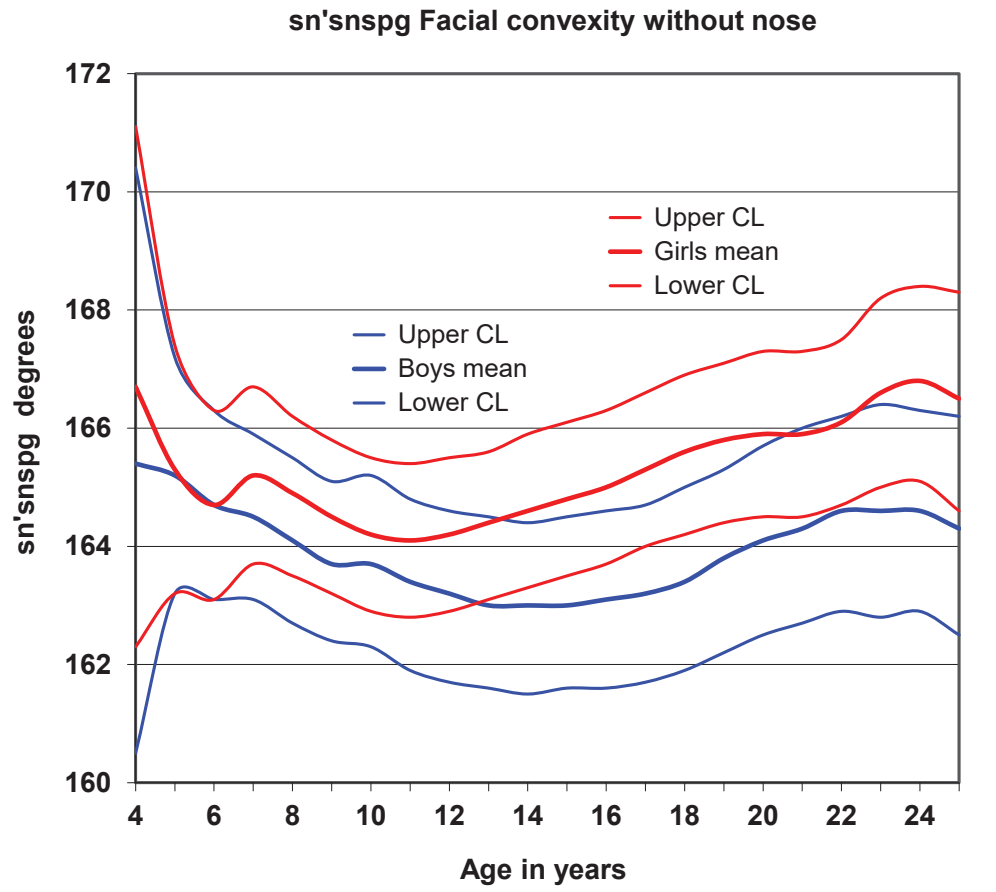
Figure 48



sn'snspg (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	160.5	165.4	170.4	6.63	0.38		7	162.3	166.7	171.1	5.92
5	18	163.2	165.2	167.2	4.32	0.10		19	163.2	165.3	167.4	4.61
6	35	163.1	164.7	166.3	4.85	0.03		27	163.1	164.7	166.3	4.23
7	43	163.1	164.5	165.9	4.65	0.64		39	163.7	165.2	166.7	4.85
8	48	162.7	164.1	165.5	4.87	0.77		49	163.5	164.9	166.2	4.83
9	49	162.4	163.7	165.1	4.81	0.83		53	163.2	164.5	165.8	4.80
10	50	162.3	163.7	165.2	5.26	0.44		54	162.9	164.2	165.5	4.90
11	50	161.9	163.4	164.8	5.17	0.74		55	162.8	164.1	165.4	4.92
12	50	161.7	163.2	164.6	5.21	1.07		55	162.9	164.2	165.5	4.87
13	50	161.6	163.0	164.5	5.27	1.33		55	163.1	164.4	165.6	4.86
14	50	161.5	163.0	164.4	5.25	1.62		55	163.3	164.6	165.9	4.85
15	50	161.6	163.0	164.5	5.26	1.81		55	163.5	164.8	166.1	4.85
16	50	161.6	163.1	164.6	5.29	1.94		55	163.7	165.0	166.3	4.90
17	50	161.8	163.2	164.7	5.36	2.05	p<0.05	55	164.0	165.3	166.6	4.95
18	49	161.9	163.5	165.0	5.52	2.02	p<0.05	55	164.2	165.6	166.9	5.04
19	49	162.2	163.8	165.4	5.66	1.87		55	164.4	165.8	167.1	5.13
20	46	162.5	164.1	165.7	5.54	1.71		55	164.5	165.9	167.3	5.26
21	46	162.7	164.4	166.0	5.66	1.42		54	164.5	165.9	167.3	5.31
22	46	162.9	164.6	166.2	5.64	1.41		53	164.7	166.1	167.5	5.17
23	41	162.8	164.6	166.4	5.79	1.66		42	165.0	166.6	168.2	5.18
24	35	163.0	164.6	166.3	5.12	1.76		41	165.1	166.8	168.4	5.26
25	30	162.5	164.3	166.2	5.14	1.60		35	164.6	166.5	168.3	5.58

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.77	-0.69	0.40	1.47	0.02		7	-1.74	-0.67	0.39	1.44
5	18	-0.78	-0.23	0.32	1.19	-0.45		19	-0.94	-0.41	0.13	1.19
6	35	-0.58	-0.26	0.05	0.95	-0.28		27	-0.71	-0.33	0.04	1.00
7	43	-0.58	-0.35	-0.12	0.78	0.43		39	-0.51	-0.28	-0.04	0.76
8	48	-0.51	-0.27	-0.02	0.87	-0.13		49	-0.49	-0.29	-0.08	0.72
9	49	-0.48	-0.29	-0.10	0.67	0.91		53	-0.34	-0.18	-0.01	0.61
10	50	-0.43	-0.29	-0.15	0.52	2.73	p<0.01	54	-0.15	-0.04	0.07	0.42
11	50	-0.33	-0.21	-0.09	0.43	3.67	p<0.001	55	-0.03	0.06	0.14	0.32
12	50	-0.26	-0.15	-0.04	0.40	3.82	p<0.001	55	0.04	0.12	0.20	0.30
13	50	-0.19	-0.08	0.03	0.39	3.97	p<0.001	55	0.11	0.20	0.28	0.33
14	50	-0.11	-0.00	0.11	0.39	3.26	p<0.01	55	0.14	0.23	0.32	0.34
15	50	-0.06	0.05	0.16	0.40	2.69	p<0.01	55	0.15	0.25	0.34	0.34
16	50	-0.01	0.10	0.21	0.41	2.26	p<0.05	55	0.18	0.26	0.35	0.33
17	50	0.07	0.18	0.30	0.42	1.10		55	0.18	0.26	0.35	0.32
18	49	0.13	0.24	0.35	0.40	-0.14		55	0.16	0.23	0.31	0.29
19	49	0.17	0.28	0.39	0.40	-1.47		55	0.11	0.18	0.25	0.27
20	46	0.17	0.27	0.36	0.33	-2.04	p<0.05	55	0.07	0.14	0.22	0.28
21	46	0.11	0.19	0.28	0.30	-1.88		54	0.00	0.08	0.16	0.30
22	46	0.03	0.11	0.20	0.30	-1.18		53	-0.10	0.02	0.14	0.44
23	41	-0.00	0.07	0.14	0.23	-0.04		42	-0.01	0.06	0.14	0.25
24	35	-0.11	-0.04	0.04	0.22	1.24		41	-0.04	0.03	0.10	0.22
25	30	-0.12	-0.06	-0.01	0.15	1.74		35	-0.05	0.01	0.07	0.18

Figure 48


sn'snspg Facial convexity without nose
sn'snspg degrees
172
170
168
166
164
162
160
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

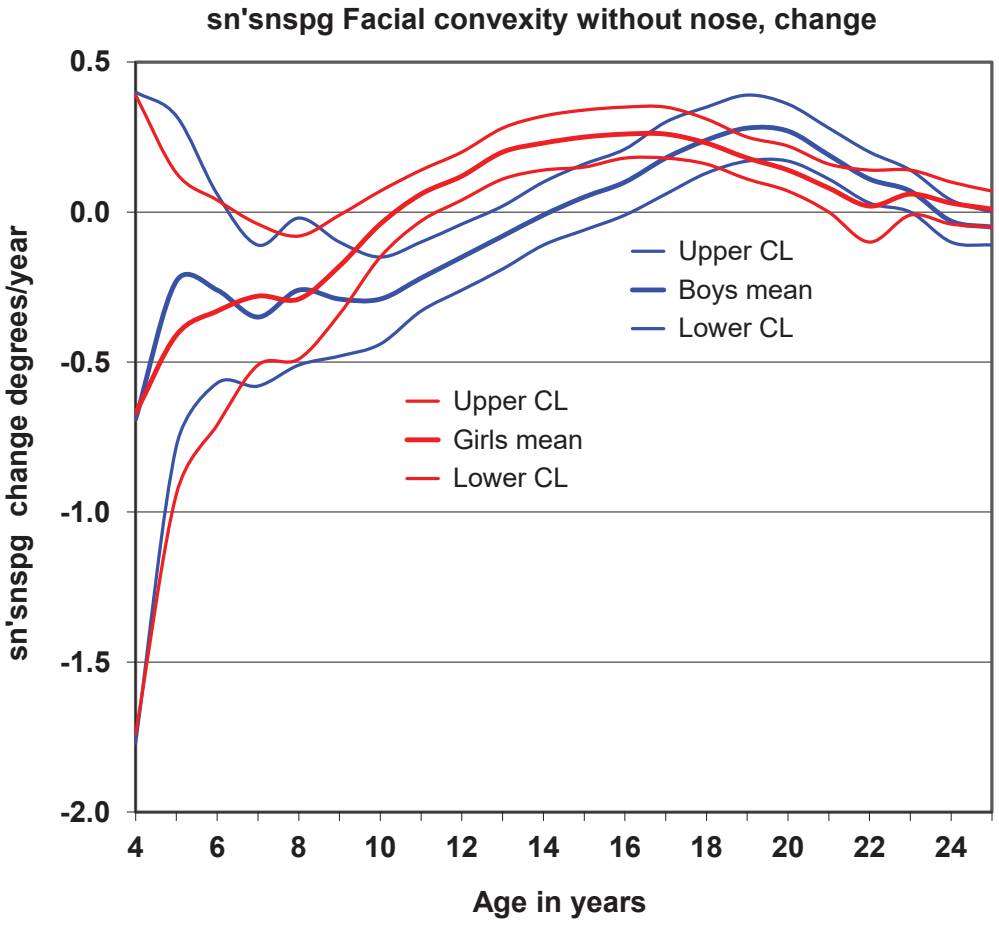
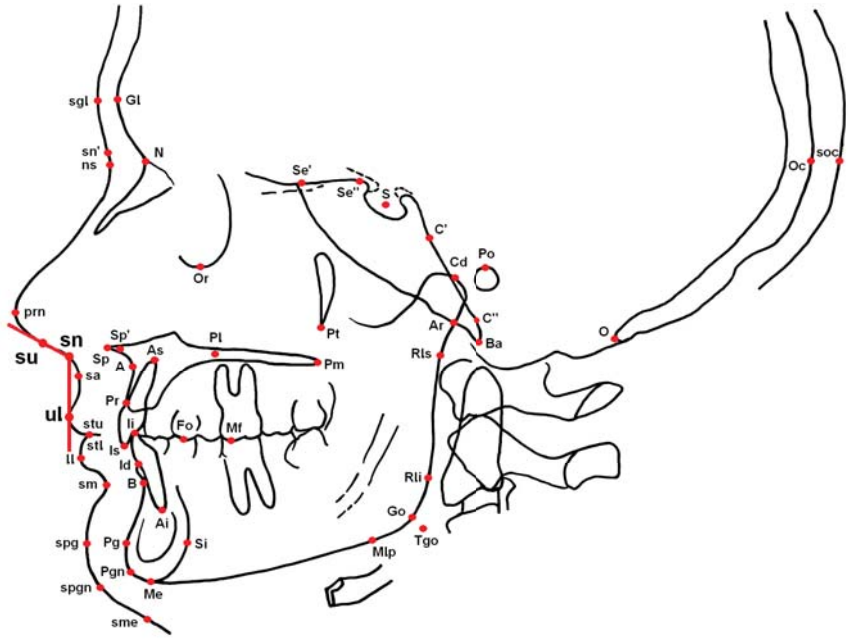

sn'snspg Facial convexity without nose, change
sn'snspg change degrees/year
0.5
0.0
-0.5
-1.0
-1.5
-2.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

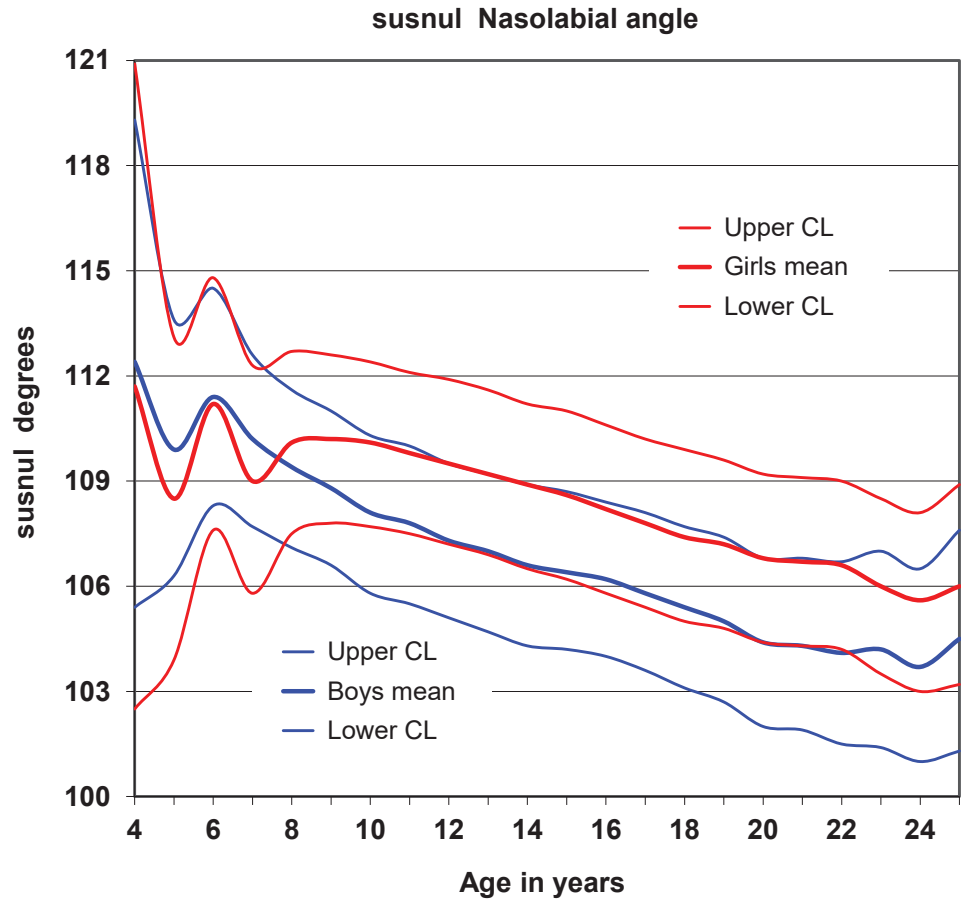
Figure 49

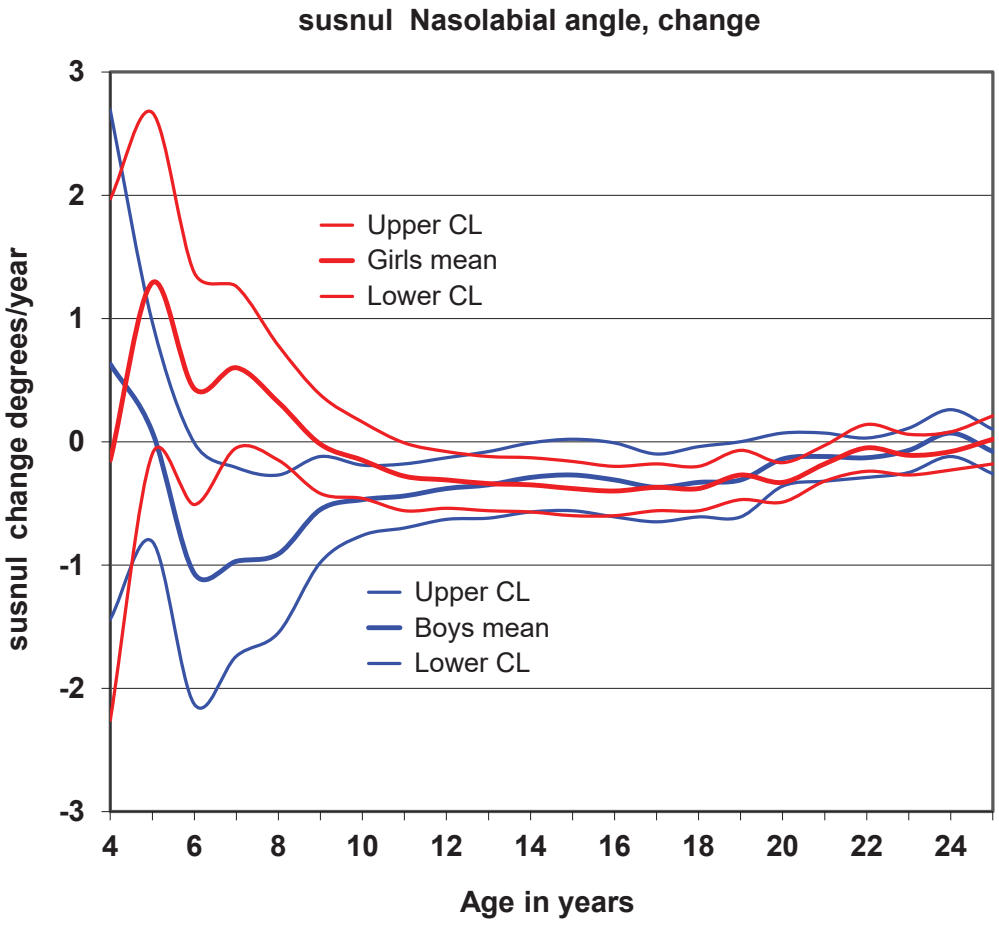


susnul (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	105.4	112.4	119.3	9.35	-0.12		7	102.5	111.7	120.9	12.41
5	18	106.3	109.9	113.6	7.92	-0.47		19	103.9	108.5	113.1	10.18
6	35	108.3	111.4	114.4	9.21	-0.06		27	107.6	111.2	114.8	9.57
7	43	107.7	110.2	112.6	8.25	-0.54		39	105.8	109.0	112.3	10.28
8	48	107.1	109.4	111.7	7.99	0.40		49	107.5	110.1	112.7	9.21
9	49	106.6	108.8	111.1	7.97	0.82		53	107.8	110.2	112.6	8.98
10	50	105.9	108.1	110.3	8.02	1.19		54	107.7	110.1	112.4	8.85
11	50	105.6	107.8	110.0	8.05	1.22		55	107.5	109.8	112.1	8.78
12	50	105.1	107.3	109.6	8.04	1.32		55	107.2	109.5	111.9	8.88
13	50	104.7	106.9	109.2	8.20	1.36		55	106.9	109.2	111.6	8.95
14	50	104.3	106.6	108.9	8.20	1.34		55	106.5	108.9	111.2	9.02
15	50	104.2	106.4	108.6	8.03	1.30		55	106.2	108.6	111.0	9.07
16	50	103.9	106.1	108.3	7.95	1.24		55	105.8	108.2	110.6	9.15
17	50	103.5	105.7	108.0	8.12	1.22		55	105.4	107.8	110.2	9.22
18	49	103.0	105.3	107.6	8.28	1.23		55	105.0	107.4	109.9	9.24
19	49	102.6	104.9	107.3	8.51	1.30		55	104.8	107.2	109.6	9.08
20	46	101.8	104.2	106.7	8.42	1.47		55	104.4	106.8	109.2	9.08
21	46	101.7	104.2	106.7	8.65	1.41		54	104.3	106.7	109.1	9.06
22	46	101.4	104.0	106.6	9.04	1.47		53	104.2	106.6	109.0	8.95
23	41	101.2	104.1	106.9	9.25	1.00		42	103.5	106.0	108.5	8.38
24	35	100.8	103.6	106.5	8.57	1.00		41	103.0	105.6	108.1	8.28
25	30	101.2	104.4	107.6	8.99	0.76		35	103.2	106.0	108.9	8.65

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.44	0.63	2.69	2.79	-0.51		7	-2.26	-0.15	1.97	2.85
5	18	-0.81	0.08	0.97	1.92	1.42		19	-0.10	1.29	2.67	3.07
6	35	-2.10	-1.04	0.02	3.21	1.97		27	-0.51	0.43	1.37	2.49
7	43	-1.72	-0.95	-0.18	2.57	2.98	p<0.01	39	-0.05	0.60	1.26	2.09
8	48	-1.53	-0.89	-0.26	2.26	3.02	p<0.01	49	-0.15	0.32	0.78	1.65
9	49	-0.97	-0.54	-0.12	1.52	1.77		53	-0.42	-0.02	0.38	1.48
10	50	-0.76	-0.48	-0.19	1.03	1.50		54	-0.46	-0.15	0.16	1.18
11	50	-0.71	-0.45	-0.19	0.94	0.87		55	-0.56	-0.28	-0.01	1.04
12	50	-0.66	-0.40	-0.14	0.94	0.50		55	-0.54	-0.31	-0.08	0.88
13	50	-0.65	-0.37	-0.09	1.02	0.18		55	-0.56	-0.34	-0.12	0.83
14	50	-0.61	-0.32	-0.02	1.06	-0.17		55	-0.57	-0.35	-0.13	0.83
15	50	-0.59	-0.29	0.01	1.08	-0.47		55	-0.60	-0.38	-0.16	0.83
16	50	-0.64	-0.33	-0.03	1.11	-0.36		55	-0.60	-0.40	-0.20	0.74
17	50	-0.69	-0.40	-0.11	1.05	0.15		55	-0.56	-0.37	-0.18	0.70
18	49	-0.63	-0.34	-0.05	1.04	-0.23		55	-0.56	-0.38	-0.20	0.68
19	49	-0.62	-0.31	-0.01	1.09	0.25		55	-0.47	-0.27	-0.07	0.76
20	46	-0.36	-0.15	0.07	0.75	-1.32		55	-0.49	-0.33	-0.17	0.61
21	46	-0.31	-0.12	0.07	0.66	-0.46		54	-0.32	-0.18	-0.03	0.55
22	46	-0.28	-0.12	0.04	0.54	0.56		53	-0.24	-0.05	0.14	0.70
23	41	-0.22	-0.05	0.12	0.56	-0.49		42	-0.27	-0.11	0.06	0.54
24	35	-0.07	0.11	0.30	0.57	-1.55		41	-0.23	-0.08	0.08	0.50
25	30	-0.23	-0.01	0.21	0.61	0.19		35	-0.18	0.02	0.21	0.59

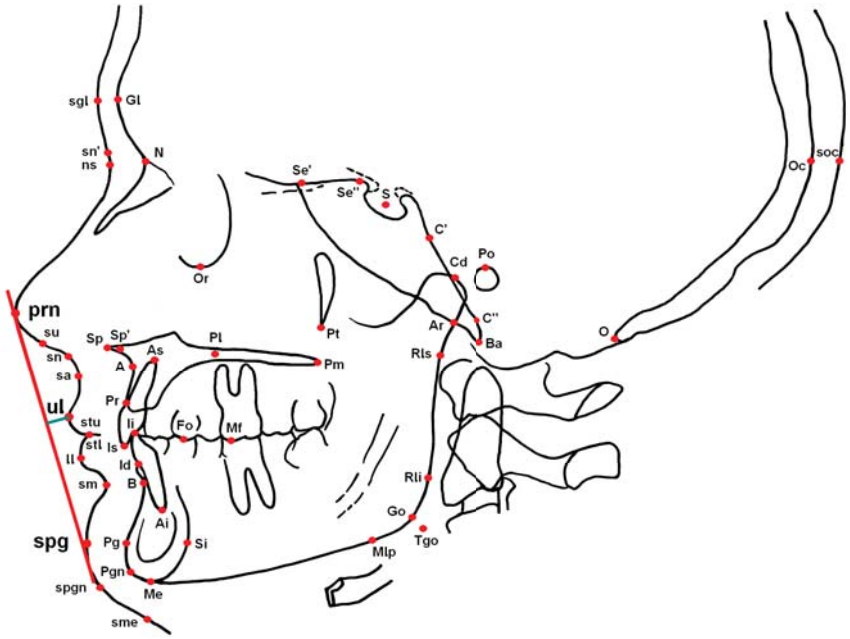
Figure 49


susnul Nasolabial angle
susnul degrees
121
118
115
112
109
106
103
100
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


susnul Nasolabial angle, change
susnul change degrees/year
3
2
1
0
-1
-2
-3
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

EstU

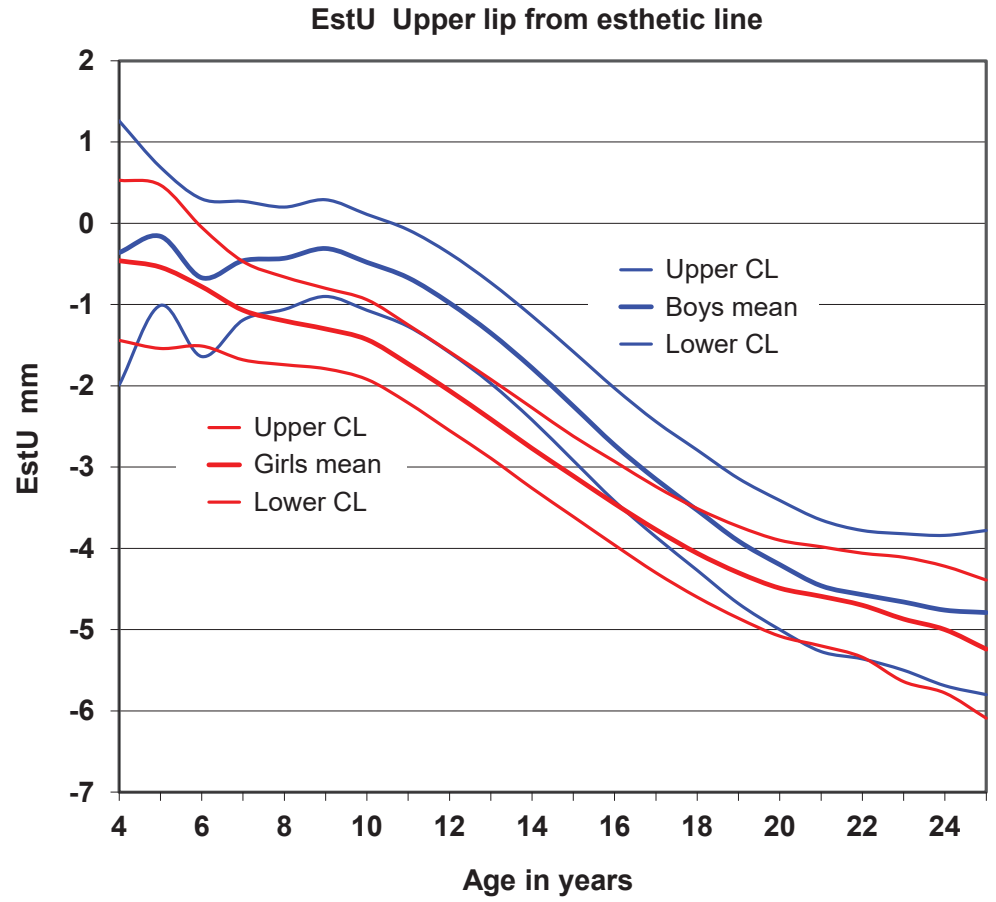
Figure 50

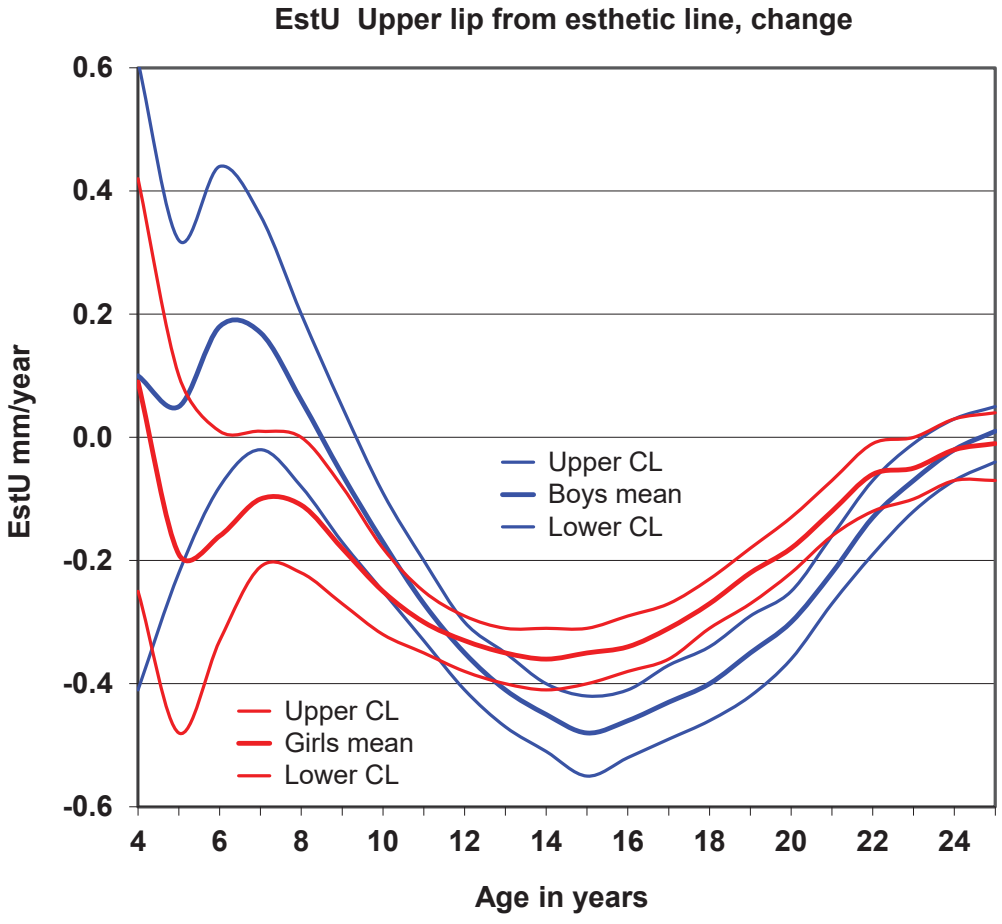


EstU (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.99	-0.36	1.26	2.19	0.09		6	-1.44	-0.46	0.53	1.23
5	18	-1.01	-0.16	0.69	1.83	0.56		18	-1.54	-0.54	0.47	2.18
6	35	-1.63	-0.66	0.30	2.92	0.18		26	-1.51	-0.78	-0.05	1.90
7	43	-1.19	-0.46	0.27	2.43	1.26		39	-1.68	-1.07	-0.47	1.92
8	48	-1.06	-0.43	0.20	2.22	1.83		49	-1.74	-1.20	-0.66	1.93
9	49	-0.91	-0.31	0.29	2.14	2.50	p<0.05	53	-1.79	-1.30	-0.80	1.84
10	50	-1.07	-0.48	0.11	2.13	2.44	p<0.05	54	-1.92	-1.43	-0.94	1.84
11	50	-1.28	-0.68	-0.08	2.16	2.71	p<0.01	55	-2.21	-1.73	-1.25	1.82
12	50	-1.59	-0.98	-0.37	2.20	2.75	p<0.01	55	-2.55	-2.06	-1.58	1.83
13	50	-1.97	-1.35	-0.73	2.24	2.64	p<0.01	55	-2.89	-2.41	-1.92	1.85
14	50	-2.42	-1.78	-1.14	2.31	2.42	p<0.05	55	-3.26	-2.77	-2.27	1.87
15	50	-2.91	-2.25	-1.58	2.41	2.07	p<0.05	55	-3.61	-3.11	-2.62	1.89
16	50	-3.41	-2.72	-2.03	2.49	1.67		55	-3.96	-3.45	-2.93	1.94
17	50	-3.85	-3.14	-2.43	2.56	1.41		55	-4.30	-3.77	-3.24	1.99
18	49	-4.26	-3.52	-2.78	2.64	1.16		55	-4.60	-4.06	-3.51	2.06
19	49	-4.67	-3.90	-3.13	2.74	0.83		55	-4.86	-4.30	-3.73	2.15
20	46	-4.99	-4.19	-3.39	2.75	0.60		55	-5.08	-4.49	-3.90	2.23
21	46	-5.26	-4.45	-3.64	2.80	0.28		54	-5.20	-4.59	-3.98	2.28
22	46	-5.35	-4.56	-3.76	2.75	0.27		53	-5.34	-4.70	-4.06	2.37
23	41	-5.49	-4.65	-3.81	2.75	0.39		42	-5.64	-4.87	-4.11	2.54
24	35	-5.68	-4.75	-3.83	2.79	0.40		41	-5.78	-5.00	-4.22	2.55
25	30	-5.79	-4.78	-3.77	2.82	0.68		35	-6.09	-5.24	-4.39	2.58

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.41	0.10	0.61	0.68	-0.05		6	-0.25	0.09	0.42	0.41
5	18	-0.22	0.05	0.32	0.58	-1.19		18	-0.48	-0.19	0.10	0.63
6	35	-0.09	0.18	0.44	0.79	-1.95		26	-0.33	-0.16	0.01	0.44
7	43	-0.02	0.17	0.36	0.64	-2.29	p<0.05	39	-0.21	-0.10	0.01	0.36
8	48	-0.08	0.06	0.20	0.49	-1.88		49	-0.22	-0.11	-0.00	0.39
9	49	-0.17	-0.06	0.05	0.40	-1.56		53	-0.27	-0.18	-0.08	0.36
10	50	-0.25	-0.17	-0.09	0.30	-1.47		54	-0.32	-0.25	-0.18	0.25
11	50	-0.33	-0.27	-0.20	0.24	-0.84		55	-0.35	-0.30	-0.25	0.18
12	50	-0.41	-0.35	-0.29	0.21	0.47		55	-0.38	-0.33	-0.29	0.18
13	50	-0.46	-0.41	-0.35	0.20	1.42		55	-0.40	-0.35	-0.31	0.18
14	50	-0.51	-0.45	-0.39	0.21	2.26	p<0.05	55	-0.41	-0.36	-0.31	0.19
15	50	-0.54	-0.48	-0.42	0.22	3.28	p<0.01	55	-0.40	-0.35	-0.31	0.18
16	50	-0.52	-0.46	-0.40	0.21	3.25	p<0.01	55	-0.38	-0.34	-0.29	0.17
17	50	-0.49	-0.43	-0.37	0.22	3.09	p<0.01	55	-0.36	-0.31	-0.27	0.17
18	49	-0.46	-0.40	-0.34	0.22	3.41	p<0.001	55	-0.31	-0.27	-0.23	0.16
19	49	-0.42	-0.35	-0.29	0.24	3.30	p<0.01	55	-0.27	-0.22	-0.18	0.16
20	46	-0.36	-0.30	-0.25	0.20	3.58	p<0.001	55	-0.22	-0.18	-0.13	0.16
21	46	-0.27	-0.22	-0.16	0.19	2.73	p<0.01	54	-0.16	-0.12	-0.07	0.17
22	46	-0.19	-0.13	-0.07	0.22	1.55		53	-0.12	-0.06	-0.01	0.20
23	41	-0.12	-0.07	-0.02	0.17	0.48		42	-0.10	-0.05	-0.00	0.15
24	35	-0.08	-0.03	0.02	0.15	0.18		41	-0.07	-0.02	0.03	0.15
25	30	-0.05	-0.00	0.05	0.14	-0.26		35	-0.07	-0.01	0.04	0.16

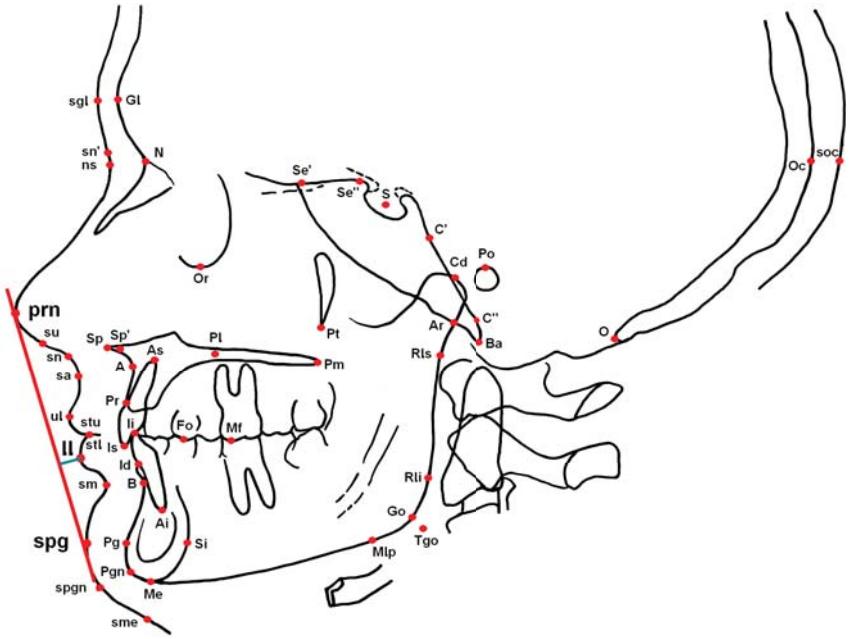
Figure 50


EstU Upper lip from esthetic line
EstU mm
2
1
0
-1
-2
-3
-4
-5
-6
-7
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


EstU Upper lip from esthetic line, change
EstU mm/year
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

EstL

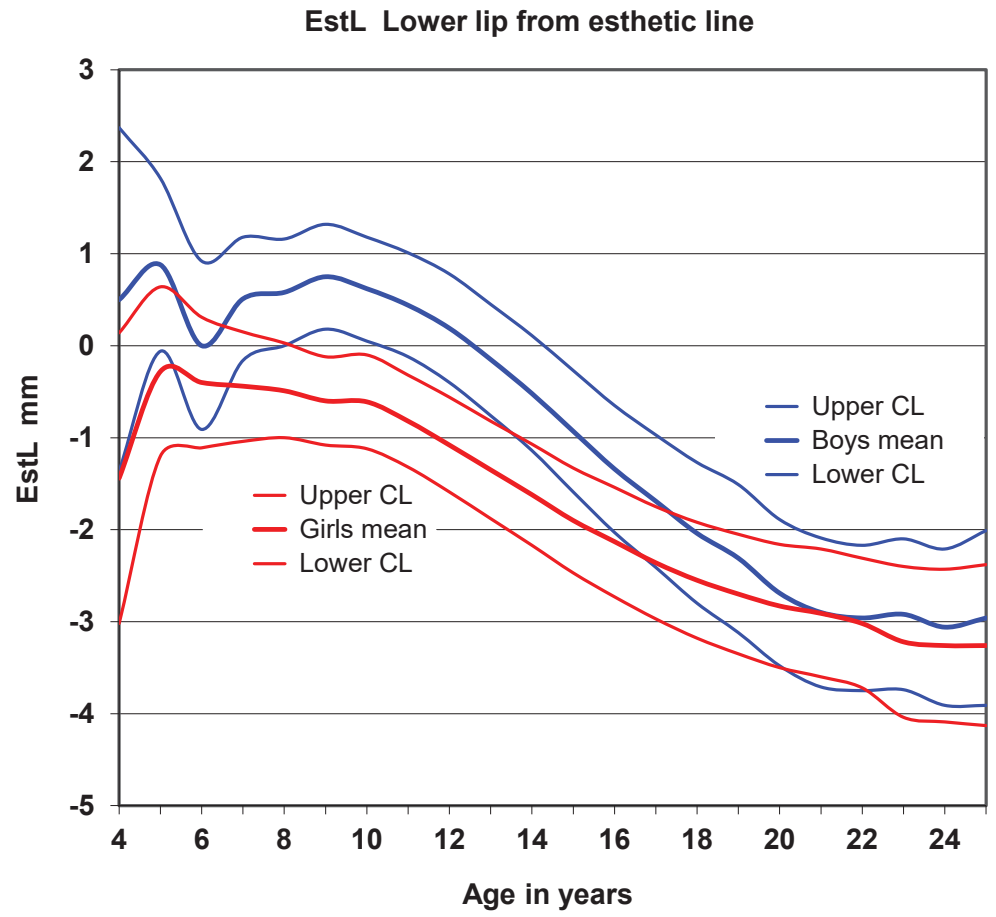
Figure 51

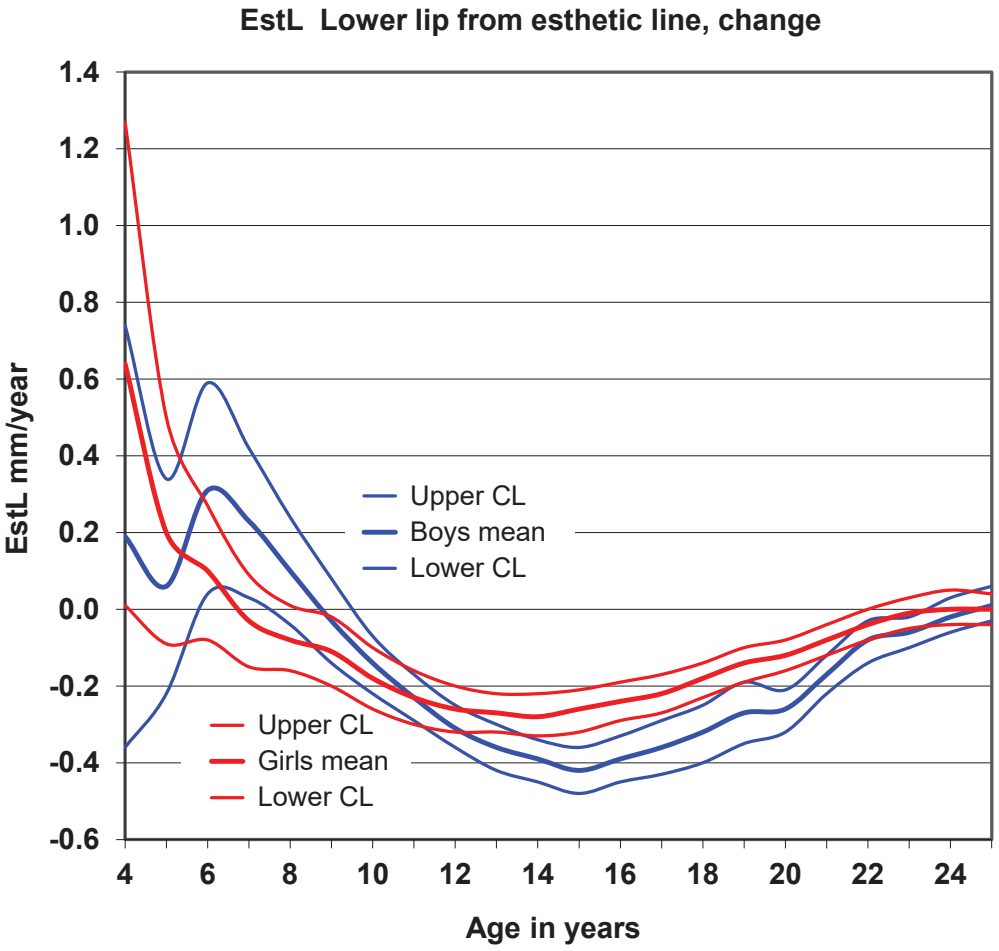


EstL (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.36	0.50	2.37	2.52	1.53		6	-3.02	-1.44	0.14	1.97
5	18	-0.06	0.88	1.82	2.03	1.73		18	-1.20	-0.28	0.64	1.99
6	35	-0.90	0.01	0.92	2.76	0.66		26	-1.11	-0.40	0.31	1.85
7	43	-0.16	0.51	1.18	2.26	2.07	p<0.05	39	-1.04	-0.44	0.15	1.89
8	48	-0.00	0.58	1.16	2.05	2.70	p<0.01	49	-1.00	-0.49	0.03	1.83
9	49	0.17	0.75	1.32	2.04	3.56	p<0.001	53	-1.08	-0.60	-0.12	1.77
10	50	0.04	0.61	1.18	2.04	3.14	p<0.01	54	-1.12	-0.61	-0.10	1.91
11	50	-0.13	0.44	1.01	2.05	3.28	p<0.01	55	-1.32	-0.82	-0.32	1.89
12	50	-0.40	0.19	0.78	2.13	3.18	p<0.01	55	-1.59	-1.08	-0.56	1.95
13	50	-0.75	-0.15	0.46	2.18	2.93	p<0.01	55	-1.88	-1.35	-0.82	2.00
14	50	-1.14	-0.51	0.11	2.26	2.62	p<0.05	55	-2.17	-1.62	-1.07	2.07
15	50	-1.58	-0.92	-0.26	2.37	2.22	p<0.05	55	-2.47	-1.90	-1.33	2.16
16	50	-2.02	-1.33	-0.64	2.48	1.75		55	-2.73	-2.13	-1.54	2.24
17	50	-2.40	-1.68	-0.96	2.59	1.43		55	-2.97	-2.36	-1.75	2.31
18	49	-2.78	-2.02	-1.26	2.72	1.05		55	-3.18	-2.55	-1.92	2.39
19	49	-3.10	-2.30	-1.50	2.86	0.77		55	-3.35	-2.70	-2.05	2.47
20	46	-3.46	-2.67	-1.87	2.75	0.31		55	-3.50	-2.83	-2.16	2.54
21	46	-3.69	-2.88	-2.07	2.81	0.05		54	-3.60	-2.91	-2.21	2.60
22	46	-3.73	-2.94	-2.15	2.74	0.14		53	-3.72	-3.02	-2.31	2.62
23	41	-3.72	-2.90	-2.08	2.68	0.54		42	-4.04	-3.22	-2.40	2.70
24	35	-3.89	-3.04	-2.19	2.57	0.36		41	-4.09	-3.26	-2.43	2.70
25	30	-3.90	-2.95	-2.00	2.65	0.47		35	-4.13	-3.26	-2.38	2.65

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.36	0.19	0.74	0.74	1.06		6	0.01	0.64	1.27	0.78
5	18	-0.22	0.06	0.34	0.60	0.69		18	-0.09	0.20	0.50	0.64
6	35	0.03	0.31	0.58	0.84	-1.15		26	-0.08	0.10	0.27	0.45
7	43	0.02	0.22	0.42	0.67	-2.05	p<0.05	39	-0.15	-0.03	0.09	0.38
8	48	-0.04	0.10	0.24	0.50	-2.11	p<0.05	49	-0.16	-0.08	0.01	0.29
9	49	-0.14	-0.03	0.08	0.39	-1.13		53	-0.20	-0.11	-0.02	0.33
10	50	-0.22	-0.14	-0.07	0.27	-0.70		54	-0.26	-0.18	-0.10	0.31
11	50	-0.29	-0.23	-0.16	0.23	-0.00		55	-0.30	-0.23	-0.16	0.27
12	50	-0.36	-0.30	-0.25	0.21	1.03		55	-0.32	-0.26	-0.20	0.24
13	50	-0.41	-0.36	-0.30	0.21	2.13	p<0.05	55	-0.32	-0.27	-0.22	0.20
14	50	-0.45	-0.39	-0.33	0.21	2.77	p<0.01	55	-0.33	-0.28	-0.22	0.21
15	50	-0.48	-0.41	-0.35	0.23	3.57	p<0.001	55	-0.32	-0.26	-0.21	0.20
16	50	-0.45	-0.39	-0.33	0.21	3.88	p<0.001	55	-0.29	-0.24	-0.19	0.18
17	50	-0.43	-0.36	-0.29	0.26	3.24	p<0.01	55	-0.27	-0.22	-0.17	0.18
18	49	-0.40	-0.32	-0.24	0.27	3.09	p<0.01	55	-0.23	-0.18	-0.14	0.18
19	49	-0.35	-0.27	-0.19	0.28	2.77	p<0.01	55	-0.19	-0.14	-0.10	0.17
20	46	-0.32	-0.26	-0.21	0.18	4.29	p<0.001	55	-0.16	-0.12	-0.08	0.16
21	46	-0.22	-0.17	-0.12	0.17	2.59	p<0.05	54	-0.12	-0.08	-0.04	0.16
22	46	-0.14	-0.08	-0.03	0.19	1.39		53	-0.08	-0.04	0.00	0.15
23	41	-0.10	-0.06	-0.02	0.13	1.87		42	-0.05	-0.01	0.03	0.13
24	35	-0.07	-0.02	0.02	0.13	0.95		41	-0.04	0.00	0.05	0.14
25	30	-0.04	0.00	0.05	0.12	-0.03		35	-0.04	0.00	0.04	0.11

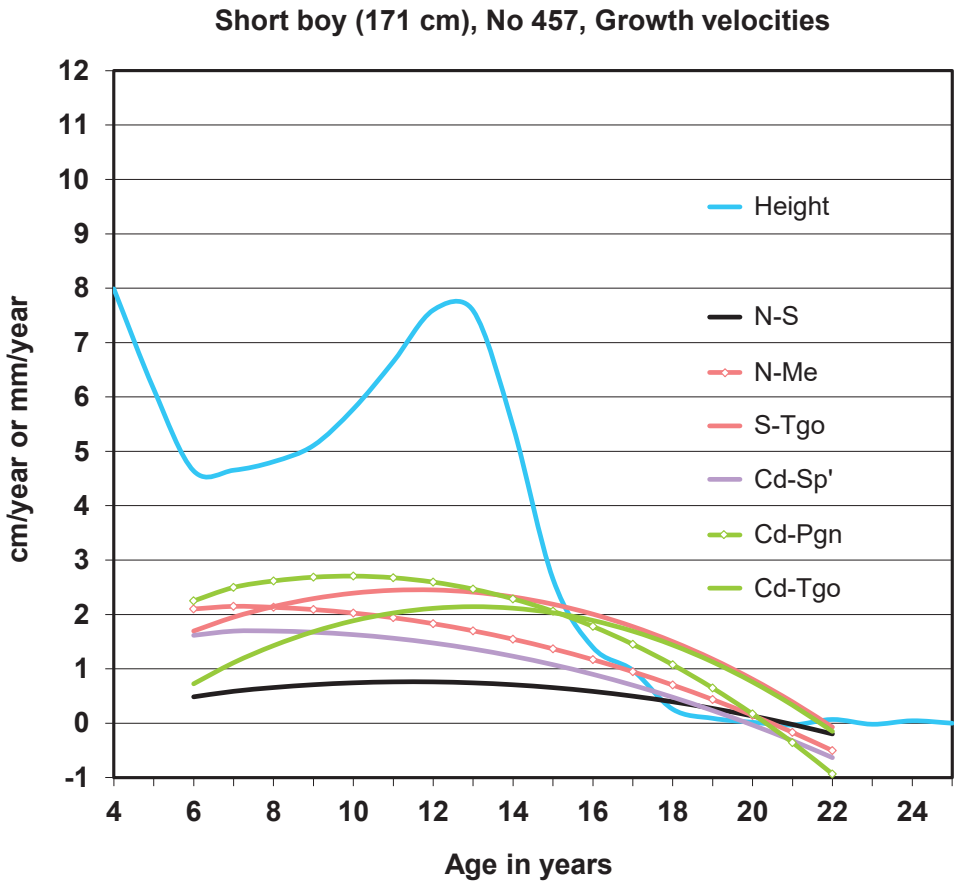
Figure 51


EstL Lower lip from esthetic line
EstL mm
3
2
1
0
-1
-2
-3
-4
-5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


EstL Lower lip from esthetic line, change
EstL mm/year
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

Short Boy

Figure 52



Medium Boy

Figure 53

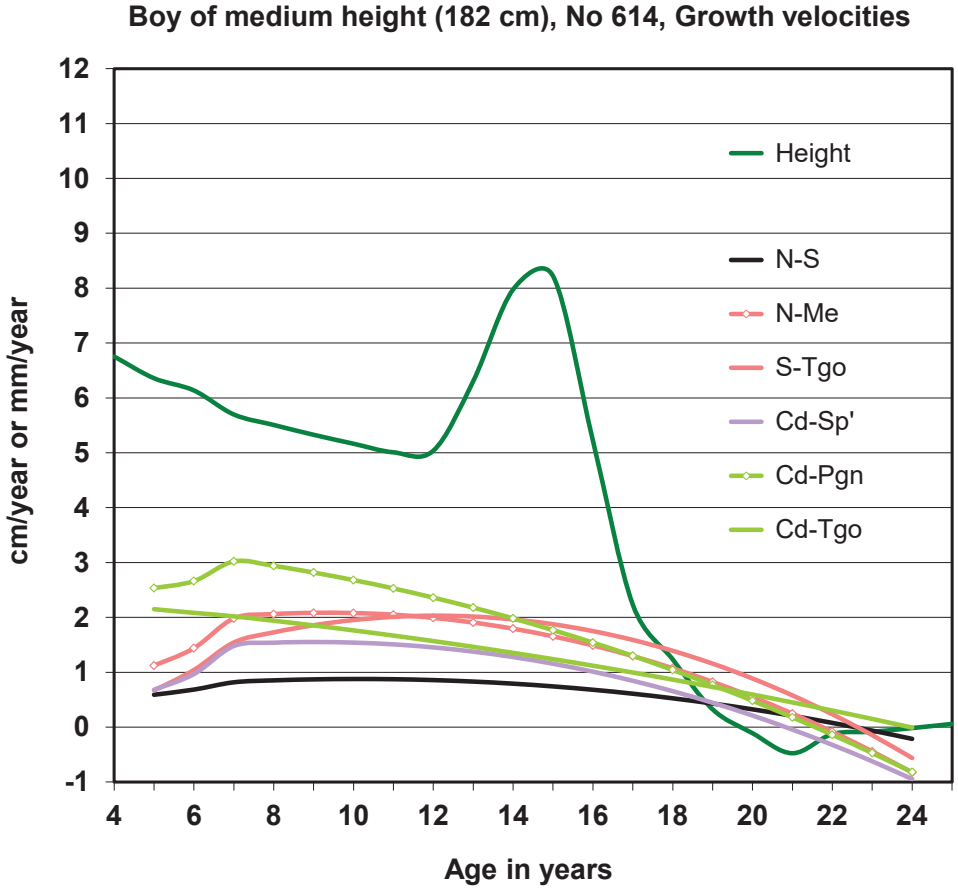
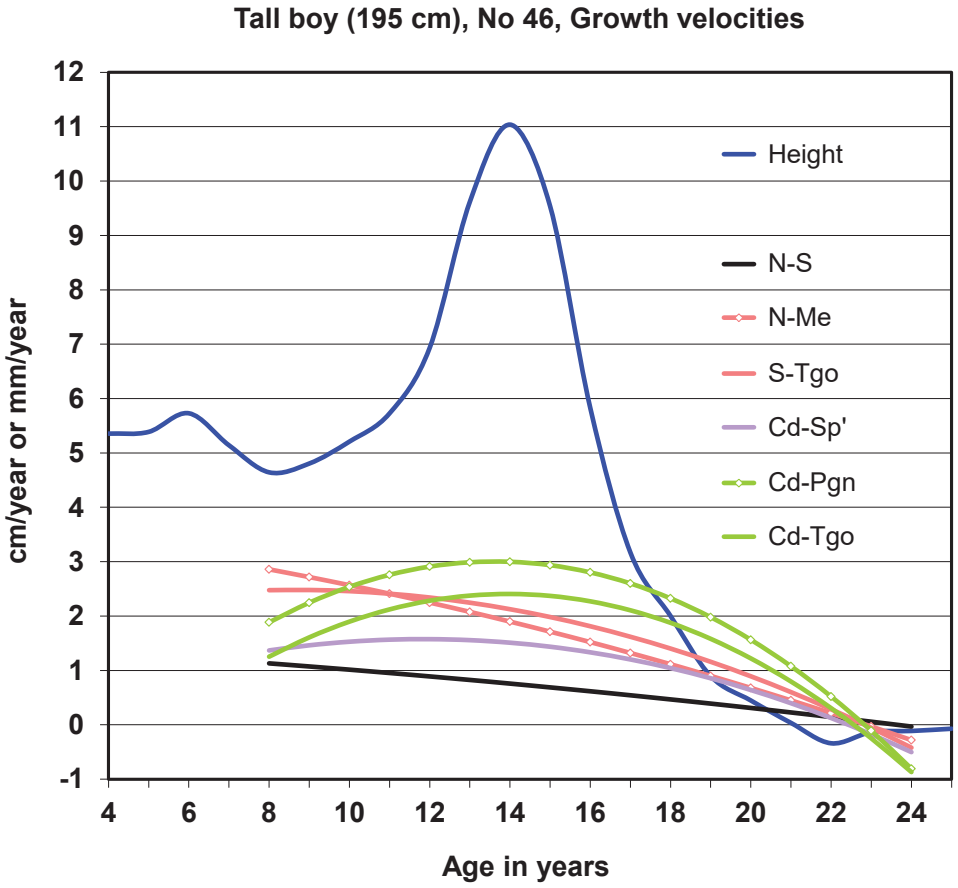
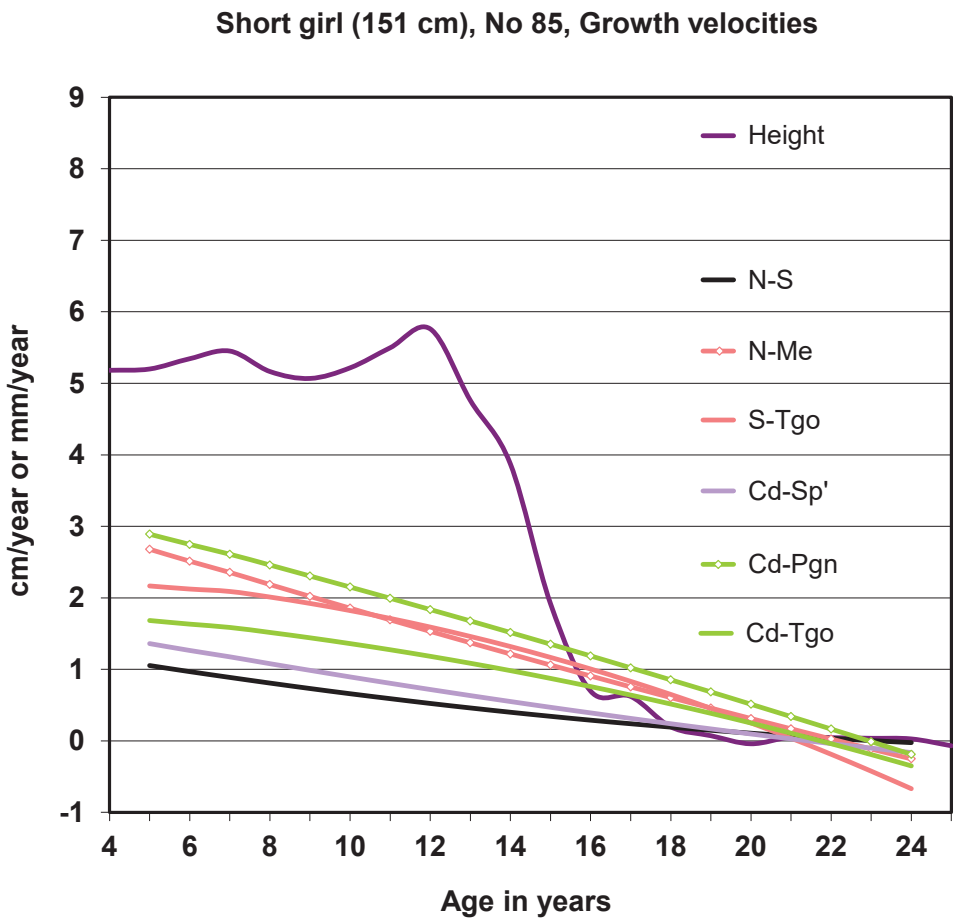


Figure 54


Tall boy (195 cm), No 46, Growth velocities
cm/year or mm/year
Age in years
Height
N-S
N-Me
S-Tgo
Cd-Sp'
Cd-Pgn
Cd-Tgo
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24

Short Girl

Figure 55



Medium Girl

Figure 56

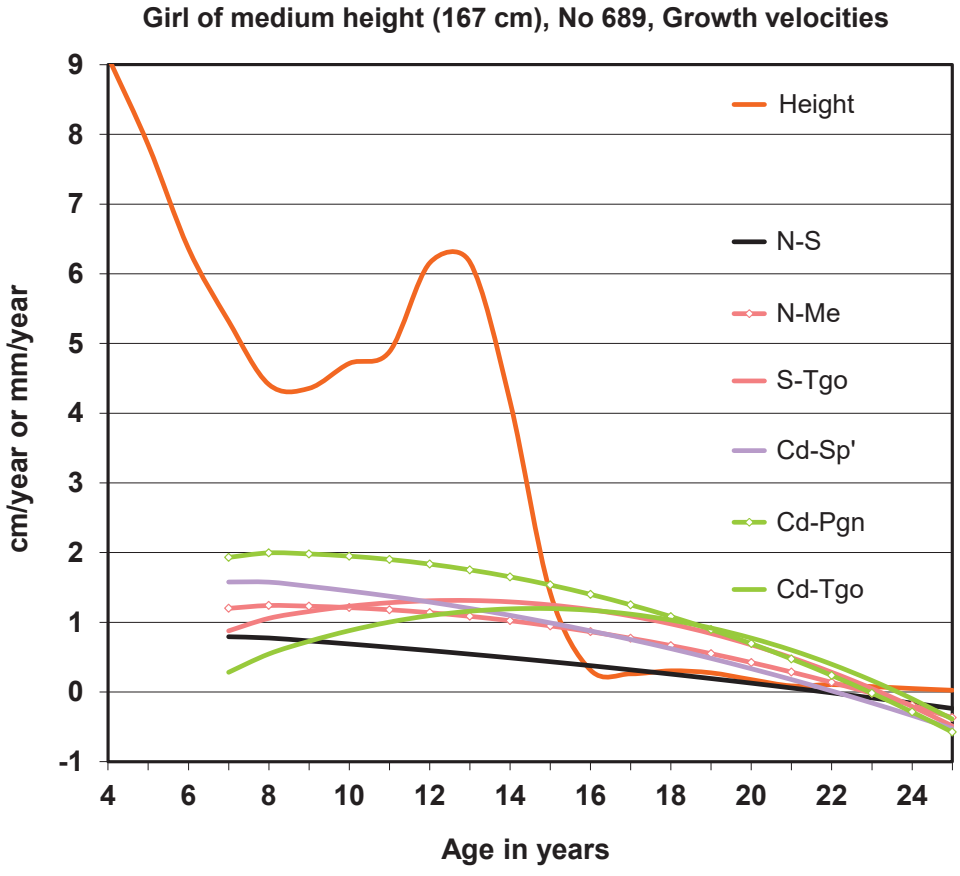
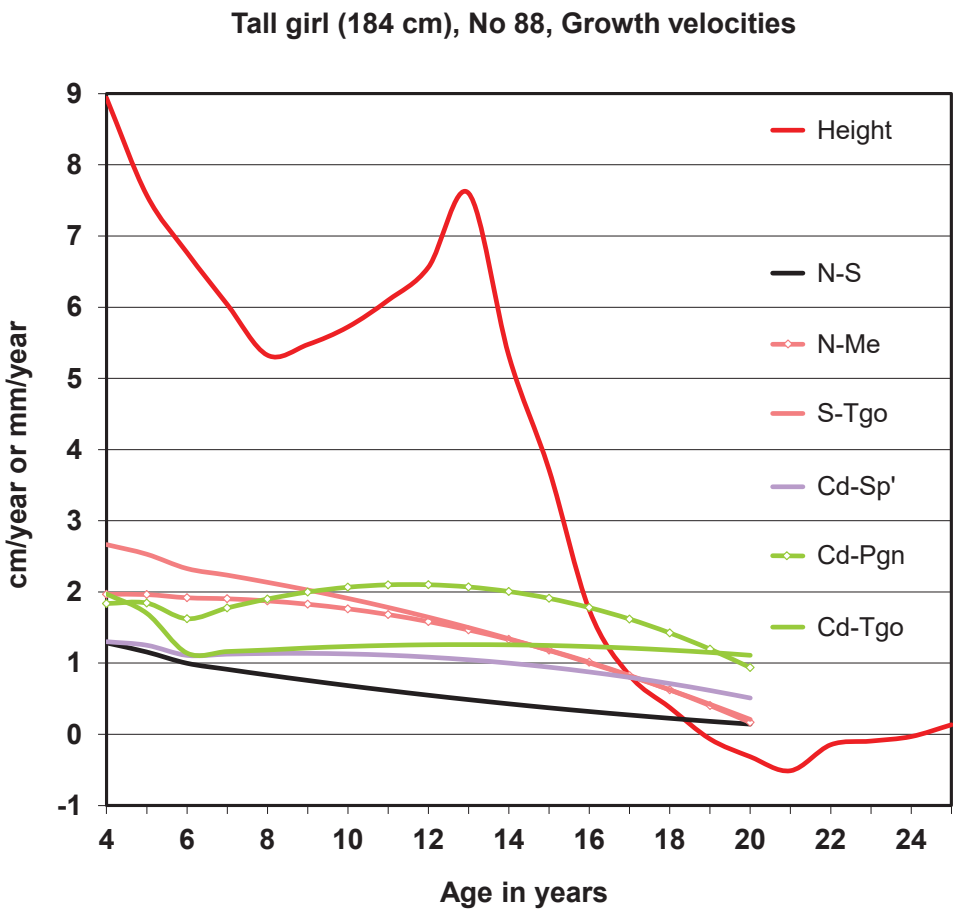


Figure 57


Tall girl (184 cm), No 88, Growth velocities
cm/year or mm/year
9
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Height
N-S
N-Me
S-Tgo
Cd-Sp'
Cd-Pgn
Cd-Tgo

5.3. Skeletal and occlusal sagittal relationships

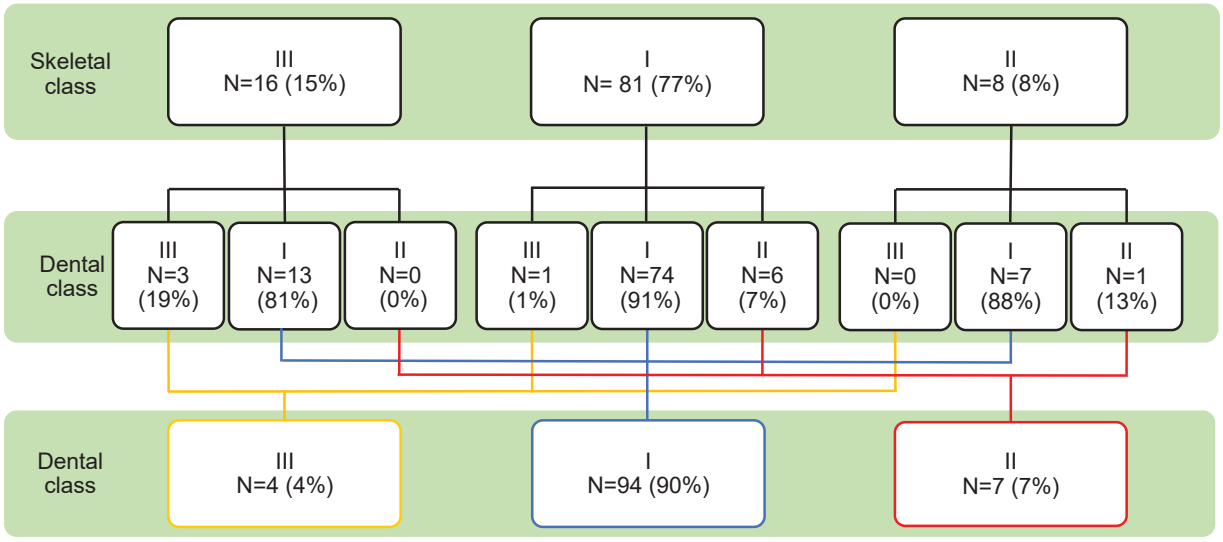


Figure 58. *Distribution of skeletal (ANB) and dental (first molar, Angle) classes among the subjects as young adults. - Dental class I (blue outline), dental class II (red outline), dental class III (yellow outline).*

In orthodontics, the categorization of skeletal class by ANB angle has been debated for many years and performed with different limits for each class (Riedel 1952; Steiner 1953; Haavikko and Helle 1974; Hussels and Nanda 1984). In this study, skeletal class assessment was performed individually according to the ANB angle with the following limits: Class I, 0-5 degrees; Class II, >5 degrees; Class III, <0 degrees (Figure 58). These values are incorporated into the 'Helsinki cephalometric analysis' and adopted by the University of Helsinki Clinic by consensus. To be noted in clinical use is that ANB is age-dependent, as also evident in the present study (Table 11).

Table 11. *ANB angle (degrees) at selected ages in the present study subjects*

Age (years)	Boys, mean (SD)	Girls, mean (SD)
4	4.99 ± 2.77	4.42 ± 2.02
9	3.24 ± 1.84	3.20 ± 1.90
22	2.19 ± 2.10	2.13 ± 2.19
25	2.51 ± 1.52	2.41 ± 2.38

The dental class was assessed individually, using the Angle classification on occlusal sagittal relationship of first permanent molars: Class I, normal occlusion; Class II, postnormal occlusion; Class III, prenormal occlusion (Angle 1899). The data was drawn from clinical examination files, and assured by assessment of plaster models.

This background information tells importantly that the majority of the healthy, orthodontically untreated subjects, forming the study group of this thesis, represent the normal type I both skeletally and dentally. Many of the subjects excluded from the study, because of orthodontic treatment, represented class II, which is therefore likely to be under-represented in the study sample. Different from this, children with class III relationships were often very harmonious in appearance, and several of them did not want orthodontic treatment at the time of the study. Moreover, skeletal Class III tendency increases during growth. The mandible grows more, in a horizontal direction, and for a longer time compared to the maxilla. A similar trend, but dentally, might be explained by mesial drift of molars.

6. GENERAL DISCUSSION

6.1. General aspects of longitudinal craniofacial growth studies

As shown in an overview of selected studies with longitudinal data on craniofacial growth (Table 1), the studies mostly originate from Northern America and Northern Europe. Nordic countries are well represented in these studies. However, comprehensive data on craniofacial growth of Finns has been practically lacking thus far. The incompleteness of data in Table 1 reflects the inconsistency of studies in reporting total numbers of participants and cephalograms. Even data that is crucial to interpretation of the measurements and comparison between different studies, such as magnification in the radiographs and whether or not the magnification was corrected into natural size in the study reports, may be missing, such as in Bishara's studies from 1981 (Bishara 1981; Bishara et al. 1981). All data in the present thesis is given with the magnification corrected to natural size.

Notably, several of the previous studies contain both a longitudinal record series of growing individuals but also single-visit data and records on subject parents and siblings. This is true for instance for the Broadbent Bolton study, which is the largest investigation with a total of 5,700 subjects (Hunter et al. 1993). Moreover, many study collections, such as the Björk and the Krogman Philadelphia collections, variably include pairs of twins, subjects with clefts and other deformities, syndromes, and other special groups (Björk 1963; Hunter et al. 1993). Information on the numbers of participants and their gender distribution of the longitudinal subsets is extractable from the study reports only with difficulty. In this thesis, the material and numbers of radiographs have been described in the greatest detail and represent healthy ethnic Finns.

Several reports on large collections have been published as monographs and are not always easily accessible. To serve as a reference and a database on craniofacial growth of Finns, the present thesis will be available for public access in electronic format. Furthermore, it is planned to be distributed in printed format to all Finnish orthodontists and post-graduate orthodontic students via the Orthodontic Section of the Finnish Dental Society Apollonia.

Cephalometric studies on normal growth, when longitudinal, are observational and prospective in nature. Some, but not all, are cohort-based studies. Even the best longitudinal studies tend to be diminishing, which means a varying drop-out during the follow-up period. For instance, in the Burlington Study, among both males and females between ages 4 and 20 years there was a 58-59% drop-out (Hunter et al. 1993). The quality of these studies would improve by drop-out analysis, but this has not been typically the tradition in studies on cephalometric growth. Neither was one performed in the present research, but notably here the drop-out was exceptionally low, 29% between the age 5 and 25 years. In pure longitudinal studies, the number of subjects in older age groups tends to be relatively small. The papers by Bishara et al. are based on a selected material from the Iowa Child Welfare Study; by only accepting individuals with complete records during the follow-up from 5 years through to 17 years and once in their adulthood, the number of study subjects remained as low as 35 (Bishara 1981; Bishara et al. 1981). Remarkably, at least two studies, the Broadbent Bolton and Michigan Growth Studies were still ongoing in 1993 and have extended long into the adulthood, yielding unique data on the changes between the young adult and the elderly face (Behrents 1985b; Behrents 1985c; Hunter et al. 1993). The sample size of 191 individuals in the Michigan Growth Study is approximately the same as the present Helsinki study's overall sample size at the study end.

Notably, the majority of studies on this subject are so-called mixed longitudinal, meaning that records on subjects newly admitted to the study are included along the way. Typical for this type of study is the relatively small number of participants in the youngest age groups. The present material is representative from the age 4 years onwards. Still another aspect that markedly interferes with comparisons between studies is the varying presence of malocclusions, and performance and timing of eventual orthodontic treatment. By adding patients with malocclusion, and in particular those receiving orthodontic consultation and care, it is easy to increase the number of subjects, but both the study population and its age distribution become biased. Typical for the study collections is the highest number of patients representing early and late mixed dentition. Birth cohort studies, by definition, include subjects with malocclusion traits. Depending on the aims of the study, those subjects can be excluded, such as in the recent Columbian study (Jimenez et al. 2020), or can be included in further follow-up, and in the latter case analyzed as a whole group or separately, such as in the Michigan study (Hunter et al. 1993). If included, it is a matter of ethical consideration to eventually postpone orthodontic treatment for as long as possible, which has been the policy for instance in the Forsyth Study (Hunter et al. 1993). In the whole 'Mother-Child Longitudinal Study', some subjects had malocclusion. However, only those who did not receive orthodontic treatment were included in this thesis cohort.

All these confounding factors should be borne in mind when interpreting results from studies on different ethnic groups; all differences are not necessarily explained by the ethnicity itself.

6.2. Selection of variables

The main purpose of this study was to produce comprehensive data on human craniofacial growth with the needs of the orthodontic specialist community primarily in mind. Orthodontists use different methods to analyze the size and form of the facial and dental morphology from patient radiographic images, their choice of methods depending on factors such as place and timing of basic and specialist education, activity in research and continuous education, working environment, type and severity of the patient's malocclusion, and personal preferences of the orthodontists. The present study therefore contains a large number of different variables – for instance for measuring the gonial angle either including or excluding the condyle – to increase the applicability of the results of this work among users of different analyses. On the other hand, it must be understood that as this is a long term longitudinal study, that this work has required decades to complete. The different analyses, points, plans, angles etc. were chosen according to the time when the thesis was planned and pointed to the facts which at the time considered relevant, in use, or generally reflecting the time era. For instance, points of importance for Koskinen-Koski analysis which was much used at earlier times, but is hardly in use anymore, were therefore digitized and are still included in the list of digitized points, although they have not been utilized in further growth analysis (Koskinen and Koski 1965). Conversely, there may be an absence of some measures: for instance, facial axis could not be formed in the absence of a digitized pterygomaxillary reference point. The leading ideas in selection of the cephalometric measures were, that anatomy from a variety of aspects was given merit. In other words, the thesis was based on variables derived from different analyses and their use modified.

6.3. Strengths and weaknesses of the study

The present study has remarkable strengths, and is in many ways unique. It is based on a relatively large number of healthy individuals, with a nearly equal number of boys and girls participating. The

recruitment had started before the birth of the individuals and the follow-up was long, ending at the age of 25 equally for both genders. The sample contains only individuals who did not receive orthodontic treatment. The participating children were on average tall, for their generation, and of similar statural height as the means in the presently used Finnish growth charts (Saari et al. 2011). The number of participants reaching adulthood was still high, and the drop-out of 56.3% was low for such a long follow-up. No drop-out analysis was performed, but factors contributing to discontinuation can be estimated as unlikely to affect craniofacial measurements.

During the study period radiation protection rules changed and became more stringent. Towards the end of the study, radiographs were taken less frequently, because the ethics committee did not allow final radiography of any participant of whom at least 6 lateral cephalograms had already been taken by the time of the extended study permission. Demands of radiation protection likewise overrode the interest to analyze systematically the morphology and size of cervical vertebrae. For a population study, the use of the Frankfurt horizontal plane as the reference is well justified.

A new method was developed for this study. All digitizing was performed directly on the radiographs, by one and the same person, using the whole image series of individuals with other subject documents to aid precise landmark identification. Corrections were made regarding both human and hardware errors to the highest possible precision, including corrections for the radiographic magnification. The number of measurements is vast, and thus correlations to somatic growth have been made possible. Because of its longitudinal prospective study setting, it was planned and launched several decades ago using the best knowledge and techniques available at the time.

In this study, all data is shown, even from the youngest ages in which the number of radiographs was very small. Results from groups with small sample sizes should be interpreted with caution.

6.4. Cephalometric method analysis errors: Intra- and inter-examiner errors

In two classic papers, Björk and then Houston described errors that can occur during cephalometric analyses. Björk described three types of fundamental error: differences between two cephalograms taken of the same individual, differences in landmark identification, and errors in measuring (Björk 1947). Much later, Houston classified possible cephalometric errors into systematic errors (bias) and random errors and described methods minimizing these sources of error (Houston 1983).

Savara et al. and Miller et al. investigated cephalometric errors in the mandible and maxilla using both frontal and lateral cephalograms (Miller et al. 1966; Savara et al. 1966). They tested within and between landmark locators, and also tested within and between measurement takers. They found landmark identification errors to be greater than measurement errors. They also found that for some landmarks there are differences between landmark locators. Within- and between examiner-errors were further studied by Richardson (Richardson 1966). He compared two examiners who studied 13 skeletal cephalometric points on 10 radiographs, with one week's interval between observations. He found that for all cephalometric points and lines, the error between operators was always larger than the error for the same operator over time.

In another similar study, but this time not only on skeletal landmarks but also on dental landmarks, cephalograms of 25 individuals were traced, using 13 cephalometric landmarks. No significant differ-

ences were observed between two cephalograms taken consecutively of the same individual. Moreover, no significant differences were found in landmark identification either by the same operator over time (intra-operator errors) nor between operators (inter-operator errors) (Midtgård et al. 1974). In a study looking at the cephalometric tracing error of Björk's mandibular structures, two examiners (one student in specialist training, one experienced specialist orthodontist) made multiple tests of 50 lateral cephalograms. They measured SNA, SNB, ANB, and Go-Me/ANS-PNS and found random and systematic errors between examiners to be greater than errors within each examiner (Cook and Gravely 1988).

Error studies in soft tissue cephalometry have also been performed in different malocclusions with the lips either relaxed or together. These studies, although mainly concerning reliable landmark identification, gave results similar to those on skeletal and dental points (Wisth 1972; Wisth and Böe 1975; Hillesund et al. 1978).

In line with results on 2D studies, it has been shown that when analyzing 3D computerized tomographic images, the inter-observer measurement errors are generally greater than intra-observer measurement errors in all three planes for skeletal, dental and soft tissue measurements (Swennen et al. 2006).

6.5. Repeatability and systematic error

In the current study, only intra-examiner reproducibility study was undertaken. The rationale for this was based on the aforementioned articles in which errors between examiners were generally greater than errors within each examiner.

Among the digitized points the largest error was in Rls, which is a superior auxiliary point on the mandibular ramus and defined indirectly by using acetate sheet line as aid to form the tangent to the ramus line. The corresponding inferior auxiliary point is Rli, also showing statistically significant differences between the replicated measurements but at a lower level. In Rls, both the difference in mean and in SD are large. In forming one of the gonial angles, the one utilizing mandibular corpus and ramus tangents, the difference also reaches statistical significance. Similarly, this holds true for the point Tgo (Tangent gonion) at the intersection of these tangent lines. This difference can be understood by taking into consideration that the auxiliary points are not anatomical, but just aiding points along a line. Another factor lies within the difficulty to localize points and tangents on the two mandibular shadows in the radiograph identically. The latter also applies to point Ar (Articulare).

Points on rounded surfaces are additional points that are identified with difficulty. Here, point spg (soft tissue pogonion) showed statistical significance in the error study; similarly did the NGoMe angle, probably due to Go, which lies on a rounded surface as well.

For C' and C", auxiliary points forming the clivus plane, the definition was changed somewhat (towards of being more tangential to the clivus plane) during this lengthy project, to reflect the learning process in the course of the study. The definition for Basion also slightly changed over the years (moving very little up and backwards), explaining why the distance S-Ba (Sella-Basion) showed a highly significant error and the NSBa angle a more moderate error. A few others, such as maxillary anterior alveolar height MaxAAH, showed some statistically significantly different measurement results in repeated digitization.

There seems to be no systematic errors or bias. In the error study of the digitized points there seems to be larger SD throughout than in the error study of the distances and angles. The reason for this is unclear, because the contrary could be obviously expected. As shown (Arponen et al. 2008), the direction of the error in cephalometric point placement largely dictates to what extent it will affect the respective linear and angular measurements. For instance, more posterior placement of the ANS (anterior nasal spine) would give a shorter hard palate whereas the maxilla-mandibular plane angle would remain the same. Similarly, mostly vertical displacement of the Rls would not be destructive of the measurement of the gonial angle.

One reason for the good agreement in the error study may be the use of acetate sheets as aid during the digitizing process, when it was performed directly on the radiographs. It was also found beneficial to draw the incisors from the basic picture of the series onto acetate sheets and to transfer them from x-ray to x-ray for each child. Since once formed, the teeth keep their form. This method could be applied to other difficult parts as well.

Only intra-examiner error was calculated. In the beginning of the study and also subsequently the author and Professor William Houston performed many cephalometric calibrations. Discussions took place on inter-examiner re-digitization, but it seemed reasonable that in these types of extended longitudinal record collections, it is best that one person does all the digitizing, handling the whole series of one subject at a time, and has the single view as to how things should be performed. In the work of Bishara, not only was each subject but also each landmark was handled at one time, to make landmark determination as consistent as possible (Bishara 1981; Bishara et al. 1981). This, however, is impossible when the landmarks are digitized straight on radiographs. There also exists the question of opinion; one has to be persistent in one's opinions and make decisions always in the same manner, admitting as well that a learning process takes place during the work.

6.6. Distinctive features of craniofacial growth of Finnish children

Taking the Sella-Nasion plane with superimposition on Sella as a reference, the following general observations regarding both genders can be made: the skull base can be interpreted to undergo minor changes only, the gonial angle shows a tendency to decrease especially in boys, the posterior clivus tangential plane is stable, but foramen magnum plane turns more horizontal during growth thus decreasing the angle between them, and finally that the palatal plane is fairly stable.

Comparison between the means of boys and girls shows that in boys, greater growth takes place and continues for a longer period. Sexual dimorphism exists, particularly in the growth of the mandible: after the age of 9 years, the mandible of boys starts to grow in an accentuating manner in comparison to girls. Between the ages of 4 and 25 years, the total increment in the Condylion-Prognathion measure in this sample was 36.5 mm in boys and 28.2 mm in girls. This measure is used in both Harvold and McNamara analyses on differences in jaw lengths and is important in terms of diagnostics and treatment planning of jaw-size disharmony. A similar pattern of sexual dimorphism is notable in the increase in anterior face height. There as well, the boys showing greater growth-related changes after the age of 9 years than girls do, and resulting in a face that is, on the average, 17.4 mm longer than in girls. The majority of this difference results from changes in lower facial height, and the sexual dimorphism of a pubertal growth spurt in boys, which in girls, while taking place two years earlier of that of the boys, remains modest (Buschang et al. 2013).

Notably, however, posterior facial height increases even more rapidly in boys than does the anterior facial height, this gender difference becoming evident already at the age of 8 years and being even more significant after the age of 18 years. This relates to the more closing type of growth rotation in boys that in girls, and the difference in growth rotation becomes more accentuated at later ages. The frontal region is more prominent in boys due to the growth of the frontal sinus.

The amount of craniofacial growth in boys and girls under the age of 11 years is similar, but the boys' growth rotation is by then already more horizontal. Thereafter, regarding means, the girls then enter their pubertal growth spurt approximately two years before the boys, but boys grow more than girls. By the age of 17 years, the growth of the girls already ceases whereas boys continue to grow up until the age of 21 years. Of the late changes, one to be highlighted is the decrease in protrusiveness of the lower incisors in girls between the age-years 20 and 24. This is in line with the findings of Behrents on changes related to ageing (Behrents 1985b; Behrents 1985c) and probably relates to a clinically observable crowding in the lower incisor area (Bishara et al. 1994).

Comparison to Swedes shows small differences (Persson and Thilander 1987). The cranial base angle in the Swedish boys is larger than in Finnish boys but diminishes slightly after the age of 7 years. Their mean growth rotation is less closing than in the Finnish boys, whereas the growth rotation in Swedish girls is more closing than in the Finnish girls. This means that the mandibular prognathism increases less in Swedish than in Finnish boys, but much more in Swedish than in Finnish girls. These differences already become observable at the age of 7 years but more so with increasing age. Hence, generally, Swedish boys have a longer face, a more opening growth pattern and are more retrognathic than are Finnish boys at all ages. The more closing growth pattern in Swedish girls becomes evident after the age of 13 years (Persson and Thilander 1987). Thilander et al. compared the craniofacial angular measurements between Swedes and Norwegian without finding significant differences (Thilander et al. 2005). Comparison between Norwegians and Spaniards showed a more horizontal mandible and more protrusive incisors in the latter (Canut et al. 1987).

Comparison of the present data with data from the United Kingdom shows that the growth pattern in both genders, in the British, is more vertical than in the Finns (Bhatia and Leighton 1993). They also display higher gonial and cranial base to mandibular plane angles and they are more retrognathic than Finns at all ages. British have a more diverging (opening) growth pattern than Finns do. Comparison of the Helsinki growth study data to that of the Caucasian population in the Michigan Growth Study in North America shows differences in line with those observed between Finns and Britons (Riolo et al. 1974). Notably, observations in the Riolo Atlas from the Michigan material end at the age of 16 years, and therefore late growth between Finns and the Americans cannot be compared.

Dutch and Finnish children were compared using data from two longitudinal growth studies: the Groningen Elementary School Study and the Helsinki Longitudinal Growth Study at three different age points. Here, the reference plane was foramen magnum plane from Basion to Opisthion. Differing from the above-mentioned national comparisons, the common reference plane to compare has been the Sella-Nasion plane. Overall, a remarkable difference emerged in facial form between the Dutch and Finnish boys, but less difference between girls. It turned out that the Dutch boys and girls had a larger cranial base angle, a steeper mandibular angle, a larger gonial angle, and a shorter mandibular corpus than did the Finns, as well as more retrognathic jaws and a divergent growth pattern. Hence it is important to have access to population-specific reference values (Verbeek and Evälahti 2001).

In Hong Kong, the Chinese showed different values in McNamara cephalometric analysis differing from those of matched young British Caucasian children, with a higher degree of sexual dimorphism in the Chinese (Wu et al. 2007). The authors make the same conclusion as to the importance of population-specific normative values. In a longitudinal cephalometric study on Columbian Mestizo, pubertal growth spurts occurred between ages 12 and 14 years in girls and between 14 and 16 years in boys (Jimenez et al. 2020), later than the respective Finnish age ranges. The Columbians, whose growth was followed up for 18 years, displayed age- and gender-specific growth changes in the craniofacial measurements. Notably, however, unlike Finns and many other ethnicities, the young Columbian Mestizo adults did not show sexual dimorphism in their mandibular growth rotation (Jimenez et al. 2020).

6.7. Future perspectives

The methodology in the present study is based on two-dimensional radiographic imaging that would not be allowed today on healthy individuals even for valuable research purposes. This means that this study will remain the one and only longitudinal lateral cephalometric study of healthy, untreated Finns. Three-dimensional imaging using ionizing radiation for a similar aim, computed tomography or cone-beam computed tomography, will thus never be ethically sustainable, even with the development of low-dose equipment. Three-dimensional reference data from MRI imaging will possibly be available in the future, but with exponentially increased difficulty in gathering and analysis of data. However, data in the midsagittal plane will be comparable to data obtained from cephalometric data based on midsagittal plane landmarks.

Lateral cephalometry will most probably retain an important role also in future orthodontic diagnostics and treatment planning. While it is agreed that the emphasis relies in treating malocclusions and facial disharmony, not on cephalometric values, the information obtained from cephalometric analysis, such as type of facial growth rotation and inclination of the incisors are of utmost importance and cannot be obtained by other means. Most of the data in this study relies on cephalometric landmarks in the midsagittal plane and will remain useful in the future. The present soft tissue data will similarly always serve as a reference for future soft tissue analyses from clinical profile photography. Since the present study population presents the height of the contemporary Finns according to the latest Finnish growth charts these normative values of craniofacial growth can be considered applicable in today's clinical orthodontics (Saari et al. 2011).

In the future, more individual data can be obtained from this study. Individual growth and growth velocity curves help us understand that besides patient cooperation related problems, expected growth may not occur and treatment results hence be poor. Monitoring the patients' hours of use of removable appliances and relating that to observed clinical changes will hopefully aid in identifying individuals with high or low remaining growth potential and in thus redirecting the treatment plan.

7. CONCLUSIONS

This thesis presents the only longitudinal cephalometric growth study that has been made on a healthy Finnish population and is likely to remain the only one, since the taking cephalometric records on healthy individuals using ionizing radiation is no longer allowed for ethical reasons. This study has produced detailed analysis of craniofacial growth and age- and gender-specific population norms of Finnish children and adolescents between the ages of 4 and 25 years, presented in the form of tables and graphs.

- Sexual dimorphism in craniofacial growth exists particularly after the age of 9 years with boys thereafter growing more than girls. The most pronounced difference occurs in the length increment of the mandible.
- Growth spurts, similar to the pubertal growth spurt in statural height, also occurs in different regions of the face. A growth spurt takes place in the mandible in boys between the ages of 9 and 16 years, but a clear spurt in the mandibular growth of girls is not detected.
- Inter-individual variation is remarkably wide as regards both timing and amount of growth in different parts of the facial skeleton. Future studies in this field are of interest and warranted.
- Finns exhibit a closing growth rotation of the mandible, particularly boys.
- Boys continue their craniofacial growth to an older age than do girls.
- Late growth takes place in different regions of the face, notably in the mandible.
- Late changes (20-25 years) include a decrease in the inclination of the mandibular incisors, particularly in girls.

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10. APPENDICES

Appendix 1

Basic data

Name	Meaning	Explanation
surname		
first name		
case number		
date of radiograph		The basic data JT.dbf is
age with two decimals		primarily ascii file JT.txt
sex (male M or 1, female F or 2)		which is based on data base
radiograph number		JUTTI1.csv created and updated
height at time of radiograph		with a Pascal program written by
adult height cm		Professor William Houston (1987).
face breadth mm		
magnification (letter new/old)		Civil engineer Tauno Voipio
dental age		has written assembler programs
menstruation		GETDAT and GETCSV to convert the
comments		data into ascii form (1995).
f1(x)	Fiducial point upper left	
f1(y)		GETDAT reads the digitized
f2(x)	Fiducial point upper right	measures picture by picture to
f2(y)		tables where double measurements
f3(x)	Fiducial point lower right	are seen separately.
f3(y)		
f4(x)	Fiducial point lower left	GETCSV further converts the
f4(y)		measurements in form one line
N(x)	Nasion	per picture. Double measurements
N(y)		are given as means. Missing values
S(x)	Sella	are given as zeroes. Separation
S(y)		character between numbers is
Ar(x)	Articulare	comma and thus the resulting file
Ar(y)		is readable with excel. There are
Ba(x)	Basion	commas also in comments so they
Ba(y)		had to be removed before reading
Or(x)	Orbitale	into excel.
Or(y)		
Sp(x)	Spina nasalis anterior	Coordinates are given with one or
Sp(y)		two decimals. Two decimals tell
Sp'(x)	3 mm posterior of Sp, midpoint	that the value is a mean.
Sp'(y)		
Pl(x)	Palatal plane help point	
Pl(y)		
Pm(x)	Spina nasalis posterior	
Pm(y)		
Pt(x)	Pterygomaxillare	
Pt(y)		
A(x)	A-point	
A(y)		
Pr(x)	Prostion	
Pr(y)		
Is(x)	Edge of upper incisor	

Name	Meaning
Is(y)	
Im(x)	Midpoint between crown and root in upper incisor
Im(y)	
As(x)	Apex of upper incisor
As(y)	
Ii(x)	Edge of lower incisor
Ii(y)	
Ai(x)	Apex of lower incisor
Ai(y)	
Id(x)	Intradentale
Id(y)	
B(x)	B-point
B(y)	
Pg(x)	Pogonion
Pg(y)	
Pgn(x)	Prognathion
Pgn(y)	
Me(x)	Menton
Me(y)	
Si(x)	Inner border of synfysis
Si(y)	
Mf(x)	Molar functional point
Mf(y)	
Fo(x)	Help point of Fop (line)
Fo(y)	
Mlp(x)	Lowest point of mandible in angular area
Mlp(y)	
Go(x)	Gonion
Go(y)	
Tgo(x)	Tangent gonion
Tgo(y)	
Rli(x)	Lower point of ramus
Rli(y)	
Rls(x)	Upper point of ramus
Rls(y)	
Cd(x)	Condylion
Cd(y)	
Po(x)	Porion
Po(y)	
O(x)	Opisthion
O(y)	
Oc(x)	Occipitale
Oc(y)	
Gl(x)	Glabella
Gl(y)	
Se′(x)	Sphenoidale plane, point 1
Se′(y)	
Se′′(x)	Sphenoidale plane, point 2
Se′′(y)	
C′(x)	Clivus plane, point 1
C′(y)	
C′′(x)	Clivus plane, point 2
C′′(y)	
Cb1(x)	Cranial base 1
Cb1(y)	
Cb2(x)	Cranial base 2
Cb2(y)	

Name	Meaning
Mn1(x)	Mandible 1
Mn1(y)	
Mn2(x)	Mandible 2
Mn2(y)	
sgl(x)	glabella (soft)
sgl(y)	
sn′(x)	extension of S-N line
sn′(y)	
ns(x)	nasion (soft)
ns(y)	
prn(x)	pronasale
prn(y)	
su(x)	between pronasale and subnasale
su(y)	
sn(x)	subnasale
sn(y)	
sa(x)	a-point (soft)
sa(y)	
ul(x)	outmost point of upper lip
ul(y)	
stu(x)	upper stomion
stu(y)	
stl(x)	lower stomion
stl(y)	
ll(x)	outmost point of lower lip
ll(y)	
sm(x)	submentale (soft)
sm(y)	
spg(x)	pogonion (soft)
spg(y)	
spgn(x)	prognathion (soft)
spgn(y)	
sme(x)	menton (soft)
sme(y)	
soc(x)	occipitale (soft)
soc(y)	
Enlarg	
Row Nr	

DISTANCES between two points (2)

Name	Point 1	Point 2
NS	N	S
SBa	S	Ba
ArGo	Ar	Go
ArTgo	Ar	Tgo
PgnTgo	Pgn	Tgo
PgnGo	Pgn	Go
SPgn	S	Pgn
Cranbase	Cb1	Cb2
CdA	Cd	A
CdPgn	Cd	Pgn
CdSp′	Cd	Sp′
SpPm	Sp	Pm
GlOc	Gl	Oc
OPr	O	Pr
OId	O	Id
OS	O	S
OGo	O	Go
MeTgo	Me	Tgo
Mandib	Mn1	Mn2
NMe	N	Me
NSp′	N	Sp′
Sp′Me	Sp′	Me
SGo	S	Go
SMlp	S	Mlp
STgo	S	Tgo
SiPg	Si	Pg
BaO	Ba	O
sglsoc	sgl	soc
nssme	ns	sme
nssn	ns	sn
snsme	sn	sme
snstu	sn	stu
stlsme	stl	sme

Program KOKOA.bas reads the description, that defines the location of each coordinate pair in ascii file JT.txt. The points are recognized with names without (x) or (y). Program reads the building instructions PERUS.ohj which contains the definitions of line lengths, distances and angles.

Program KOKOA.bas creates new ascii file, which's form is derived from Excel files got from England. It was originally named PERUS.dbf meaning Principal file. When running KOKOA.bas the output file may be named freely. That was important in testing the collection of measures.

In the collection procedure there are two correction functions to be selected:

- correction for linearity of coordinate board. That is made first.
- compensation of radiograph magnification.

The files UUDET.txt and UUDET.dbf were created so that their descriptions are the same as in old files PERUS.TXT and PERUS.DBF where the coordinate corrections were not made. Later both corrections are always present in files Uudet.

The program KOKOA.bas reads data one picture at time and calculates all the measured coordinates. When correcting coordinates the full area correction is applied if the point is less than 50 mm from any boarder. If inside these limits the linear correction is applied.

LINE through one point (4)

Name	Point	Definition
Vertical	Is	X=X(Is)
Horizontal	Is	Y=Y(Is)

LINES trough two points (7)

Name	Point 1	Point 2
Max	Pl	Pm
Mand	Me	Mlp
Ram	Rls	Rli
Upp	As	Is
Low	Ai	Ii
Chin	Pg	B
Fop	Mf	Fo
FH	Or	Po
Sphen	Se′	Se′′
Cliv	C′′	C′
For	Ba	O
Est	prn	spg
ABplane	A	B
NSplane	N	S
Nose	ns	spg
Burs	sn	spg

ANGLES determined by three points (5)

Name	Point 1	Point 2	Point 3
SNA	S	N	A
SNB	S	N	B
ANB	A	N	B
NAPg	N	A	Pg
SNPg	S	N	Pg
NSBa	N	S	Ba
NSAr	N	S	Ar
NGoMe	N	Go	Me
NTgoMe	N	Tgo	Me
MeGoAr	Me	Go	Ar
MeTgoAr	Me	Tgo	Ar
sn′snspg	sn′	sn	spg
sn′prnspg	sn′	prn	spg
susnsa	su	sn	sa
susnul	su	sn	ul
sglnsprn	sgl	ns	prn

In program KOKOA.bas there are routines to calculate all cephalometric measures, projections and angles except the calculation of Wits appraisal. It is calculated separately using coordinate rotation and geometrics.

There are eight routines in program. The parameter file tells one by one, which routine is used, which points are used and where the result is written.

When compensation of magnification is selected that is done first before calculating the measures and angles.

When writing this there are 111.284 measured coordinates in initial file. 3.920 (3.3 %) are 50 mm or less of any boarder. These 3.920 points are subject to greater correction than that in the linear middle region.

Program AGETABLE counts of KORJATTU.TXT or similar file the tables for 4 to 25 years using list of parameters. The method is moving polynomial fit giving results for full years. The output is given by gender (N, Mean, CD-values, SD) and T-test for each year between genders. In polynomial fit three points on both sides of calculation age are used.

Program VELOCITY is principally the same, but the first derivative of polynomial is used resulting in the change velocity of measure per year.

The newest program is AgeVelo that combines AGETABLE and VELOCITY resulting in printed output for thesis.

ANGLES between two lines (6)

Name	Line 1	Line 2	Points of 1		Points of 2	
SN/FH	NSplane	FH	N	S	Po	Or
SN/Mand	NSplane	Mand	S	N	Me	Mlp
SN/Max	NSplane	Max	S	N	Pl	Pm
*) SN is not a line! SN is a distance.						
Max/Mand	Max	Mand	Pl	Pm	Mlp	Me
Max/Fop	Max	Fop	Pm	Pl	Fo	Mf
Sphen/Cliv	Sphen	Cliv	Se′	Se′′	C′′	C′
Cliv/For	For	Cliv	O	Ba	C′′	C′
Mand/Ram	Ram	Mand	Rli	Rls	Me	Mlp
Chin/Mand	Mand	Chin	Mlp	Me	Pg	B
Chin/SN	NSplane	Chin	S	N	Pg	B
Upp/SN	Upp	NSplane	Is	As	N	S
Upp/Max	Upp	Max	As	Is	Pl	Pm
Low/Mand	Mand	Low	Mlp	Me	Ai	Ii
Upp/Low	Low	Upp	Ii	Ai	As	Is
AB/Fop	Fop	ABplane	Fo	Mf	A	B

PERPENDICULAR DISTANCE of a point from a line (3)

Name	Point	Line	Point	Points of line		
Ii_A-Pg	Ii	A-Pg	Ii	A	Pg	
Is_A-Pg	Is	A-Pg	Is	A	Pg	
MaxPAH	Mf	Max	Mf	Pl	Pm	
MaxAAH	Is	Max	Is	Pl	Pm	
MandPAH	Mf	Mand	Mf	Me	Mlp	
MandAAH	Ii	Mand	Ii	Me	Mlp	
OJ	Ii	Vertical	Ii	Is		Special case (4)
OB	Ii	Horizontal	Ii		Is	Special case (4)
EstU	ul	Est	ul	prn	spg	
EstL	ll	Est	ll	prn	spg	
Ntip	prn	Nose	prn	ns	spg	
Burul	ul	Burs	ul	sn	spg	
Burll	ll	Burs	ll	sn	spg	

The counting system created for the program Kokoa.bas is:

0 Direct copy as such, for example age and gender
2 Distance between two points, always positive
3 Distance of x from line y-z, both signs are possible
4 Line defined by one point (vertical or horizontal)
5 Angle defined by three points x-y-z (apex in y)
6 Angle defined by two lines x-y and u-v (apex depending on positions)
7 Line defined by two points x-y
8 Difference of two segments of lines
9 Wits appraisal. Special procedure.

Later three segments of lines were added:

MeTgo	Me	Tgo
Cranbase	Cb1	Cb2
Mandib	Mn1	Mn2

ANGLES between two lines (6)

Name	Line 1	Line 2	Points of 1		Points of 2	
CB/SN	Cranbase	NSplane	Cb1	Cb2	S	N
CB/Mandib	Cranbase	Mandib	Cb1	Cb2	Mn2	Mn1
CB/MeTgo	Cranbase	MeTgo	Cb1	Cb2	Tgo	Me

At date 2019-04-11 the following was added:

Wits appraisal. It is the difference of projections of points A and B with reference to line from point Fo to point Mf. No simple formula exists so the calculation was made geometric first rotating the coordinates so that the y-coordinates of Fo and Mf are zero. Then Wits appraisal is given as difference of x-coordinates by A and B in this order. Later McNamara was added. The routine 8 was used counting the difference of Cd-Pgn and Cd-A. The segment of line Cd-A was also added.

Appendix 2

Cephalometric System

Name	F	Parameters				Explanation
Case	0					Copy from Perus.dbf
Name	0					"
PersID	0					"
Picture nr	0					"
Sex	0					"
Age rounded	0					Age with one decimal
Date	0					Date in standard form
Enlarg	0					Radiograph enlargement
Age 2 dec	0					Age with two decimals
Birthday	0					Birthdate in standard form
SNA	5	A	N	S	N	Angle by three points
SNB	5	B	N	S	N	fourth point dummy
ANB	5	A	N	B	N	
NAPg	6	A	Pg	N	A	Angle by two lines
SNPg	5	Pg	N	S	N	Angle by three points
NSBa	5	N	S	Ba	S	
NSAr	5	N	S	Ar	S	
NGoMe	5	N	Go	Me	Go	
ArGoMe	5	Ar	Go	Me	Go	
N-S	2	N	S			Distance N to S
S-Ba	2	S	Ba			Distance S to Ba
Ar-Go	2	Ar	Go			
Pgn-Go	2	Pgn	Go			
S-Pgn	2	S	Pgn			
Cd-Pgn	2	Cd	Pgn			
Sp-Pm	2	Sp	Pm			
Gl-Oc	2	Gl	Oc			
O-Pr	2	O	Pr			
O-Id	2	O	Id			
O-S	2	O	S			
O-Go	2	O	Go			
N-Me	2	N	Me			
N-Sp′	2	N	Sp′			
Sp′-Me	2	Sp′	Me			
S-Mlp	2	S	Mlp			
Pg-Si	2	Si	Pg			
Ba-O	2	Ba	O			
MaxPAH	3	Mf	Pl	Pm	Max	Distance from line
MaxAAH	3	Is	Pl	Pm	Max	
MandPAH	3	Mf	Me	Mlp	Mand	
MandAAH	3	Ii	Me	Mlp	Mand	
OJ	4	Ii	Is	Is	Verti	Distance from vertical
OB	4	Ii	Is	Is	Horiz	Distance from horizontal
SN/Mand	6	S	N	Me	Mlp	Angle between lines
SN/Max	6	S	N	Pl	Pm	given with four points
Max/Mand	6	Pl	Pm	Mlp	Me	
Max/Fop	6	Pm	Pl	Fo	Mf	
Sphen/Cliv	6	Se′	Se′′	C′	C′′	
Cliv/For	6	O	Ba	C′′	C′	
Mand/Ram	6	Rli	Rls	Me	Mlp	
Chin/Mand	6	Mlp	Me	Pg	B	
Chin/SN	6	S	N	Pg	B	

Name	F	Parameters				Explanation
Upp/SN	6	Is	As	N	S	
Upp/Max	6	As	Is	Pm	Pl	
Low/Mand	6	Mlp	Me	Ai	Ii	
Upp/Low	6	Ii	Ai	As	Is	
Is_A-Pg	3	Is	A	Pg	IsA	Distance Is to A-Pg
sgl-soc	2	sgl	soc			Distance between points
ns-sme	2	ns	sme			
ns-sn	2	ns	sn			
sn-sme	2	sn	sme			
sn-stu	2	sn	stu			
stl-sme	2	stl	sme			
EstU	3	ul	prn	spg	Est	Distance from line
EstL	3	ll	prn	spg	Est	
Ntip	3	prn	ns	spg	Nose	
Burul	3	ul	sn	spg	Burs	
Burll	3	ll	sn	spg	Burs	
sn'snspg	6	sn	spg	sn'	sn	Angle by two lines
sn'prnspg	5	spg	prn	sn'	prn	Angle by three points
susnul	5	su	sn	ul	sn	
sglnsprn	5	sgl	ns	prn	ns	
S-Tgo	2	S	Tgo			Hard distance
Ar-Tgo	2	Ar	Tgo			
Cd-Sp'	2	Cd	Sp'			Distance Cd-Sp'
NTgoMe	5	N	Tgo	Me	N	Angle by three points
ArTgoMe	5	Ar	Tgo	Me	N	
SN/FH	6	N	S	Po	Or	Angle between lines
CB/SN	6	Cb1	Cb2	S	N	Angle by two lines
CB/Mand	6	Cb1	Cb2	Mn2	Mn1	Angle by two lines
CB/MN	6	Cb1	Cb2	Tgo	Me	Angle by two lines
Ii_A-Pg	3	Ii	A	Pg	IiA	Distance Ii to A-Pg
Wits_app	9	special programme				Wits appraisal
S-Ar	2	S	Ar			Distance
Tgo-Pgn	2	Tgo	Pgn			Distance
Cd-Go	2	Cd	Go			Distance
Cd-Pg	2	Cd	Pg			Distance
Cd-Tgo	2	Cd	Tgo			Distance
S-Go	2	S	Go			Distance
sgl-sme	2	sgl	sme			Distance
Me-Go	2	Me	Go			Distance
Me-Tgo	2	Me	Tgo			Distance
Differen	8	Cd	Pgn	Cd	Sp'	Difference by Harvold
PFH/AFH %	7	N	Me	S	Tgo	Ratio
LAFH/AFH %	7	N	Me	Sp'	Me	Ratio
Cd-A	2	Cd	A			Distance
McDiffer	8	Cd	Pgn	Cd	A	Difference by McNamara

f0 Direct copy
f2 Distance between two points mm
f3 Distance of point to a line mm
f4 Distance vertical or horizontal to a line
f5 Angle defined by three points
f6 Angle between two lines
f7 Ratio of two lines
f8 Difference of two lines
f9 Wits appraisal

Appendix 3

Craniofacial Growth of Finns

from 4 to 25 years

Marjut Evälahti

Contents

INDIVIDUAL GROWTH

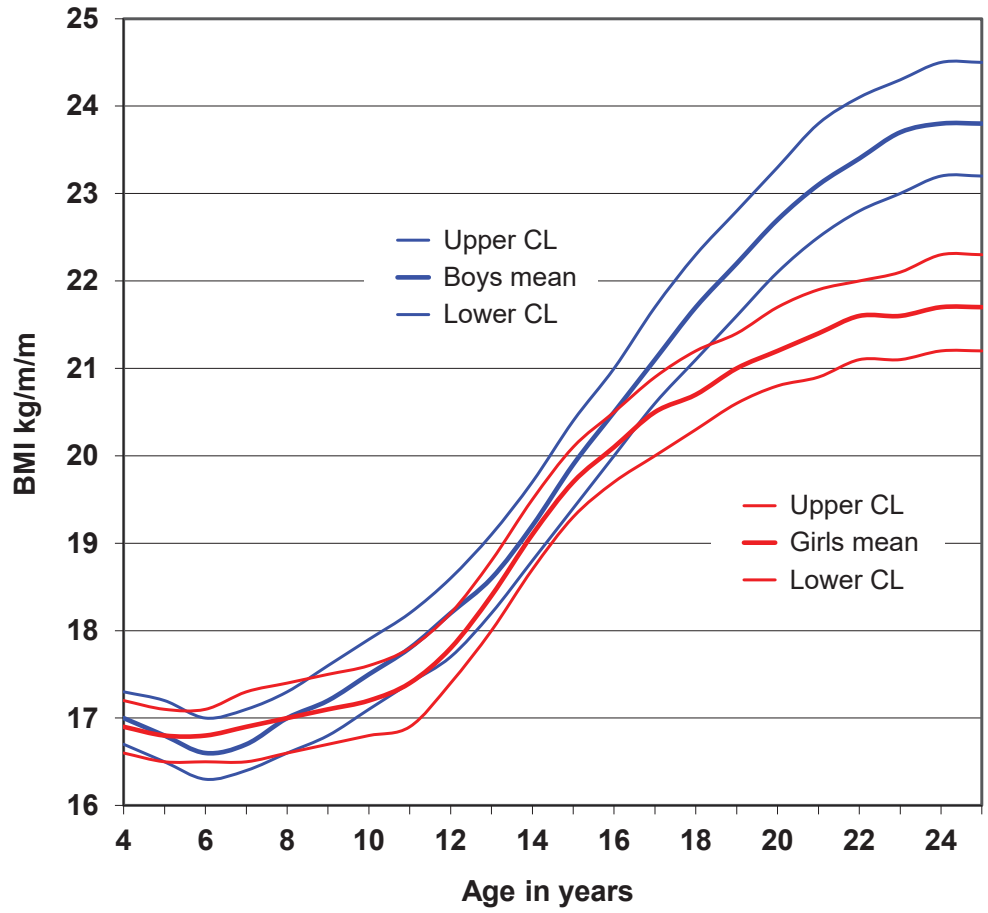
BMI (kg/m/m)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	16.7	17.0	17.3	1.22	0.28		59	16.6	16.9	17.2	1.24
5	69	16.5	16.8	17.2	1.48	0.24		87	16.5	16.8	17.1	1.35
6	75	16.3	16.6	17.0	1.53	-0.82		93	16.5	16.8	17.1	1.61
7	81	16.4	16.7	17.1	1.58	-0.54		96	16.5	16.9	17.3	1.93
8	83	16.6	17.0	17.3	1.73	-0.09		100	16.6	17.0	17.4	2.06
9	84	16.8	17.2	17.6	1.77	0.52		102	16.7	17.1	17.5	2.07
10	85	17.1	17.5	17.9	1.87	1.12		103	16.8	17.2	17.6	2.08
11	85	17.4	17.8	18.2	1.92	1.37		105	16.9	17.4	17.8	2.18
12	85	17.7	18.2	18.6	2.03	1.10		105	17.4	17.8	18.2	2.14
13	85	18.2	18.6	19.1	2.13	0.68		105	18.0	18.4	18.8	2.15
14	85	18.8	19.2	19.7	2.20	0.46		105	18.7	19.1	19.5	2.14
15	85	19.4	19.9	20.4	2.32	0.57		105	19.3	19.7	20.1	2.15
16	85	20.0	20.5	21.0	2.44	1.25		105	19.7	20.1	20.5	2.12
17	85	20.6	21.1	21.7	2.58	1.99	p<0.05	105	20.0	20.5	20.9	2.12
18	85	21.1	21.7	22.3	2.74	2.62	p<0.01	105	20.3	20.7	21.2	2.19
19	85	21.6	22.2	22.8	2.88	3.29	p<0.01	105	20.6	21.0	21.4	2.26
20	85	22.1	22.7	23.3	2.97	3.84	p<0.001	105	20.8	21.2	21.7	2.36
21	85	22.5	23.1	23.8	2.98	4.40	p<0.001	105	20.9	21.4	21.9	2.42
22	85	22.8	23.4	24.1	2.94	4.74	p<0.001	105	21.1	21.6	22.0	2.48
23	82	23.0	23.7	24.3	2.91	5.22	p<0.001	99	21.1	21.6	22.1	2.41
24	74	23.2	23.8	24.5	2.90	4.96	p<0.001	92	21.2	21.7	22.3	2.51
25	66	23.2	23.8	24.5	2.71	4.71	p<0.001	81	21.2	21.7	22.3	2.56

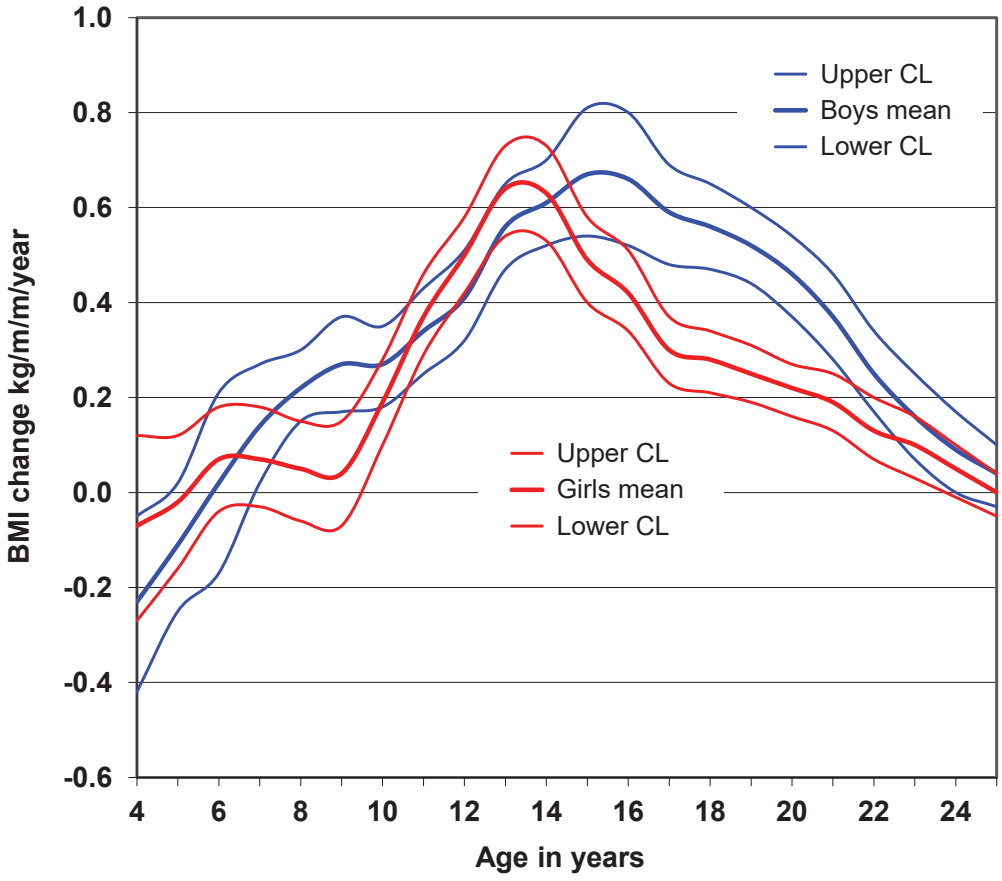
Change per year

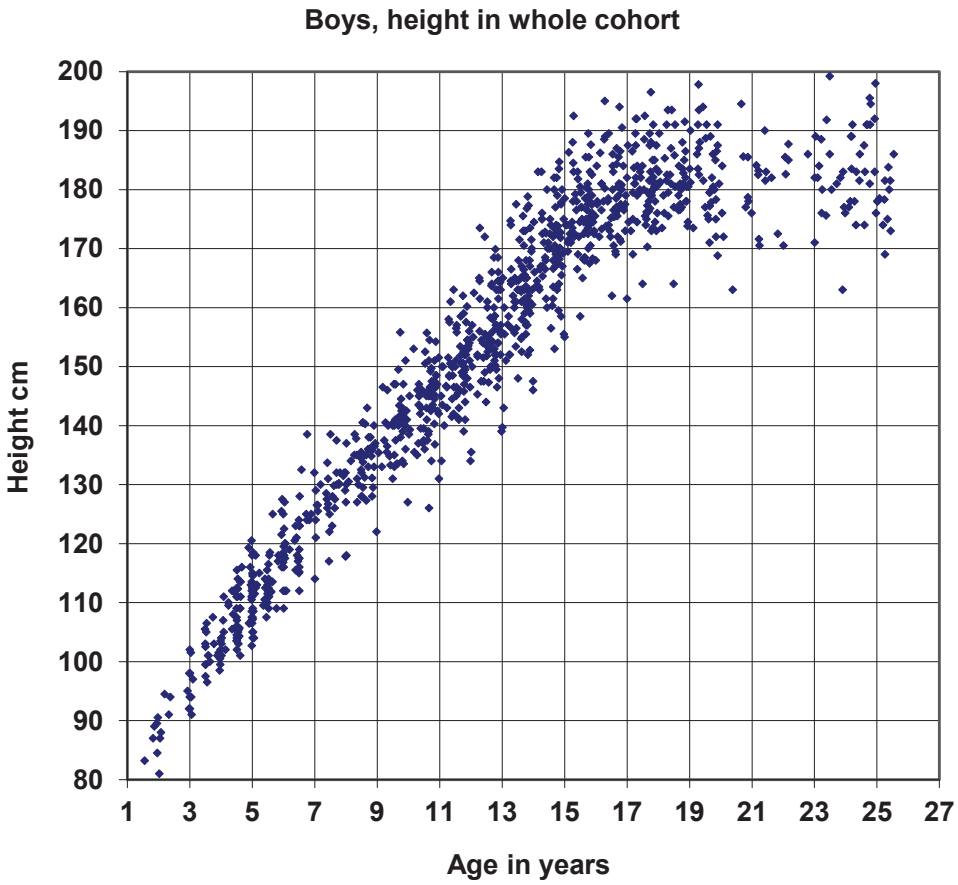
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	-0.42	-0.23	-0.05	0.68	-1.14		59	-0.27	-0.07	0.12	0.78
5	69	-0.25	-0.11	0.02	0.57	-0.90		87	-0.16	-0.02	0.12	0.68
6	75	-0.17	0.02	0.21	0.85	-0.47		93	-0.04	0.07	0.18	0.56
7	81	0.02	0.14	0.27	0.57	0.86		96	-0.03	0.07	0.18	0.51
8	83	0.15	0.22	0.30	0.35	2.63	p<0.01	100	-0.06	0.05	0.15	0.53
9	84	0.17	0.27	0.37	0.49	2.93	p<0.01	102	-0.07	0.04	0.15	0.56
10	85	0.18	0.27	0.35	0.41	1.16		103	0.10	0.19	0.28	0.48
11	85	0.25	0.34	0.43	0.43	-0.50		105	0.29	0.37	0.46	0.45
12	85	0.32	0.41	0.51	0.44	-1.35		105	0.42	0.50	0.58	0.42
13	85	0.47	0.56	0.65	0.43	-1.10		105	0.54	0.64	0.73	0.49
14	85	0.52	0.61	0.70	0.44	-0.26		105	0.53	0.63	0.73	0.52
15	85	0.54	0.67	0.81	0.63	2.26	p<0.05	105	0.40	0.49	0.58	0.48
16	85	0.52	0.66	0.80	0.64	3.00	p<0.01	105	0.34	0.42	0.51	0.44
17	85	0.48	0.59	0.69	0.50	4.55	p<0.001	105	0.23	0.30	0.37	0.38
18	85	0.47	0.56	0.65	0.42	5.18	p<0.001	105	0.21	0.28	0.34	0.33
19	85	0.44	0.52	0.60	0.39	5.21	p<0.001	105	0.19	0.25	0.31	0.31
20	85	0.37	0.46	0.54	0.41	4.69	p<0.001	105	0.16	0.22	0.27	0.30
21	85	0.28	0.37	0.46	0.41	3.48	p<0.001	105	0.13	0.19	0.25	0.30
22	85	0.17	0.25	0.34	0.41	2.20	p<0.05	105	0.07	0.13	0.20	0.34
23	82	0.07	0.16	0.25	0.41	1.24		99	0.03	0.10	0.16	0.32
24	74	0.00	0.09	0.17	0.38	0.78		92	-0.01	0.05	0.10	0.27
25	66	-0.03	0.04	0.10	0.27	0.97		81	-0.05	0.00	0.04	0.20

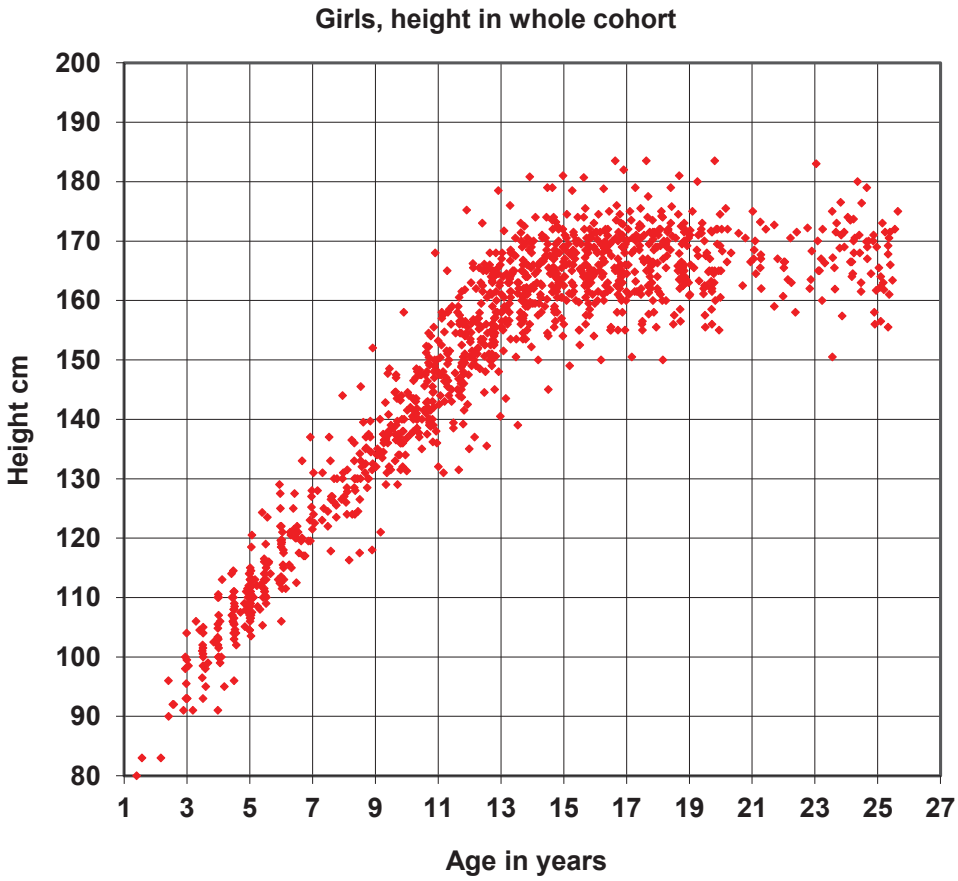
BMI in whole cohort



BMI, change in whole cohort




Boys, height in whole cohort
Height cm
200
190
180
170
160
150
140
130
120
110
100
90
80
1
3
5
7
9
11
13
15
17
19
21
23
25
27
Age in years

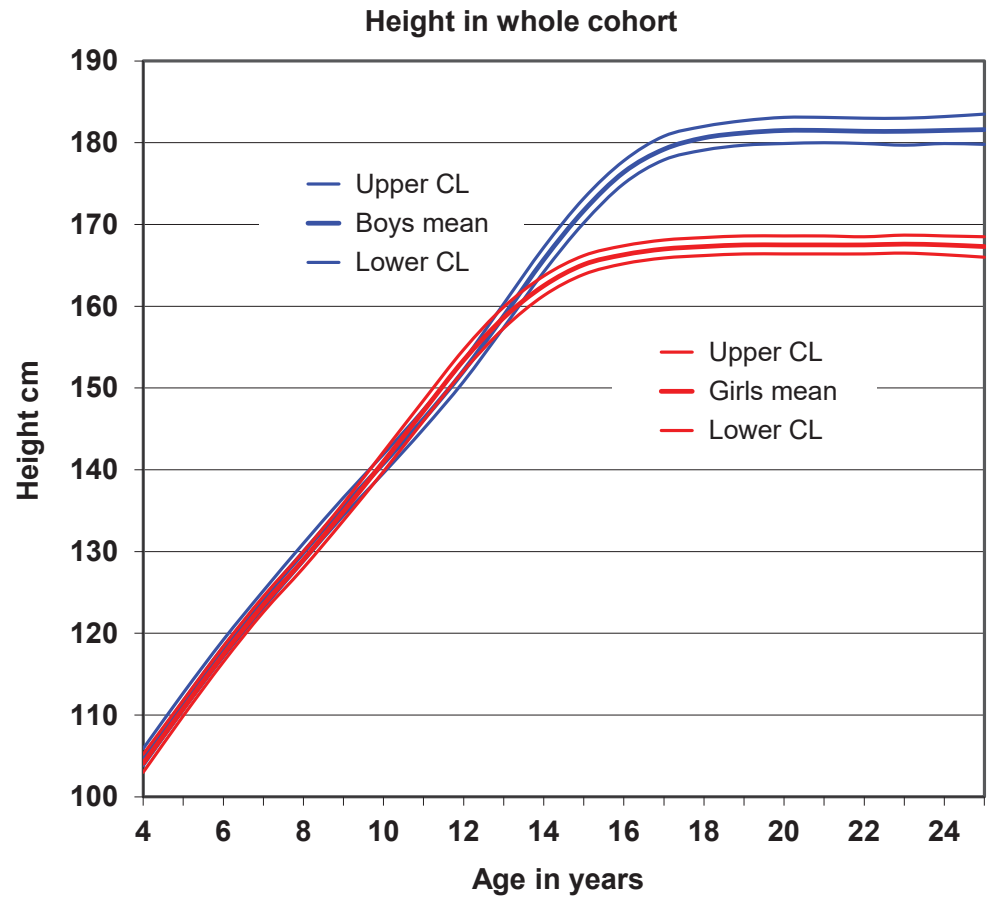

Girls, height in whole cohort
Height cm
200
190
180
170
160
150
140
130
120
110
100
90
80
1
3
5
7
9
11
13
15
17
19
21
23
25
27
Age in years

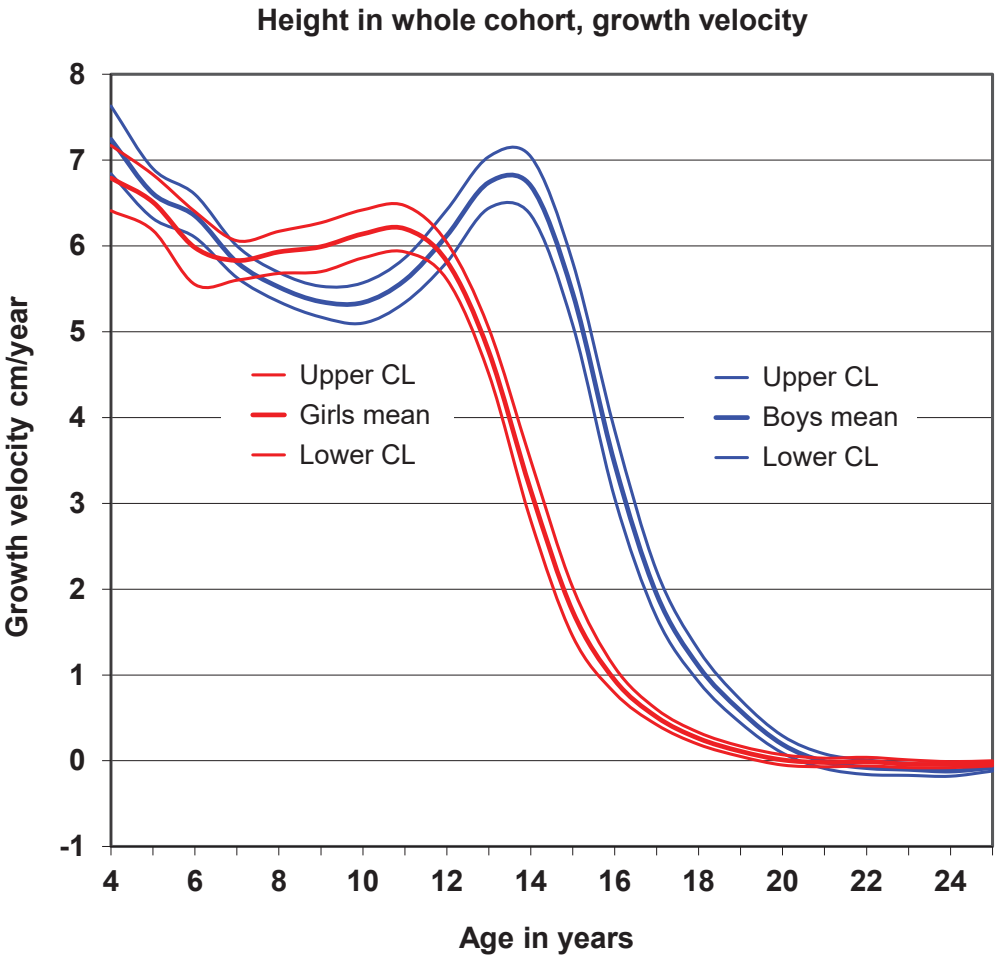
Height (cm)

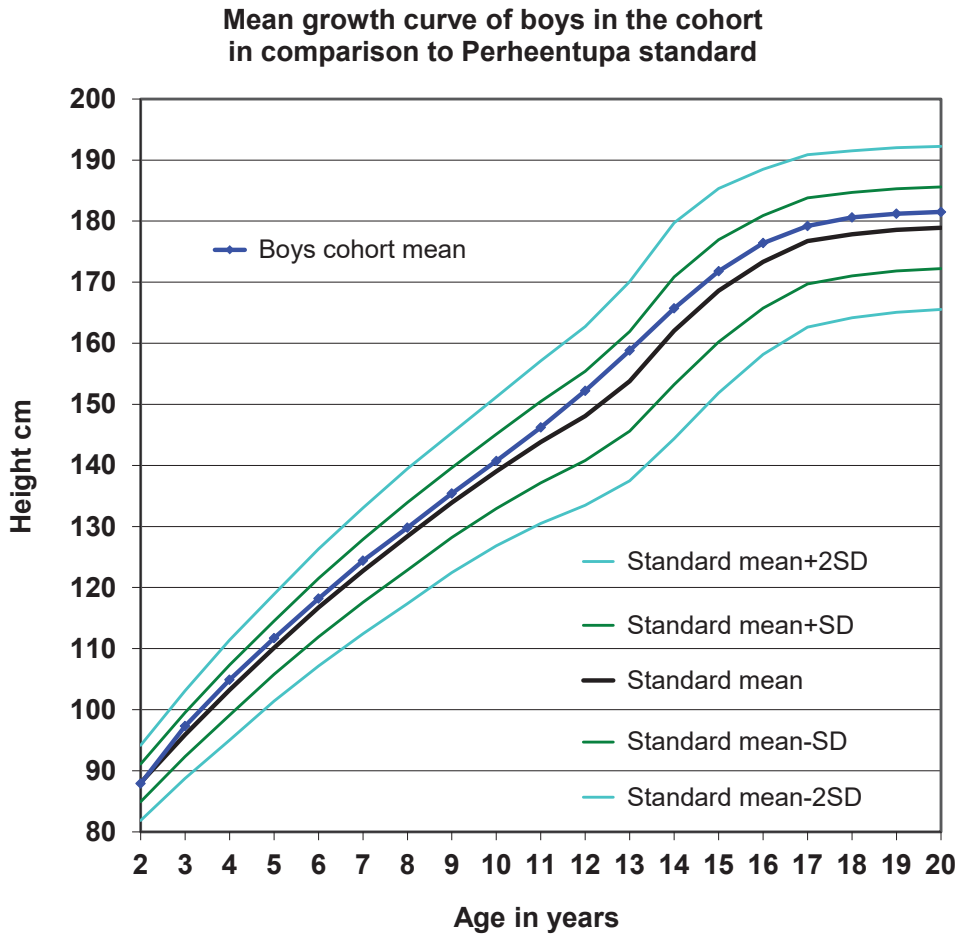
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	103.7	104.8	105.9	4.04	0.86		59	103.0	104.1	105.2	4.38
5	69	110.6	111.6	112.7	4.50	1.12		87	109.9	110.8	111.8	4.52
6	76	117.2	118.3	119.3	4.75	1.13		93	116.5	117.4	118.4	4.63
7	82	123.2	124.3	125.4	4.93	0.99		96	122.6	123.6	124.5	4.76
8	83	128.8	129.9	131.0	5.12	1.11		100	128.0	129.0	130.1	5.22
9	84	134.3	135.4	136.5	5.18	0.69		102	133.8	134.9	136.0	5.57
10	85	139.5	140.7	141.9	5.53	-0.34		103	139.8	141.0	142.1	6.07
11	85	145.0	146.2	147.4	5.70	-1.07		105	145.9	147.2	148.5	6.64
12	85	150.9	152.2	153.5	6.14	-1.19		105	152.0	153.3	154.6	6.91
13	85	157.4	158.8	160.3	6.78	0.20		105	157.3	158.6	159.9	6.71
14	85	164.2	165.7	167.2	7.00	3.29	p<0.01	105	161.3	162.5	163.7	6.21
15	85	170.3	171.8	173.3	6.87	7.35	p<0.001	105	163.9	165.1	166.2	5.80
16	85	175.0	176.4	177.8	6.67	11.15	p<0.001	105	165.2	166.3	167.4	5.73
17	85	177.7	179.2	180.6	6.83	13.28	p<0.001	105	165.9	167.0	168.1	5.78
18	85	179.1	180.6	182.0	6.97	14.32	p<0.001	105	166.2	167.3	168.4	5.79
19	85	179.7	181.2	182.7	7.20	14.61	p<0.001	105	166.4	167.5	168.6	5.78
20	85	179.9	181.5	183.1	7.36	14.72	p<0.001	105	166.4	167.5	168.6	5.74
21	85	180.0	181.5	183.1	7.36	14.84	p<0.001	105	166.4	167.5	168.6	5.71
22	85	179.9	181.4	183.0	7.36	14.82	p<0.001	105	166.4	167.5	168.5	5.64
23	82	179.7	181.4	183.0	7.49	14.05	p<0.001	99	166.5	167.6	168.7	5.65
24	74	179.9	181.5	183.2	7.31	13.89	p<0.001	92	166.3	167.5	168.6	5.71
25	66	179.8	181.6	183.5	7.57	12.97	p<0.001	81	166.0	167.3	168.5	5.87

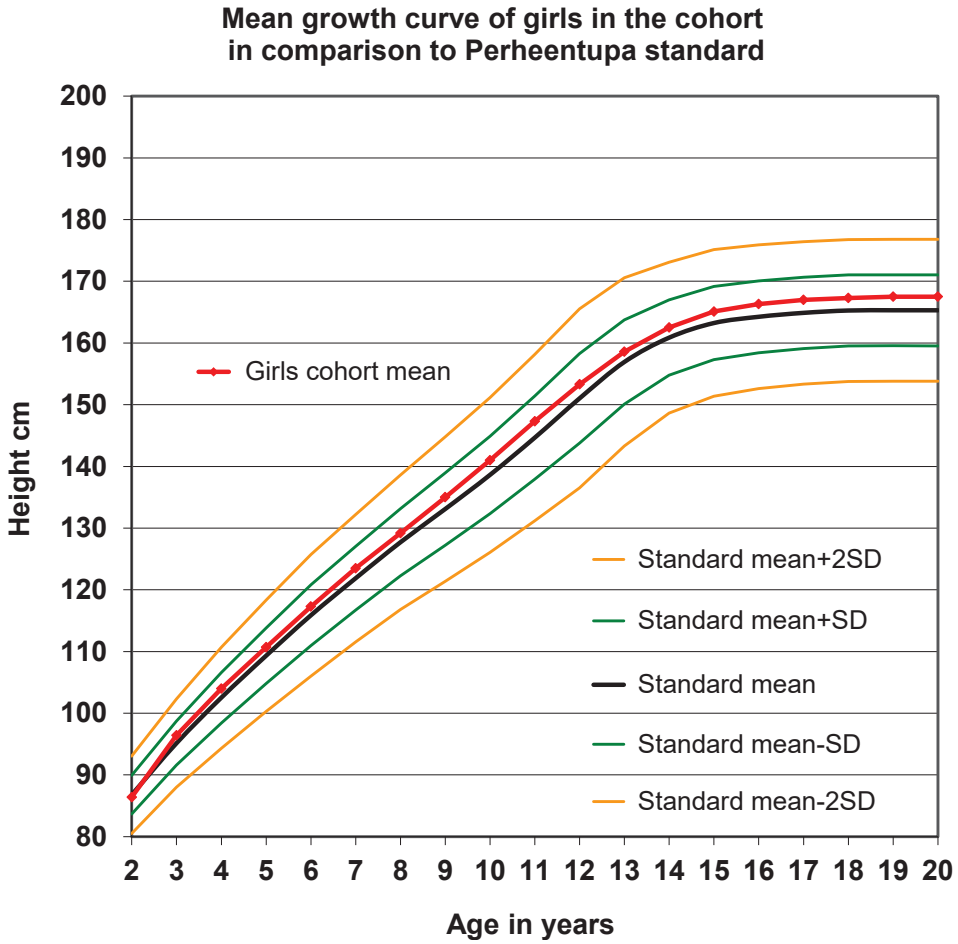
Change per year

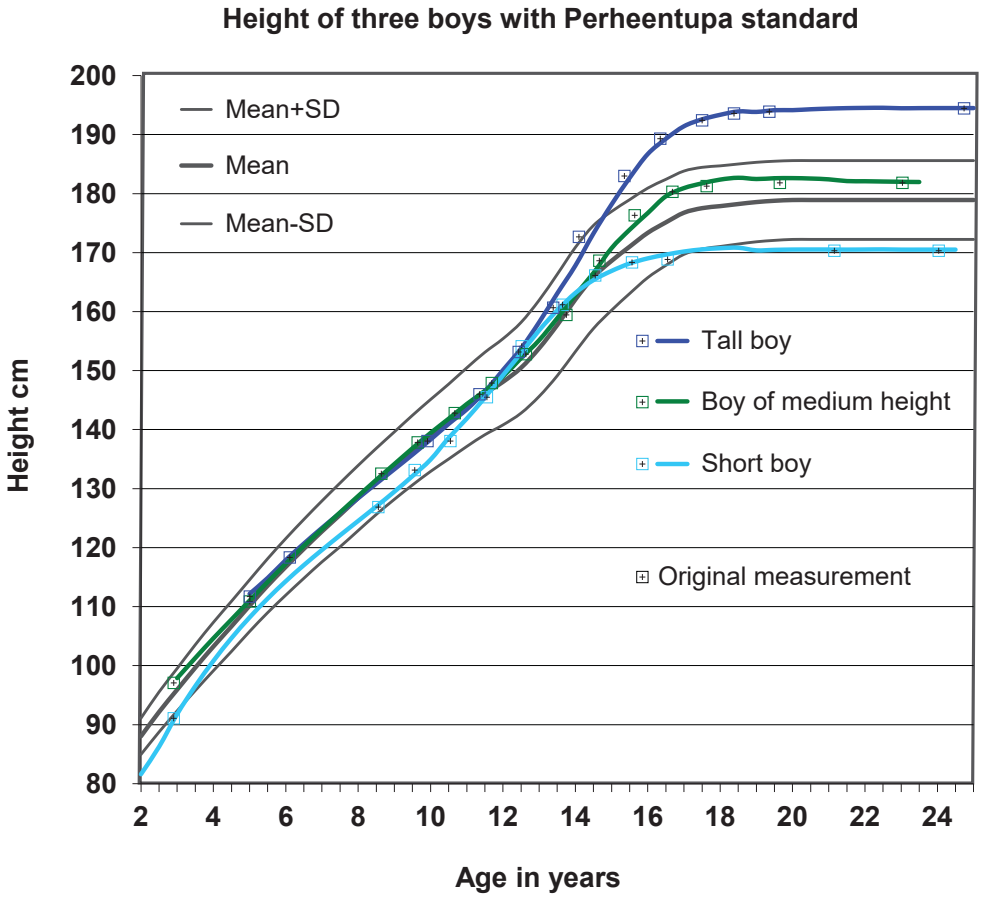
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	52	6.84	7.24	7.63	1.46	1.59		59	6.41	6.79	7.17	1.49
5	69	6.32	6.61	6.90	1.23	0.44		87	6.19	6.51	6.84	1.55
6	76	6.10	6.35	6.60	1.11	1.40		93	5.55	5.98	6.40	2.08
7	82	5.63	5.81	6.00	0.84	-0.11		96	5.61	5.83	6.06	1.13
8	83	5.35	5.52	5.69	0.78	-2.55	p<0.05	100	5.68	5.92	6.17	1.25
9	84	5.17	5.35	5.53	0.84	-3.51	p<0.001	102	5.70	5.99	6.27	1.47
10	85	5.10	5.34	5.57	1.09	-4.24	p<0.001	103	5.86	6.14	6.42	1.44
11	85	5.34	5.60	5.86	1.22	-3.08	p<0.01	105	5.93	6.20	6.47	1.42
12	85	5.81	6.12	6.42	1.43	1.60		105	5.61	5.82	6.04	1.11
13	85	6.44	6.74	7.04	1.42	9.64	p<0.001	105	4.51	4.77	5.04	1.39
14	85	6.36	6.70	7.04	1.59	14.02	p<0.001	105	2.80	3.15	3.50	1.84
15	85	5.08	5.45	5.81	1.72	16.00	p<0.001	105	1.45	1.74	2.02	1.48
16	85	3.06	3.46	3.85	1.84	12.68	p<0.001	105	0.79	0.94	1.09	0.78
17	85	1.67	1.94	2.21	1.28	10.54	p<0.001	105	0.42	0.51	0.60	0.48
18	85	0.92	1.10	1.29	0.87	9.02	p<0.001	105	0.19	0.26	0.33	0.35
19	85	0.44	0.58	0.71	0.62	6.63	p<0.001	105	0.05	0.11	0.17	0.32
20	85	0.09	0.19	0.29	0.46	3.26	p<0.01	105	-0.05	0.01	0.07	0.31
21	85	-0.09	-0.01	0.08	0.39	0.26		105	-0.07	-0.02	0.03	0.27
22	85	-0.16	-0.08	0.01	0.38	-1.32		105	-0.06	-0.01	0.04	0.27
23	82	-0.17	-0.10	-0.03	0.32	-1.49		99	-0.08	-0.04	0.01	0.23
24	74	-0.18	-0.12	-0.05	0.29	-1.93		92	-0.08	-0.04	-0.01	0.19
25	66	-0.12	-0.08	-0.04	0.17	-2.24	p<0.05	81	-0.06	-0.03	0.00	0.12

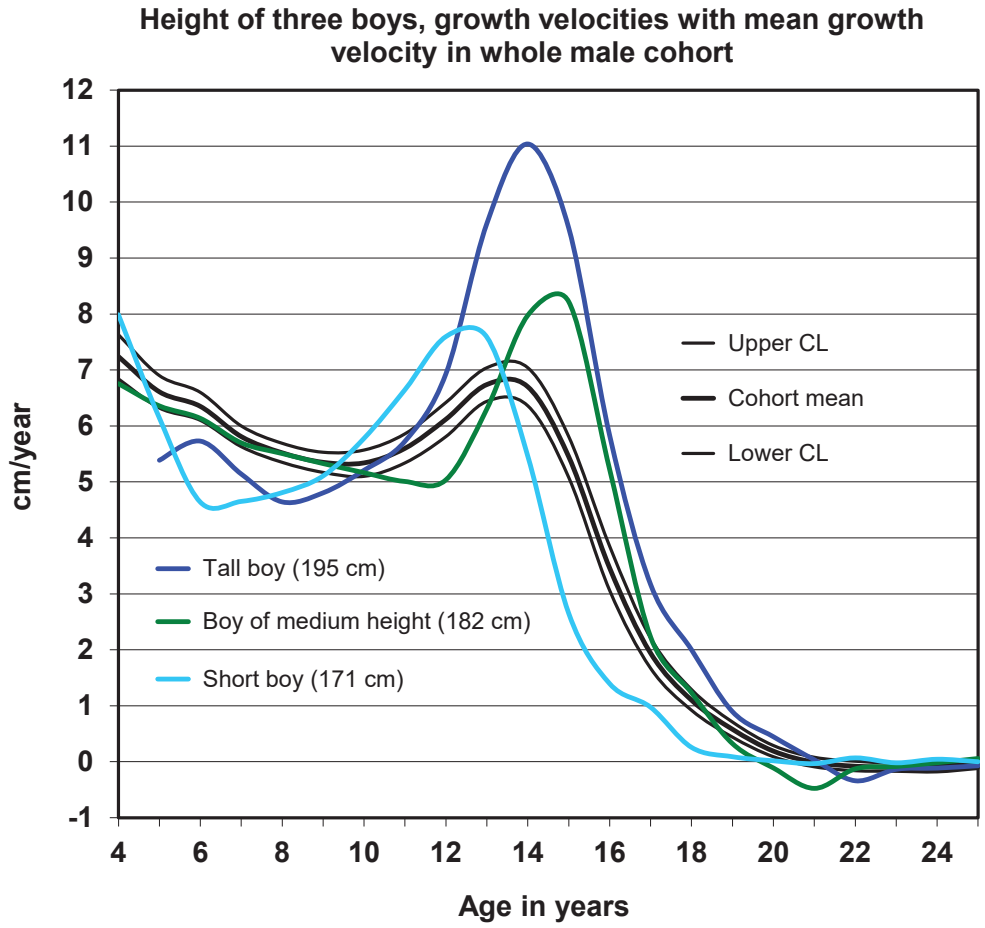

Height in whole cohort
Height cm
190
180
170
160
150
140
130
120
110
100
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

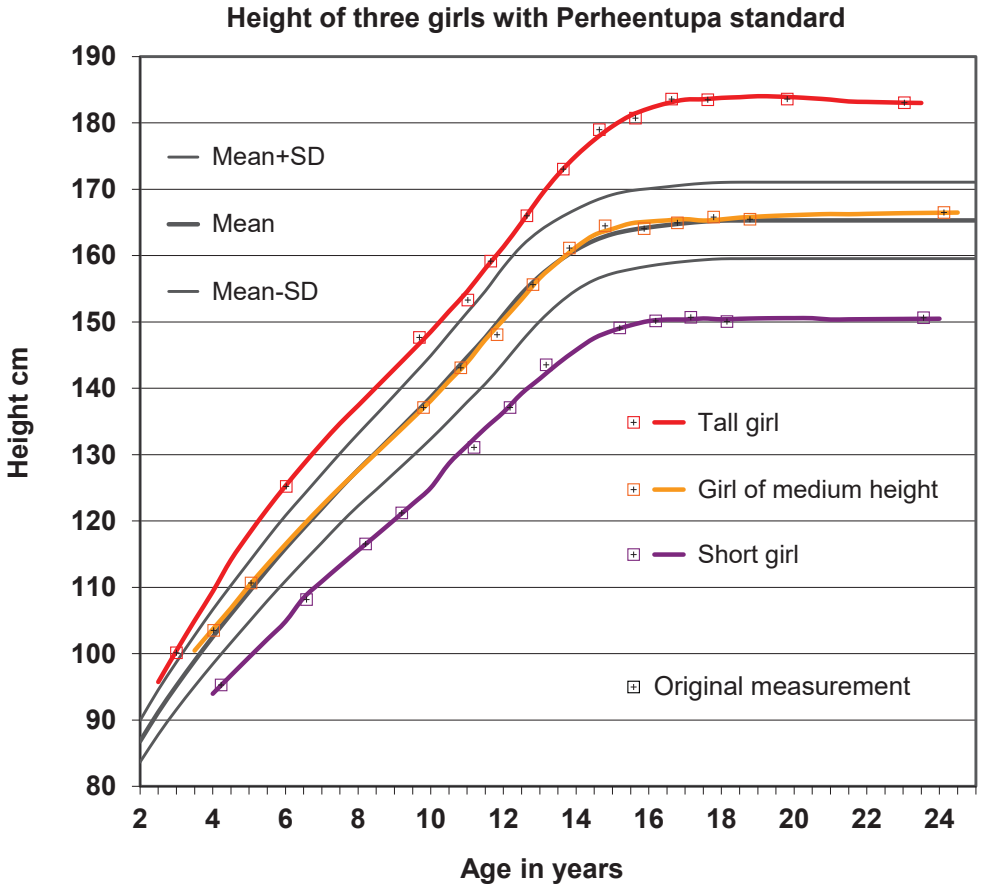

Height in whole cohort, growth velocity
Growth velocity cm/year
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

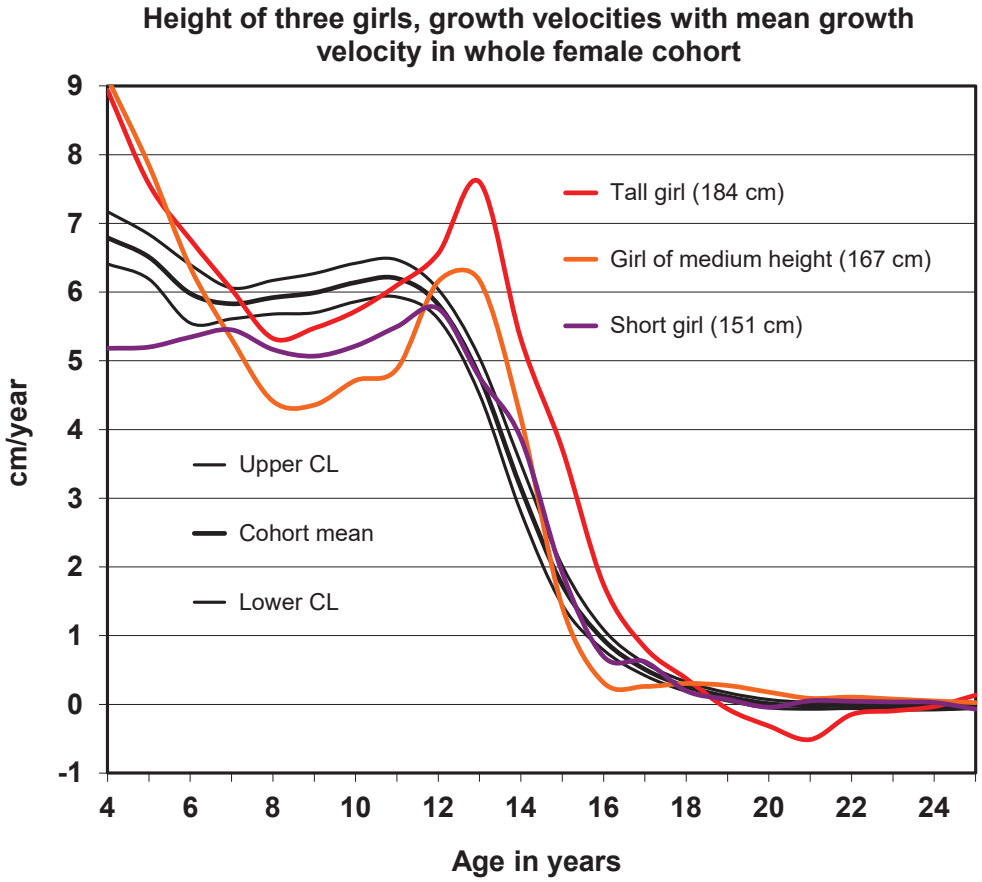

Mean growth curve of boys in the cohort
in comparison to Perheentupa standard
Height cm
200
190
180
170
160
150
140
130
120
110
100
90
80
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Age in years
Boys cohort mean
Standard mean+2SD
Standard mean+SD
Standard mean
Standard mean-SD
Standard mean-2SD

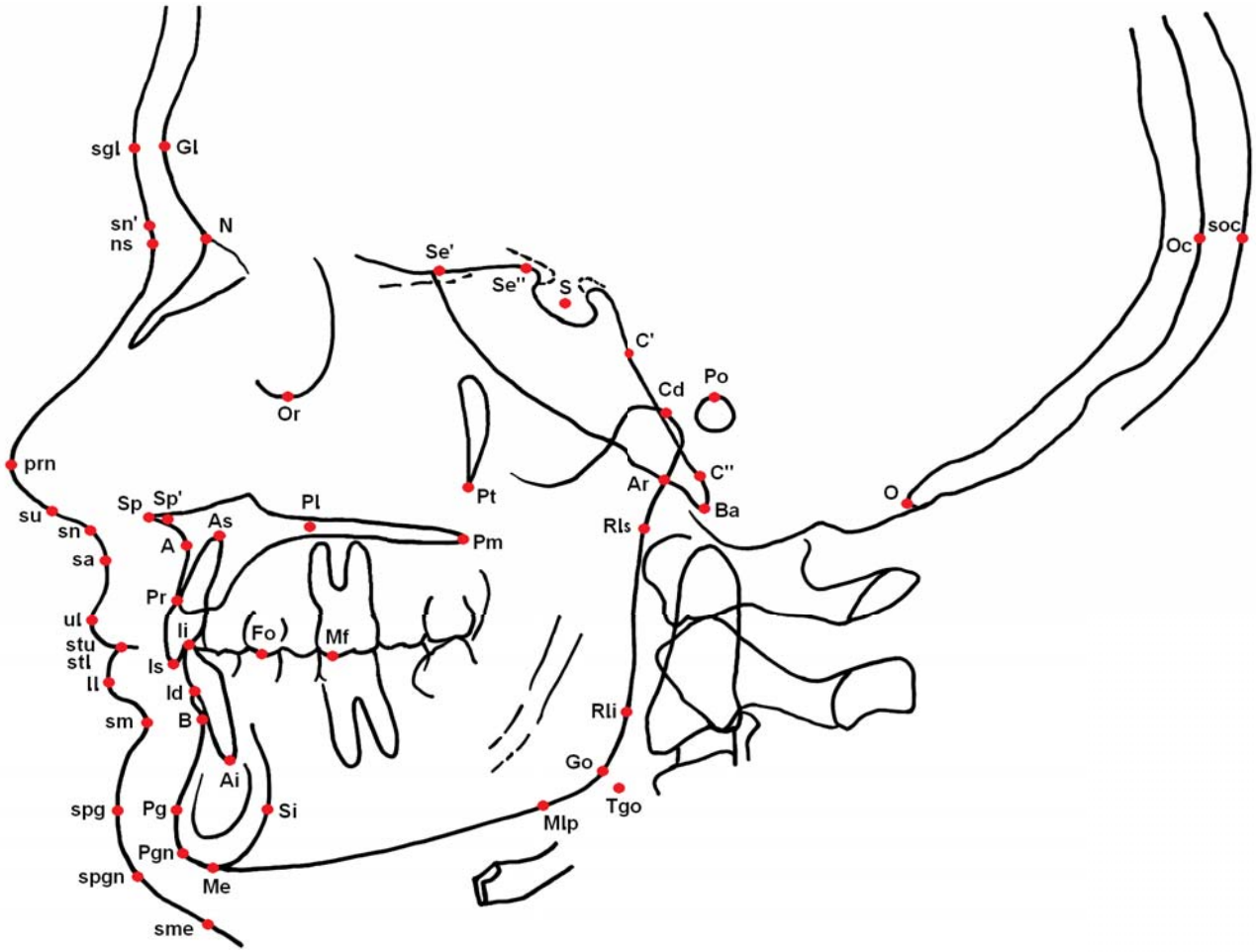

Mean growth curve of girls in the cohort
in comparison to Perheentupa standard
Height cm
200
190
180
170
160
150
140
130
120
110
100
90
80
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Age in years
Girls cohort mean
Standard mean+2SD
Standard mean+SD
Standard mean
Standard mean-SD
Standard mean-2SD


Height of three boys with Perheentupa standard
Height cm
200
190
180
170
160
150
140
130
120
110
100
90
80
2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Mean+SD
Mean
Mean-SD
Tall boy
Boy of medium height
Short boy
Original measurement


Height of three boys, growth velocities with mean growth velocity in whole male cohort
cm/year
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Cohort mean
Lower CL
Tall boy (195 cm)
Boy of medium height (182 cm)
Short boy (171 cm)


Height of three girls with Perheentupa standard
Height cm
190
180
170
160
150
140
130
120
110
100
90
80
2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Mean+SD
Mean
Mean-SD
Tall girl
Girl of medium height
Short girl
Original measurement


Height of three girls, growth velocities with mean growth velocity in whole female cohort
cm/year
9
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Tall girl (184 cm)
Girl of medium height (167 cm)
Short girl (151 cm)
Upper CL
Cohort mean
Lower CL


sgl
Gl
sn'
ns
N
Se'
Se''
S
C'
Cd
Po
Or
Oc
soc
prn
su
sn
sa
Sp
Sp'
As
A
Pl
Pt
Pm
Ar
C''
Ba
O
Rls
Pr
ul
stu
stl
ll
sm
li
ls
ld
B
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Go
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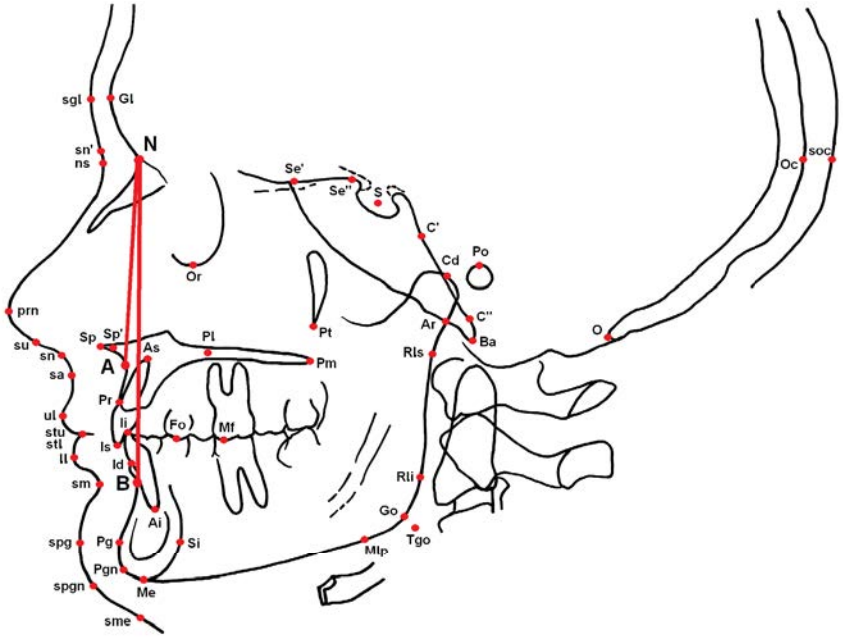
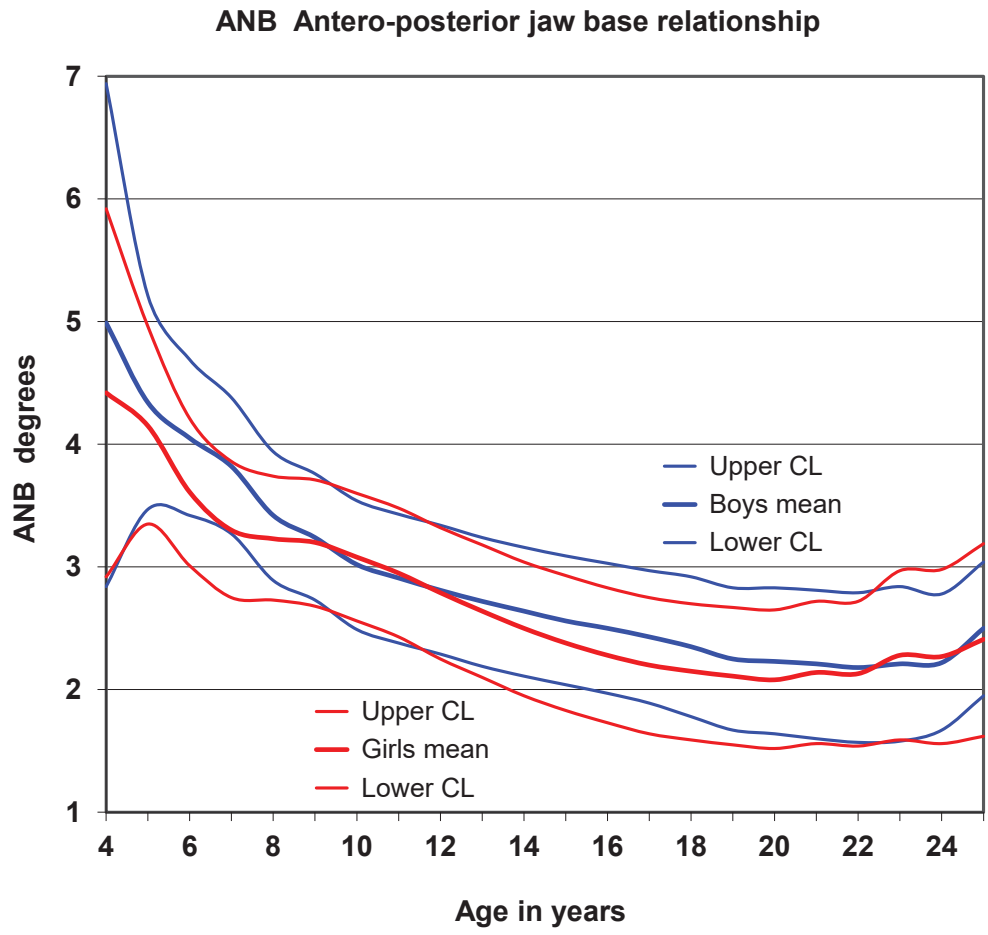
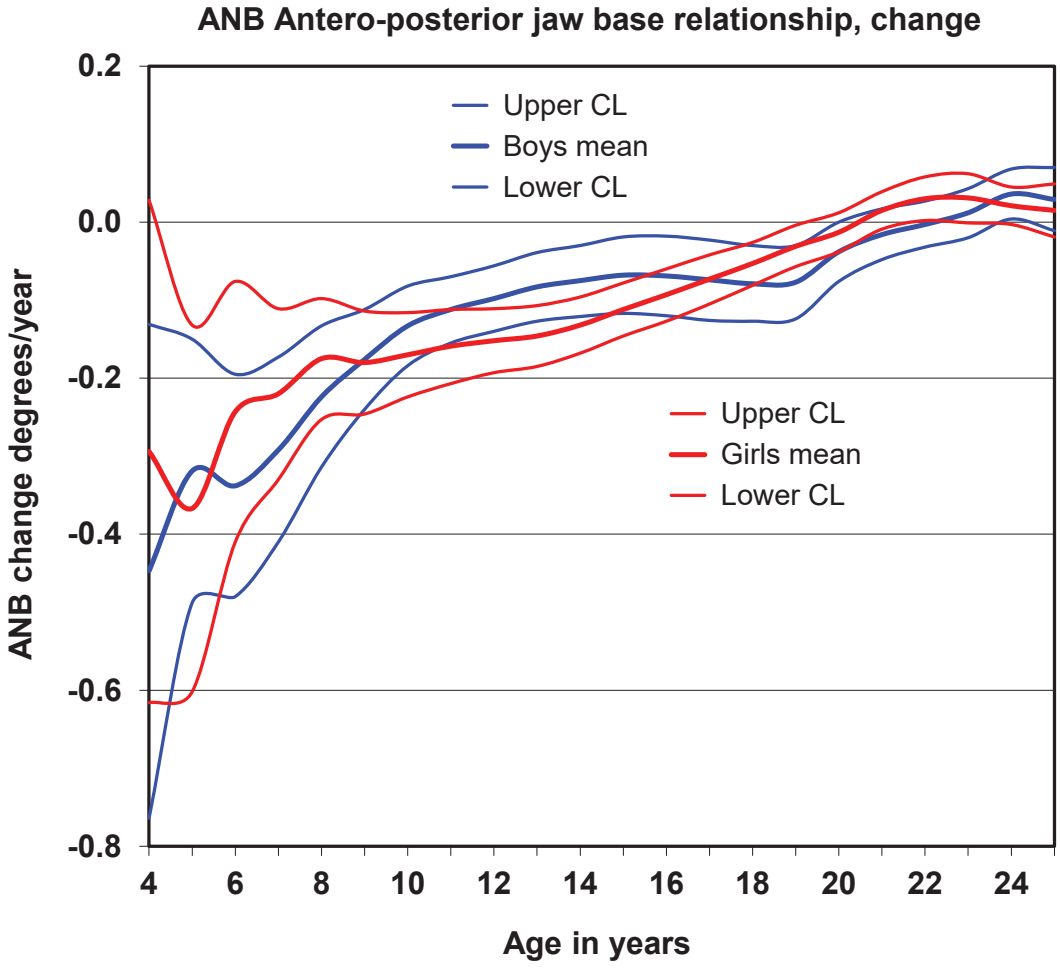
Pg
Pgn
spgn
Me
sme

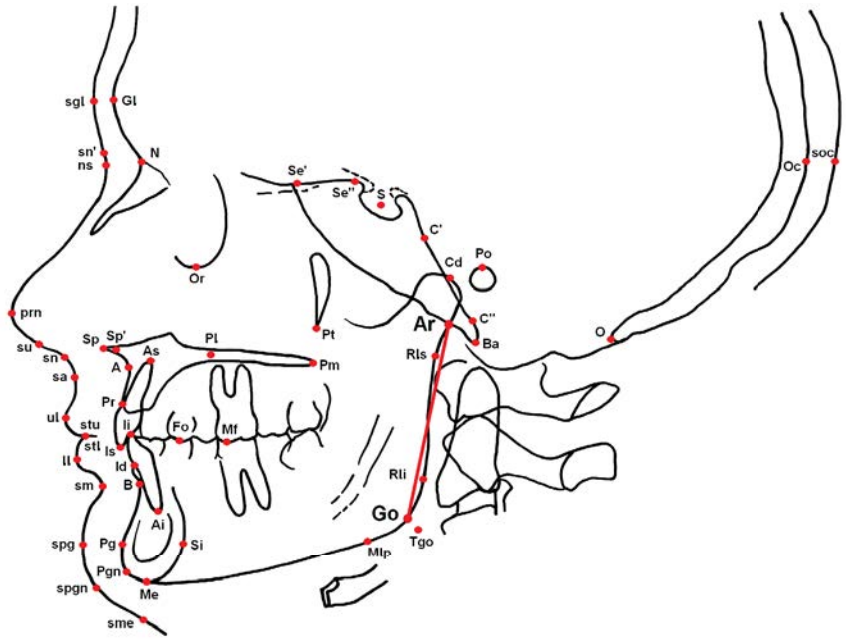


ANB (degrees)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.94	4.99	7.04	2.77	0.44		7	2.92	4.42	5.92	2.02
5	18	3.47	4.34	5.21	1.88	0.31		19	3.35	4.15	4.96	1.80
6	35	3.43	4.06	4.69	1.91	0.99		27	3.01	3.61	4.21	1.59
7	43	3.27	3.82	4.38	1.85	1.30		39	2.75	3.30	3.86	1.75
8	48	2.89	3.41	3.93	1.84	0.49		49	2.73	3.23	3.74	1.81
9	49	2.72	3.24	3.75	1.84	0.11		53	2.68	3.20	3.71	1.90
10	50	2.49	3.01	3.54	1.89	-0.18		54	2.56	3.08	3.60	1.95
11	50	2.38	2.90	3.42	1.88	-0.13		55	2.43	2.95	3.48	1.99
12	50	2.29	2.81	3.33	1.89	0.06		55	2.25	2.79	3.32	2.02
13	50	2.19	2.72	3.24	1.89	0.20		55	2.10	2.64	3.18	2.05
14	50	2.11	2.64	3.17	1.90	0.36		55	1.95	2.50	3.04	2.06
15	50	2.04	2.57	3.10	1.91	0.49		55	1.83	2.38	2.93	2.07
16	50	1.97	2.51	3.04	1.93	0.58		55	1.73	2.28	2.83	2.09
17	50	1.90	2.44	2.98	1.96	0.61		55	1.64	2.20	2.75	2.11
18	49	1.79	2.36	2.93	2.03	0.53		55	1.59	2.15	2.70	2.11
19	49	1.68	2.26	2.85	2.09	0.37		55	1.55	2.11	2.67	2.12
20	46	1.65	2.25	2.84	2.07	0.39		55	1.52	2.08	2.65	2.14
21	46	1.61	2.22	2.83	2.10	0.19		54	1.56	2.14	2.72	2.17
22	46	1.58	2.19	2.80	2.10	0.14		53	1.54	2.13	2.72	2.19
23	41	1.59	2.22	2.85	2.07	-0.12		42	1.59	2.28	2.97	2.28
24	35	1.68	2.24	2.79	1.68	-0.08		41	1.56	2.27	2.98	2.31
25	30	1.96	2.51	3.05	1.52	0.20		35	1.62	2.41	3.19	2.38

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.76	-0.45	-0.13	0.43	0.67		7	-0.62	-0.29	0.03	0.43
5	18	-0.49	-0.32	-0.15	0.37	-0.32		19	-0.60	-0.37	-0.13	0.52
6	35	-0.48	-0.34	-0.20	0.43	0.88		27	-0.41	-0.24	-0.08	0.44
7	43	-0.41	-0.29	-0.18	0.40	0.89		39	-0.33	-0.22	-0.11	0.35
8	48	-0.32	-0.23	-0.13	0.32	0.82		49	-0.25	-0.18	-0.10	0.28
9	49	-0.24	-0.18	-0.11	0.23	-0.07		53	-0.25	-0.18	-0.11	0.25
10	50	-0.18	-0.13	-0.08	0.18	-0.99		54	-0.22	-0.17	-0.12	0.20
11	50	-0.15	-0.11	-0.07	0.15	-1.47		55	-0.21	-0.16	-0.11	0.18
12	50	-0.14	-0.10	-0.05	0.15	-1.86		55	-0.19	-0.15	-0.11	0.15
13	50	-0.13	-0.08	-0.04	0.16	-2.18	p<0.05	55	-0.19	-0.15	-0.11	0.15
14	50	-0.12	-0.07	-0.03	0.16	-2.01	p<0.05	55	-0.17	-0.13	-0.10	0.14
15	50	-0.11	-0.07	-0.02	0.18	-1.53		55	-0.15	-0.11	-0.08	0.13
16	50	-0.12	-0.07	-0.02	0.19	-0.87		55	-0.13	-0.09	-0.06	0.13
17	50	-0.12	-0.07	-0.02	0.19	-0.03		55	-0.10	-0.07	-0.04	0.12
18	49	-0.13	-0.08	-0.03	0.17	0.87		55	-0.08	-0.05	-0.03	0.10
19	49	-0.12	-0.08	-0.03	0.17	1.70		55	-0.06	-0.03	-0.00	0.10
20	46	-0.08	-0.04	0.00	0.13	1.10		55	-0.04	-0.01	0.01	0.09
21	46	-0.05	-0.02	0.02	0.11	1.53		54	-0.01	0.01	0.04	0.09
22	46	-0.03	-0.00	0.03	0.10	1.61		53	0.00	0.03	0.06	0.10
23	41	-0.02	0.01	0.04	0.10	0.94		42	-0.00	0.03	0.06	0.11
24	35	-0.00	0.03	0.06	0.09	-0.50		41	-0.00	0.02	0.05	0.08
25	30	-0.02	0.02	0.06	0.11	-0.26		35	-0.02	0.02	0.05	0.10

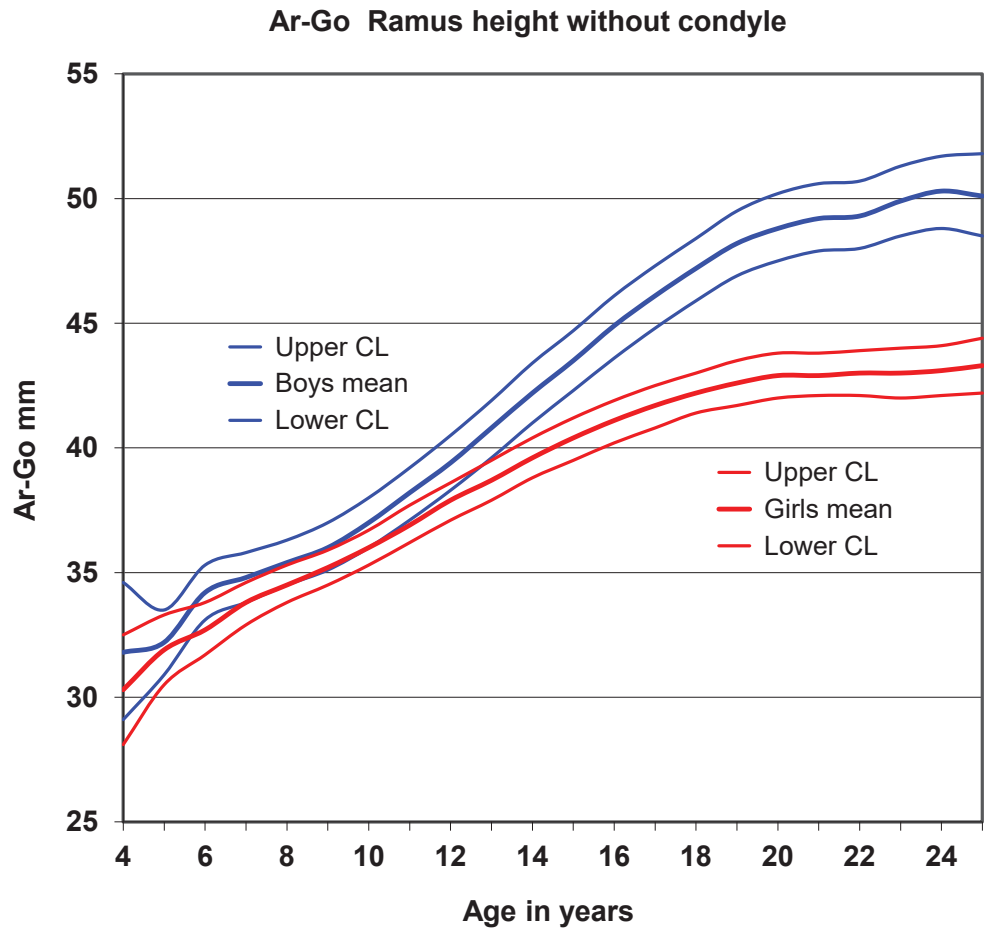

ANB Antero-posterior jaw base relationship
ANB degrees
7
6
5
4
3
2
1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

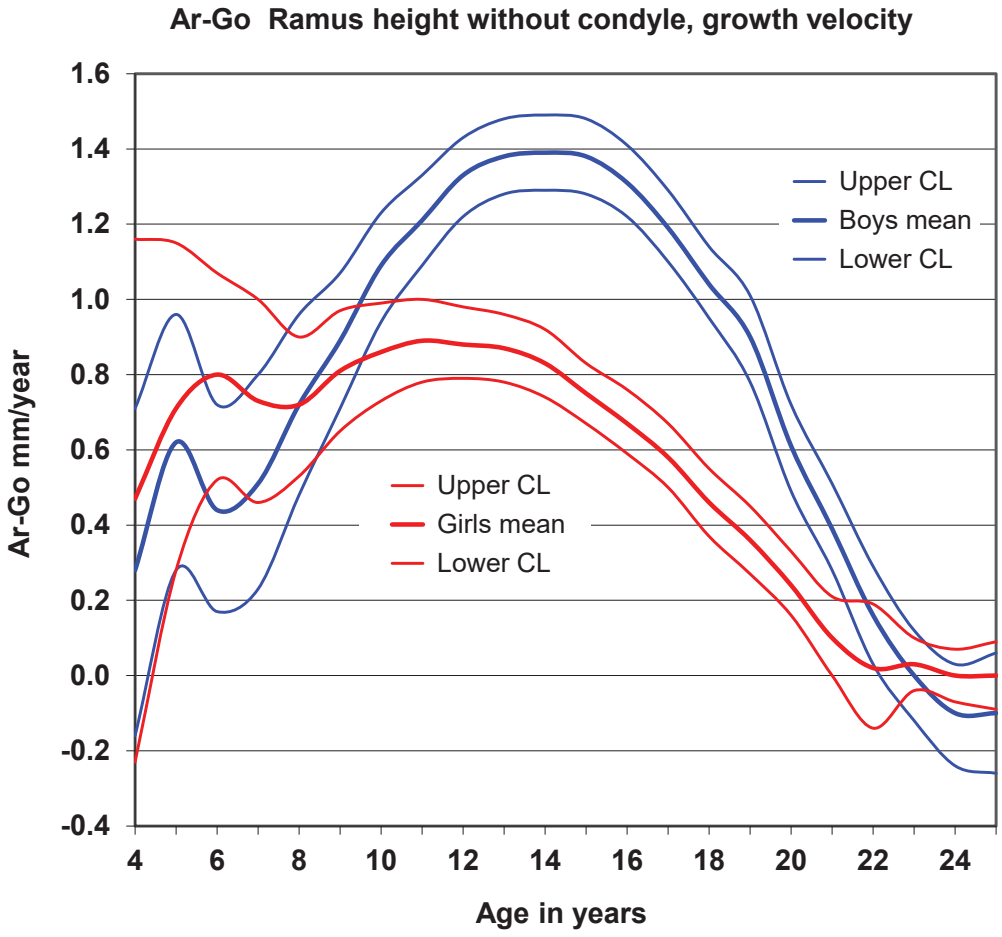

ANB Antero-posterior jaw base relationship, change
ANB change degrees/year
0.2
0.0
-0.2
-0.4
-0.6
-0.8
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

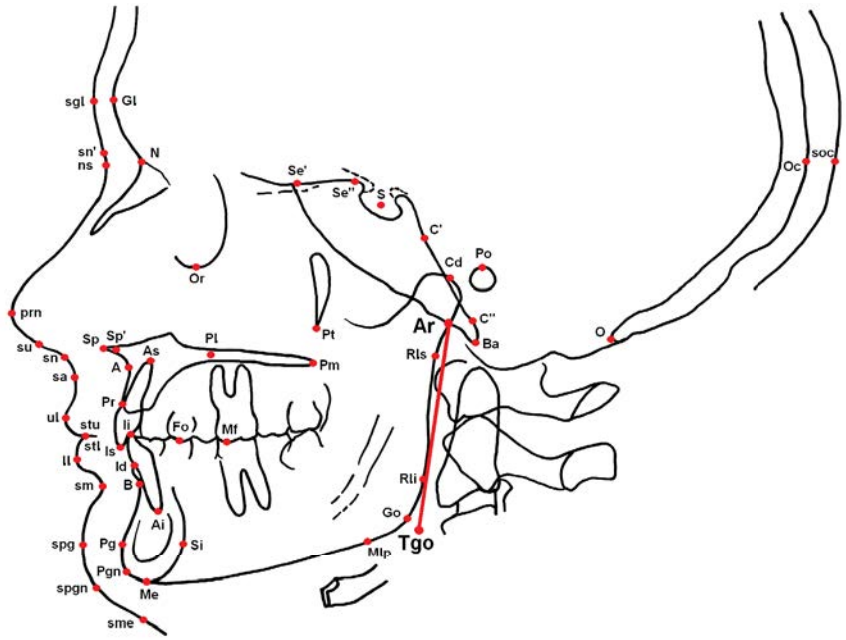


Ar-Go (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	29.1	31.8	34.6	3.69	0.86		7	28.1	30.3	32.5	2.96
5	18	30.9	32.2	33.5	2.83	0.29		19	30.5	31.9	33.3	3.06
6	35	33.0	34.1	35.2	3.37	1.75		27	31.7	32.7	33.8	2.75
7	43	33.8	34.8	35.8	3.36	1.53		39	32.9	33.8	34.6	2.66
8	48	34.5	35.4	36.3	3.23	1.48		49	33.8	34.5	35.3	2.66
9	49	35.1	36.1	37.0	3.39	1.42		53	34.5	35.2	35.9	2.63
10	50	36.0	37.0	38.0	3.58	1.62		54	35.3	36.0	36.7	2.70
11	50	37.2	38.2	39.2	3.75	1.98		55	36.2	36.9	37.7	2.85
12	50	38.3	39.4	40.5	3.98	2.33	p<0.05	55	37.1	37.9	38.6	2.96
13	50	39.6	40.8	41.9	4.15	2.90	p<0.01	55	37.9	38.7	39.5	3.05
14	50	41.0	42.1	43.3	4.30	3.51	p<0.001	55	38.8	39.6	40.4	3.10
15	50	42.3	43.5	44.7	4.41	4.22	p<0.001	55	39.5	40.4	41.2	3.11
16	50	43.6	44.8	46.0	4.47	5.01	p<0.001	55	40.2	41.1	41.9	3.16
17	50	44.8	46.0	47.3	4.53	5.68	p<0.001	55	40.8	41.7	42.5	3.20
18	49	45.8	47.1	48.4	4.56	6.39	p<0.001	55	41.4	42.2	43.0	3.18
19	49	46.8	48.1	49.4	4.53	7.19	p<0.001	55	41.7	42.6	43.5	3.23
20	46	47.4	48.7	50.1	4.64	7.37	p<0.001	55	42.0	42.9	43.8	3.25
21	46	47.8	49.1	50.5	4.67	7.76	p<0.001	54	42.1	42.9	43.8	3.24
22	46	47.9	49.2	50.6	4.62	7.90	p<0.001	53	42.1	43.0	43.9	3.18
23	41	48.4	49.8	51.2	4.60	7.74	p<0.001	42	42.0	43.0	44.0	3.26
24	35	48.7	50.2	51.6	4.46	7.92	p<0.001	41	42.1	43.1	44.1	3.26
25	30	48.4	50.1	51.7	4.68	6.84	p<0.001	35	42.2	43.3	44.4	3.31

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.16	0.28	0.71	0.59	-0.45		7	-0.23	0.47	1.16	0.93
5	18	0.28	0.62	0.96	0.74	-0.33		19	0.28	0.71	1.15	0.96
6	35	0.19	0.48	0.76	0.85	-1.56		27	0.52	0.80	1.07	0.73
7	43	0.25	0.53	0.82	0.96	-0.97		39	0.46	0.73	1.00	0.85
8	48	0.49	0.73	0.97	0.85	0.09		49	0.53	0.72	0.90	0.66
9	49	0.71	0.89	1.08	0.65	0.66		53	0.65	0.81	0.97	0.60
10	50	0.94	1.08	1.23	0.52	2.22	p<0.05	54	0.73	0.86	0.99	0.49
11	50	1.08	1.20	1.32	0.43	3.72	p<0.001	55	0.78	0.89	1.00	0.41
12	50	1.21	1.31	1.41	0.37	5.88	p<0.001	55	0.79	0.88	0.98	0.37
13	50	1.27	1.36	1.46	0.35	7.21	p<0.001	55	0.78	0.87	0.96	0.35
14	50	1.28	1.37	1.47	0.34	8.09	p<0.001	55	0.74	0.83	0.92	0.35
15	50	1.27	1.36	1.45	0.33	9.73	p<0.001	55	0.67	0.75	0.83	0.31
16	50	1.20	1.29	1.38	0.33	9.86	p<0.001	55	0.59	0.67	0.76	0.31
17	50	1.09	1.18	1.26	0.32	9.30	p<0.001	55	0.50	0.58	0.67	0.33
18	49	0.94	1.03	1.13	0.35	8.56	p<0.001	55	0.37	0.46	0.55	0.33
19	49	0.77	0.89	1.01	0.42	7.04	p<0.001	55	0.27	0.36	0.45	0.35
20	46	0.48	0.60	0.72	0.41	4.96	p<0.001	55	0.16	0.24	0.33	0.31
21	46	0.28	0.39	0.51	0.40	3.64	p<0.001	54	-0.00	0.10	0.21	0.40
22	46	0.05	0.17	0.29	0.43	1.33		53	-0.14	0.02	0.19	0.62
23	41	-0.09	0.02	0.13	0.37	-0.14		42	-0.04	0.03	0.10	0.23
24	35	-0.18	-0.07	0.05	0.34	-1.00		41	-0.07	-0.00	0.07	0.23
25	30	-0.13	-0.03	0.07	0.28	-0.51		35	-0.09	0.00	0.09	0.28

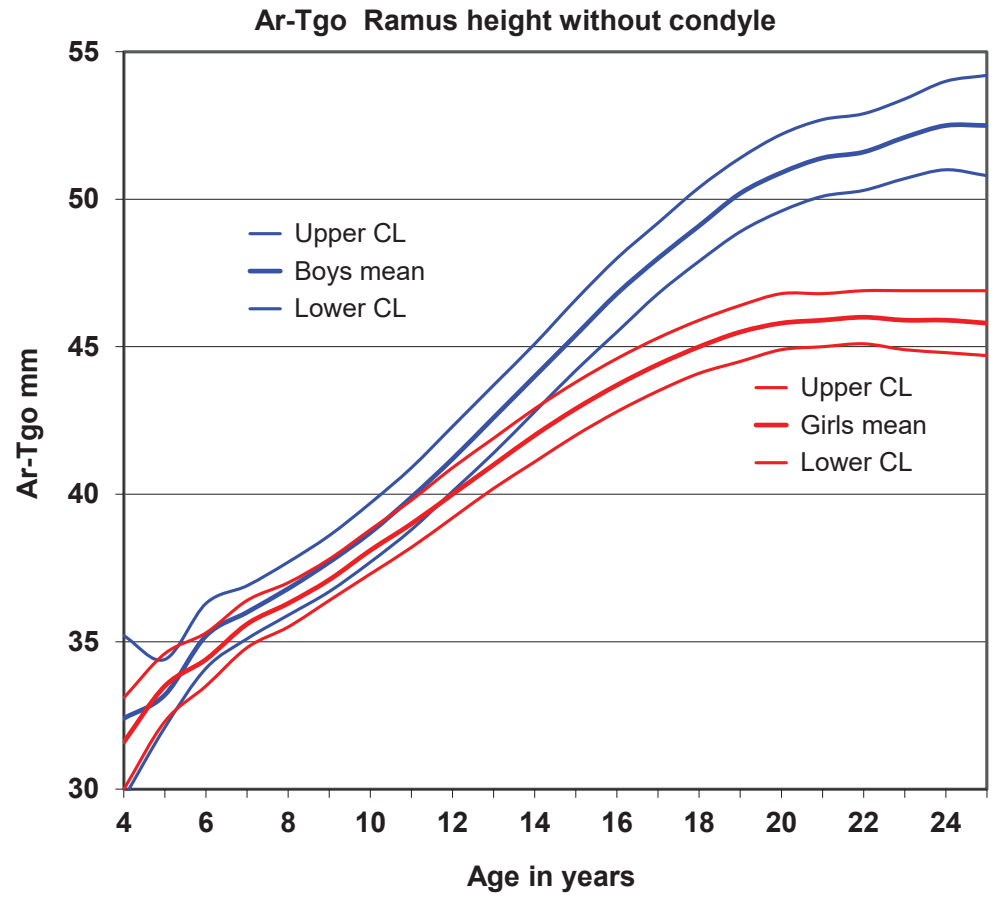

Ar-Go Ramus height without condyle
Ar-Go mm
55
50
45
40
35
30
25
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

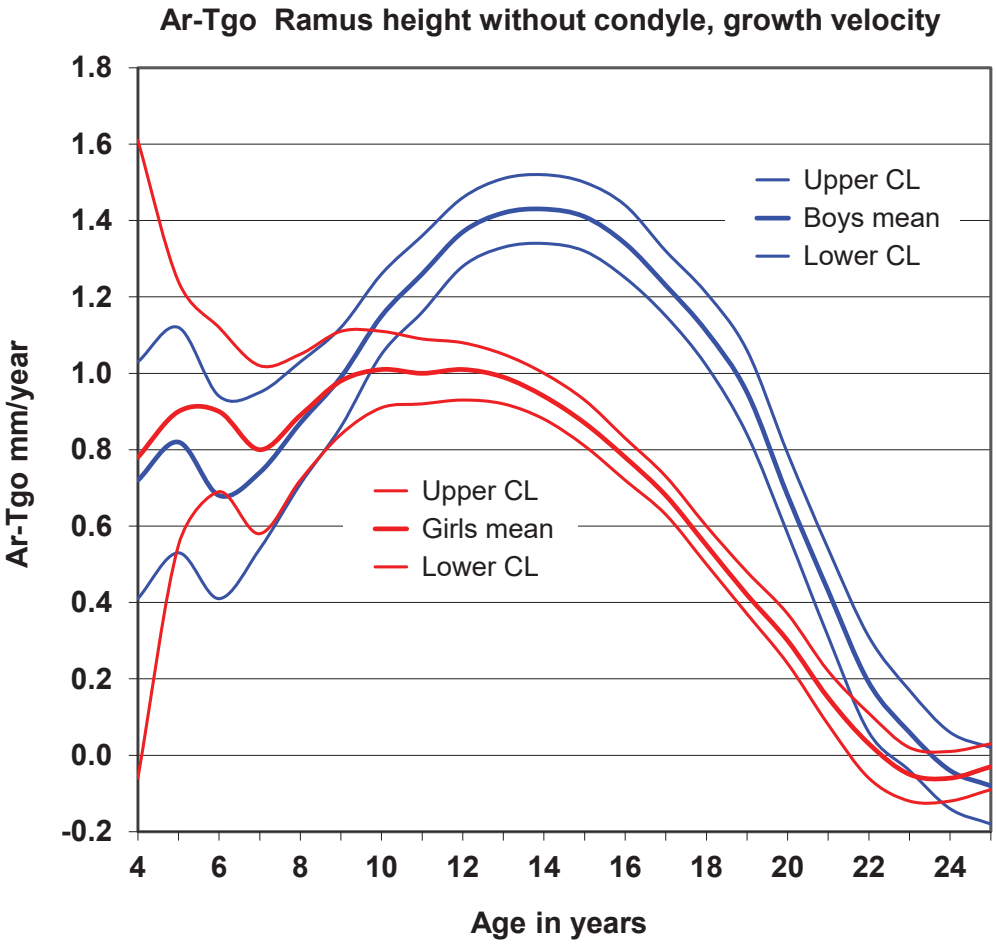

Ar-Go Ramus height without condyle, growth velocity
Ar-Go mm/year
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

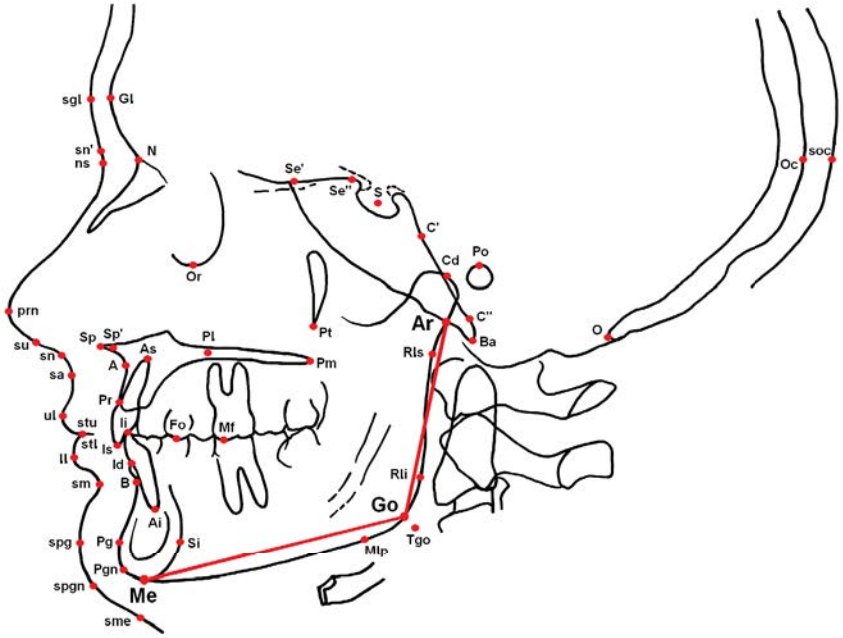


Ar-Tgo (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	29.7	32.4	35.2	3.72	0.52		7	30.0	31.6	33.1	2.09
5	18	32.1	33.2	34.4	2.48	-0.27		19	32.3	33.5	34.6	2.47
6	35	34.2	35.2	36.3	3.25	1.08		27	33.5	34.4	35.3	2.41
7	43	35.1	36.0	36.9	3.10	0.69		39	34.8	35.6	36.4	2.52
8	48	35.9	36.8	37.7	3.31	0.88		49	35.5	36.3	37.0	2.57
9	49	36.7	37.6	38.6	3.46	0.88		53	36.4	37.1	37.8	2.66
10	50	37.7	38.7	39.7	3.63	0.96		54	37.3	38.1	38.8	2.83
11	50	38.8	39.9	40.9	3.77	1.25		55	38.2	39.0	39.8	3.05
12	50	40.1	41.2	42.3	3.94	1.61		55	39.2	40.0	40.9	3.18
13	50	41.4	42.6	43.7	4.07	2.15	p<0.05	55	40.2	41.0	41.9	3.28
14	50	42.8	44.0	45.2	4.20	2.71	p<0.01	55	41.1	42.0	42.9	3.37
15	50	44.2	45.4	46.6	4.27	3.35	p<0.01	55	42.0	42.9	43.8	3.43
16	50	45.6	46.8	48.0	4.32	4.07	p<0.001	55	42.8	43.7	44.6	3.47
17	50	46.8	48.0	49.2	4.35	4.71	p<0.001	55	43.5	44.4	45.3	3.52
18	49	47.9	49.2	50.4	4.40	5.37	p<0.001	55	44.1	45.0	45.9	3.51
19	49	49.0	50.2	51.5	4.44	6.10	p<0.001	55	44.5	45.5	46.4	3.49
20	46	49.6	50.9	52.3	4.52	6.41	p<0.001	55	44.9	45.8	46.8	3.49
21	46	50.1	51.4	52.7	4.47	6.94	p<0.001	54	45.0	45.9	46.8	3.47
22	46	50.3	51.6	52.9	4.44	7.07	p<0.001	53	45.1	46.0	46.9	3.45
23	41	50.7	52.1	53.4	4.55	7.07	p<0.001	42	44.9	45.9	46.9	3.31
24	35	51.0	52.5	54.0	4.51	7.34	p<0.001	41	44.8	45.9	46.9	3.36
25	30	50.8	52.5	54.2	4.70	6.69	p<0.001	35	44.7	45.8	46.9	3.40

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.41	0.72	1.03	0.42	-0.13		7	-0.06	0.78	1.61	1.12
5	18	0.53	0.82	1.12	0.64	-0.31		19	0.55	0.90	1.24	0.77
6	35	0.40	0.66	0.91	0.77	-1.39		27	0.69	0.90	1.12	0.57
7	43	0.54	0.73	0.93	0.66	-0.43		39	0.58	0.80	1.02	0.71
8	48	0.71	0.86	1.02	0.56	-0.18		49	0.72	0.89	1.05	0.60
9	49	0.86	0.99	1.12	0.46	0.12		53	0.84	0.98	1.11	0.50
10	50	1.05	1.15	1.26	0.39	1.91		54	0.91	1.01	1.11	0.39
11	50	1.17	1.27	1.36	0.36	3.96	p<0.001	55	0.92	1.00	1.09	0.32
12	50	1.29	1.38	1.47	0.33	6.28	p<0.001	55	0.93	1.01	1.08	0.28
13	50	1.34	1.43	1.52	0.32	7.94	p<0.001	55	0.92	0.99	1.05	0.25
14	50	1.36	1.44	1.53	0.31	9.45	p<0.001	55	0.88	0.94	1.00	0.24
15	50	1.34	1.42	1.51	0.31	10.67	p<0.001	55	0.81	0.87	0.93	0.22
16	50	1.27	1.36	1.44	0.30	11.40	p<0.001	55	0.72	0.78	0.83	0.21
17	50	1.17	1.24	1.32	0.28	11.94	p<0.001	55	0.63	0.68	0.73	0.20
18	49	1.03	1.12	1.21	0.32	11.01	p<0.001	55	0.50	0.55	0.60	0.20
19	49	0.85	0.95	1.06	0.38	8.99	p<0.001	55	0.37	0.42	0.48	0.21
20	46	0.58	0.68	0.79	0.36	6.26	p<0.001	55	0.24	0.30	0.37	0.25
21	46	0.31	0.43	0.54	0.39	4.18	p<0.001	54	0.08	0.15	0.22	0.26
22	46	0.06	0.19	0.31	0.44	2.17	p<0.05	53	-0.06	0.03	0.11	0.30
23	41	-0.04	0.06	0.17	0.34	1.71		42	-0.12	-0.05	0.02	0.23
24	35	-0.14	-0.04	0.06	0.30	0.25		41	-0.12	-0.06	0.01	0.22
25	30	-0.18	-0.08	0.02	0.28	-0.92		35	-0.09	-0.03	0.03	0.18


Ar-Tgo Ramus height without condyle
Ar-Tgo mm
55
50
45
40
35
30
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Ar-Tgo Ramus height without condyle, growth velocity
Ar-Tgo mm/year
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

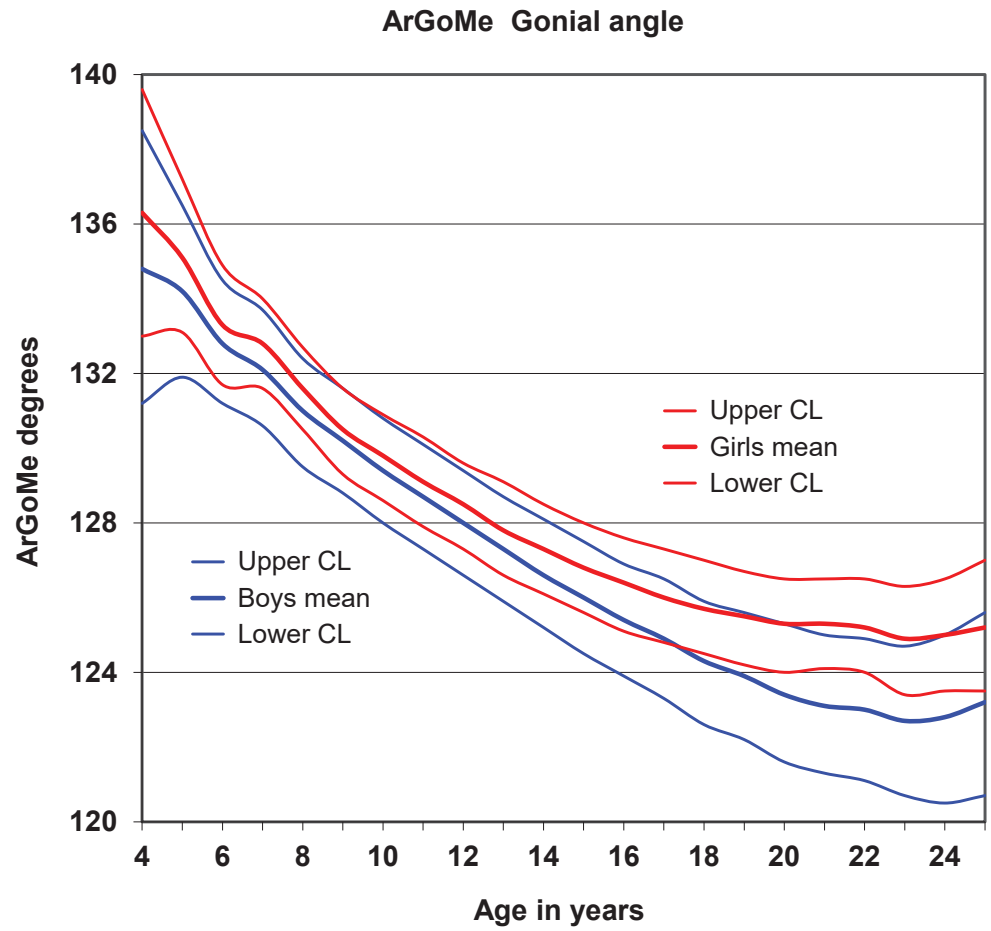


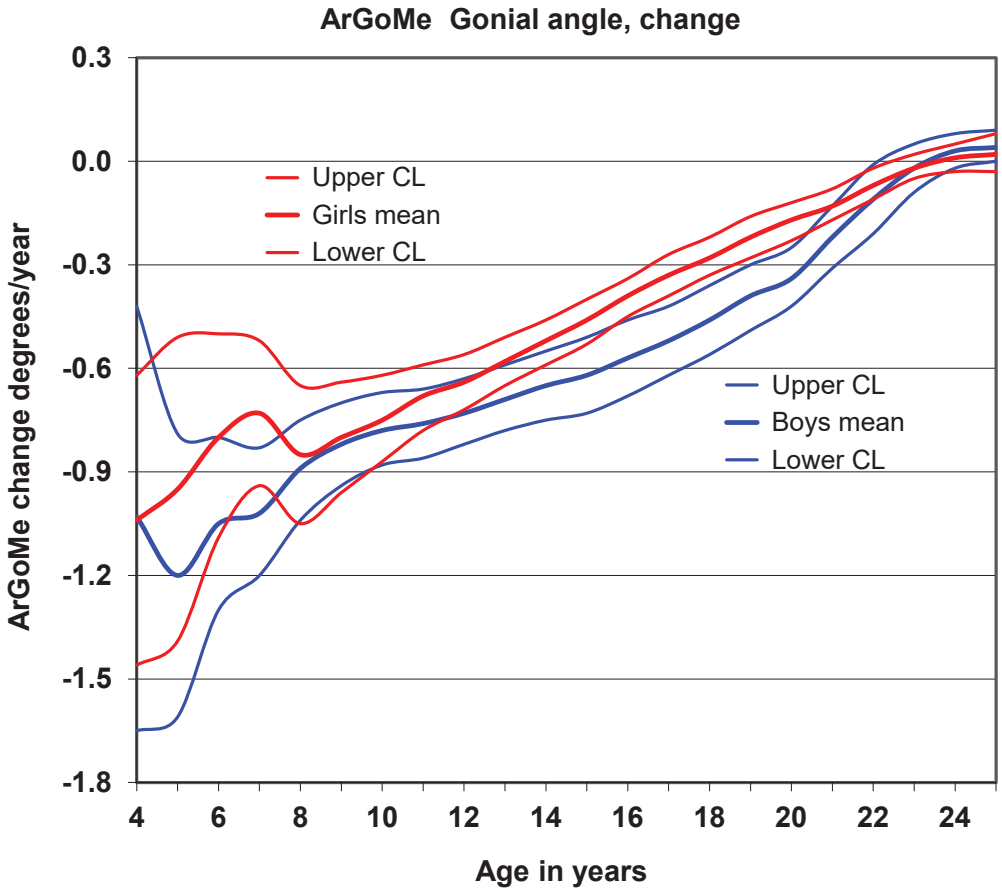
ArGoMe (degrees)

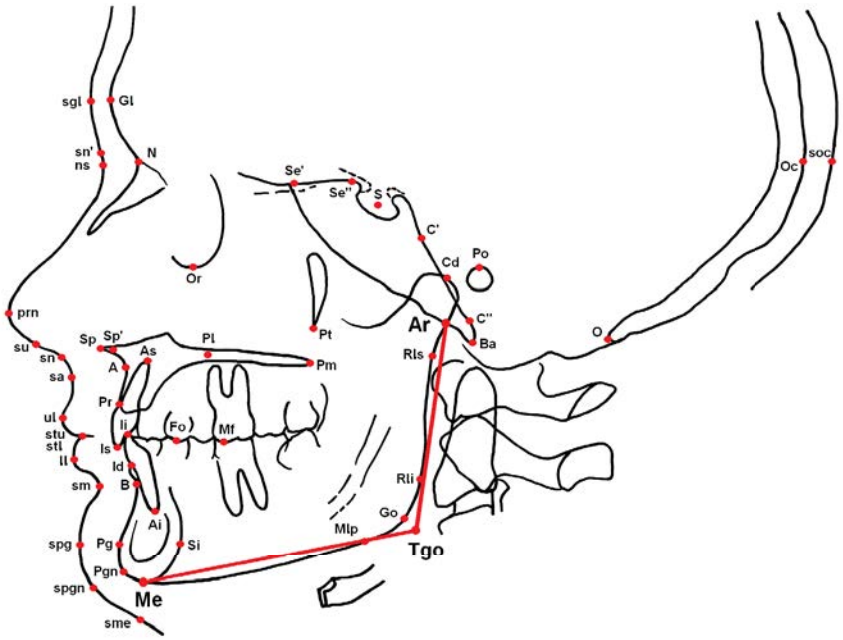
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	131.2	134.8	138.5	4.91	0.60		7	133.0	136.3	139.6	4.43
5	18	131.9	134.2	136.5	4.92	0.60		19	133.1	135.1	137.2	4.58
6	35	131.2	132.8	134.5	5.00	0.38		27	131.7	133.3	134.9	4.24
7	43	130.6	132.1	133.7	5.20	0.65		39	131.6	132.8	134.0	3.89
8	48	129.5	131.0	132.4	5.11	0.72		49	130.5	131.6	132.7	4.00
9	49	128.8	130.2	131.6	5.06	0.27		53	129.3	130.5	131.6	4.18
10	50	128.0	129.4	130.8	5.02	0.41		54	128.6	129.8	130.9	4.35
11	50	127.3	128.7	130.1	5.02	0.42		55	127.9	129.1	130.3	4.42
12	50	126.6	128.0	129.4	5.07	0.52		55	127.3	128.5	129.6	4.50
13	50	125.9	127.3	128.7	5.13	0.57		55	126.6	127.8	129.1	4.56
14	50	125.2	126.6	128.1	5.24	0.68		55	126.1	127.3	128.5	4.61
15	50	124.5	126.0	127.5	5.38	0.82		55	125.6	126.8	128.0	4.63
16	50	123.8	125.4	126.9	5.56	0.99		55	125.1	126.4	127.6	4.67
17	50	123.3	124.9	126.5	5.73	1.12		55	124.8	126.0	127.3	4.68
18	49	122.6	124.3	125.9	5.89	1.39		55	124.5	125.7	127.0	4.69
19	49	122.2	123.9	125.5	6.06	1.54		55	124.2	125.5	126.7	4.72
20	46	121.6	123.4	125.3	6.38	1.68		55	124.0	125.3	126.5	4.76
21	46	121.3	123.1	125.0	6.51	1.94		54	124.1	125.3	126.5	4.63
22	46	121.1	123.0	124.9	6.63	1.94		53	124.0	125.2	126.5	4.69
23	41	120.7	122.7	124.6	6.45	1.76		42	123.4	124.9	126.3	4.82
24	35	120.5	122.7	125.0	6.72	1.68		41	123.5	125.0	126.5	4.86
25	30	120.7	123.2	125.6	6.94	1.38		35	123.5	125.2	127.0	5.17

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.65	-1.03	-0.42	0.83	-0.01		7	-1.46	-1.04	-0.62	0.57
5	18	-1.61	-1.20	-0.79	0.89	0.82		19	-1.39	-0.95	-0.51	0.98
6	35	-1.29	-1.05	-0.80	0.75	1.27		27	-1.09	-0.80	-0.50	0.79
7	43	-1.20	-1.01	-0.83	0.62	1.98		39	-0.94	-0.73	-0.52	0.68
8	48	-1.04	-0.89	-0.74	0.52	0.35		49	-1.05	-0.85	-0.65	0.72
9	49	-0.94	-0.82	-0.70	0.43	0.19		53	-0.96	-0.80	-0.64	0.60
10	50	-0.88	-0.78	-0.67	0.38	0.34		54	-0.87	-0.75	-0.62	0.47
11	50	-0.86	-0.76	-0.67	0.35	1.16		55	-0.78	-0.68	-0.59	0.37
12	50	-0.82	-0.73	-0.63	0.34	1.42		55	-0.72	-0.64	-0.56	0.30
13	50	-0.79	-0.69	-0.60	0.34	1.81		55	-0.65	-0.58	-0.51	0.26
14	50	-0.75	-0.65	-0.56	0.36	2.19	p<0.05	55	-0.59	-0.52	-0.46	0.25
15	50	-0.73	-0.63	-0.52	0.39	2.58	p<0.05	55	-0.53	-0.46	-0.40	0.24
16	50	-0.69	-0.58	-0.47	0.40	2.95	p<0.01	55	-0.45	-0.39	-0.34	0.22
17	50	-0.62	-0.52	-0.42	0.36	3.28	p<0.01	55	-0.39	-0.33	-0.27	0.22
18	49	-0.56	-0.46	-0.36	0.36	3.25	p<0.01	55	-0.33	-0.28	-0.22	0.22
19	49	-0.49	-0.39	-0.30	0.34	3.09	p<0.01	55	-0.28	-0.22	-0.16	0.22
20	46	-0.42	-0.34	-0.25	0.29	3.27	p<0.01	55	-0.23	-0.17	-0.12	0.20
21	46	-0.31	-0.22	-0.13	0.32	1.89		54	-0.17	-0.13	-0.08	0.17
22	46	-0.20	-0.10	-0.00	0.35	0.69		53	-0.11	-0.07	-0.02	0.17
23	41	-0.08	-0.02	0.05	0.22	0.01		42	-0.05	-0.02	0.02	0.13
24	35	-0.02	0.03	0.08	0.15	-0.76		41	-0.03	0.01	0.05	0.13
25	30	0.00	0.05	0.10	0.14	-0.77		35	-0.03	0.02	0.08	0.16


ArGoMe Gonial angle
ArGoMe degrees
140
136
132
128
124
120
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


ArGoMe Gonial angle, change
ArGoMe change degrees/year
0.3
0.0
-0.3
-0.6
-0.9
-1.2
-1.5
-1.8
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

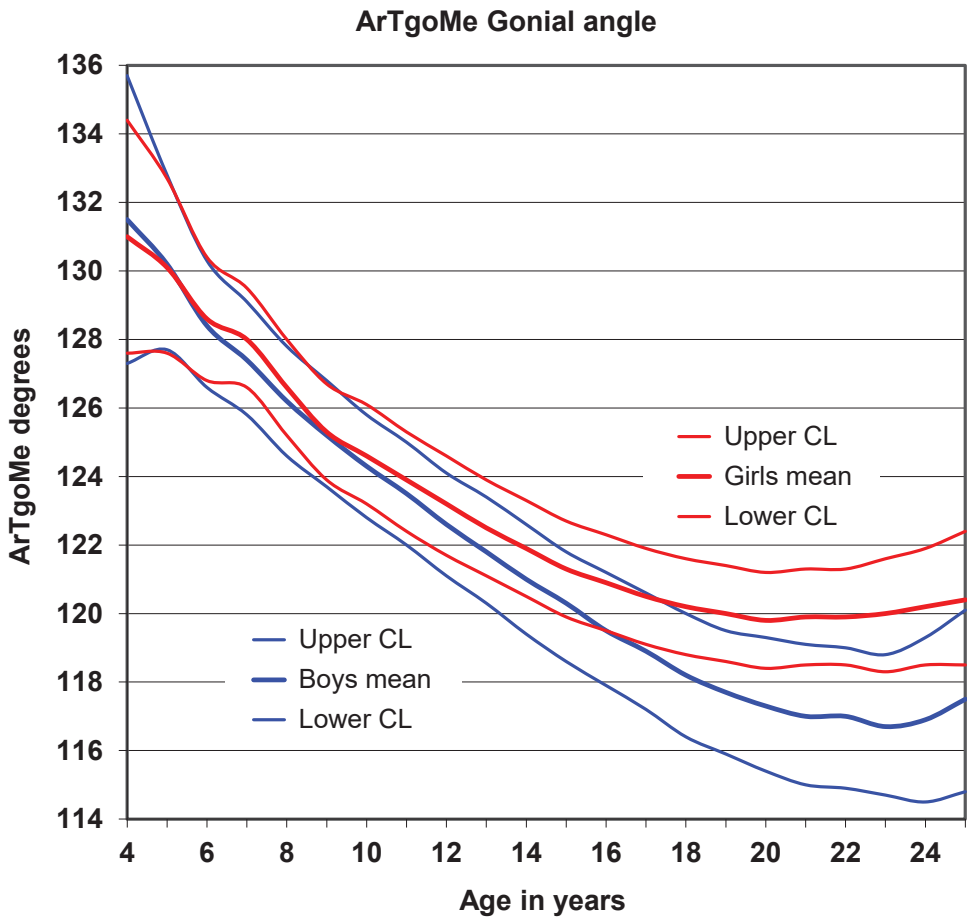


ArTgoMe (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	127.3	131.5	135.7	5.67	-0.18		7	127.6	131.0	134.4	4.55
5	18	127.7	130.2	132.8	5.61	-0.05		19	127.6	130.1	132.7	5.65
6	35	126.5	128.4	130.3	5.60	0.15		27	126.8	128.6	130.4	4.84
7	43	125.8	127.4	129.1	5.52	0.54		39	126.6	128.0	129.5	4.60
8	48	124.6	126.2	127.8	5.61	0.37		49	125.2	126.6	128.0	4.92
9	49	123.7	125.2	126.8	5.51	0.04		53	123.9	125.3	126.7	5.17
10	50	122.8	124.3	125.8	5.43	0.29		54	123.2	124.6	126.1	5.37
11	50	122.0	123.5	125.0	5.45	0.32		55	122.4	123.9	125.3	5.34
12	50	121.1	122.6	124.2	5.49	0.50		55	121.7	123.2	124.6	5.38
13	50	120.3	121.8	123.4	5.54	0.64		55	121.1	122.5	123.9	5.38
14	50	119.4	121.0	122.6	5.64	0.80		55	120.5	121.9	123.3	5.37
15	50	118.6	120.3	121.9	5.79	0.99		55	119.9	121.3	122.7	5.34
16	50	117.9	119.5	121.2	5.95	1.24		55	119.5	120.9	122.3	5.33
17	50	117.2	118.9	120.6	6.13	1.47		55	119.1	120.5	121.9	5.30
18	49	116.4	118.2	120.0	6.31	1.78		55	118.8	120.2	121.6	5.25
19	49	115.9	117.7	119.5	6.48	1.99	p<0.05	55	118.6	120.0	121.4	5.26
20	46	115.4	117.3	119.3	6.84	2.04	p<0.05	55	118.4	119.8	121.2	5.28
21	46	115.0	117.0	119.1	6.97	2.35	p<0.05	54	118.5	119.9	121.3	5.15
22	46	114.9	117.0	119.0	7.12	2.35	p<0.05	53	118.5	119.9	121.3	5.25
23	41	114.7	116.7	118.8	6.83	2.39	p<0.05	42	118.3	120.0	121.6	5.46
24	35	114.5	116.9	119.3	7.20	2.28	p<0.05	41	118.5	120.2	121.9	5.46
25	30	114.8	117.5	120.1	7.46	1.82		35	118.5	120.4	122.4	5.80

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-2.05	-1.19	-0.32	1.16	0.76		7	-1.32	-0.80	-0.28	0.70
5	18	-1.83	-1.42	-1.01	0.89	1.21		19	-1.57	-0.97	-0.36	1.35
6	35	-1.46	-1.17	-0.89	0.87	1.06		27	-1.29	-0.93	-0.56	0.97
7	43	-1.34	-1.12	-0.91	0.73	2.13	p<0.05	39	-1.03	-0.74	-0.45	0.92
8	48	-1.16	-1.00	-0.84	0.58	1.00		49	-1.10	-0.85	-0.60	0.89
9	49	-1.06	-0.93	-0.80	0.48	1.06		53	-0.99	-0.80	-0.61	0.72
10	50	-1.04	-0.91	-0.78	0.46	1.30		54	-0.92	-0.78	-0.64	0.54
11	50	-1.01	-0.89	-0.77	0.42	2.15	p<0.05	55	-0.83	-0.71	-0.60	0.43
12	50	-0.98	-0.86	-0.75	0.41	2.49	p<0.05	55	-0.77	-0.68	-0.59	0.35
13	50	-0.94	-0.83	-0.72	0.39	2.68	p<0.01	55	-0.73	-0.64	-0.56	0.32
14	50	-0.89	-0.79	-0.68	0.39	3.07	p<0.01	55	-0.66	-0.57	-0.49	0.31
15	50	-0.87	-0.75	-0.64	0.40	3.67	p<0.001	55	-0.58	-0.50	-0.42	0.31
16	50	-0.81	-0.70	-0.59	0.39	4.18	p<0.001	55	-0.50	-0.42	-0.34	0.30
17	50	-0.75	-0.65	-0.55	0.37	4.82	p<0.001	55	-0.42	-0.34	-0.26	0.30
18	49	-0.67	-0.57	-0.47	0.36	4.59	p<0.001	55	-0.36	-0.28	-0.21	0.28
19	49	-0.58	-0.48	-0.38	0.37	4.26	p<0.001	55	-0.28	-0.21	-0.14	0.27
20	46	-0.44	-0.34	-0.25	0.33	3.62	p<0.001	55	-0.20	-0.14	-0.07	0.24
21	46	-0.33	-0.23	-0.12	0.36	2.40	p<0.05	54	-0.14	-0.08	-0.02	0.23
22	46	-0.18	-0.08	0.02	0.35	1.21		53	-0.08	-0.01	0.06	0.25
23	41	-0.06	0.02	0.11	0.28	0.27		42	-0.03	0.04	0.10	0.21
24	35	-0.00	0.08	0.15	0.23	-0.65		41	-0.02	0.04	0.10	0.20
25	30	0.01	0.07	0.14	0.18	-1.19		35	-0.06	0.01	0.08	0.21


ArTgoMe Gonial angle
ArTgoMe degrees
136
134
132
130
128
126
124
122
120
118
116
114
4
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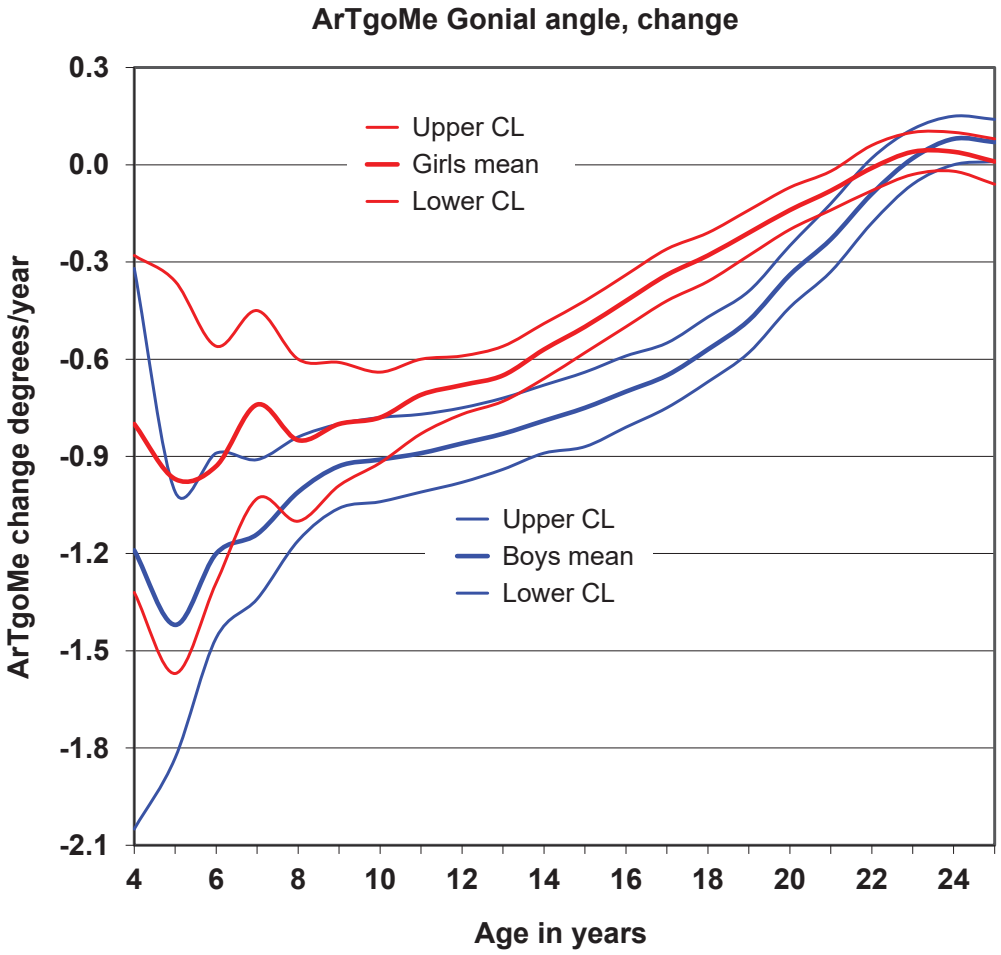
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


ArTgoMe Gonial angle, change
ArTgoMe change degrees/year
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0.0
-0.3
-0.6
-0.9
-1.2
-1.5
-1.8
-2.1
4
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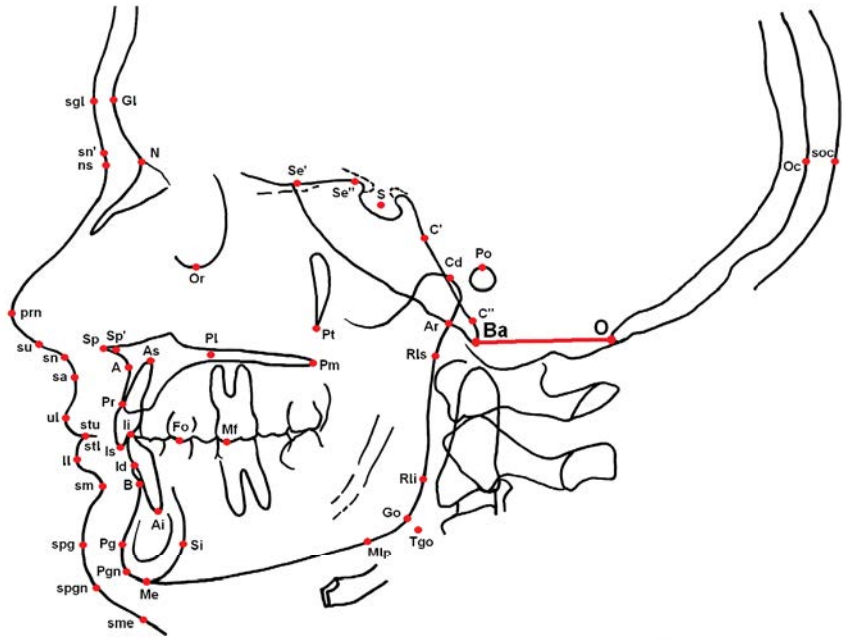
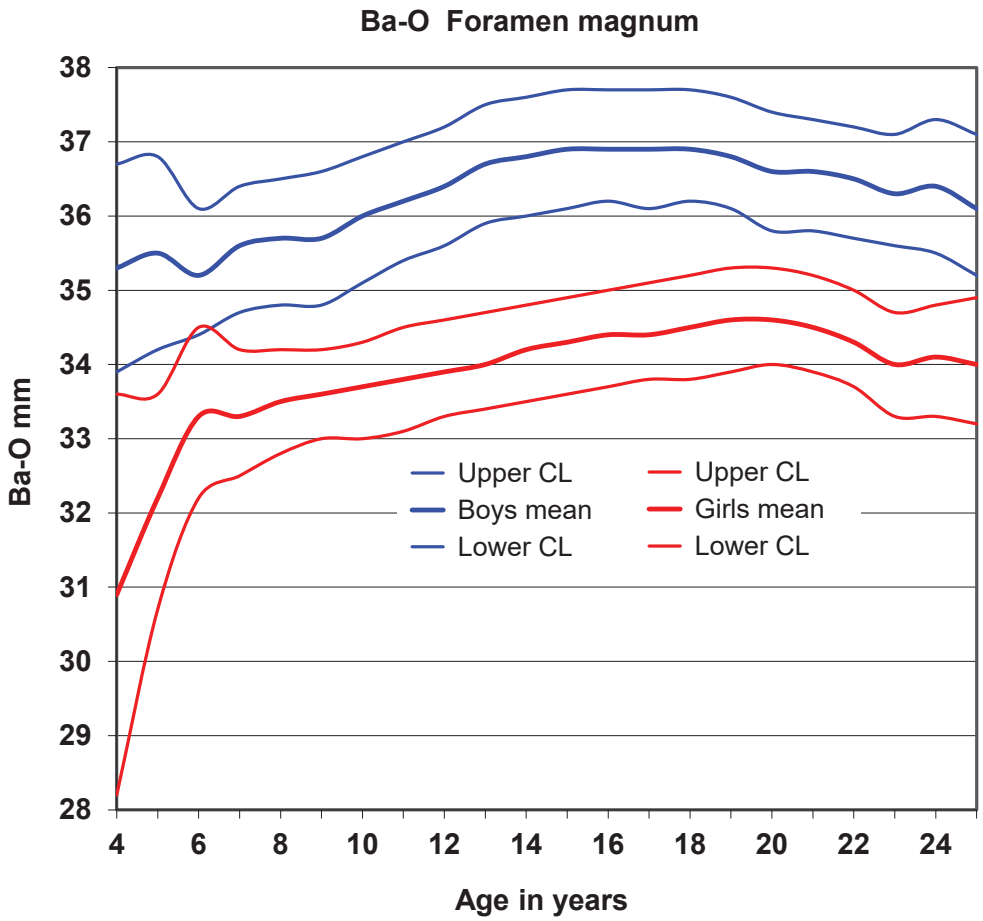
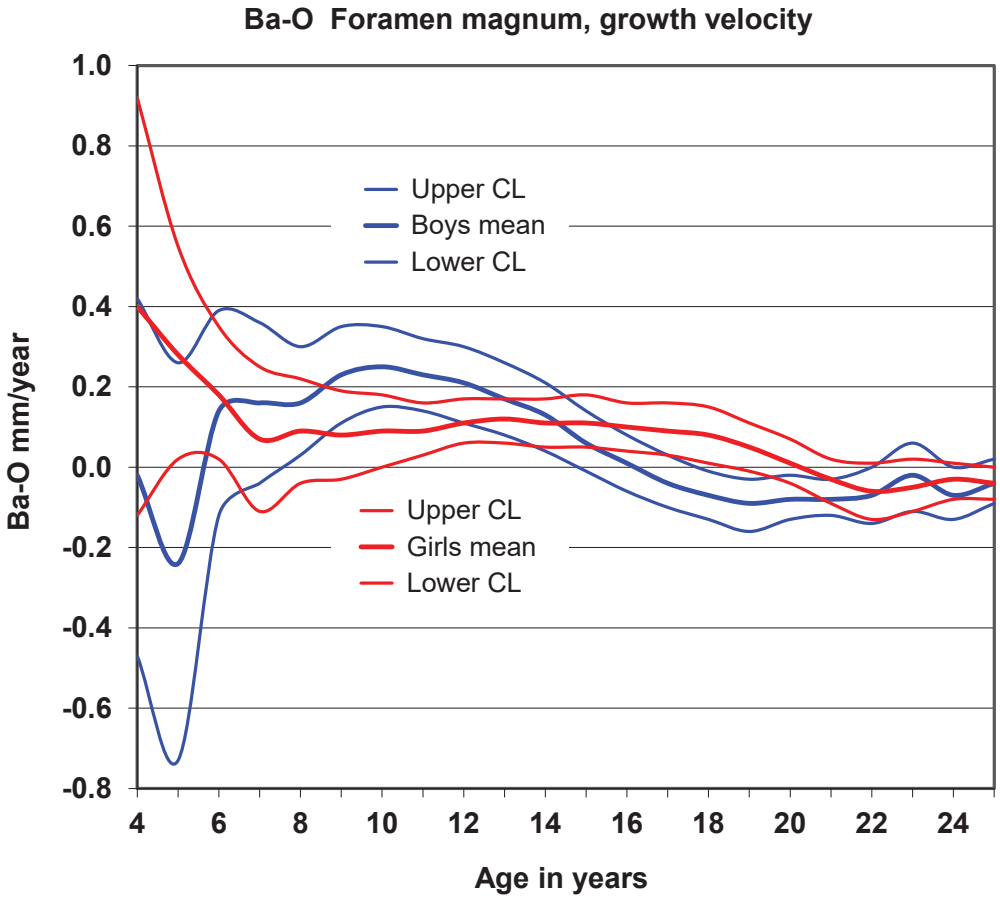
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL



Ba-O (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	33.9	35.3	36.7	1.91	2.78	p<0.05	7	28.2	30.9	33.6	3.67
5	18	34.2	35.5	36.8	2.75	3.43	p<0.01	19	30.7	32.2	33.6	3.13
6	35	34.4	35.2	36.1	2.63	2.64	p<0.05	27	32.2	33.3	34.5	3.06
7	43	34.7	35.6	36.4	2.91	3.52	p<0.001	39	32.5	33.3	34.2	2.78
8	48	34.8	35.7	36.5	3.02	3.92	p<0.001	49	32.8	33.5	34.2	2.47
9	49	34.8	35.7	36.6	3.08	3.88	p<0.001	53	33.0	33.6	34.2	2.38
10	50	35.1	36.0	36.8	2.96	4.40	p<0.001	54	33.0	33.7	34.3	2.38
11	50	35.4	36.2	37.0	2.91	4.52	p<0.001	55	33.1	33.8	34.5	2.53
12	50	35.6	36.4	37.2	2.86	4.75	p<0.001	55	33.3	33.9	34.6	2.55
13	50	35.9	36.7	37.4	2.87	4.94	p<0.001	55	33.4	34.0	34.7	2.56
14	50	36.0	36.8	37.6	2.85	4.99	p<0.001	55	33.5	34.2	34.8	2.58
15	50	36.1	36.9	37.7	2.81	4.97	p<0.001	55	33.6	34.3	34.9	2.61
16	50	36.1	36.9	37.7	2.82	4.88	p<0.001	55	33.7	34.4	35.0	2.58
17	50	36.1	36.9	37.7	2.79	4.67	p<0.001	55	33.8	34.4	35.1	2.60
18	49	36.1	36.9	37.7	2.74	4.56	p<0.001	55	33.8	34.5	35.2	2.57
19	49	36.0	36.8	37.5	2.71	4.27	p<0.001	55	33.9	34.6	35.3	2.52
20	46	35.8	36.6	37.4	2.73	3.80	p<0.001	55	34.0	34.6	35.3	2.50
21	46	35.7	36.5	37.3	2.71	3.95	p<0.001	54	33.9	34.5	35.2	2.42
22	46	35.7	36.4	37.2	2.65	4.16	p<0.001	53	33.7	34.3	35.0	2.38
23	41	35.5	36.3	37.1	2.54	4.27	p<0.001	42	33.3	34.0	34.7	2.40
24	35	35.4	36.3	37.2	2.72	3.90	p<0.001	41	33.3	34.1	34.8	2.37
25	30	35.2	36.1	37.0	2.64	3.22	p<0.01	35	33.2	34.0	34.9	2.50

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.47	-0.02	0.42	0.60	1.21		7	-0.12	0.40	0.92	0.70
5	18	-0.73	-0.24	0.26	1.07	1.85		19	0.02	0.28	0.55	0.59
6	35	-0.11	0.14	0.40	0.77	0.25		27	0.02	0.18	0.35	0.43
7	43	-0.03	0.17	0.36	0.66	-0.69		39	-0.11	0.07	0.25	0.56
8	48	0.03	0.17	0.30	0.47	-0.79		49	-0.04	0.09	0.22	0.45
9	49	0.11	0.23	0.35	0.43	-1.86		53	-0.03	0.08	0.19	0.41
10	50	0.15	0.25	0.35	0.36	-2.38	p<0.05	54	-0.00	0.09	0.18	0.33
11	50	0.13	0.23	0.32	0.33	-2.35	p<0.05	55	0.03	0.09	0.16	0.25
12	50	0.11	0.20	0.29	0.33	-1.69		55	0.06	0.11	0.17	0.21
13	50	0.08	0.17	0.26	0.32	-0.99		55	0.06	0.12	0.17	0.22
14	50	0.04	0.12	0.21	0.30	-0.17		55	0.05	0.11	0.17	0.23
15	50	-0.02	0.06	0.13	0.27	1.05		55	0.05	0.11	0.18	0.24
16	50	-0.06	0.01	0.07	0.24	2.00	p<0.05	55	0.04	0.10	0.16	0.23
17	50	-0.10	-0.04	0.02	0.22	3.00	p<0.01	55	0.03	0.09	0.16	0.24
18	49	-0.13	-0.07	-0.01	0.22	3.10	p<0.01	55	0.01	0.08	0.15	0.26
19	49	-0.16	-0.09	-0.03	0.23	3.16	p<0.01	55	-0.01	0.05	0.11	0.24
20	46	-0.14	-0.08	-0.02	0.20	2.19	p<0.05	55	-0.04	0.01	0.07	0.22
21	46	-0.12	-0.08	-0.03	0.16	1.17		54	-0.09	-0.03	0.02	0.20
22	46	-0.13	-0.06	0.01	0.24	-0.01		53	-0.13	-0.06	0.01	0.26
23	41	-0.10	-0.02	0.07	0.28	-0.55		42	-0.11	-0.05	0.02	0.21
24	35	-0.12	-0.06	0.01	0.20	0.56		41	-0.08	-0.03	0.01	0.15
25	30	-0.08	-0.02	0.03	0.15	-0.59		35	-0.08	-0.04	-0.00	0.12


Ba-O Foramen magnum
Ba-O mm
38
37
36
35
34
33
32
31
30
29
28
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Ba-O Foramen magnum, growth velocity
Ba-O mm/year
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0.8
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0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
4
6
8
10
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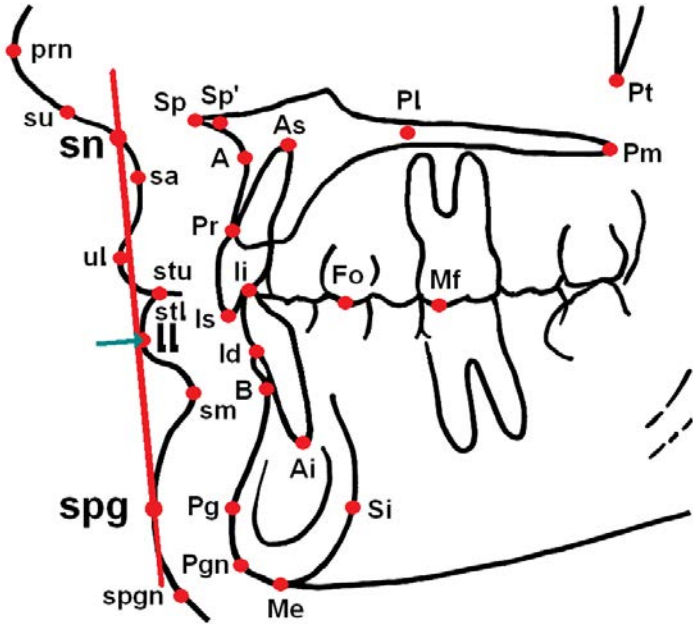
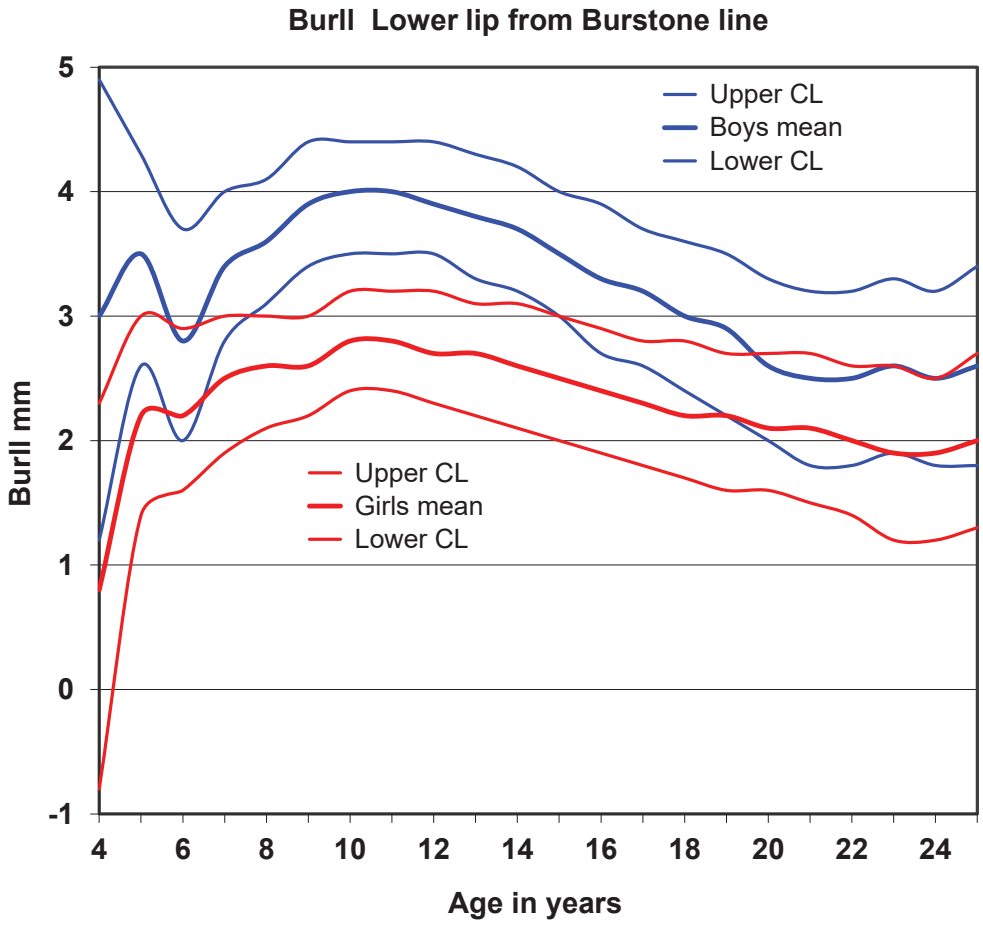
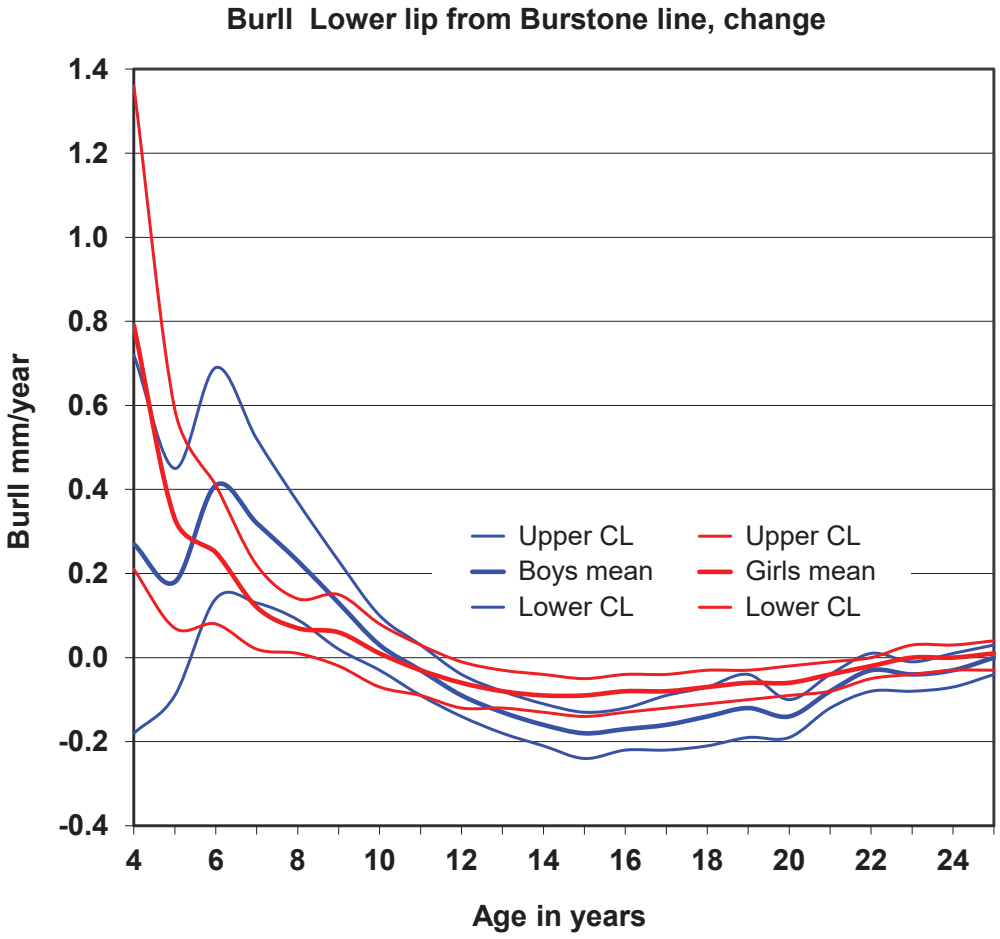
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

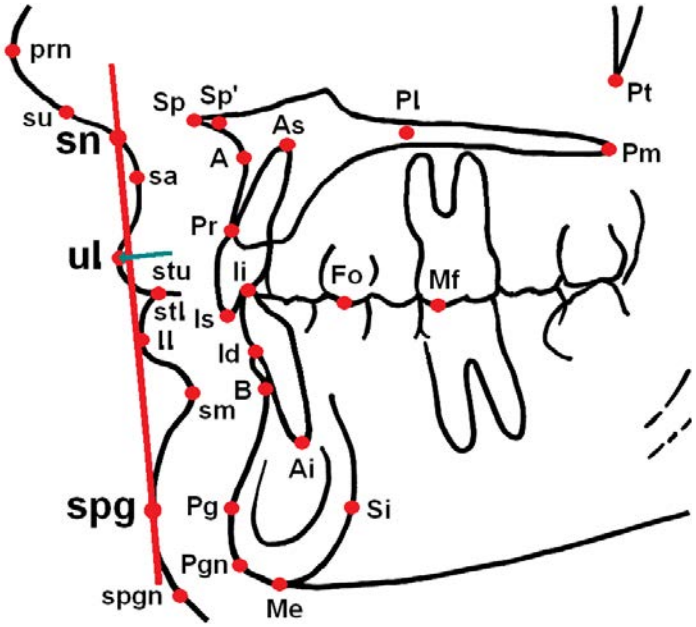


Burll (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.20	3.03	4.85	2.47	1.87		7	-0.77	0.76	2.28	2.06
5	18	2.62	3.47	4.31	1.83	2.10	p<0.05	19	1.44	2.23	3.02	1.75
6	35	1.99	2.85	3.72	2.61	1.05		27	1.61	2.25	2.88	1.68
7	43	2.80	3.43	4.05	2.09	2.32	p<0.05	39	1.94	2.46	2.97	1.64
8	48	3.13	3.63	4.14	1.78	3.16	p<0.01	49	2.13	2.56	2.99	1.55
9	49	3.42	3.89	4.37	1.70	3.95	p<0.001	53	2.24	2.64	3.05	1.50
10	50	3.50	3.97	4.43	1.67	3.65	p<0.001	54	2.36	2.79	3.22	1.62
11	50	3.50	3.97	4.44	1.69	3.65	p<0.001	55	2.36	2.79	3.22	1.62
12	50	3.45	3.93	4.41	1.74	3.55	p<0.001	55	2.30	2.74	3.19	1.69
13	50	3.32	3.81	4.31	1.78	3.35	p<0.01	55	2.21	2.67	3.12	1.73
14	50	3.17	3.68	4.19	1.84	3.11	p<0.01	55	2.10	2.58	3.05	1.80
15	50	2.97	3.50	4.04	1.92	2.78	p<0.01	55	1.98	2.47	2.97	1.87
16	50	2.76	3.32	3.88	2.01	2.41	p<0.05	55	1.89	2.40	2.91	1.92
17	50	2.59	3.17	3.76	2.10	2.16	p<0.05	55	1.79	2.31	2.84	1.97
18	49	2.39	3.00	3.61	2.19	1.84		55	1.71	2.24	2.78	2.02
19	49	2.25	2.90	3.54	2.29	1.67		55	1.64	2.18	2.73	2.06
20	46	2.00	2.66	3.31	2.28	1.23		55	1.57	2.12	2.68	2.10
21	46	1.85	2.53	3.21	2.35	0.98		54	1.52	2.09	2.66	2.12
22	46	1.85	2.52	3.19	2.32	1.12		53	1.43	2.01	2.59	2.15
23	41	1.91	2.60	3.30	2.28	1.43		42	1.23	1.90	2.56	2.20
24	35	1.79	2.50	3.21	2.14	1.24		41	1.20	1.88	2.55	2.20
25	30	1.78	2.57	3.37	2.23	1.13		35	1.27	1.96	2.66	2.11

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.18	0.27	0.72	0.61	1.37		7	0.21	0.79	1.36	0.78
5	18	-0.09	0.18	0.45	0.59	0.75		19	0.07	0.33	0.59	0.58
6	35	0.13	0.41	0.69	0.84	-0.90		27	0.08	0.25	0.41	0.44
7	43	0.12	0.32	0.51	0.65	-1.75		39	0.02	0.12	0.22	0.32
8	48	0.09	0.23	0.37	0.49	-2.01	p<0.05	49	0.01	0.07	0.14	0.24
9	49	0.02	0.12	0.23	0.37	-0.90		53	-0.02	0.06	0.15	0.31
10	50	-0.03	0.03	0.10	0.24	-0.54		54	-0.07	0.01	0.08	0.28
11	50	-0.08	-0.03	0.03	0.21	-0.07		55	-0.09	-0.03	0.03	0.24
12	50	-0.13	-0.08	-0.03	0.18	0.58		55	-0.12	-0.06	-0.01	0.21
13	50	-0.18	-0.12	-0.07	0.19	1.33		55	-0.12	-0.08	-0.03	0.18
14	50	-0.21	-0.16	-0.10	0.20	1.91		55	-0.13	-0.09	-0.04	0.18
15	50	-0.24	-0.18	-0.12	0.21	2.37	p<0.05	55	-0.14	-0.09	-0.05	0.17
16	50	-0.22	-0.17	-0.11	0.19	2.40	p<0.05	55	-0.13	-0.08	-0.04	0.15
17	50	-0.22	-0.15	-0.09	0.23	1.84		55	-0.12	-0.08	-0.04	0.15
18	49	-0.21	-0.14	-0.07	0.25	1.68		55	-0.11	-0.07	-0.03	0.15
19	49	-0.19	-0.11	-0.04	0.27	1.30		55	-0.10	-0.06	-0.03	0.13
20	46	-0.19	-0.14	-0.10	0.16	3.04	p<0.01	55	-0.09	-0.06	-0.02	0.13
21	46	-0.12	-0.08	-0.04	0.14	1.53		54	-0.08	-0.04	-0.01	0.12
22	46	-0.08	-0.04	0.01	0.16	0.48		53	-0.05	-0.02	0.00	0.10
23	41	-0.08	-0.05	-0.01	0.11	1.81		42	-0.04	-0.00	0.03	0.11
24	35	-0.07	-0.04	-0.00	0.10	1.65		41	-0.03	0.00	0.03	0.10
25	30	-0.05	-0.01	0.02	0.10	0.84		35	-0.03	0.01	0.04	0.10


BurII Lower lip from Burstone line
BurII mm
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24


BurII Lower lip from Burstone line, change
BurII mm/year
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4
6
8
10
12
14
16
18
20
22
24

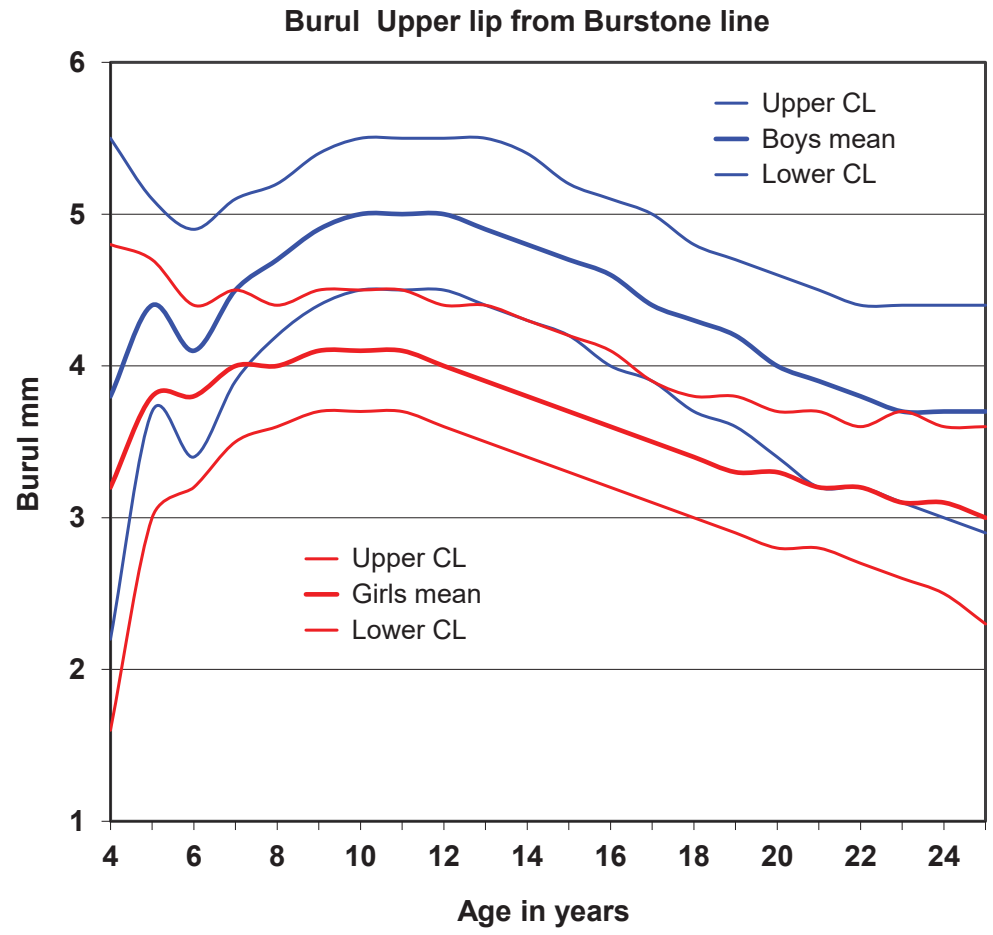


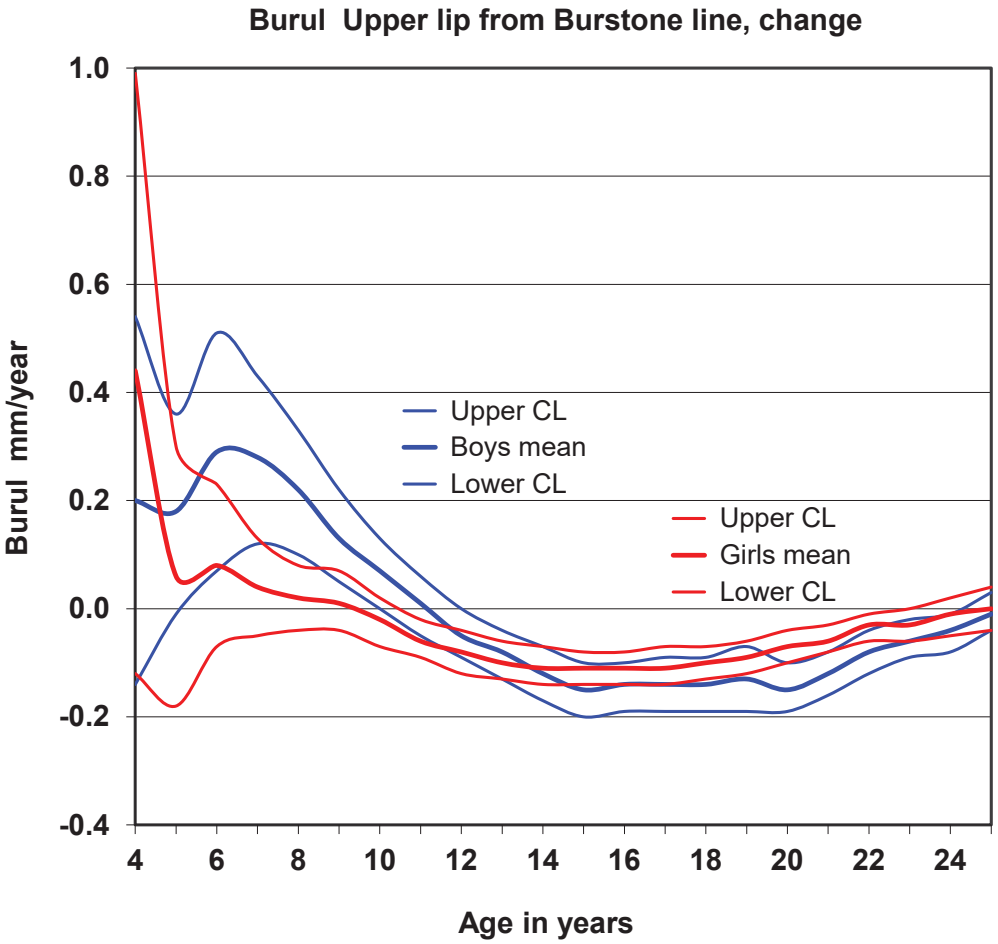
Burul (mm)

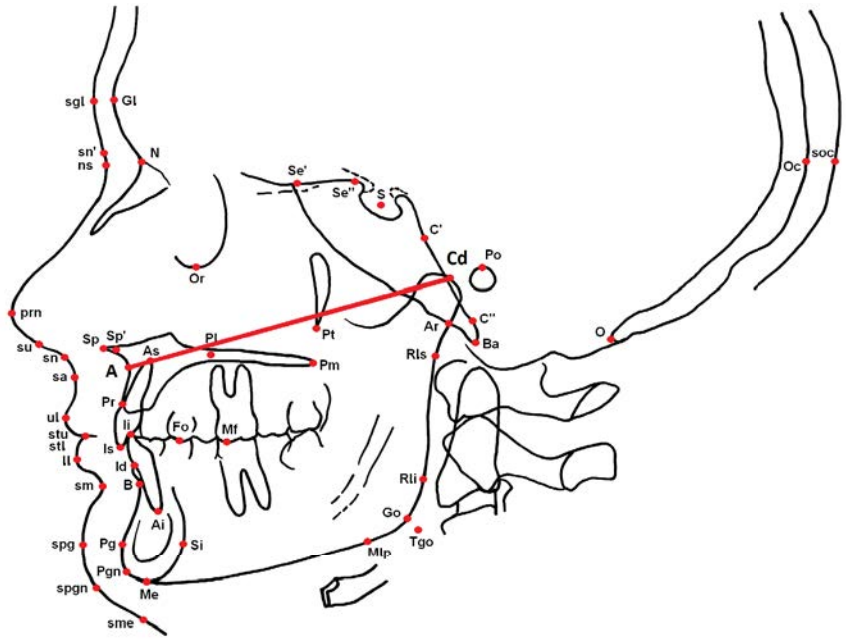
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.20	3.83	5.46	2.20	0.52		7	1.63	3.23	4.83	2.16
5	18	3.69	4.42	5.15	1.58	1.01		19	3.01	3.85	4.68	1.85
6	35	3.37	4.15	4.93	2.35	0.68		27	3.20	3.79	4.38	1.57
7	43	3.92	4.50	5.08	1.94	1.29		39	3.52	4.00	4.48	1.54
8	48	4.17	4.67	5.18	1.77	2.05	p<0.05	49	3.60	4.00	4.41	1.45
9	49	4.41	4.89	5.38	1.74	2.52	p<0.05	53	3.68	4.09	4.49	1.50
10	50	4.50	4.98	5.46	1.72	2.67	p<0.01	54	3.73	4.13	4.54	1.52
11	50	4.53	5.02	5.52	1.77	2.83	p<0.01	55	3.71	4.11	4.52	1.53
12	50	4.51	5.01	5.51	1.79	2.98	p<0.01	55	3.63	4.04	4.45	1.55
13	50	4.45	4.95	5.45	1.82	3.04	p<0.01	55	3.53	3.95	4.36	1.56
14	50	4.34	4.85	5.36	1.85	3.02	p<0.01	55	3.42	3.84	4.26	1.58
15	50	4.19	4.71	5.24	1.90	2.87	p<0.01	55	3.31	3.73	4.15	1.59
16	50	4.03	4.57	5.10	1.93	2.72	p<0.01	55	3.21	3.63	4.05	1.60
17	50	3.89	4.44	4.99	1.97	2.63	p<0.01	55	3.10	3.52	3.95	1.60
18	49	3.74	4.30	4.85	1.99	2.47	p<0.05	55	3.00	3.42	3.85	1.61
19	49	3.60	4.17	4.74	2.03	2.35	p<0.05	55	2.90	3.33	3.76	1.63
20	46	3.42	4.03	4.64	2.11	2.07	p<0.05	55	2.82	3.26	3.69	1.65
21	46	3.26	3.88	4.50	2.14	1.72		54	2.78	3.23	3.67	1.66
22	46	3.20	3.81	4.43	2.13	1.67		53	2.70	3.17	3.63	1.72
23	41	3.11	3.75	4.39	2.10	1.44		42	2.57	3.12	3.68	1.85
24	35	3.05	3.74	4.42	2.06	1.50		41	2.49	3.06	3.63	1.86
25	30	2.94	3.69	4.44	2.09	1.47		35	2.34	2.97	3.59	1.88

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.14	0.20	0.54	0.46	0.71		7	-0.12	0.44	0.99	0.75
5	18	-0.01	0.18	0.36	0.41	-0.77		19	-0.18	0.06	0.30	0.53
6	35	0.06	0.29	0.51	0.67	-1.42		27	-0.07	0.08	0.23	0.40
7	43	0.12	0.27	0.43	0.52	-2.49	p<0.05	39	-0.05	0.04	0.13	0.28
8	48	0.10	0.21	0.33	0.41	-2.94	p<0.01	49	-0.04	0.02	0.08	0.22
9	49	0.05	0.13	0.22	0.30	-2.33	p<0.05	53	-0.04	0.01	0.07	0.21
10	50	0.00	0.07	0.13	0.23	-2.36	p<0.05	54	-0.07	-0.02	0.02	0.17
11	50	-0.04	0.01	0.06	0.19	-1.92		55	-0.09	-0.06	-0.02	0.14
12	50	-0.09	-0.04	0.00	0.17	-1.20		55	-0.12	-0.08	-0.04	0.14
13	50	-0.13	-0.08	-0.03	0.18	-0.49		55	-0.13	-0.10	-0.06	0.12
14	50	-0.17	-0.12	-0.07	0.18	0.31		55	-0.14	-0.11	-0.07	0.13
15	50	-0.19	-0.14	-0.09	0.19	1.12		55	-0.14	-0.11	-0.08	0.12
16	50	-0.19	-0.14	-0.09	0.17	1.11		55	-0.14	-0.11	-0.08	0.12
17	50	-0.19	-0.14	-0.08	0.18	1.02		55	-0.14	-0.11	-0.07	0.12
18	49	-0.19	-0.14	-0.09	0.19	1.44		55	-0.13	-0.10	-0.07	0.11
19	49	-0.19	-0.13	-0.07	0.20	1.24		55	-0.12	-0.09	-0.06	0.11
20	46	-0.19	-0.15	-0.10	0.15	3.01	p<0.01	55	-0.10	-0.07	-0.04	0.11
21	46	-0.16	-0.12	-0.08	0.14	2.56	p<0.05	54	-0.08	-0.06	-0.03	0.10
22	46	-0.12	-0.08	-0.04	0.15	1.81		53	-0.06	-0.03	-0.01	0.11
23	41	-0.10	-0.06	-0.02	0.12	1.14		42	-0.06	-0.03	0.00	0.11
24	35	-0.08	-0.05	-0.02	0.10	1.60		41	-0.05	-0.01	0.02	0.10
25	30	-0.06	-0.02	0.02	0.11	0.47		35	-0.04	-0.00	0.04	0.12

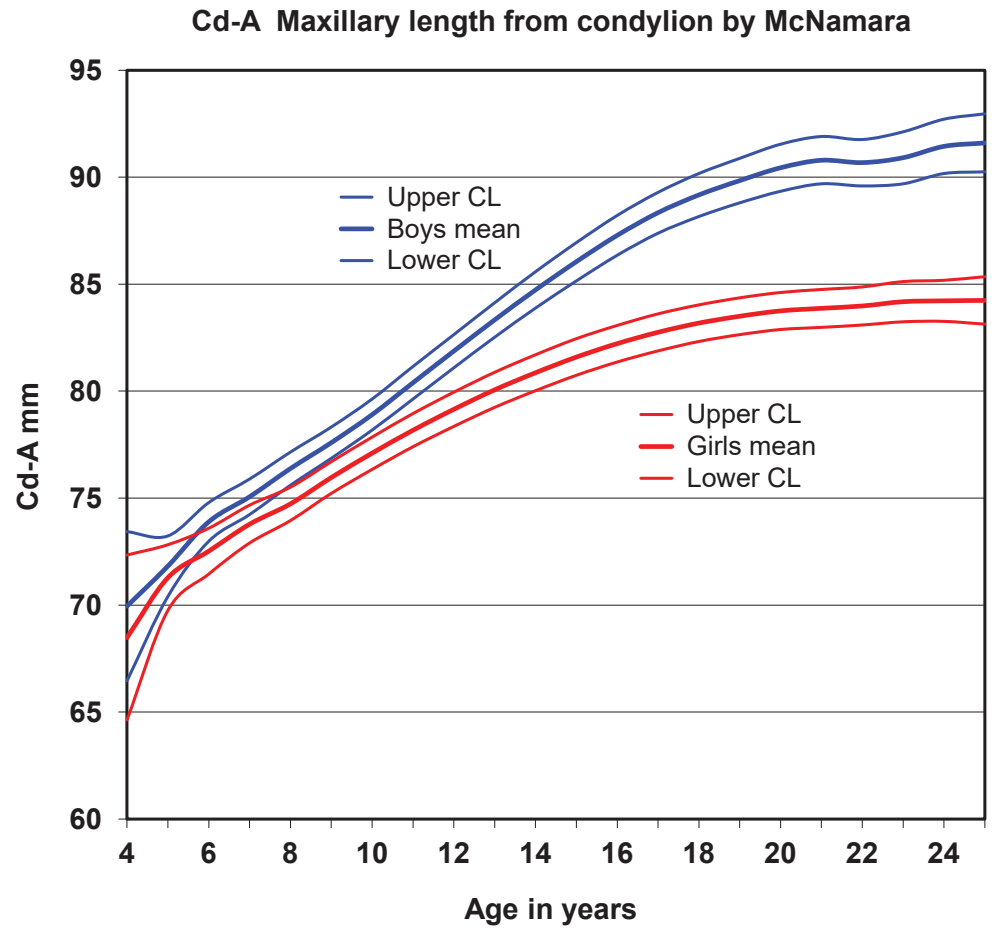

Burul Upper lip from Burstone line
Burul mm
6
5
4
3
2
1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

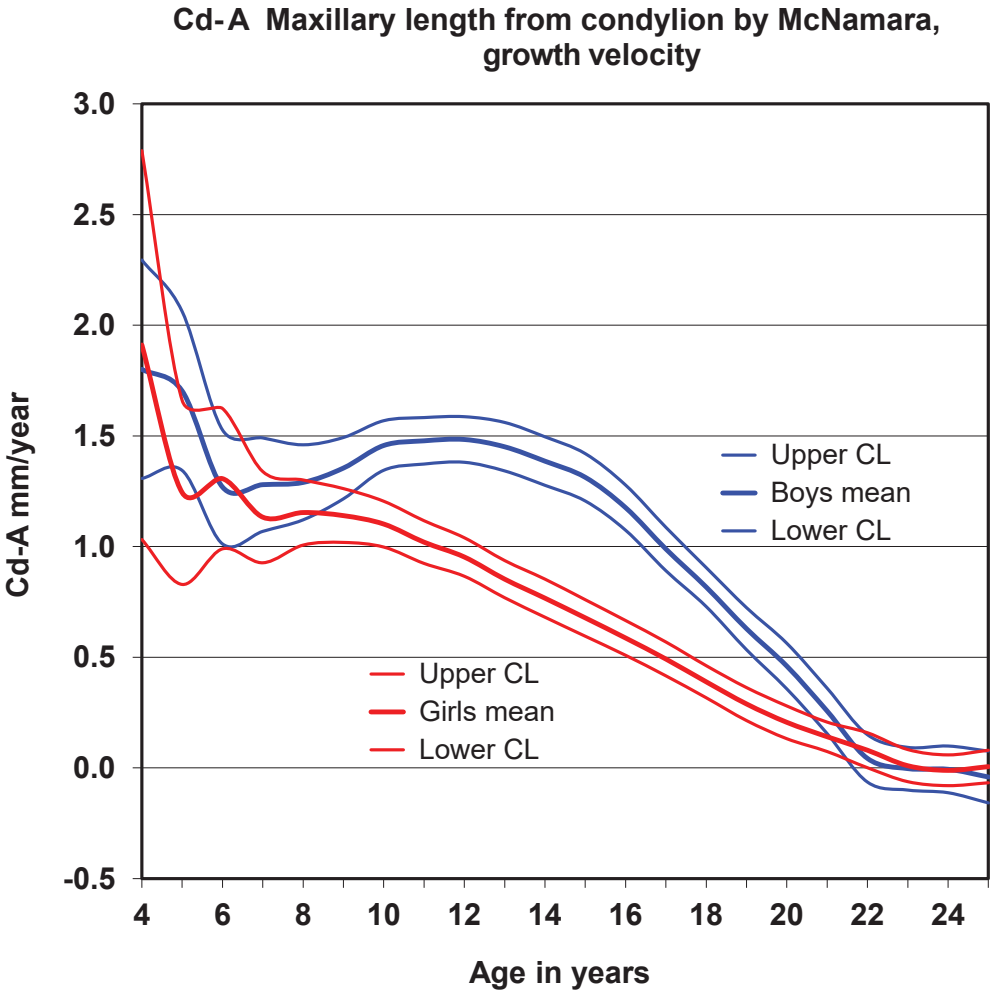

Burul Upper lip from Burstone line, change
Burul mm/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

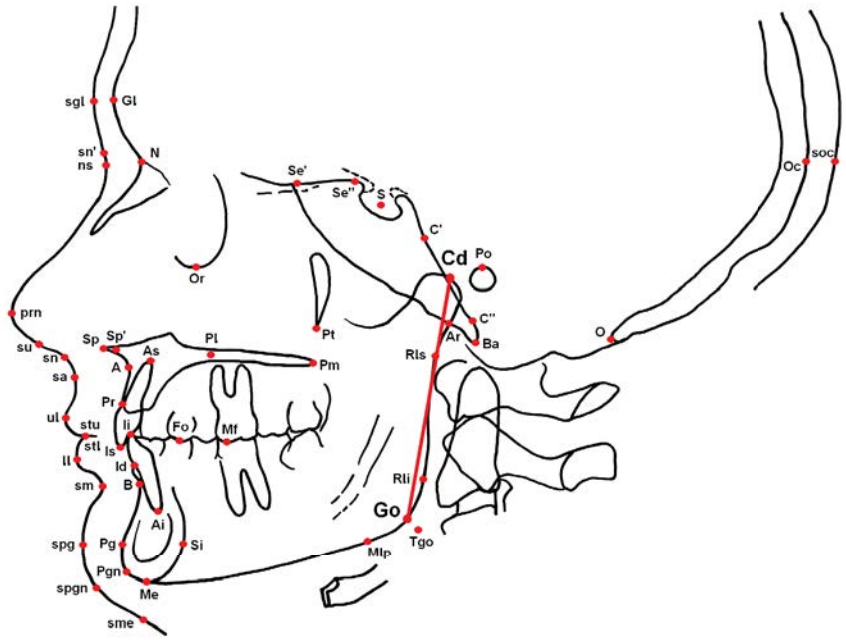


Cd-A (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	66.5	69.9	73.4	4.70	0.55		7	64.6	68.5	72.3	5.20
5	18	70.4	71.8	73.2	3.06	0.50		19	69.7	71.3	72.8	3.42
6	35	73.0	73.9	74.8	2.73	1.92		27	71.5	72.5	73.6	2.84
7	43	74.2	75.1	75.9	2.77	2.06	p<0.05	39	72.9	73.8	74.7	2.83
8	48	75.6	76.4	77.1	2.73	2.94	p<0.01	49	74.0	74.7	75.5	2.78
9	49	76.9	77.6	78.3	2.61	3.08	p<0.01	53	75.2	76.0	76.7	2.76
10	50	78.2	78.9	79.6	2.62	3.37	p<0.01	54	76.3	77.1	77.9	2.83
11	50	79.6	80.4	81.1	2.73	4.00	p<0.001	55	77.4	78.2	78.9	2.93
12	50	81.1	81.9	82.6	2.80	4.76	p<0.001	55	78.4	79.2	79.9	3.02
13	50	82.5	83.3	84.1	2.91	5.55	p<0.001	55	79.2	80.1	80.9	3.10
14	50	83.9	84.7	85.6	3.07	6.32	p<0.001	55	80.0	80.9	81.7	3.19
15	50	85.2	86.0	86.9	3.22	7.08	p<0.001	55	80.7	81.6	82.4	3.22
16	50	86.4	87.3	88.2	3.36	7.86	p<0.001	55	81.4	82.2	83.1	3.25
17	50	87.4	88.3	89.3	3.45	8.51	p<0.001	55	81.9	82.7	83.6	3.28
18	49	88.2	89.2	90.2	3.59	8.95	p<0.001	55	82.3	83.2	84.0	3.24
19	49	88.8	89.8	90.9	3.72	9.28	p<0.001	55	82.6	83.5	84.4	3.25
20	46	89.3	90.4	91.5	3.81	9.51	p<0.001	55	82.9	83.7	84.6	3.27
21	46	89.7	90.8	91.9	3.82	9.70	p<0.001	54	83.0	83.9	84.8	3.32
22	46	89.6	90.7	91.8	3.76	9.42	p<0.001	53	83.1	84.0	84.9	3.30
23	41	89.7	90.9	92.1	3.97	8.61	p<0.001	42	83.2	84.2	85.1	3.11
24	35	90.2	91.4	92.7	3.83	9.03	p<0.001	41	83.3	84.2	85.2	3.14
25	30	90.2	91.6	93.0	3.78	8.34	p<0.001	35	83.1	84.2	85.3	3.34

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.31	1.80	2.29	0.67	-0.21		7	1.03	1.91	2.79	1.19
5	18	1.34	1.70	2.06	0.78	1.63		19	0.83	1.24	1.66	0.92
6	35	1.01	1.27	1.53	0.78	-0.18		27	0.99	1.31	1.62	0.84
7	43	1.07	1.28	1.49	0.71	0.97		39	0.93	1.13	1.34	0.66
8	48	1.12	1.29	1.46	0.60	1.19		49	1.01	1.15	1.30	0.53
9	49	1.22	1.35	1.49	0.49	2.29	p<0.05	53	1.02	1.14	1.26	0.45
10	50	1.34	1.46	1.57	0.41	4.56	p<0.001	54	1.00	1.10	1.21	0.39
11	50	1.37	1.48	1.58	0.38	6.30	p<0.001	55	0.92	1.02	1.12	0.37
12	50	1.38	1.48	1.59	0.37	7.76	p<0.001	55	0.87	0.95	1.04	0.33
13	50	1.34	1.45	1.56	0.39	8.59	p<0.001	55	0.77	0.85	0.94	0.32
14	50	1.28	1.39	1.50	0.39	8.79	p<0.001	55	0.68	0.77	0.85	0.33
15	50	1.21	1.31	1.42	0.39	9.30	p<0.001	55	0.60	0.68	0.76	0.31
16	50	1.07	1.18	1.28	0.37	9.04	p<0.001	55	0.51	0.59	0.67	0.30
17	50	0.89	0.99	1.09	0.35	7.90	p<0.001	55	0.42	0.49	0.57	0.29
18	49	0.73	0.82	0.91	0.31	7.43	p<0.001	55	0.32	0.39	0.46	0.27
19	49	0.53	0.63	0.72	0.34	5.60	p<0.001	55	0.21	0.29	0.36	0.28
20	46	0.36	0.46	0.56	0.36	4.02	p<0.001	55	0.13	0.21	0.28	0.28
21	46	0.15	0.26	0.36	0.36	1.92		54	0.07	0.14	0.21	0.25
22	46	-0.06	0.04	0.15	0.37	-0.56		53	0.00	0.08	0.16	0.29
23	41	-0.10	-0.00	0.09	0.32	-0.22		42	-0.06	0.01	0.08	0.24
24	35	-0.11	-0.01	0.10	0.32	0.07		41	-0.08	-0.01	0.06	0.23
25	30	-0.16	-0.04	0.08	0.33	-0.69		35	-0.07	0.01	0.08	0.22


Cd-A Maxillary length from condylion by McNamara
Cd-A mm
95
90
85
80
75
70
65
60
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Cd-A Maxillary length from condylion by McNamara, growth velocity
Cd-A mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL



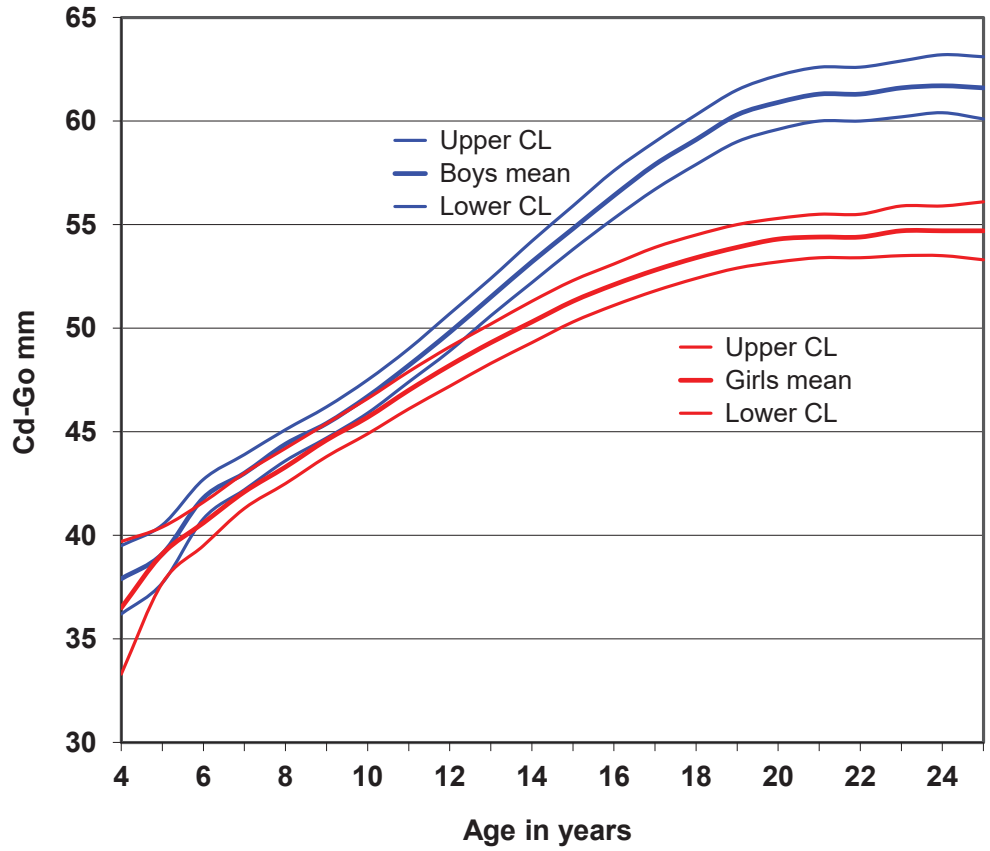
Cd-Go (mm)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	36.2	37.9	39.5	2.18	0.75		7	33.3	36.5	39.7	4.26
5	18	37.7	39.1	40.5	2.99	0.01		19	37.7	39.1	40.4	2.99
6	35	40.9	41.8	42.7	2.84	1.69		27	39.5	40.6	41.6	2.81
7	43	42.2	43.0	43.9	2.80	1.52		39	41.3	42.1	43.0	2.64
8	48	43.6	44.3	45.1	2.64	1.80		49	42.5	43.3	44.2	3.01
9	49	44.6	45.4	46.1	2.62	1.35		53	43.8	44.6	45.4	3.14
10	50	45.9	46.7	47.5	2.81	1.58		54	44.9	45.7	46.6	3.27
11	50	47.3	48.2	49.0	2.94	1.90		55	46.1	47.0	47.9	3.43
12	50	48.9	49.8	50.7	3.16	2.47	p<0.05	55	47.2	48.2	49.1	3.55
13	50	50.6	51.5	52.4	3.36	3.23	p<0.01	55	48.3	49.3	50.2	3.66
14	50	52.2	53.2	54.2	3.58	4.01	p<0.001	55	49.3	50.3	51.3	3.75
15	50	53.8	54.8	55.9	3.79	4.83	p<0.001	55	50.3	51.3	52.3	3.81
16	50	55.3	56.4	57.6	3.99	5.68	p<0.001	55	51.1	52.1	53.1	3.85
17	50	56.7	57.9	59.0	4.18	6.38	p<0.001	55	51.8	52.8	53.9	3.90
18	49	57.9	59.1	60.3	4.27	7.09	p<0.001	55	52.4	53.4	54.5	3.91
19	49	59.0	60.3	61.5	4.37	7.77	p<0.001	55	52.9	53.9	55.0	3.95
20	46	59.6	60.9	62.2	4.51	7.78	p<0.001	55	53.2	54.3	55.3	3.98
21	46	60.0	61.3	62.6	4.55	8.01	p<0.001	54	53.4	54.4	55.5	3.99
22	46	60.0	61.3	62.6	4.48	8.23	p<0.001	53	53.4	54.4	55.5	3.83
23	41	60.2	61.6	62.9	4.38	7.46	p<0.001	42	53.5	54.7	55.9	4.00
24	35	60.4	61.8	63.2	4.11	7.61	p<0.001	41	53.5	54.7	55.9	3.99
25	30	60.1	61.6	63.1	4.23	6.60	p<0.001	35	53.3	54.7	56.1	4.15

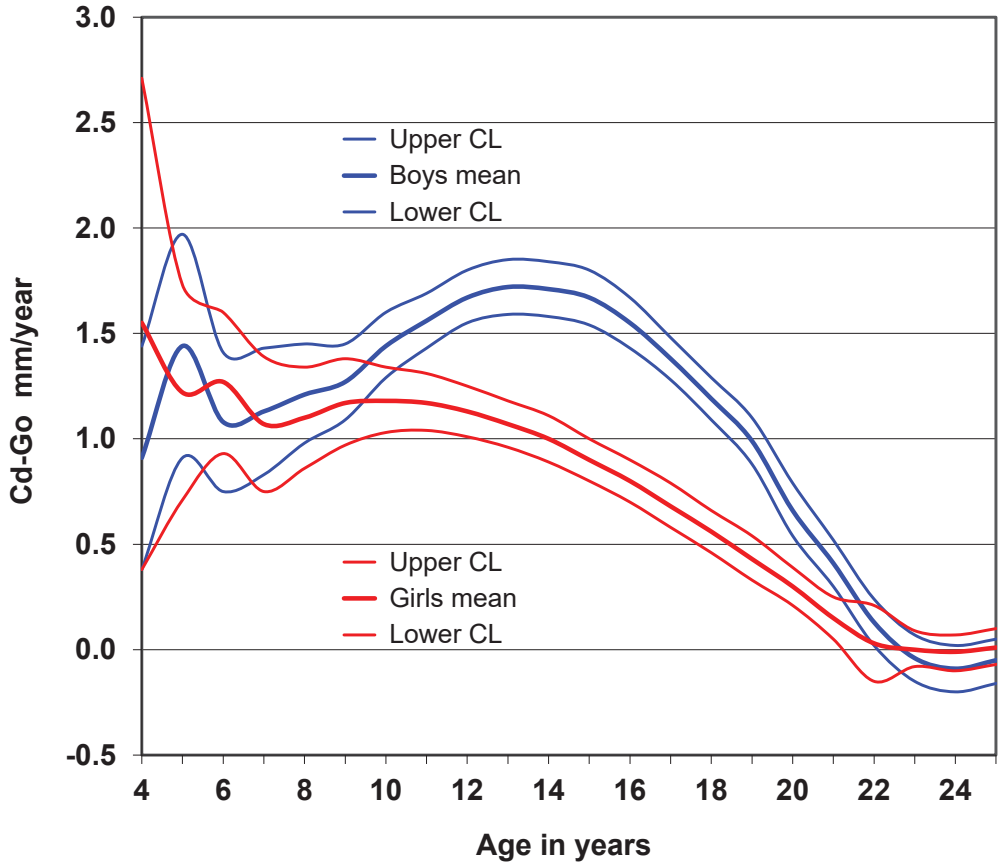
Change per year

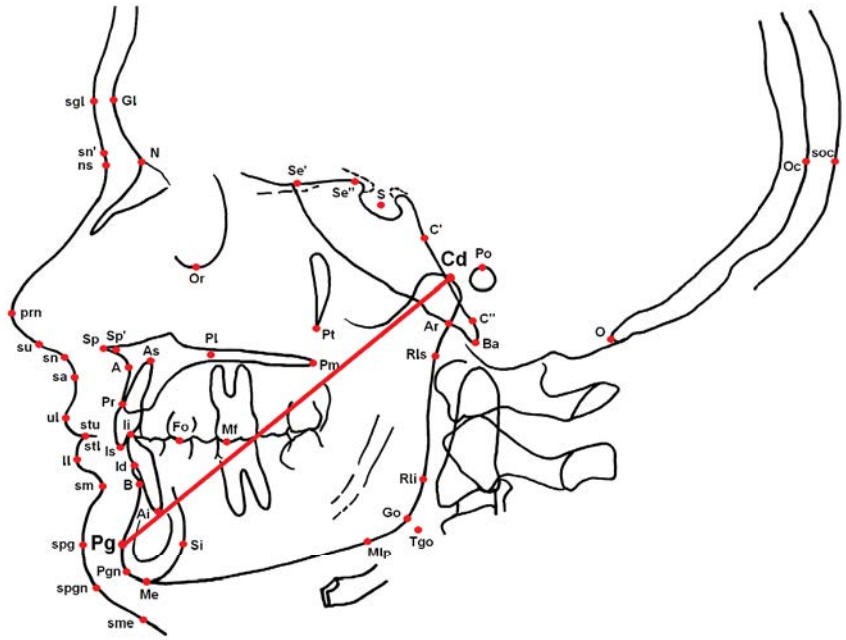
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.38	0.91	1.44	0.72	-0.98		7	0.38	1.55	2.71	1.57
5	18	0.91	1.44	1.97	1.14	0.58		19	0.71	1.22	1.73	1.13
6	35	0.75	1.08	1.41	0.98	-0.78		27	0.93	1.27	1.60	0.89
7	43	0.83	1.13	1.43	0.99	0.29		39	0.75	1.07	1.39	1.02
8	48	0.98	1.21	1.45	0.83	0.65		49	0.86	1.10	1.34	0.86
9	49	1.09	1.27	1.45	0.64	0.66		53	0.97	1.17	1.38	0.76
10	50	1.29	1.44	1.60	0.56	2.31	p<0.05	54	1.03	1.18	1.34	0.59
11	50	1.43	1.56	1.69	0.46	4.05	p<0.001	55	1.04	1.17	1.31	0.51
12	50	1.55	1.67	1.80	0.45	6.12	p<0.001	55	1.01	1.13	1.25	0.46
13	50	1.59	1.72	1.85	0.46	7.57	p<0.001	55	0.96	1.07	1.18	0.42
14	50	1.58	1.71	1.84	0.46	8.40	p<0.001	55	0.89	1.00	1.11	0.41
15	50	1.54	1.67	1.80	0.47	9.31	p<0.001	55	0.80	0.90	1.00	0.38
16	50	1.43	1.55	1.67	0.43	9.44	p<0.001	55	0.70	0.80	0.90	0.38
17	50	1.28	1.38	1.48	0.37	9.39	p<0.001	55	0.58	0.68	0.79	0.39
18	49	1.09	1.19	1.29	0.36	8.82	p<0.001	55	0.46	0.56	0.66	0.38
19	49	0.88	0.99	1.10	0.39	7.32	p<0.001	55	0.33	0.43	0.54	0.38
20	46	0.54	0.66	0.79	0.42	4.80	p<0.001	55	0.21	0.30	0.39	0.35
21	46	0.30	0.41	0.52	0.38	3.35	p<0.01	54	0.05	0.15	0.25	0.39
22	46	0.02	0.13	0.24	0.39	0.88		53	-0.15	0.03	0.21	0.67
23	41	-0.15	-0.04	0.07	0.36	-0.69		42	-0.08	0.00	0.09	0.27
24	35	-0.20	-0.09	0.02	0.34	-1.12		41	-0.10	-0.01	0.07	0.28
25	30	-0.16	-0.05	0.05	0.30	-0.93		35	-0.07	0.01	0.10	0.26

Cd-Go Ramus height with condyle



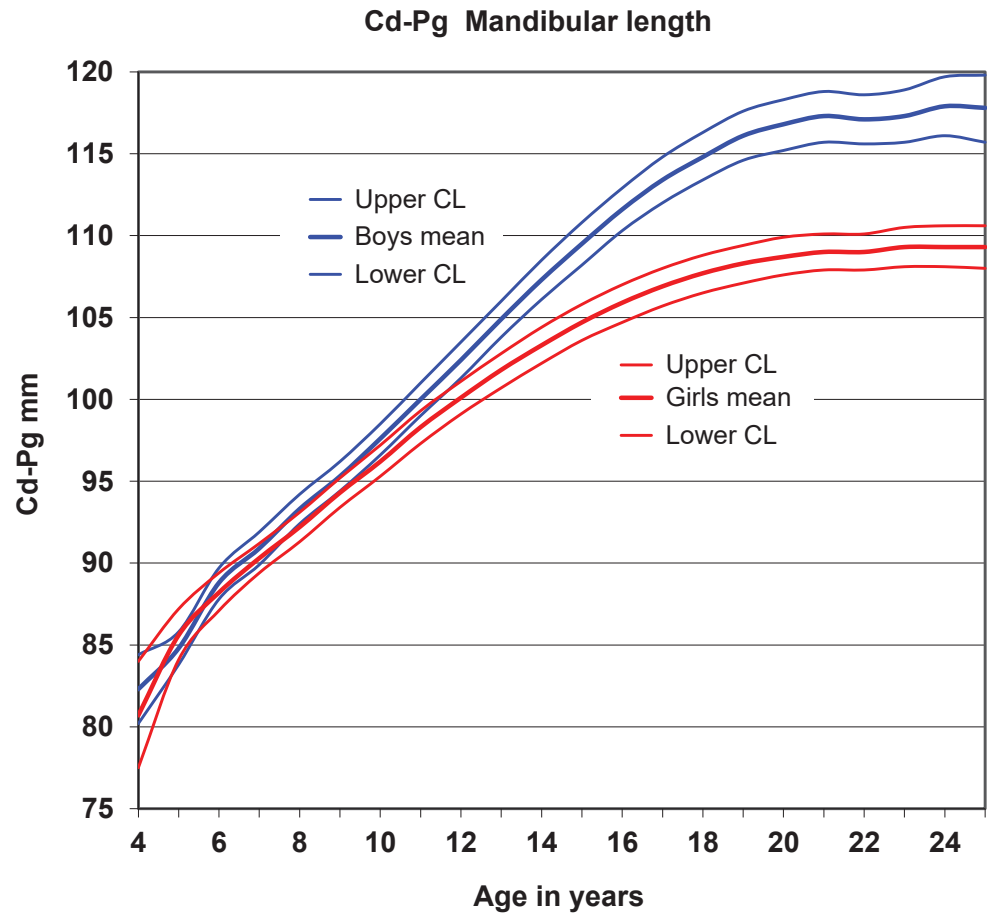
Cd-Go Ramus height with condyle, growth velocity

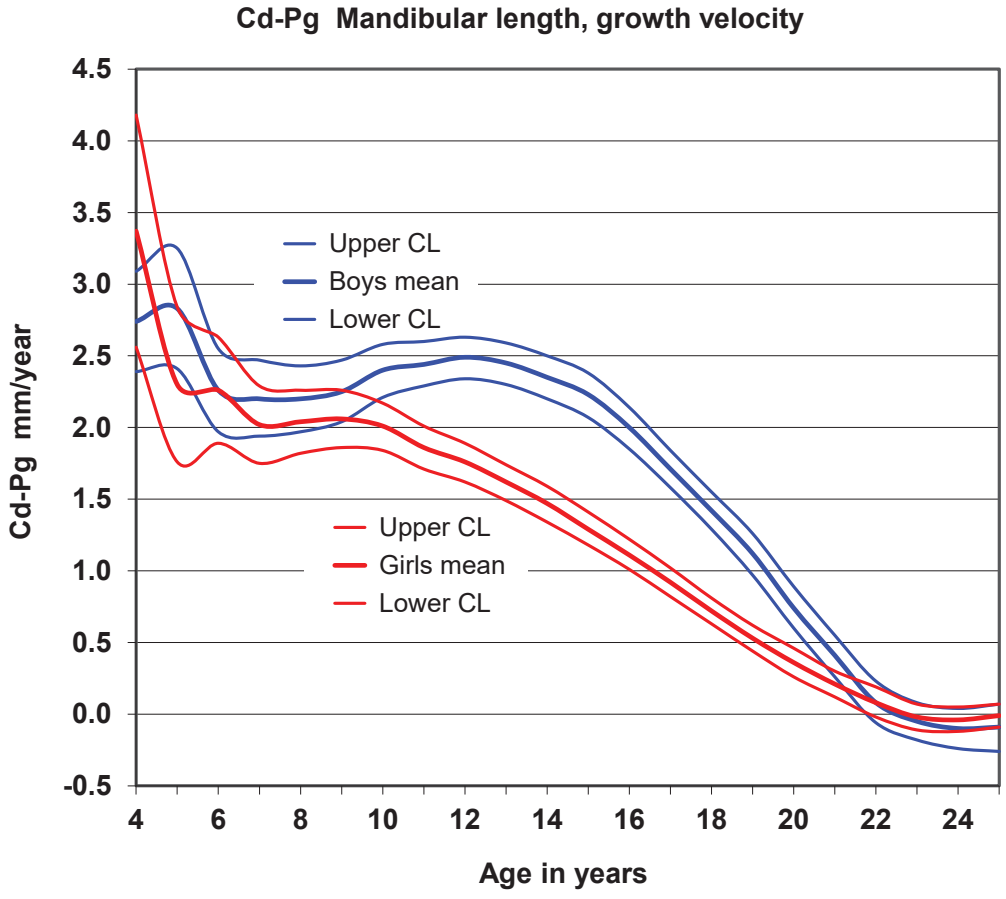


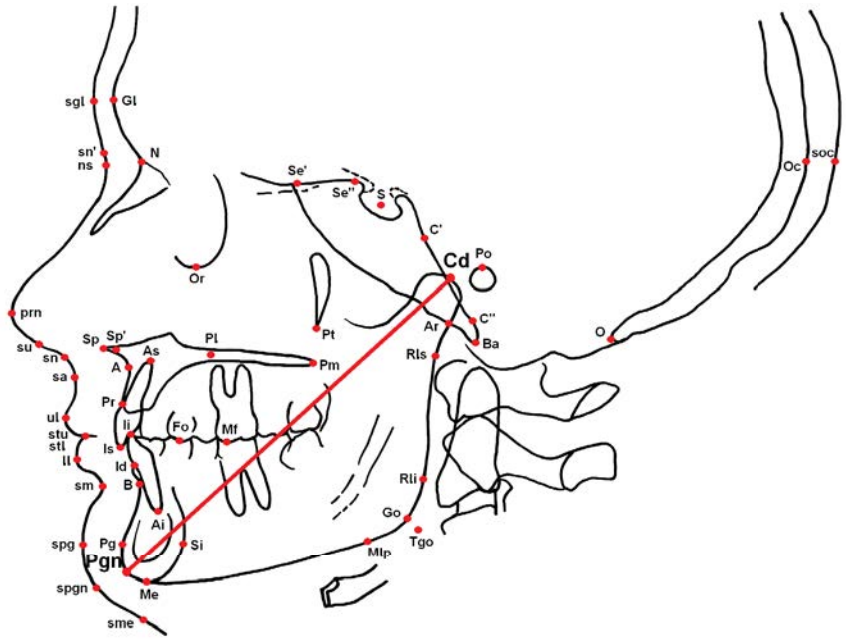


Cd-Pg (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	80.2	82.3	84.4	2.84	0.81		7	77.5	80.7	84.0	4.35
5	18	83.8	84.8	85.8	2.19	-0.81		19	84.1	85.6	87.2	3.44
6	35	87.8	88.8	89.7	2.98	0.67		27	87.1	88.2	89.4	3.08
7	43	89.9	90.9	91.9	3.30	0.86		39	89.4	90.3	91.2	2.90
8	48	92.4	93.3	94.2	3.27	1.64		49	91.3	92.2	93.1	3.17
9	49	94.4	95.3	96.2	3.16	1.52		53	93.4	94.3	95.2	3.28
10	50	96.6	97.6	98.5	3.33	1.95		54	95.3	96.2	97.2	3.60
11	50	99.0	100.0	101.0	3.67	2.37	p<0.05	55	97.3	98.3	99.3	3.69
12	50	101.3	102.4	103.5	3.90	3.12	p<0.01	55	99.1	100.1	101.1	3.79
13	50	103.8	104.9	106.0	4.13	3.99	p<0.001	55	100.7	101.8	102.8	3.91
14	50	106.1	107.3	108.5	4.34	4.86	p<0.001	55	102.2	103.3	104.4	4.04
15	50	108.2	109.5	110.8	4.56	5.63	p<0.001	55	103.6	104.7	105.8	4.18
16	50	110.3	111.6	112.9	4.78	6.47	p<0.001	55	104.7	105.9	107.0	4.28
17	50	112.0	113.4	114.8	4.97	7.11	p<0.001	55	105.7	106.9	108.0	4.37
18	49	113.4	114.8	116.3	5.12	7.69	p<0.001	55	106.5	107.7	108.8	4.36
19	49	114.6	116.1	117.6	5.30	8.22	p<0.001	55	107.1	108.3	109.4	4.35
20	46	115.2	116.8	118.3	5.35	8.37	p<0.001	55	107.6	108.7	109.9	4.31
21	46	115.7	117.3	118.8	5.37	8.57	p<0.001	54	107.9	109.0	110.1	4.26
22	46	115.6	117.1	118.6	5.24	8.61	p<0.001	53	107.9	109.0	110.1	4.10
23	41	115.7	117.3	118.9	5.31	7.72	p<0.001	42	108.1	109.3	110.5	4.04
24	35	116.1	117.9	119.7	5.40	7.92	p<0.001	41	108.1	109.3	110.6	4.00
25	30	115.7	117.8	119.8	5.79	6.91	p<0.001	35	108.0	109.3	110.6	4.03

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.39	2.74	3.09	0.47	-1.40		7	2.56	3.37	4.18	1.09
5	18	2.41	2.83	3.25	0.91	1.52		19	1.76	2.30	2.84	1.20
6	35	1.97	2.26	2.55	0.87	0.01		27	1.89	2.26	2.63	0.99
7	43	1.94	2.20	2.47	0.90	0.94		39	1.75	2.02	2.29	0.87
8	48	1.97	2.20	2.43	0.82	0.97		49	1.82	2.04	2.26	0.79
9	49	2.04	2.25	2.47	0.77	1.28		53	1.86	2.06	2.26	0.75
10	50	2.21	2.40	2.58	0.67	3.13	p<0.01	54	1.84	2.01	2.17	0.61
11	50	2.29	2.44	2.60	0.56	5.25	p<0.001	55	1.71	1.86	2.01	0.57
12	50	2.34	2.49	2.63	0.52	7.16	p<0.001	55	1.62	1.76	1.89	0.52
13	50	2.30	2.45	2.59	0.53	8.43	p<0.001	55	1.49	1.62	1.74	0.48
14	50	2.20	2.35	2.50	0.54	8.98	p<0.001	55	1.34	1.47	1.59	0.47
15	50	2.07	2.23	2.38	0.56	9.67	p<0.001	55	1.18	1.29	1.41	0.43
16	50	1.85	2.00	2.14	0.53	9.62	p<0.001	55	1.01	1.11	1.22	0.41
17	50	1.58	1.71	1.84	0.46	9.64	p<0.001	55	0.82	0.92	1.02	0.37
18	49	1.29	1.42	1.55	0.48	8.61	p<0.001	55	0.63	0.72	0.81	0.35
19	49	0.97	1.12	1.26	0.52	6.88	p<0.001	55	0.44	0.53	0.62	0.34
20	46	0.60	0.74	0.89	0.50	4.43	p<0.001	55	0.26	0.36	0.46	0.37
21	46	0.26	0.41	0.55	0.51	2.35	p<0.05	54	0.12	0.21	0.30	0.34
22	46	-0.06	0.08	0.23	0.50	-0.01		53	-0.02	0.08	0.19	0.38
23	41	-0.18	-0.05	0.08	0.41	-0.36		42	-0.11	-0.02	0.07	0.30
24	35	-0.24	-0.10	0.04	0.42	-0.78		41	-0.12	-0.04	0.05	0.28
25	30	-0.26	-0.09	0.07	0.47	-0.92		35	-0.09	-0.01	0.07	0.25


Cd-Pg Mandibular length
Cd-Pg mm
120
115
110
105
100
95
90
85
80
75
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Cd-Pg Mandibular length, growth velocity
Cd-Pg mm/year
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

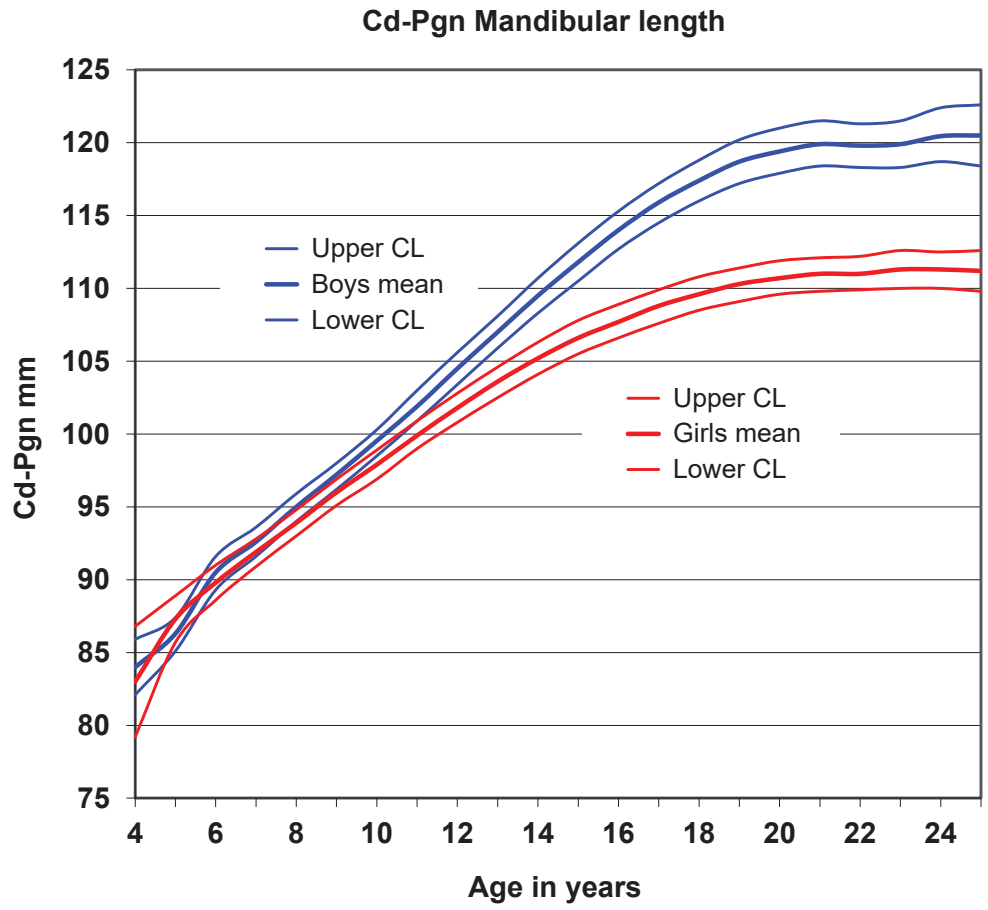


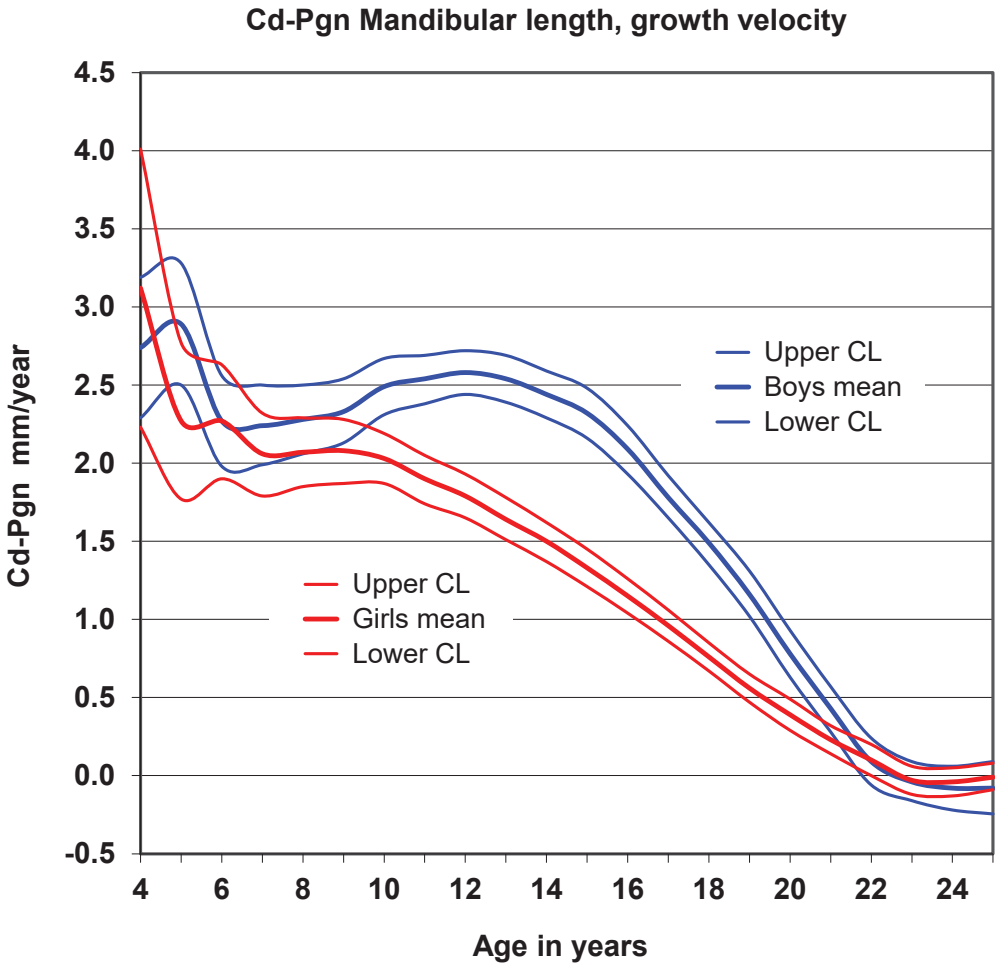
Cd-Pgn (mm)

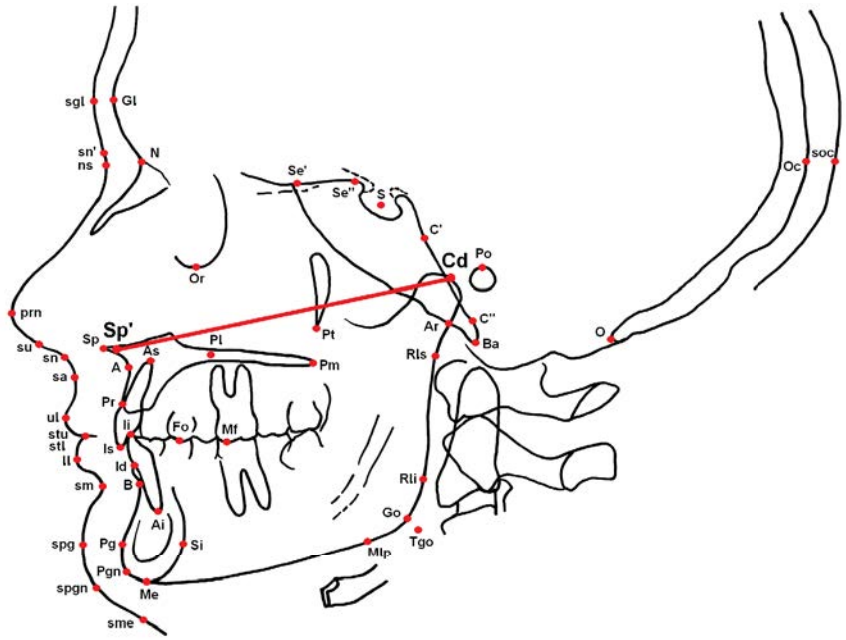
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	82.1	84.0	85.9	2.60	0.45		7	79.2	83.0	86.8	5.12
5	18	85.1	86.3	87.4	2.42	-1.07		19	85.7	87.3	88.9	3.54
6	35	89.3	90.5	91.6	3.34	0.75		27	88.6	89.8	91.0	3.18
7	43	91.6	92.6	93.6	3.43	0.98		39	90.9	91.9	92.8	3.02
8	48	94.0	95.0	95.9	3.36	1.65		49	93.0	93.9	94.8	3.29
9	49	96.2	97.1	98.0	3.24	1.65		53	95.1	96.0	96.9	3.37
10	50	98.5	99.4	100.3	3.38	2.14	p<0.05	54	97.0	97.9	98.9	3.63
11	50	100.9	101.9	103.0	3.71	2.67	p<0.01	55	99.0	100.0	101.0	3.69
12	50	103.4	104.5	105.6	3.91	3.51	p<0.001	55	100.8	101.8	102.8	3.77
13	50	105.9	107.0	108.2	4.10	4.47	p<0.001	55	102.5	103.6	104.6	3.88
14	50	108.3	109.5	110.7	4.29	5.41	p<0.001	55	104.1	105.1	106.2	4.01
15	50	110.6	111.8	113.1	4.50	6.26	p<0.001	55	105.5	106.5	107.6	4.13
16	50	112.7	114.0	115.3	4.72	7.13	p<0.001	55	106.6	107.7	108.9	4.25
17	50	114.5	115.9	117.2	4.94	7.80	p<0.001	55	107.6	108.8	109.9	4.35
18	49	116.0	117.4	118.8	5.07	8.42	p<0.001	55	108.5	109.6	110.8	4.37
19	49	117.2	118.7	120.2	5.25	8.95	p<0.001	55	109.1	110.3	111.4	4.38
20	46	117.9	119.4	121.0	5.32	9.05	p<0.001	55	109.6	110.7	111.9	4.35
21	46	118.4	119.9	121.5	5.35	9.22	p<0.001	54	109.8	111.0	112.1	4.31
22	46	118.3	119.8	121.3	5.26	9.21	p<0.001	53	109.9	111.0	112.2	4.16
23	41	118.3	119.9	121.5	5.37	8.16	p<0.001	42	110.0	111.3	112.6	4.17
24	35	118.7	120.5	122.4	5.49	8.35	p<0.001	41	110.0	111.3	112.5	4.19
25	30	118.4	120.5	122.6	5.84	7.44	p<0.001	35	109.8	111.2	112.6	4.23

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.29	2.74	3.19	0.61	-0.74		7	2.23	3.12	4.01	1.20
5	18	2.50	2.89	3.28	0.84	1.92		19	1.77	2.27	2.77	1.11
6	35	1.98	2.27	2.56	0.88	0.01		27	1.90	2.27	2.63	0.96
7	43	1.99	2.24	2.50	0.86	0.98		39	1.79	2.06	2.32	0.84
8	48	2.06	2.28	2.50	0.78	1.32		49	1.85	2.07	2.29	0.79
9	49	2.13	2.33	2.54	0.73	1.71		53	1.87	2.08	2.28	0.76
10	50	2.31	2.49	2.67	0.64	3.74	p<0.001	54	1.87	2.03	2.19	0.61
11	50	2.38	2.54	2.69	0.55	5.82	p<0.001	55	1.74	1.90	2.05	0.58
12	50	2.44	2.58	2.72	0.52	7.62	p<0.001	55	1.65	1.79	1.93	0.54
13	50	2.39	2.54	2.69	0.54	8.86	p<0.001	55	1.51	1.64	1.78	0.50
14	50	2.29	2.44	2.59	0.55	9.32	p<0.001	55	1.37	1.50	1.62	0.48
15	50	2.16	2.32	2.48	0.58	9.89	p<0.001	55	1.21	1.33	1.45	0.44
16	50	1.93	2.09	2.24	0.55	9.92	p<0.001	55	1.04	1.15	1.26	0.41
17	50	1.65	1.78	1.92	0.49	9.67	p<0.001	55	0.86	0.96	1.06	0.38
18	49	1.35	1.49	1.62	0.48	9.00	p<0.001	55	0.67	0.76	0.85	0.34
19	49	1.02	1.16	1.31	0.53	6.98	p<0.001	55	0.47	0.56	0.65	0.34
20	46	0.63	0.78	0.93	0.52	4.38	p<0.001	55	0.29	0.39	0.49	0.36
21	46	0.28	0.43	0.57	0.51	2.28	p<0.05	54	0.14	0.23	0.32	0.34
22	46	-0.06	0.09	0.24	0.51	-0.08		53	-0.00	0.10	0.20	0.37
23	41	-0.16	-0.04	0.09	0.42	-0.04		42	-0.12	-0.03	0.06	0.29
24	35	-0.22	-0.08	0.06	0.42	-0.44		41	-0.13	-0.04	0.05	0.29
25	30	-0.25	-0.08	0.09	0.48	-0.80		35	-0.09	-0.01	0.08	0.24

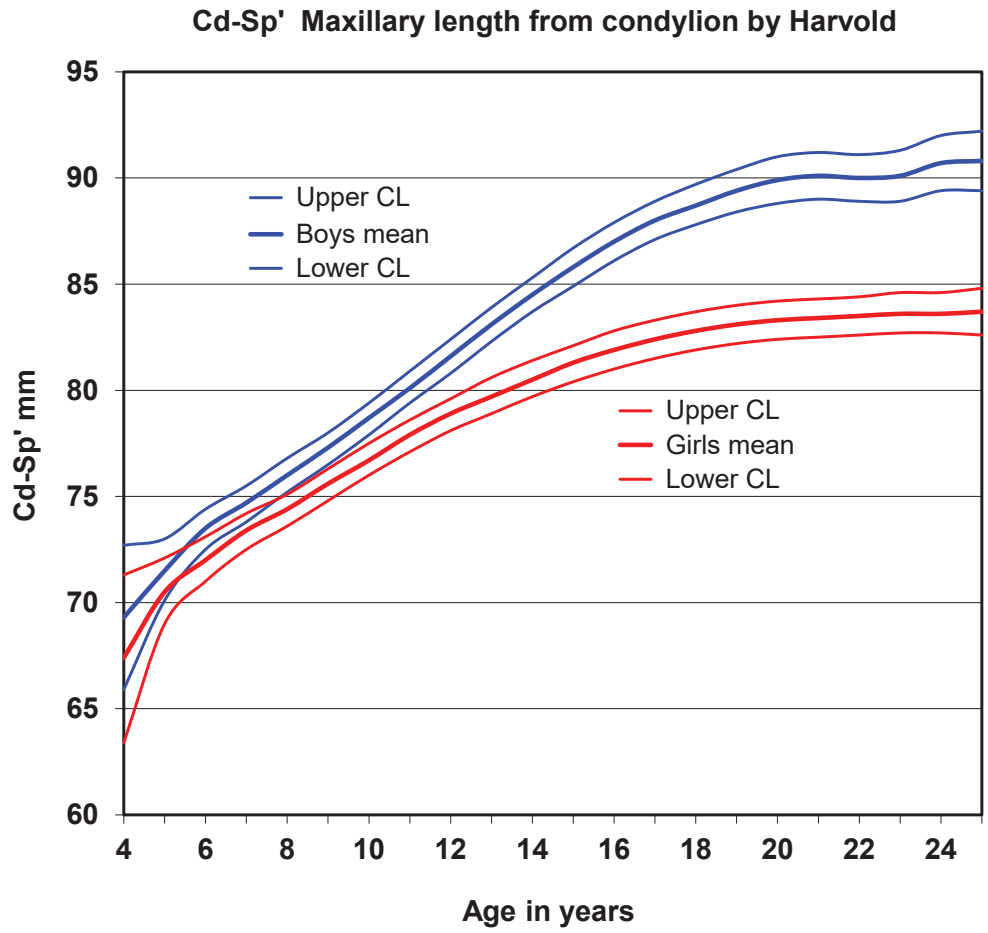

Cd-Pgn Mandibular length
Cd-Pgn mm
125
120
115
110
105
100
95
90
85
80
75
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

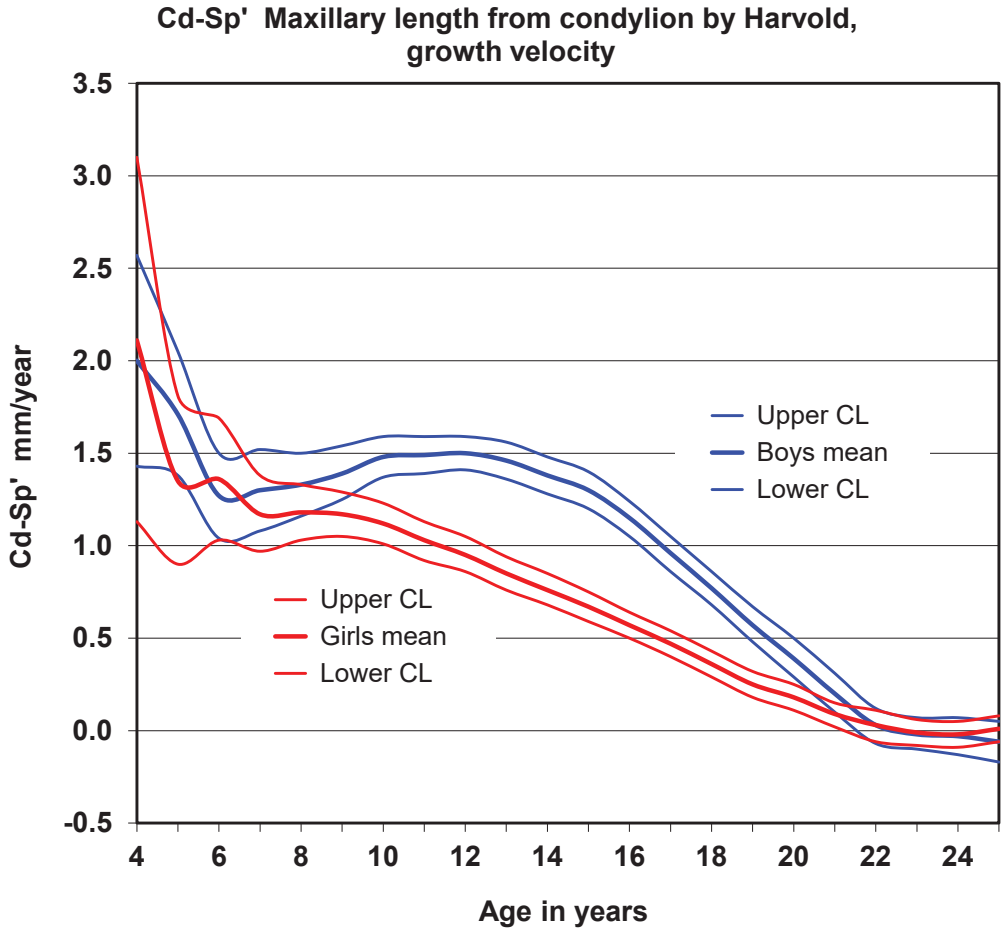

Cd-Pgn Mandibular length, growth velocity
Cd-Pgn mm/year
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

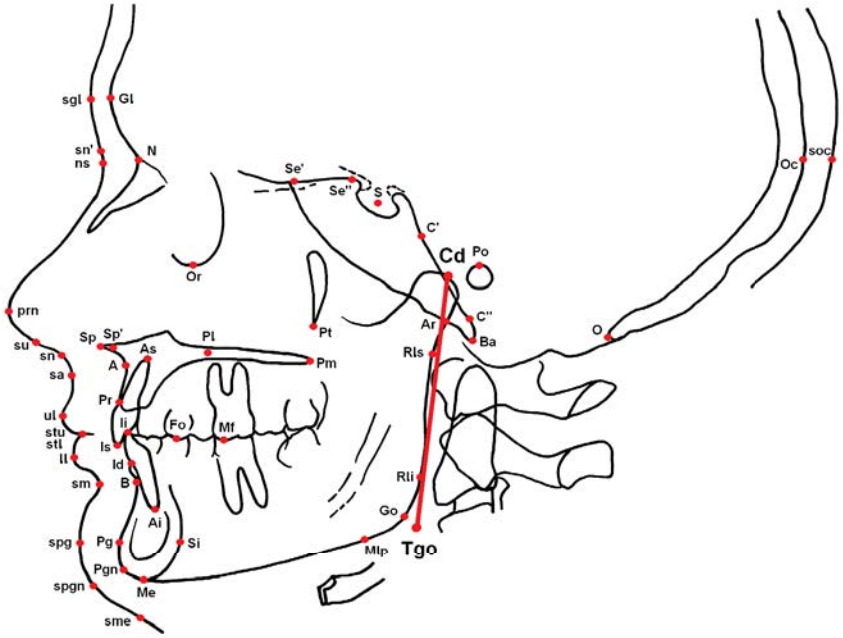


Cd-Sp’ (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	65.9	69.3	72.7	4.61	0.74		7	63.4	67.4	71.3	5.33
5	18	70.1	71.5	73.0	3.17	0.90		19	69.0	70.5	72.1	3.53
6	35	72.5	73.5	74.4	2.86	2.00	p<0.05	27	71.0	72.0	73.1	2.85
7	43	73.8	74.7	75.5	2.82	2.15	p<0.05	39	72.5	73.4	74.2	2.77
8	48	75.2	76.0	76.8	2.79	2.93	p<0.01	49	73.6	74.4	75.1	2.77
9	49	76.5	77.3	78.0	2.68	3.14	p<0.01	53	74.8	75.6	76.3	2.76
10	50	77.9	78.6	79.4	2.72	3.46	p<0.001	54	76.0	76.7	77.5	2.84
11	50	79.4	80.1	80.9	2.83	4.06	p<0.001	55	77.1	77.9	78.6	2.89
12	50	80.8	81.6	82.4	2.85	4.81	p<0.001	55	78.1	78.9	79.6	3.00
13	50	82.3	83.1	83.9	2.91	5.66	p<0.001	55	78.9	79.7	80.6	3.12
14	50	83.7	84.5	85.3	3.01	6.45	p<0.001	55	79.7	80.5	81.4	3.24
15	50	84.9	85.8	86.7	3.12	7.17	p<0.001	55	80.4	81.3	82.1	3.31
16	50	86.1	87.0	87.9	3.22	7.96	p<0.001	55	81.0	81.9	82.8	3.35
17	50	87.1	88.0	88.9	3.30	8.60	p<0.001	55	81.5	82.4	83.3	3.38
18	49	87.8	88.8	89.7	3.42	9.05	p<0.001	55	81.9	82.8	83.7	3.33
19	49	88.4	89.4	90.4	3.55	9.36	p<0.001	55	82.2	83.1	84.0	3.35
20	46	88.8	89.9	91.0	3.73	9.36	p<0.001	55	82.4	83.3	84.2	3.33
21	46	89.0	90.1	91.2	3.79	9.37	p<0.001	54	82.5	83.4	84.3	3.40
22	46	88.9	90.0	91.1	3.81	8.94	p<0.001	53	82.6	83.5	84.4	3.42
23	41	88.9	90.1	91.3	4.05	8.15	p<0.001	42	82.7	83.6	84.6	3.15
24	35	89.4	90.7	92.0	3.97	8.60	p<0.001	41	82.7	83.6	84.6	3.15
25	30	89.4	90.8	92.2	3.98	7.86	p<0.001	35	82.6	83.7	84.8	3.32

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.43	2.00	2.57	0.77	-0.20		7	1.13	2.11	3.10	1.32
5	18	1.38	1.71	2.05	0.72	1.23		19	0.90	1.35	1.81	1.02
6	35	1.04	1.27	1.50	0.70	-0.46		27	1.03	1.36	1.69	0.88
7	43	1.08	1.30	1.52	0.73	0.81		39	0.97	1.17	1.38	0.65
8	48	1.16	1.33	1.50	0.59	1.31		49	1.03	1.18	1.33	0.53
9	49	1.25	1.39	1.54	0.51	2.33	p<0.05	53	1.05	1.17	1.29	0.45
10	50	1.37	1.48	1.59	0.41	4.47	p<0.001	54	1.01	1.12	1.23	0.41
11	50	1.39	1.49	1.59	0.36	6.23	p<0.001	55	0.92	1.03	1.13	0.40
12	50	1.41	1.50	1.59	0.33	8.02	p<0.001	55	0.86	0.95	1.05	0.36
13	50	1.36	1.46	1.56	0.35	9.08	p<0.001	55	0.76	0.85	0.94	0.33
14	50	1.28	1.38	1.48	0.36	9.11	p<0.001	55	0.68	0.76	0.85	0.33
15	50	1.20	1.30	1.40	0.36	9.75	p<0.001	55	0.59	0.67	0.75	0.30
16	50	1.05	1.15	1.24	0.35	9.48	p<0.001	55	0.50	0.57	0.64	0.27
17	50	0.86	0.96	1.05	0.35	8.14	p<0.001	55	0.40	0.47	0.54	0.26
18	49	0.68	0.77	0.86	0.32	7.21	p<0.001	55	0.29	0.36	0.43	0.26
19	49	0.48	0.57	0.67	0.35	5.33	p<0.001	55	0.18	0.25	0.32	0.26
20	46	0.29	0.39	0.50	0.35	3.43	p<0.001	55	0.11	0.18	0.25	0.26
21	46	0.10	0.20	0.31	0.36	1.90		54	0.02	0.09	0.15	0.25
22	46	-0.07	0.03	0.12	0.34	-0.01		53	-0.06	0.03	0.11	0.32
23	41	-0.10	-0.02	0.07	0.28	-0.15		42	-0.08	-0.01	0.06	0.24
24	35	-0.13	-0.03	0.07	0.30	-0.16		41	-0.09	-0.02	0.05	0.22
25	30	-0.17	-0.06	0.05	0.31	-1.04		35	-0.06	0.01	0.08	0.21


Cd-Sp' Maxillary length from condylion by Harvold
Cd-Sp' mm
95
90
85
80
75
70
65
60
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Cd-Sp' Maxillary length from condylion by Harvold,
growth velocity
Cd-Sp' mm/year
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

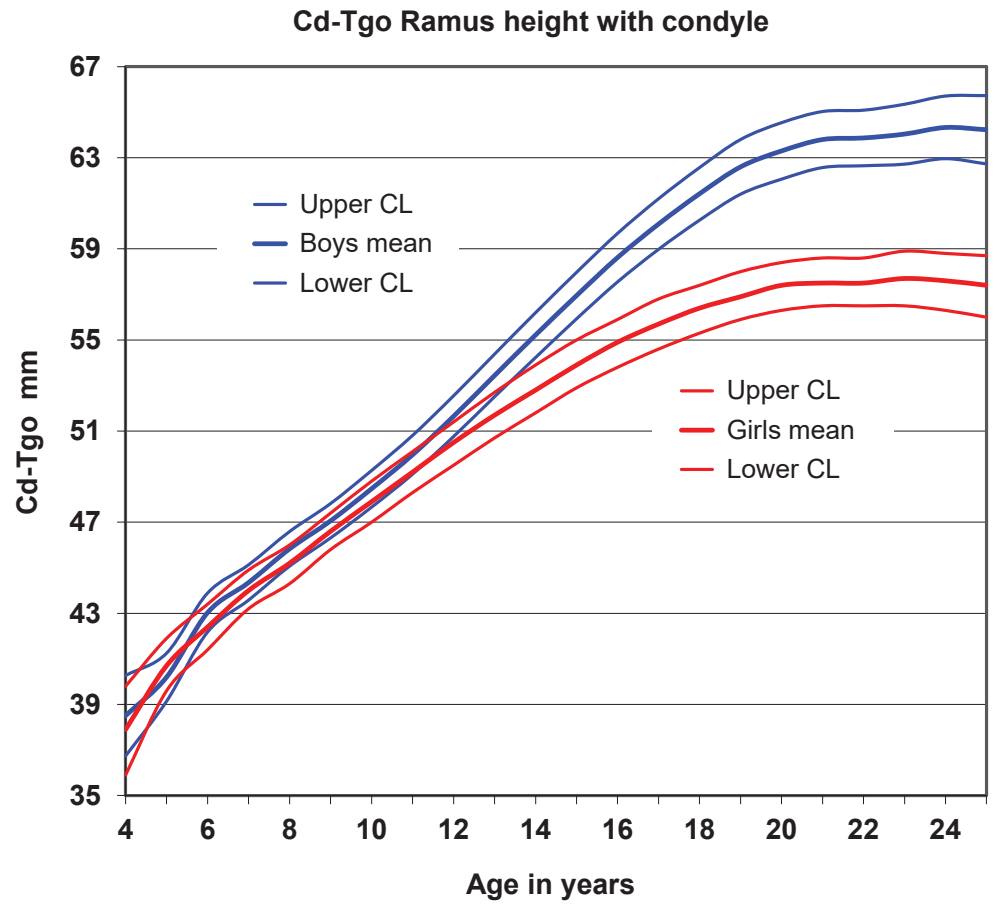


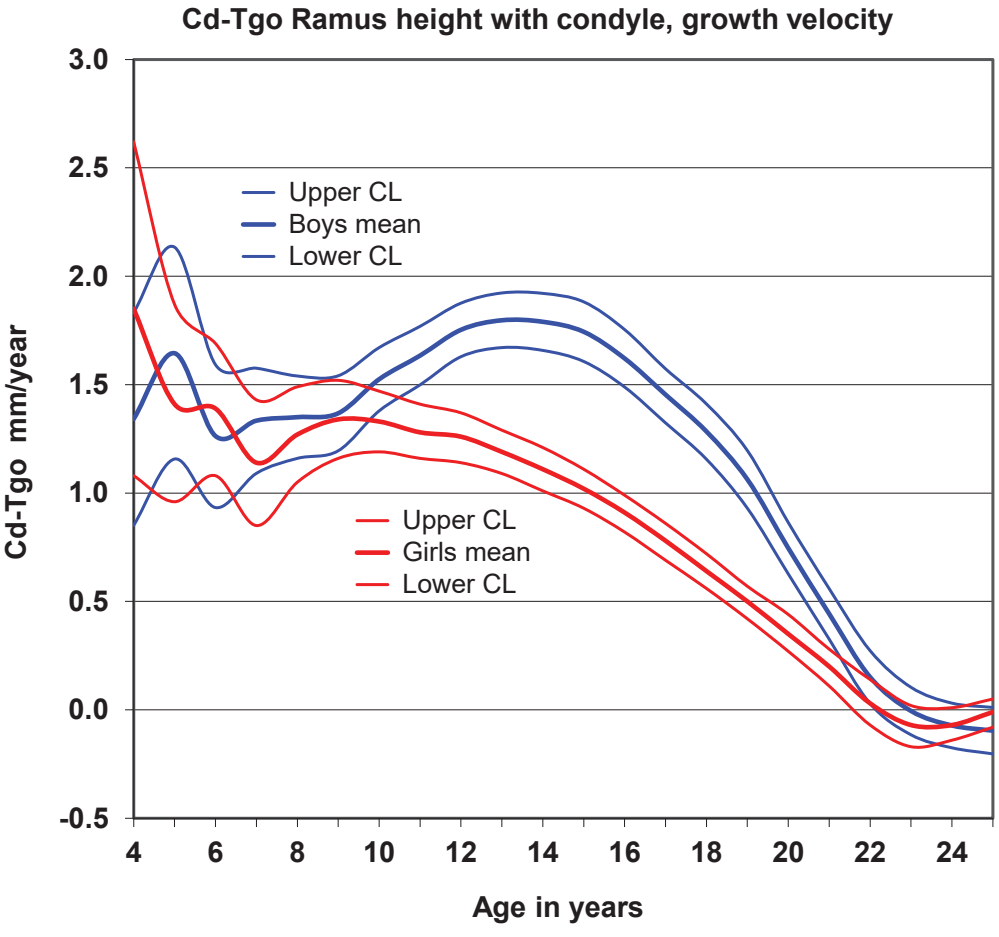
Cd-Tgo (mm)

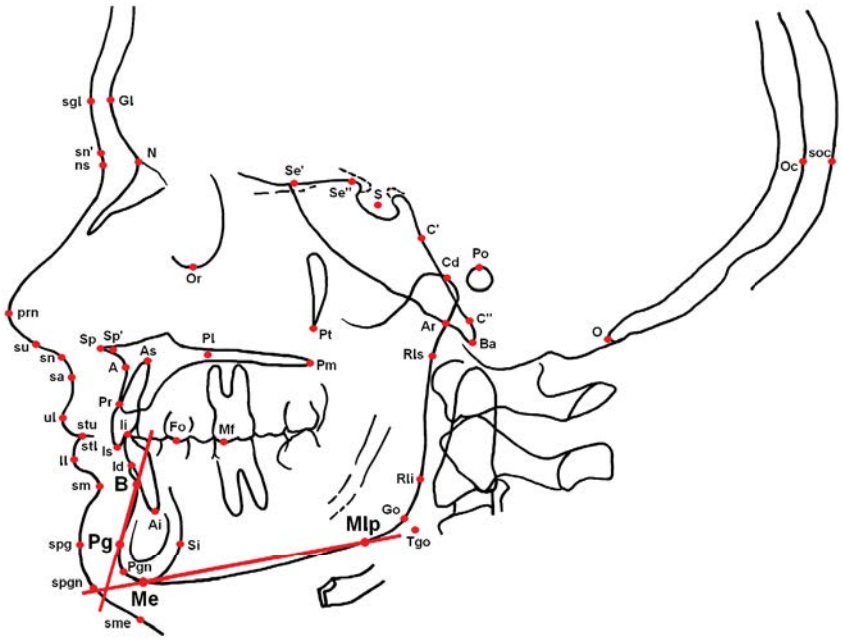
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	36.7	38.5	40.3	2.38	0.48		7	35.9	37.9	39.8	2.58
5	18	39.1	40.2	41.3	2.28	-0.64		19	39.6	40.7	41.9	2.58
6	35	42.2	43.0	43.9	2.60	0.96		27	41.4	42.4	43.4	2.68
7	43	43.6	44.4	45.1	2.59	0.55		39	43.2	44.0	44.9	2.72
8	48	45.1	45.8	46.6	2.69	1.19		49	44.3	45.2	46.0	2.89
9	49	46.3	47.1	47.8	2.71	0.81		53	45.8	46.6	47.4	3.04
10	50	47.7	48.5	49.3	2.91	0.93		54	47.0	47.9	48.8	3.28
11	50	49.1	50.0	50.8	3.06	1.19		55	48.3	49.2	50.1	3.43
12	50	50.8	51.7	52.5	3.23	1.77		55	49.5	50.5	51.4	3.56
13	50	52.5	53.4	54.4	3.37	2.53	p<0.05	55	50.7	51.7	52.7	3.70
14	50	54.2	55.2	56.2	3.55	3.29	p<0.01	55	51.8	52.8	53.9	3.82
15	50	55.9	57.0	58.0	3.69	4.07	p<0.001	55	52.9	53.9	55.0	3.92
16	50	57.6	58.6	59.7	3.84	4.90	p<0.001	55	53.8	54.9	55.9	3.99
17	50	59.0	60.1	61.2	4.00	5.59	p<0.001	55	54.6	55.7	56.8	4.05
18	49	60.3	61.4	62.6	4.13	6.28	p<0.001	55	55.3	56.4	57.4	4.05
19	49	61.4	62.6	63.8	4.30	6.92	p<0.001	55	55.9	56.9	58.0	4.04
20	46	62.1	63.3	64.5	4.29	7.15	p<0.001	55	56.3	57.4	58.4	4.04
21	46	62.6	63.8	65.0	4.25	7.54	p<0.001	54	56.5	57.5	58.6	4.04
22	46	62.7	63.9	65.1	4.22	7.75	p<0.001	53	56.5	57.5	58.6	3.90
23	41	62.7	64.0	65.4	4.30	7.03	p<0.001	42	56.5	57.7	58.9	3.94
24	35	63.0	64.3	65.7	4.15	7.20	p<0.001	41	56.3	57.6	58.8	4.03
25	30	62.7	64.2	65.7	4.19	6.59	p<0.001	35	56.0	57.4	58.7	4.20

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.85	1.34	1.83	0.66	-1.09		7	1.08	1.85	2.62	1.04
5	18	1.16	1.65	2.13	1.06	0.68		19	0.96	1.41	1.87	1.00
6	35	0.93	1.26	1.59	1.00	-0.53		27	1.08	1.39	1.69	0.81
7	43	1.09	1.33	1.58	0.81	0.99		39	0.85	1.14	1.43	0.93
8	48	1.16	1.35	1.54	0.67	0.56		49	1.05	1.27	1.49	0.79
9	49	1.20	1.37	1.54	0.62	0.22		53	1.16	1.34	1.52	0.68
10	50	1.38	1.52	1.67	0.53	1.86		54	1.19	1.33	1.47	0.53
11	50	1.50	1.63	1.77	0.49	3.68	p<0.001	55	1.16	1.28	1.41	0.48
12	50	1.63	1.75	1.88	0.44	5.74	p<0.001	55	1.14	1.26	1.37	0.44
13	50	1.67	1.80	1.92	0.46	7.32	p<0.001	55	1.09	1.19	1.29	0.39
14	50	1.66	1.79	1.92	0.47	8.20	p<0.001	55	1.01	1.11	1.21	0.37
15	50	1.61	1.74	1.88	0.50	8.73	p<0.001	55	0.93	1.02	1.11	0.35
16	50	1.49	1.62	1.75	0.48	9.00	p<0.001	55	0.82	0.91	0.99	0.33
17	50	1.34	1.45	1.57	0.43	9.37	p<0.001	55	0.69	0.78	0.86	0.31
18	49	1.16	1.28	1.41	0.46	8.59	p<0.001	55	0.56	0.64	0.72	0.30
19	49	0.93	1.06	1.20	0.48	7.45	p<0.001	55	0.42	0.50	0.57	0.28
20	46	0.63	0.75	0.86	0.41	5.40	p<0.001	55	0.27	0.35	0.44	0.32
21	46	0.33	0.44	0.56	0.40	3.41	p<0.001	54	0.11	0.20	0.28	0.32
22	46	0.03	0.15	0.27	0.42	1.47		53	-0.07	0.03	0.14	0.39
23	41	-0.11	-0.01	0.10	0.36	0.92		42	-0.17	-0.07	0.02	0.31
24	35	-0.17	-0.07	0.03	0.31	-0.06		41	-0.14	-0.07	0.01	0.25
25	30	-0.20	-0.10	0.01	0.30	-1.31		35	-0.08	-0.01	0.05	0.20


Cd-Tgo Ramus height with condyle
Cd-Tgo mm
67
63
59
55
51
47
43
39
35
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Cd-Tgo Ramus height with condyle, growth velocity
Cd-Tgo mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

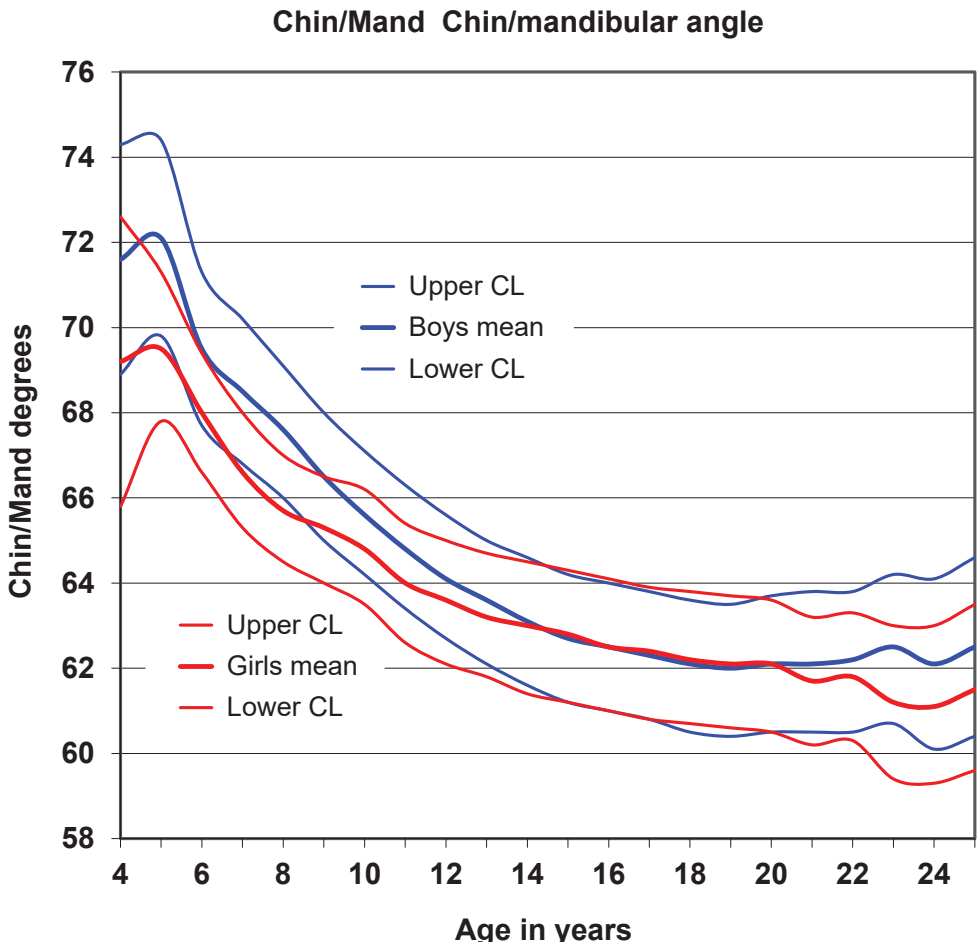


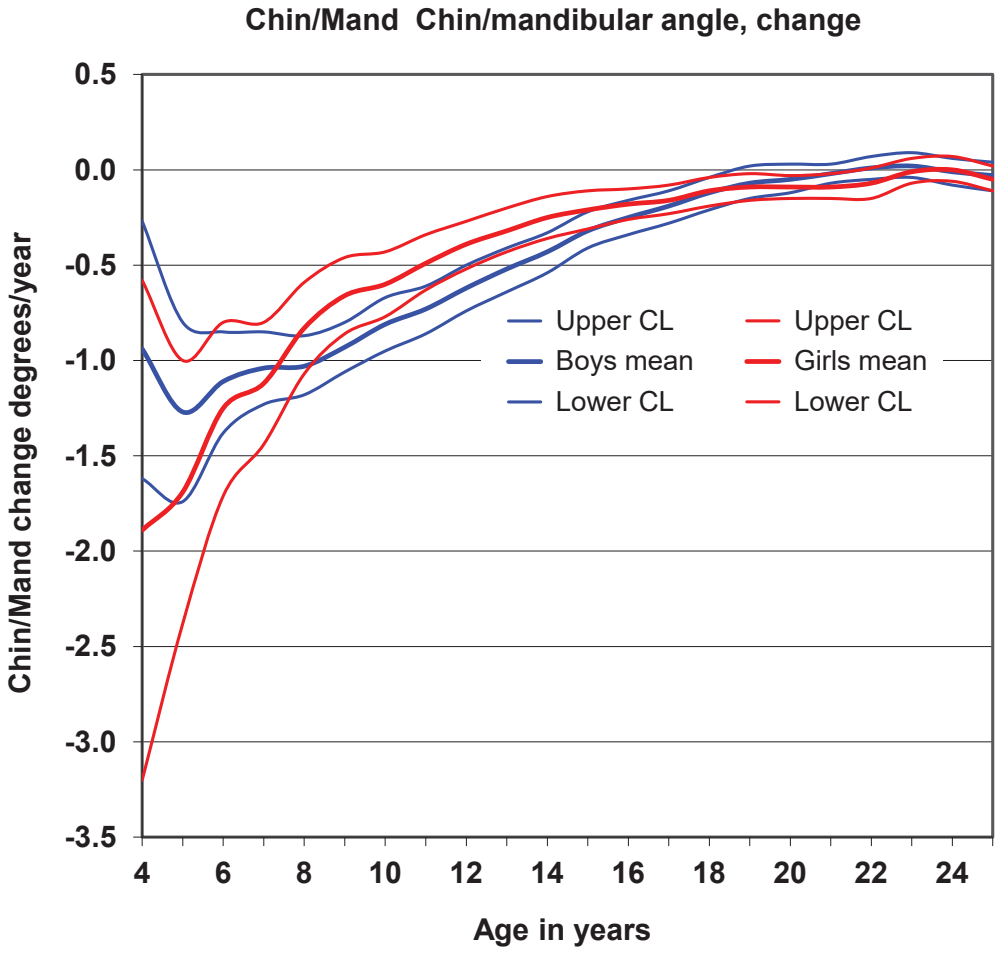
Chin/Mand (degrees)

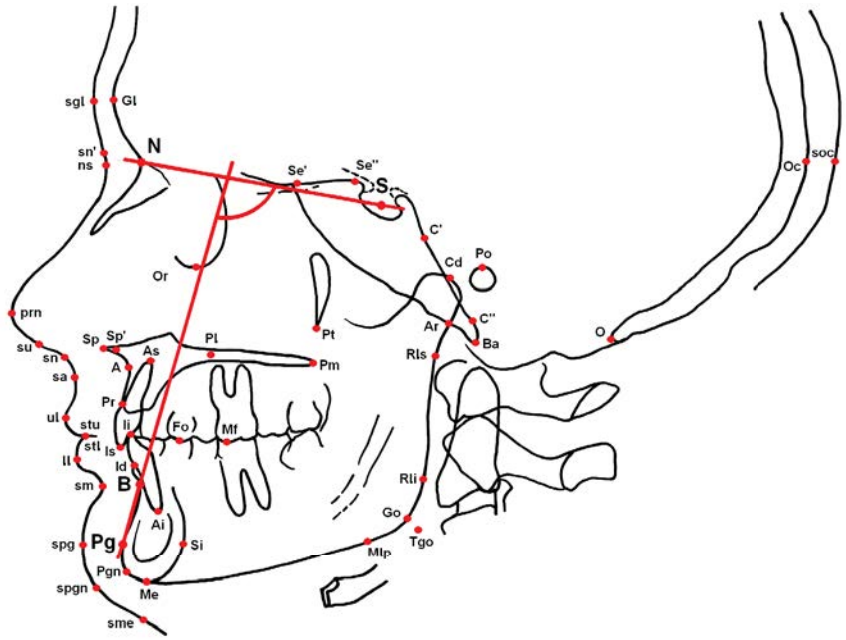
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	68.9	71.6	74.3	3.65	1.07		7	65.8	69.2	72.6	4.59
5	18	69.8	72.1	74.4	4.95	1.75		19	67.8	69.5	71.3	3.95
6	35	67.7	69.5	71.3	5.42	1.23		27	66.6	68.0	69.4	3.76
7	43	66.8	68.5	70.2	5.72	1.70		39	65.3	66.6	68.0	4.28
8	48	66.0	67.6	69.1	5.51	1.81		49	64.5	65.7	67.0	4.45
9	49	65.0	66.5	68.0	5.39	1.28		53	64.0	65.3	66.5	4.56
10	50	64.2	65.6	67.1	5.28	0.81		54	63.5	64.8	66.2	4.99
11	50	63.4	64.8	66.3	5.20	0.78		55	62.6	64.0	65.4	5.31
12	50	62.7	64.1	65.6	5.19	0.53		55	62.1	63.6	65.0	5.48
13	50	62.1	63.6	65.0	5.24	0.31		55	61.8	63.2	64.7	5.62
14	50	61.6	63.1	64.6	5.32	0.13		55	61.4	63.0	64.5	5.74
15	50	61.2	62.7	64.2	5.38	-0.04		55	61.2	62.8	64.3	5.80
16	50	61.0	62.5	64.0	5.39	-0.07		55	61.0	62.5	64.1	5.85
17	50	60.8	62.3	63.8	5.42	-0.09		55	60.8	62.4	63.9	5.90
18	49	60.5	62.1	63.6	5.51	-0.15		55	60.7	62.2	63.8	5.95
19	49	60.4	62.0	63.5	5.57	-0.15		55	60.6	62.1	63.7	5.94
20	46	60.5	62.1	63.7	5.53	0.05		55	60.5	62.1	63.6	5.90
21	46	60.5	62.1	63.8	5.60	0.38		54	60.2	61.7	63.2	5.67
22	46	60.5	62.2	63.8	5.64	0.32		53	60.3	61.8	63.3	5.62
23	41	60.7	62.5	64.2	5.71	0.98		42	59.4	61.2	63.0	5.99
24	35	60.1	62.1	64.1	6.03	0.70		41	59.3	61.1	63.0	5.99
25	30	60.4	62.5	64.6	5.92	0.67		35	59.6	61.5	63.5	5.90

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.62	-0.94	-0.27	0.91	-1.26		7	-3.20	-1.89	-0.58	1.77
5	18	-1.74	-1.27	-0.80	1.01	-0.97		19	-2.38	-1.69	-1.00	1.54
6	35	-1.39	-1.12	-0.85	0.81	-0.54		27	-1.71	-1.25	-0.80	1.20
7	43	-1.24	-1.04	-0.85	0.64	-0.40		39	-1.44	-1.12	-0.80	1.01
8	48	-1.18	-1.03	-0.88	0.54	1.37		49	-1.07	-0.83	-0.59	0.85
9	49	-1.07	-0.93	-0.80	0.47	2.20	p<0.05	53	-0.86	-0.66	-0.46	0.74
10	50	-0.95	-0.81	-0.67	0.51	1.84		54	-0.77	-0.60	-0.43	0.63
11	50	-0.86	-0.73	-0.61	0.45	2.51	p<0.05	55	-0.63	-0.49	-0.34	0.55
12	50	-0.74	-0.62	-0.50	0.42	2.57	p<0.05	55	-0.52	-0.39	-0.27	0.47
13	50	-0.63	-0.52	-0.41	0.41	2.51	p<0.05	55	-0.43	-0.32	-0.20	0.43
14	50	-0.54	-0.43	-0.32	0.38	2.36	p<0.05	55	-0.36	-0.25	-0.14	0.40
15	50	-0.41	-0.32	-0.22	0.34	1.51		55	-0.31	-0.21	-0.11	0.38
16	50	-0.34	-0.25	-0.16	0.32	1.12		55	-0.26	-0.18	-0.10	0.32
17	50	-0.27	-0.19	-0.11	0.30	0.62		55	-0.23	-0.16	-0.08	0.30
18	49	-0.21	-0.12	-0.04	0.30	0.20		55	-0.19	-0.11	-0.04	0.28
19	49	-0.15	-0.06	0.02	0.30	-0.46		55	-0.16	-0.09	-0.02	0.27
20	46	-0.12	-0.05	0.03	0.25	-0.93		55	-0.15	-0.09	-0.03	0.24
21	46	-0.07	-0.02	0.03	0.19	-1.55		54	-0.15	-0.09	-0.02	0.25
22	46	-0.05	0.01	0.07	0.21	-1.43		53	-0.15	-0.07	0.01	0.30
23	41	-0.04	0.02	0.09	0.21	-0.62		42	-0.07	-0.01	0.06	0.22
24	35	-0.09	-0.01	0.06	0.21	0.38		41	-0.06	0.00	0.07	0.22
25	30	-0.12	-0.04	0.04	0.21	-0.11		35	-0.11	-0.05	0.02	0.19


Chin/Mand Chin/mandibular angle
Chin/Mand degrees
76
74
72
70
68
66
64
62
60
58
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Chin/Mand Chin/mandibular angle, change
Chin/Mand change degrees/year
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

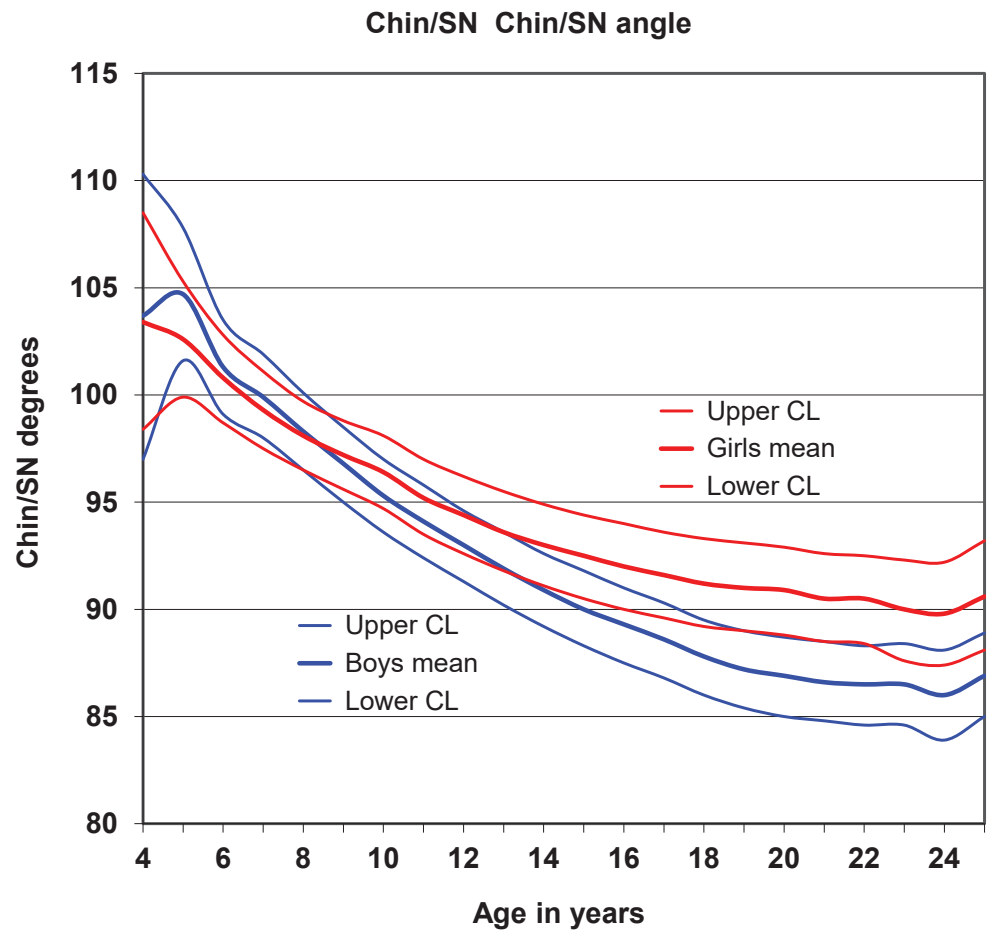


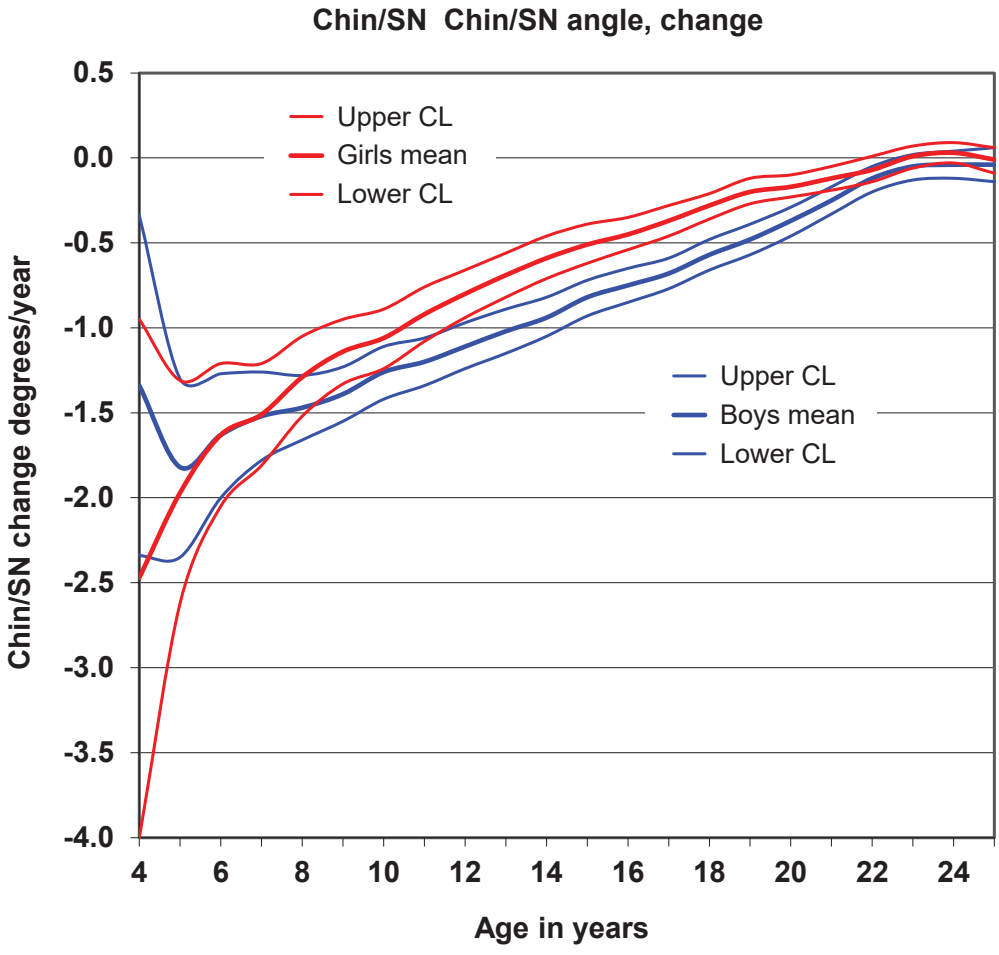
Chin/SN (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	97.0	103.7	110.3	8.92	-0.06		7	98.4	103.4	108.5	6.82
5	18	101.6	104.7	107.8	6.71	-1.02		19	99.9	102.6	105.3	6.06
6	35	99.1	101.3	103.5	6.59	-0.32		27	98.7	100.8	102.8	5.40
7	43	98.0	99.9	101.9	6.52	-0.46		39	97.5	99.3	101.1	5.81
8	48	96.5	98.3	100.1	6.40	-0.18		49	96.5	98.1	99.7	5.71
9	49	95.0	96.8	98.5	6.22	0.36		53	95.6	97.2	98.8	5.81
10	50	93.6	95.3	97.0	6.13	0.85		54	94.7	96.4	98.1	6.38
11	50	92.5	94.1	95.8	6.01	0.92		55	93.5	95.2	97.0	6.54
12	50	91.3	93.0	94.6	6.01	1.14		55	92.6	94.4	96.2	6.75
13	50	90.2	91.9	93.6	6.05	1.37		55	91.8	93.6	95.5	6.95
14	50	89.2	90.9	92.6	6.14	1.59		55	91.1	93.0	94.9	7.16
15	50	88.3	90.0	91.8	6.25	1.83		55	90.5	92.5	94.4	7.32
16	50	87.5	89.3	91.0	6.29	2.02	p<0.05	55	90.0	92.0	94.0	7.44
17	50	86.8	88.6	90.3	6.33	2.20	p<0.05	55	89.6	91.6	93.6	7.54
18	49	86.0	87.7	89.5	6.29	2.53	p<0.05	55	89.2	91.2	93.3	7.65
19	49	85.4	87.2	89.0	6.33	2.77	p<0.01	55	89.0	91.0	93.1	7.66
20	46	85.0	86.9	88.7	6.35	2.82	p<0.01	55	88.8	90.9	92.9	7.64
21	46	84.8	86.6	88.4	6.40	2.80	p<0.01	54	88.5	90.5	92.6	7.53
22	46	84.6	86.5	88.3	6.37	2.83	p<0.01	53	88.4	90.5	92.5	7.59
23	41	84.5	86.4	88.3	6.20	2.26	p<0.05	42	87.6	90.0	92.3	7.84
24	35	83.9	86.0	88.1	6.35	2.32	p<0.05	41	87.4	89.8	92.2	7.82
25	30	85.0	86.9	88.8	5.44	2.23	p<0.05	35	88.1	90.6	93.2	7.62

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-2.34	-1.34	-0.34	1.35	-1.22		7	-4.00	-2.47	-0.95	2.06
5	18	-2.35	-1.82	-1.30	1.14	-0.34		19	-2.62	-1.97	-1.31	1.46
6	35	-1.99	-1.63	-1.27	1.08	0.01		27	-2.05	-1.63	-1.21	1.11
7	43	-1.77	-1.52	-1.26	0.85	0.03		39	-1.81	-1.51	-1.21	0.97
8	48	-1.66	-1.47	-1.28	0.67	1.16		49	-1.52	-1.29	-1.05	0.84
9	49	-1.55	-1.39	-1.23	0.57	1.92		53	-1.33	-1.14	-0.95	0.72
10	50	-1.42	-1.27	-1.11	0.56	1.67		54	-1.24	-1.06	-0.89	0.67
11	50	-1.34	-1.20	-1.06	0.51	2.58	p<0.05	55	-1.08	-0.92	-0.76	0.60
12	50	-1.24	-1.11	-0.97	0.49	3.13	p<0.01	55	-0.94	-0.80	-0.66	0.53
13	50	-1.15	-1.02	-0.90	0.47	3.59	p<0.001	55	-0.82	-0.69	-0.56	0.49
14	50	-1.06	-0.94	-0.82	0.43	3.99	p<0.001	55	-0.71	-0.59	-0.46	0.47
15	50	-0.93	-0.83	-0.72	0.38	4.02	p<0.001	55	-0.62	-0.51	-0.39	0.43
16	50	-0.86	-0.76	-0.66	0.36	4.40	p<0.001	55	-0.54	-0.45	-0.35	0.37
17	50	-0.77	-0.68	-0.59	0.33	4.82	p<0.001	55	-0.46	-0.37	-0.28	0.33
18	49	-0.66	-0.57	-0.49	0.32	4.98	p<0.001	55	-0.36	-0.28	-0.21	0.29
19	49	-0.57	-0.48	-0.39	0.32	4.77	p<0.001	55	-0.27	-0.20	-0.12	0.28
20	46	-0.46	-0.38	-0.29	0.30	3.82	p<0.001	55	-0.23	-0.17	-0.10	0.24
21	46	-0.33	-0.25	-0.17	0.27	2.53	p<0.05	54	-0.19	-0.12	-0.05	0.26
22	46	-0.20	-0.12	-0.05	0.26	1.03		53	-0.14	-0.07	0.01	0.29
23	41	-0.12	-0.05	0.03	0.25	1.14		42	-0.06	0.01	0.07	0.21
24	35	-0.12	-0.04	0.05	0.25	1.27		41	-0.03	0.03	0.09	0.21
25	30	-0.13	-0.03	0.07	0.27	0.27		35	-0.09	-0.01	0.06	0.23


Chin/SN Chin/SN angle
Chin/SN degrees
115
110
105
100
95
90
85
80
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


Chin/SN Chin/SN angle, change
Chin/SN change degrees/year
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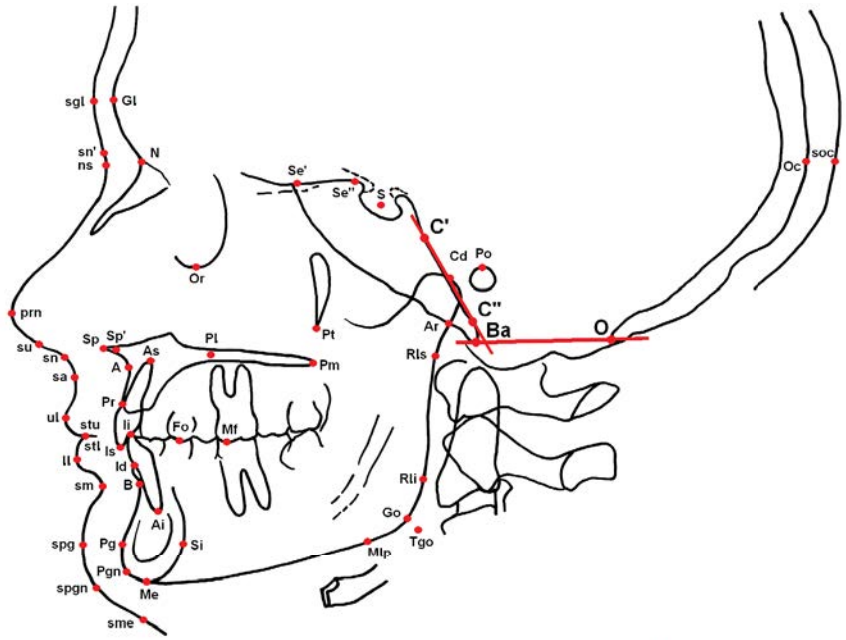
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL



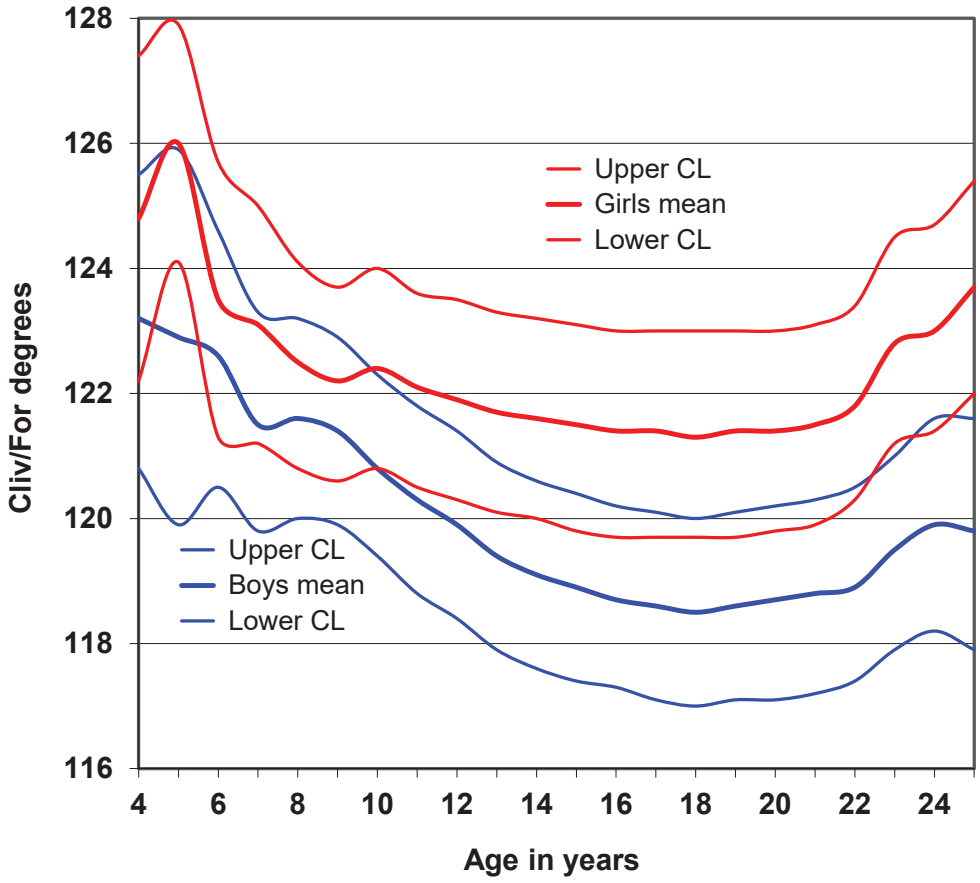
Cliv/For (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	120.8	123.2	125.5	3.12	0.93		7	122.2	124.8	127.4	3.54
5	18	119.9	122.9	125.9	6.52	1.77		19	124.1	126.0	127.9	4.24
6	35	120.5	122.6	124.6	6.14	0.61		27	121.3	123.5	125.7	5.79
7	43	119.8	121.5	123.3	6.00	1.15		39	121.2	123.1	125.0	6.20
8	48	120.1	121.6	123.2	5.58	0.70		49	120.8	122.5	124.1	5.87
9	49	119.9	121.4	122.9	5.44	0.69		53	120.6	122.2	123.7	5.71
10	50	119.4	120.9	122.3	5.35	1.34		54	120.8	122.4	124.0	6.02
11	50	118.9	120.3	121.8	5.35	1.56		55	120.5	122.1	123.6	5.93
12	50	118.4	119.9	121.4	5.33	1.79		55	120.3	121.9	123.5	5.97
13	50	117.9	119.4	120.9	5.42	2.04	p<0.05	55	120.1	121.7	123.3	6.02
14	50	117.6	119.1	120.6	5.41	2.22	p<0.05	55	120.0	121.6	123.2	6.12
15	50	117.4	118.9	120.3	5.34	2.31	p<0.05	55	119.8	121.5	123.1	6.20
16	50	117.2	118.7	120.2	5.34	2.36	p<0.05	55	119.7	121.4	123.0	6.24
17	50	117.1	118.6	120.1	5.37	2.42	p<0.05	55	119.7	121.4	123.0	6.28
18	49	116.9	118.4	119.9	5.25	2.56	p<0.05	55	119.7	121.3	123.0	6.26
19	49	117.0	118.5	120.0	5.31	2.49	p<0.05	55	119.7	121.4	123.0	6.19
20	46	117.0	118.6	120.2	5.44	2.40	p<0.05	55	119.8	121.4	123.0	6.10
21	46	117.1	118.7	120.3	5.41	2.42	p<0.05	54	119.9	121.5	123.1	5.98
22	46	117.3	118.8	120.4	5.32	2.65	p<0.01	53	120.3	121.8	123.4	5.79
23	41	117.9	119.4	120.9	5.04	3.00	p<0.01	42	121.2	122.8	124.5	5.38
24	35	118.2	119.8	121.5	5.05	2.70	p<0.01	41	121.4	123.0	124.7	5.27
25	30	117.9	119.7	121.6	5.15	3.14	p<0.01	35	122.0	123.7	125.4	5.10

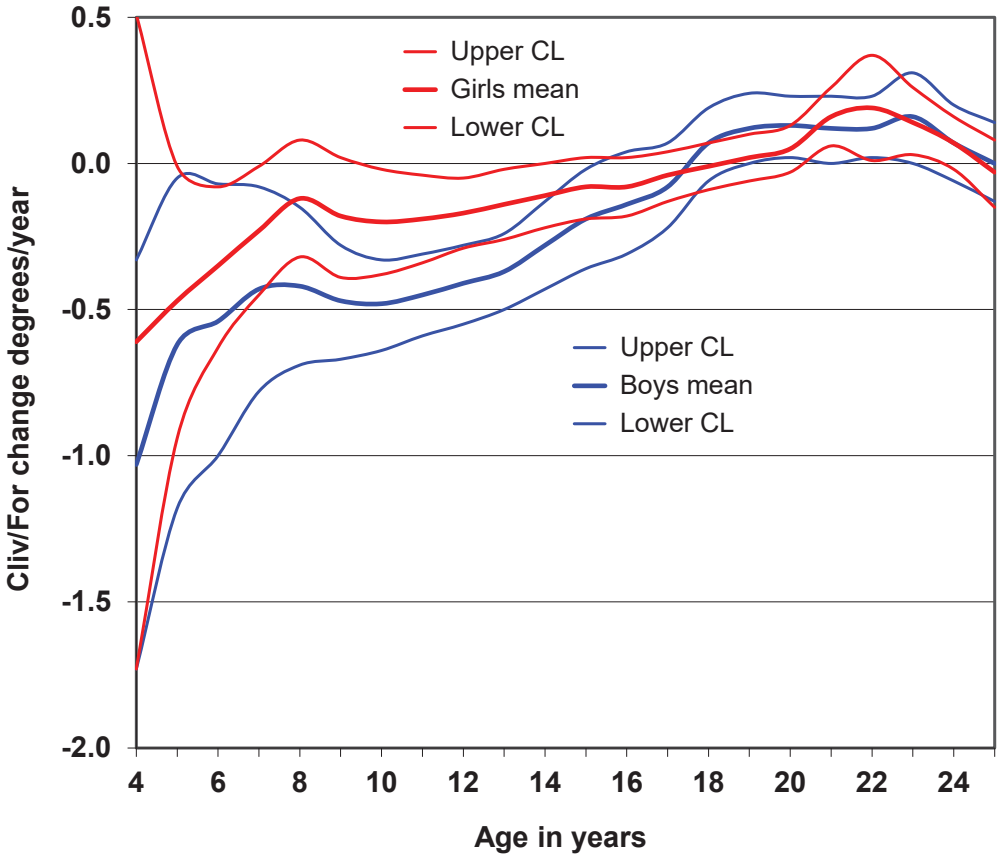
Change per year

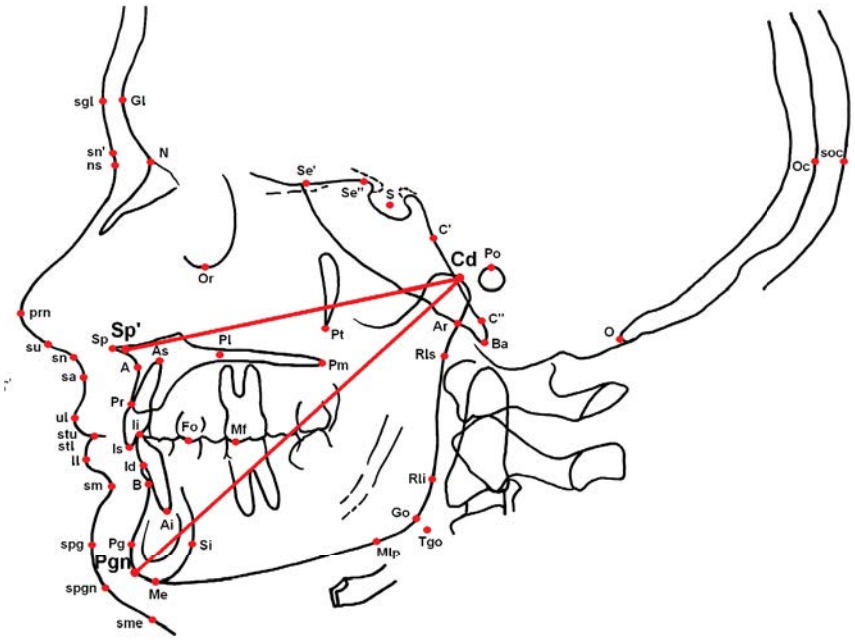
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.73	-1.03	-0.33	0.95	0.62		7	-1.73	-0.61	0.51	1.51
5	18	-1.18	-0.62	-0.05	1.22	0.39		19	-0.94	-0.47	-0.01	1.03
6	35	-0.98	-0.52	-0.05	1.40	0.55		27	-0.63	-0.35	-0.08	0.74
7	43	-0.77	-0.42	-0.07	1.18	0.88		39	-0.45	-0.23	-0.01	0.70
8	48	-0.69	-0.41	-0.14	0.96	1.72		49	-0.32	-0.12	0.08	0.71
9	49	-0.67	-0.47	-0.27	0.70	1.98		53	-0.39	-0.18	0.02	0.75
10	50	-0.64	-0.48	-0.33	0.56	2.34	p<0.05	54	-0.38	-0.20	-0.02	0.67
11	50	-0.59	-0.46	-0.32	0.50	2.54	p<0.05	55	-0.34	-0.19	-0.04	0.57
12	50	-0.55	-0.42	-0.30	0.47	2.85	p<0.01	55	-0.29	-0.17	-0.05	0.46
13	50	-0.51	-0.38	-0.25	0.47	2.68	p<0.01	55	-0.26	-0.14	-0.02	0.45
14	50	-0.44	-0.29	-0.14	0.54	1.90		55	-0.22	-0.11	-0.00	0.42
15	50	-0.37	-0.20	-0.03	0.60	1.21		55	-0.19	-0.08	0.02	0.39
16	50	-0.32	-0.15	0.03	0.63	0.69		55	-0.18	-0.08	0.02	0.36
17	50	-0.23	-0.09	0.06	0.53	0.51		55	-0.13	-0.04	0.04	0.33
18	49	-0.06	0.06	0.18	0.44	-0.91		55	-0.09	-0.01	0.07	0.31
19	49	-0.01	0.11	0.24	0.44	-1.32		55	-0.06	0.02	0.10	0.30
20	46	0.02	0.12	0.23	0.37	-1.12		55	-0.03	0.05	0.13	0.31
21	46	0.01	0.12	0.23	0.39	0.51		54	0.06	0.16	0.26	0.38
22	46	0.03	0.13	0.23	0.35	0.54		53	0.01	0.19	0.37	0.67
23	41	0.01	0.17	0.32	0.51	-0.26		42	0.03	0.14	0.26	0.39
24	35	-0.03	0.09	0.22	0.38	-0.25		41	-0.02	0.07	0.16	0.30
25	30	-0.08	0.04	0.16	0.34	-0.81		35	-0.15	-0.03	0.08	0.35

Cliv/For Clivus plane/foramen magnum angle



Cliv/For Clivus plane/foramen magnum angle, change



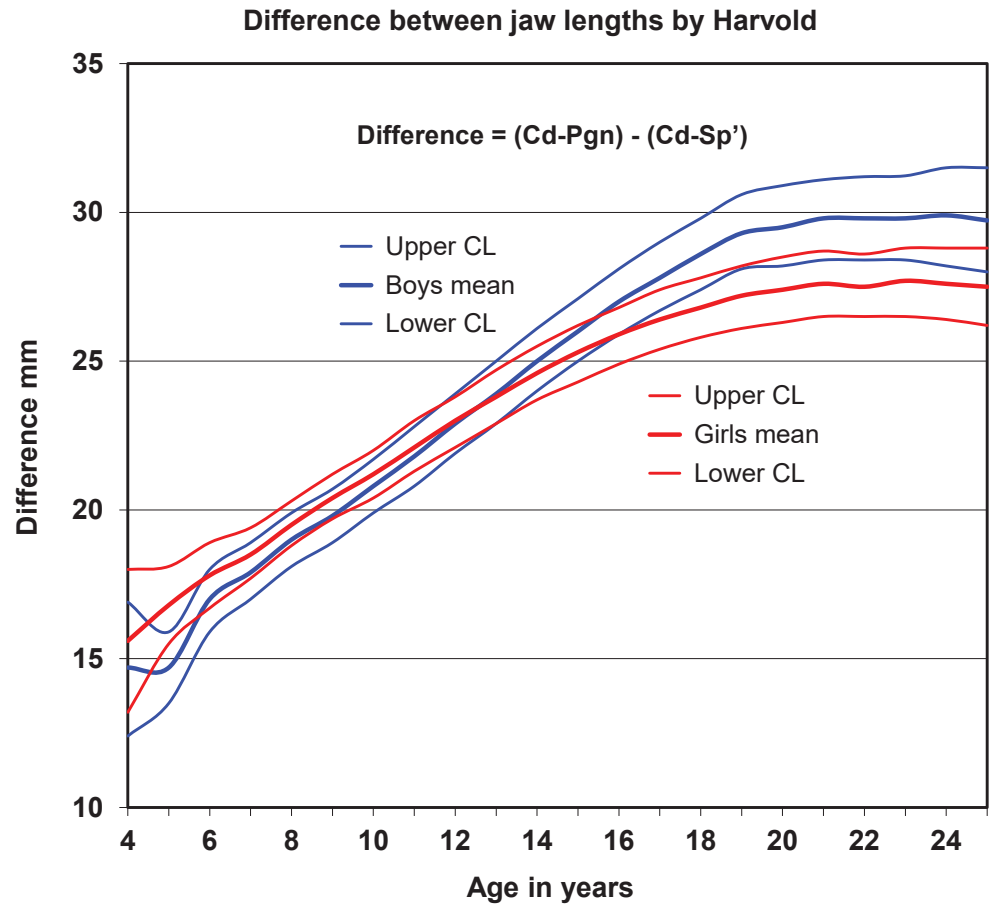


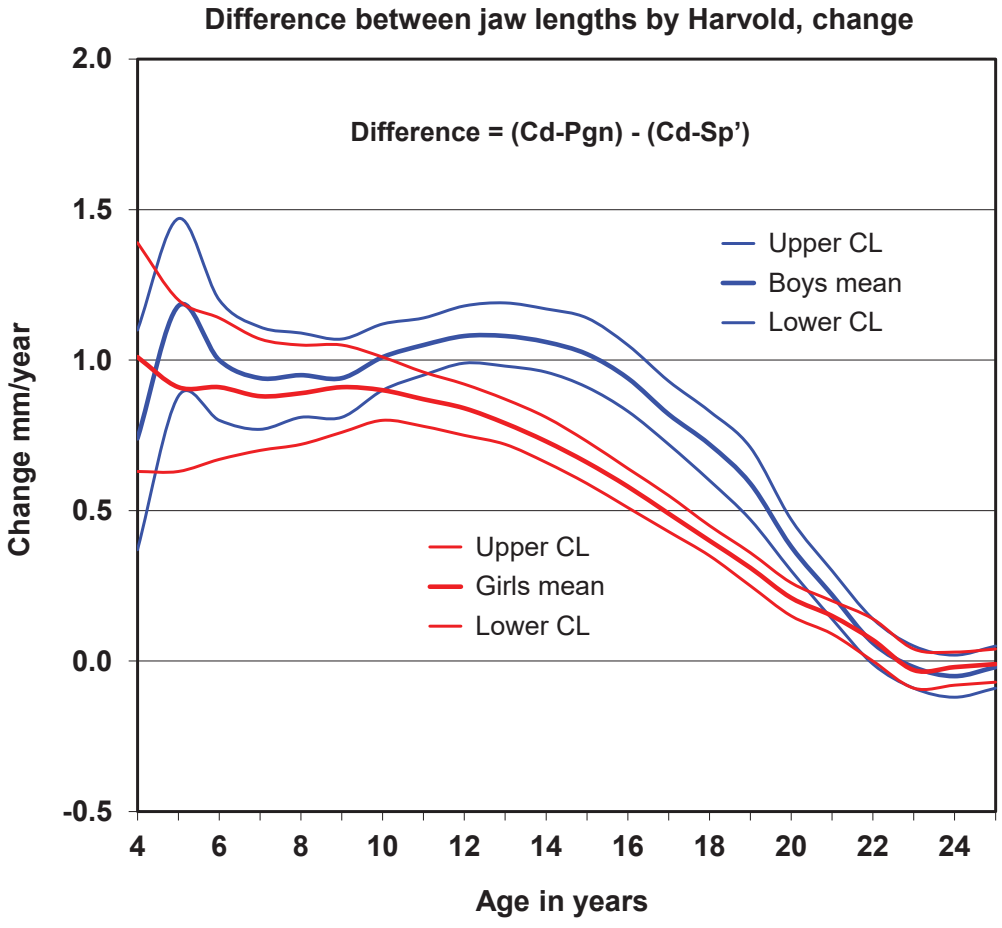
Difference, Harvold (mm)

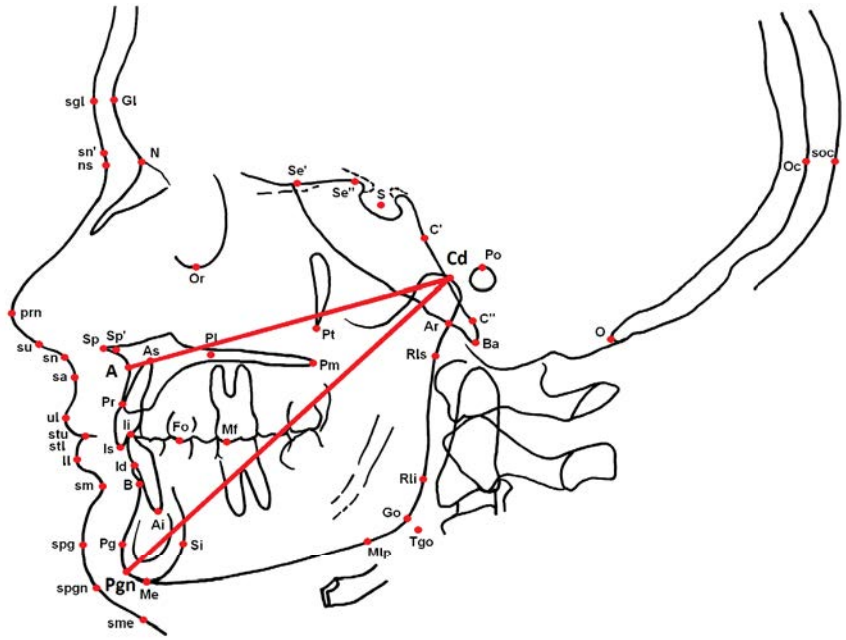
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	12.4	14.7	16.9	3.04	-0.58		7	13.2	15.6	18.0	3.23
5	18	13.5	14.7	15.9	2.62	-2.29	p<0.05	19	15.5	16.8	18.1	2.86
6	35	15.9	17.0	18.0	3.26	-1.06		27	16.7	17.8	18.9	2.84
7	43	17.0	17.9	18.9	3.20	-0.96		39	17.7	18.5	19.4	2.68
8	48	18.1	19.0	19.9	3.18	-0.91		49	18.8	19.5	20.3	2.67
9	49	18.9	19.8	20.7	3.31	-1.01		53	19.7	20.4	21.2	2.78
10	50	19.8	20.8	21.7	3.45	-0.64		54	20.4	21.2	22.0	3.04
11	50	20.8	21.8	22.8	3.55	-0.52		55	21.3	22.1	23.0	3.14
12	50	21.9	22.9	23.9	3.62	-0.17		55	22.1	23.0	23.8	3.22
13	50	22.9	23.9	25.0	3.69	0.21		55	22.9	23.8	24.7	3.31
14	50	24.0	25.0	26.1	3.78	0.62		55	23.7	24.6	25.5	3.40
15	50	25.0	26.0	27.1	3.89	1.06		55	24.3	25.3	26.2	3.51
16	50	25.9	27.0	28.1	4.03	1.52		55	24.9	25.9	26.8	3.63
17	50	26.7	27.8	29.0	4.19	1.88		55	25.4	26.4	27.4	3.74
18	49	27.4	28.6	29.8	4.33	2.25	p<0.05	55	25.8	26.8	27.8	3.84
19	49	28.1	29.3	30.6	4.49	2.57	p<0.05	55	26.1	27.2	28.2	3.93
20	46	28.2	29.5	30.9	4.59	2.49	p<0.05	55	26.3	27.4	28.5	4.00
21	46	28.4	29.8	31.1	4.68	2.50	p<0.05	54	26.5	27.6	28.7	4.01
22	46	28.4	29.8	31.2	4.75	2.55	p<0.05	53	26.5	27.5	28.6	4.00
23	41	28.4	29.8	31.2	4.67	2.25	p<0.05	42	26.5	27.7	28.8	3.86
24	35	28.2	29.9	31.5	5.00	2.20	p<0.05	41	26.4	27.6	28.8	3.95
25	30	28.0	29.7	31.5	4.96	2.00	p<0.05	35	26.2	27.5	28.8	3.93

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.37	0.74	1.10	0.49	-1.00		7	0.63	1.01	1.39	0.51
5	18	0.88	1.18	1.47	0.63	1.26		19	0.63	0.91	1.20	0.63
6	35	0.80	1.00	1.20	0.61	0.60		27	0.67	0.91	1.14	0.63
7	43	0.77	0.94	1.11	0.57	0.46		39	0.70	0.88	1.07	0.60
8	48	0.81	0.95	1.09	0.51	0.56		49	0.72	0.89	1.05	0.59
9	49	0.81	0.94	1.07	0.45	0.34		53	0.76	0.91	1.05	0.53
10	50	0.90	1.01	1.12	0.40	1.32		54	0.80	0.90	1.01	0.41
11	50	0.95	1.05	1.14	0.35	2.67	p<0.01	55	0.78	0.87	0.96	0.35
12	50	0.99	1.08	1.18	0.34	3.81	p<0.001	55	0.75	0.84	0.92	0.31
13	50	0.98	1.08	1.19	0.37	4.42	p<0.001	55	0.72	0.79	0.87	0.30
14	50	0.96	1.06	1.17	0.39	5.05	p<0.001	55	0.66	0.73	0.81	0.28
15	50	0.91	1.02	1.14	0.41	5.44	p<0.001	55	0.59	0.66	0.73	0.26
16	50	0.83	0.94	1.05	0.40	5.65	p<0.001	55	0.51	0.58	0.64	0.25
17	50	0.72	0.82	0.93	0.38	5.51	p<0.001	55	0.43	0.49	0.55	0.23
18	49	0.60	0.72	0.83	0.41	5.24	p<0.001	55	0.35	0.40	0.45	0.19
19	49	0.47	0.59	0.71	0.43	4.30	p<0.001	55	0.25	0.31	0.36	0.21
20	46	0.30	0.38	0.47	0.30	3.42	p<0.001	55	0.15	0.21	0.26	0.22
21	46	0.14	0.22	0.30	0.27	1.64		54	0.09	0.15	0.20	0.20
22	46	-0.01	0.06	0.14	0.26	-0.10		53	-0.00	0.07	0.14	0.27
23	41	-0.09	-0.02	0.05	0.24	0.12		42	-0.09	-0.03	0.04	0.20
24	35	-0.12	-0.05	0.02	0.20	-0.62		41	-0.08	-0.02	0.03	0.17
25	30	-0.09	-0.02	0.05	0.21	-0.13		35	-0.07	-0.01	0.04	0.15


Difference between jaw lengths by Harvold
Difference = (Cd-Pgn) - (Cd-Sp')
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
Difference mm
35
30
25
20
15
10
4
6
8
10
12
14
16
18
20
22
24
Age in years


Difference between jaw lengths by Harvold, change
Difference = (Cd-Pgn) - (Cd-Sp')
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
Change mm/year
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years

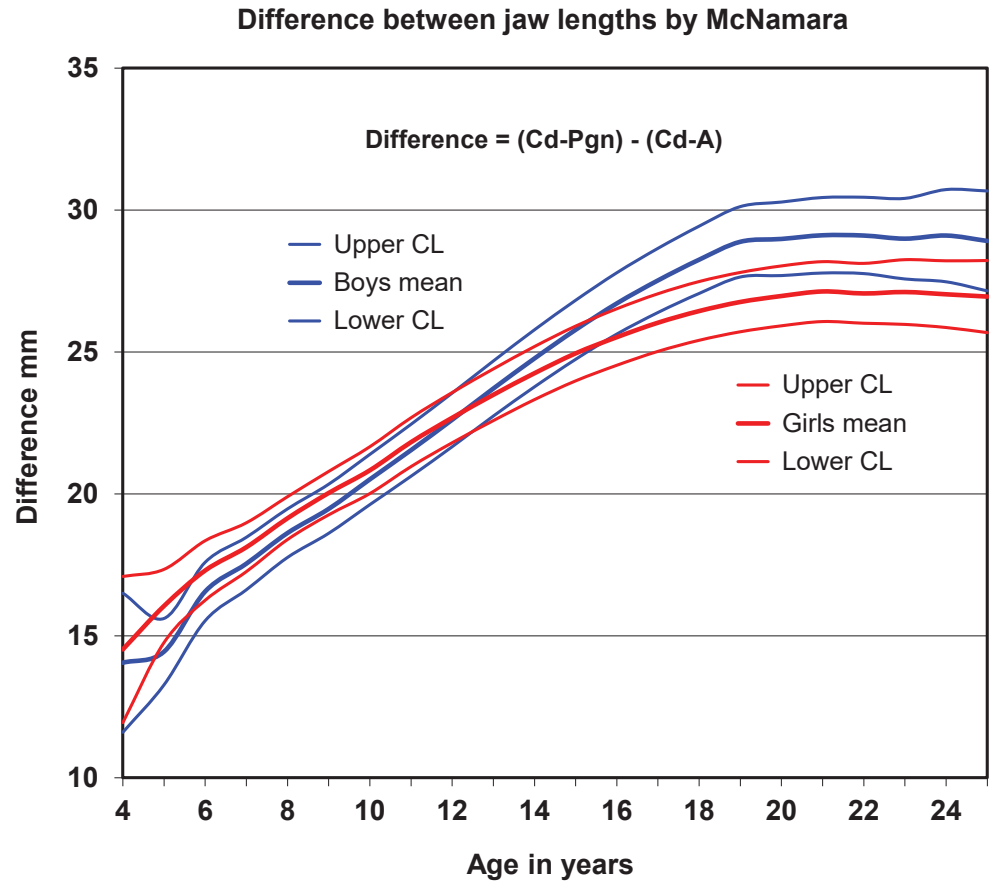


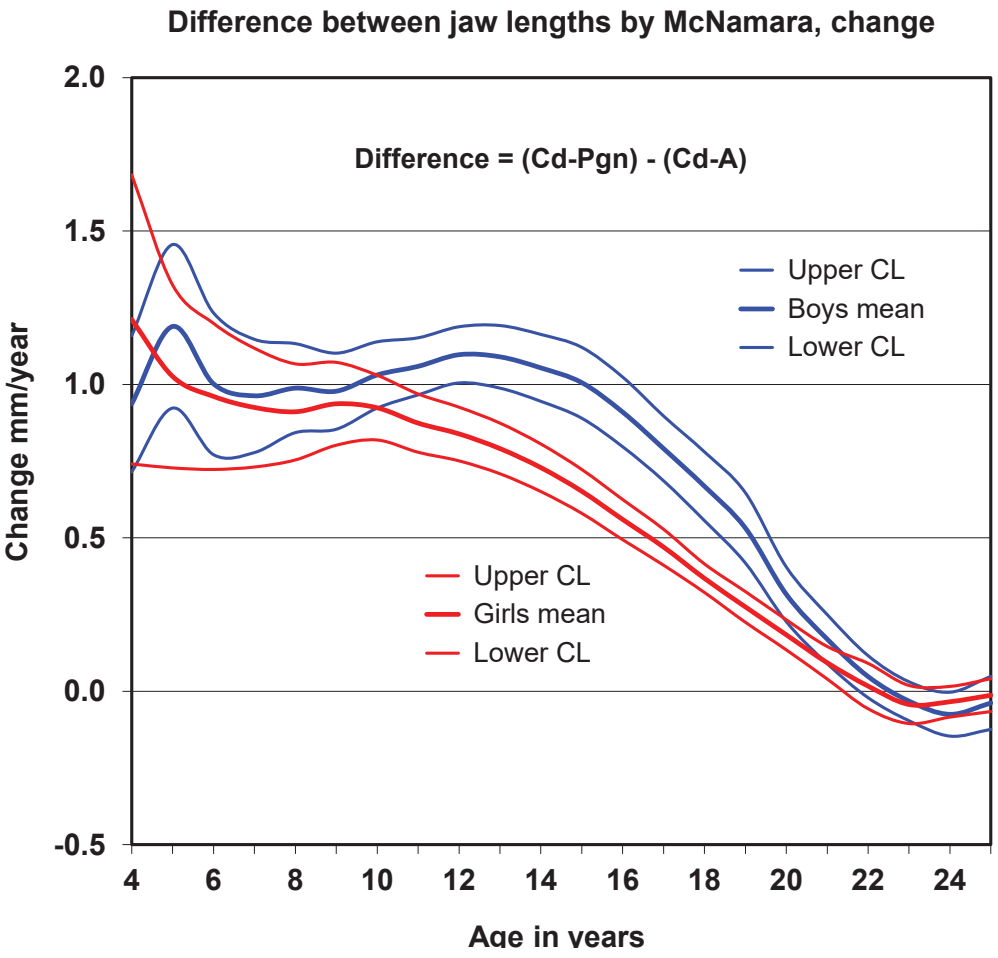
Difference, McNamara (mm)

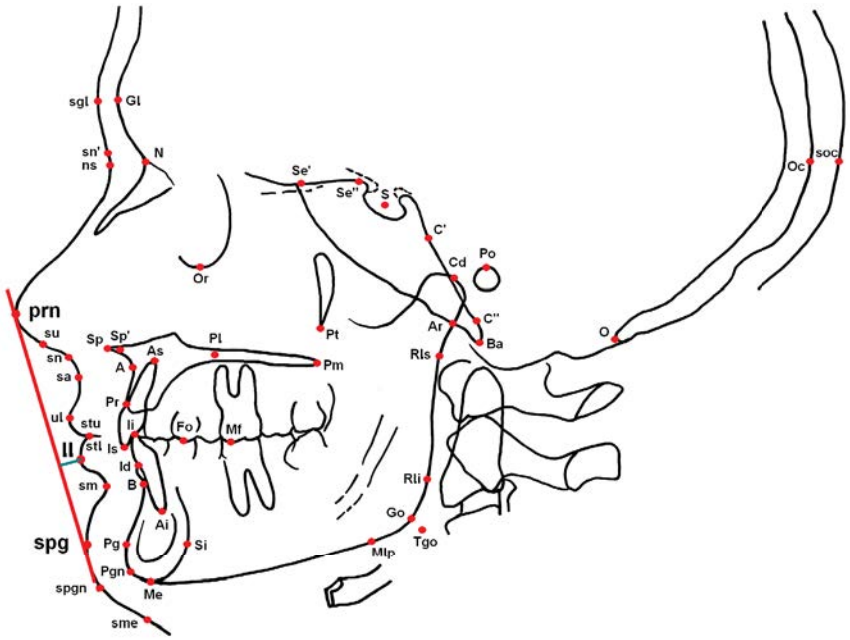
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	11.6	14.0	16.5	3.31	-0.26		7	11.9	14.5	17.1	3.48
5	18	13.3	14.4	15.6	2.53	-1.80		19	14.8	16.0	17.3	2.87
6	35	15.5	16.6	17.6	3.11	-0.96		27	16.2	17.3	18.3	2.78
7	43	16.6	17.5	18.5	3.09	-0.89		39	17.3	18.1	19.0	2.74
8	48	17.8	18.6	19.5	3.02	-0.91		49	18.4	19.1	19.9	2.69
9	49	18.6	19.5	20.3	3.09	-0.95		53	19.3	20.0	20.8	2.84
10	50	19.6	20.5	21.4	3.20	-0.53		54	20.0	20.8	21.7	3.10
11	50	20.6	21.5	22.4	3.30	-0.44		55	21.0	21.8	22.7	3.25
12	50	21.7	22.6	23.6	3.41	-0.11		55	21.8	22.7	23.6	3.35
13	50	22.7	23.7	24.7	3.50	0.32		55	22.6	23.5	24.4	3.45
14	50	23.8	24.8	25.8	3.62	0.74		55	23.3	24.3	25.2	3.54
15	50	24.7	25.8	26.8	3.76	1.15		55	24.0	24.9	25.9	3.65
16	50	25.6	26.7	27.8	3.90	1.59		55	24.5	25.5	26.5	3.76
17	50	26.4	27.5	28.6	4.07	1.92		55	25.0	26.0	27.1	3.85
18	49	27.1	28.2	29.4	4.23	2.26	p<0.05	55	25.4	26.4	27.5	3.92
19	49	27.6	28.9	30.1	4.43	2.58	p<0.05	55	25.7	26.8	27.8	3.96
20	46	27.7	29.0	30.3	4.50	2.38	p<0.05	55	25.9	27.0	28.0	4.00
21	46	27.8	29.1	30.4	4.60	2.32	p<0.05	54	26.1	27.1	28.2	3.95
22	46	27.8	29.1	30.4	4.66	2.37	p<0.05	53	26.0	27.1	28.1	3.93
23	41	27.6	29.0	30.4	4.65	2.02	p<0.05	42	26.0	27.1	28.3	3.77
24	35	27.5	29.1	30.7	4.91	2.06	p<0.05	41	25.9	27.0	28.2	3.83
25	30	27.1	28.9	30.7	4.93	1.80		35	25.7	26.9	28.2	3.83

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.71	0.94	1.16	0.30	-1.04		7	0.74	1.21	1.68	0.64
5	18	0.92	1.19	1.46	0.58	0.80		19	0.73	1.03	1.32	0.66
6	35	0.77	1.00	1.23	0.70	0.24		27	0.72	0.96	1.20	0.63
7	43	0.78	0.96	1.15	0.62	0.28		39	0.73	0.92	1.12	0.62
8	48	0.84	0.99	1.13	0.51	0.71		49	0.75	0.91	1.07	0.56
9	49	0.85	0.98	1.10	0.44	0.44		53	0.80	0.94	1.07	0.50
10	50	0.92	1.03	1.14	0.39	1.39		54	0.82	0.92	1.03	0.40
11	50	0.97	1.06	1.15	0.34	2.72	p<0.01	55	0.78	0.87	0.97	0.36
12	50	1.00	1.10	1.19	0.33	3.98	p<0.001	55	0.75	0.84	0.93	0.33
13	50	0.99	1.09	1.19	0.37	4.49	p<0.001	55	0.71	0.79	0.87	0.31
14	50	0.95	1.05	1.16	0.39	4.83	p<0.001	55	0.65	0.73	0.81	0.29
15	50	0.89	1.01	1.12	0.42	5.21	p<0.001	55	0.58	0.65	0.72	0.27
16	50	0.80	0.91	1.02	0.41	5.36	p<0.001	55	0.49	0.56	0.63	0.25
17	50	0.69	0.79	0.90	0.38	5.37	p<0.001	55	0.41	0.47	0.53	0.22
18	49	0.56	0.67	0.78	0.40	5.05	p<0.001	55	0.32	0.37	0.41	0.18
19	49	0.42	0.53	0.65	0.41	4.21	p<0.001	55	0.23	0.28	0.32	0.19
20	46	0.23	0.32	0.41	0.31	2.65	p<0.01	55	0.13	0.18	0.23	0.19
21	46	0.09	0.17	0.25	0.28	1.62		54	0.04	0.09	0.15	0.20
22	46	-0.02	0.05	0.12	0.24	0.60		53	-0.06	0.02	0.09	0.27
23	41	-0.10	-0.03	0.03	0.21	0.23		42	-0.10	-0.04	0.02	0.21
24	35	-0.15	-0.07	-0.00	0.22	-0.93		41	-0.08	-0.03	0.02	0.16
25	30	-0.12	-0.04	0.05	0.24	-0.50		35	-0.07	-0.01	0.04	0.16

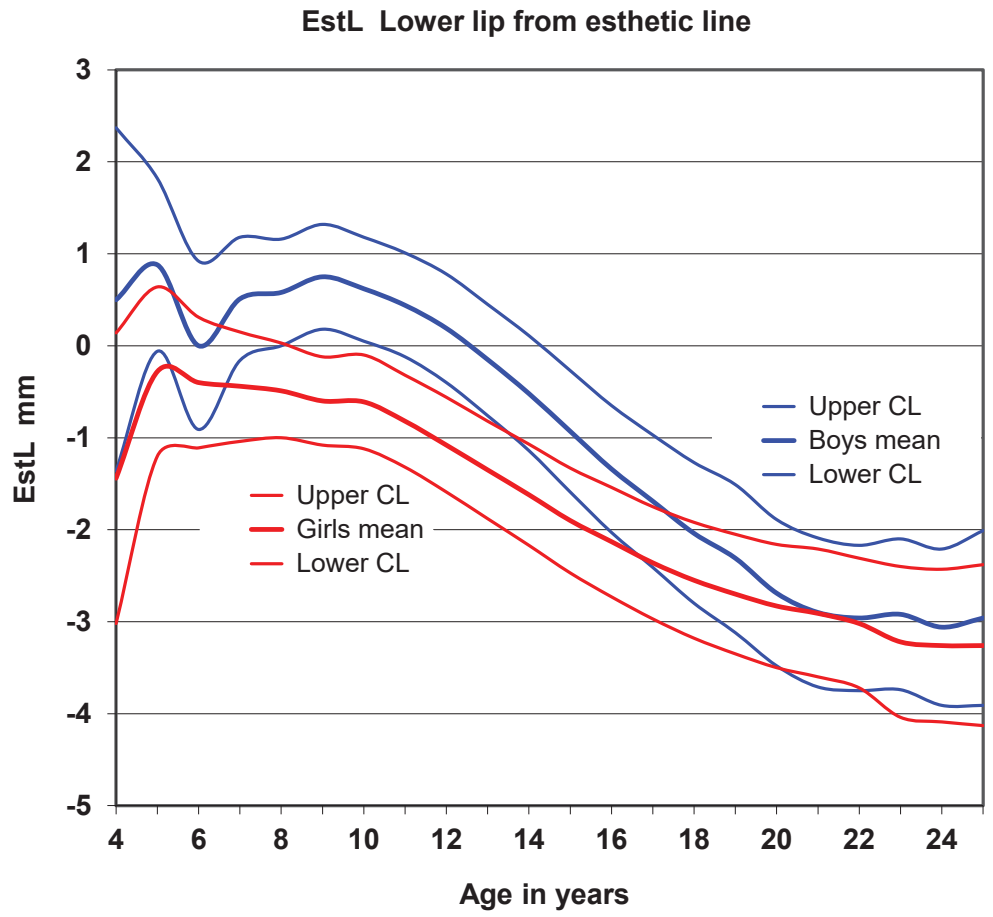

Difference between jaw lengths by McNamara
Difference = (Cd-Pgn) - (Cd-A)
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
Difference mm
35
30
25
20
15
10
4
6
8
10
12
14
16
18
20
22
24
Age in years

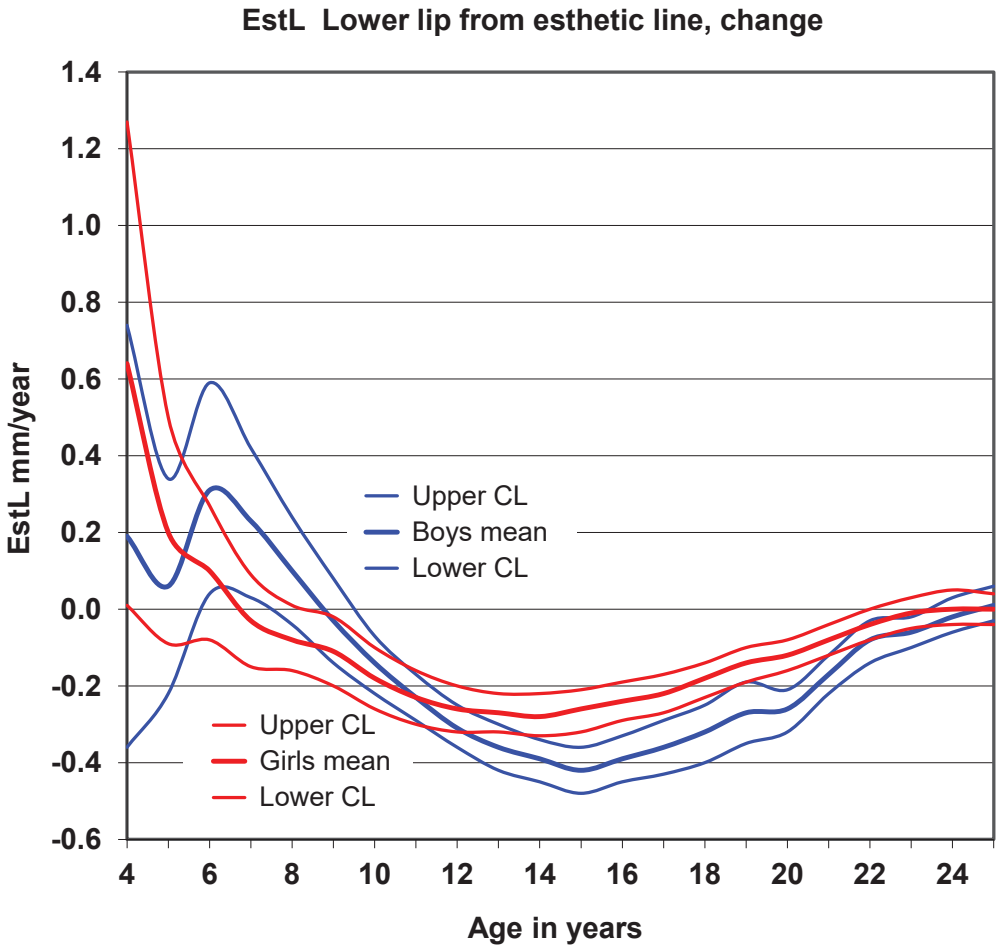

Difference between jaw lengths by McNamara, change
Difference = (Cd-Pgn) - (Cd-A)
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
Change mm/year
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years

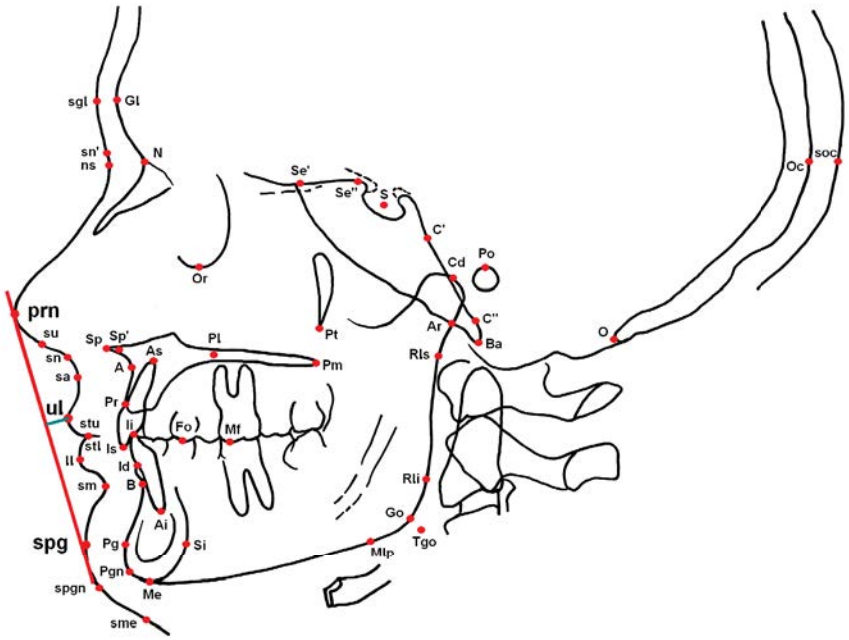


EstL (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.36	0.50	2.37	2.52	1.53		6	-3.02	-1.44	0.14	1.97
5	18	-0.06	0.88	1.82	2.03	1.73		18	-1.20	-0.28	0.64	1.99
6	35	-0.90	0.01	0.92	2.76	0.66		26	-1.11	-0.40	0.31	1.85
7	43	-0.16	0.51	1.18	2.26	2.07	p<0.05	39	-1.04	-0.44	0.15	1.89
8	48	-0.00	0.58	1.16	2.05	2.70	p<0.01	49	-1.00	-0.49	0.03	1.83
9	49	0.17	0.75	1.32	2.04	3.56	p<0.001	53	-1.08	-0.60	-0.12	1.77
10	50	0.04	0.61	1.18	2.04	3.14	p<0.01	54	-1.12	-0.61	-0.10	1.91
11	50	-0.13	0.44	1.01	2.05	3.28	p<0.01	55	-1.32	-0.82	-0.32	1.89
12	50	-0.40	0.19	0.78	2.13	3.18	p<0.01	55	-1.59	-1.08	-0.56	1.95
13	50	-0.75	-0.15	0.46	2.18	2.93	p<0.01	55	-1.88	-1.35	-0.82	2.00
14	50	-1.14	-0.51	0.11	2.26	2.62	p<0.05	55	-2.17	-1.62	-1.07	2.07
15	50	-1.58	-0.92	-0.26	2.37	2.22	p<0.05	55	-2.47	-1.90	-1.33	2.16
16	50	-2.02	-1.33	-0.64	2.48	1.75		55	-2.73	-2.13	-1.54	2.24
17	50	-2.40	-1.68	-0.96	2.59	1.43		55	-2.97	-2.36	-1.75	2.31
18	49	-2.78	-2.02	-1.26	2.72	1.05		55	-3.18	-2.55	-1.92	2.39
19	49	-3.10	-2.30	-1.50	2.86	0.77		55	-3.35	-2.70	-2.05	2.47
20	46	-3.46	-2.67	-1.87	2.75	0.31		55	-3.50	-2.83	-2.16	2.54
21	46	-3.69	-2.88	-2.07	2.81	0.05		54	-3.60	-2.91	-2.21	2.60
22	46	-3.73	-2.94	-2.15	2.74	0.14		53	-3.72	-3.02	-2.31	2.62
23	41	-3.72	-2.90	-2.08	2.68	0.54		42	-4.04	-3.22	-2.40	2.70
24	35	-3.89	-3.04	-2.19	2.57	0.36		41	-4.09	-3.26	-2.43	2.70
25	30	-3.90	-2.95	-2.00	2.65	0.47		35	-4.13	-3.26	-2.38	2.65

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.36	0.19	0.74	0.74	1.06		6	0.01	0.64	1.27	0.78
5	18	-0.22	0.06	0.34	0.60	0.69		18	-0.09	0.20	0.50	0.64
6	35	0.03	0.31	0.58	0.84	-1.15		26	-0.08	0.10	0.27	0.45
7	43	0.02	0.22	0.42	0.67	-2.05	p<0.05	39	-0.15	-0.03	0.09	0.38
8	48	-0.04	0.10	0.24	0.50	-2.11	p<0.05	49	-0.16	-0.08	0.01	0.29
9	49	-0.14	-0.03	0.08	0.39	-1.13		53	-0.20	-0.11	-0.02	0.33
10	50	-0.22	-0.14	-0.07	0.27	-0.70		54	-0.26	-0.18	-0.10	0.31
11	50	-0.29	-0.23	-0.16	0.23	-0.00		55	-0.30	-0.23	-0.16	0.27
12	50	-0.36	-0.30	-0.25	0.21	1.03		55	-0.32	-0.26	-0.20	0.24
13	50	-0.41	-0.36	-0.30	0.21	2.13	p<0.05	55	-0.32	-0.27	-0.22	0.20
14	50	-0.45	-0.39	-0.33	0.21	2.77	p<0.01	55	-0.33	-0.28	-0.22	0.21
15	50	-0.48	-0.41	-0.35	0.23	3.57	p<0.001	55	-0.32	-0.26	-0.21	0.20
16	50	-0.45	-0.39	-0.33	0.21	3.88	p<0.001	55	-0.29	-0.24	-0.19	0.18
17	50	-0.43	-0.36	-0.29	0.26	3.24	p<0.01	55	-0.27	-0.22	-0.17	0.18
18	49	-0.40	-0.32	-0.24	0.27	3.09	p<0.01	55	-0.23	-0.18	-0.14	0.18
19	49	-0.35	-0.27	-0.19	0.28	2.77	p<0.01	55	-0.19	-0.14	-0.10	0.17
20	46	-0.32	-0.26	-0.21	0.18	4.29	p<0.001	55	-0.16	-0.12	-0.08	0.16
21	46	-0.22	-0.17	-0.12	0.17	2.59	p<0.05	54	-0.12	-0.08	-0.04	0.16
22	46	-0.14	-0.08	-0.03	0.19	1.39		53	-0.08	-0.04	0.00	0.15
23	41	-0.10	-0.06	-0.02	0.13	1.87		42	-0.05	-0.01	0.03	0.13
24	35	-0.07	-0.02	0.02	0.13	0.95		41	-0.04	0.00	0.05	0.14
25	30	-0.04	0.00	0.05	0.12	-0.03		35	-0.04	0.00	0.04	0.11

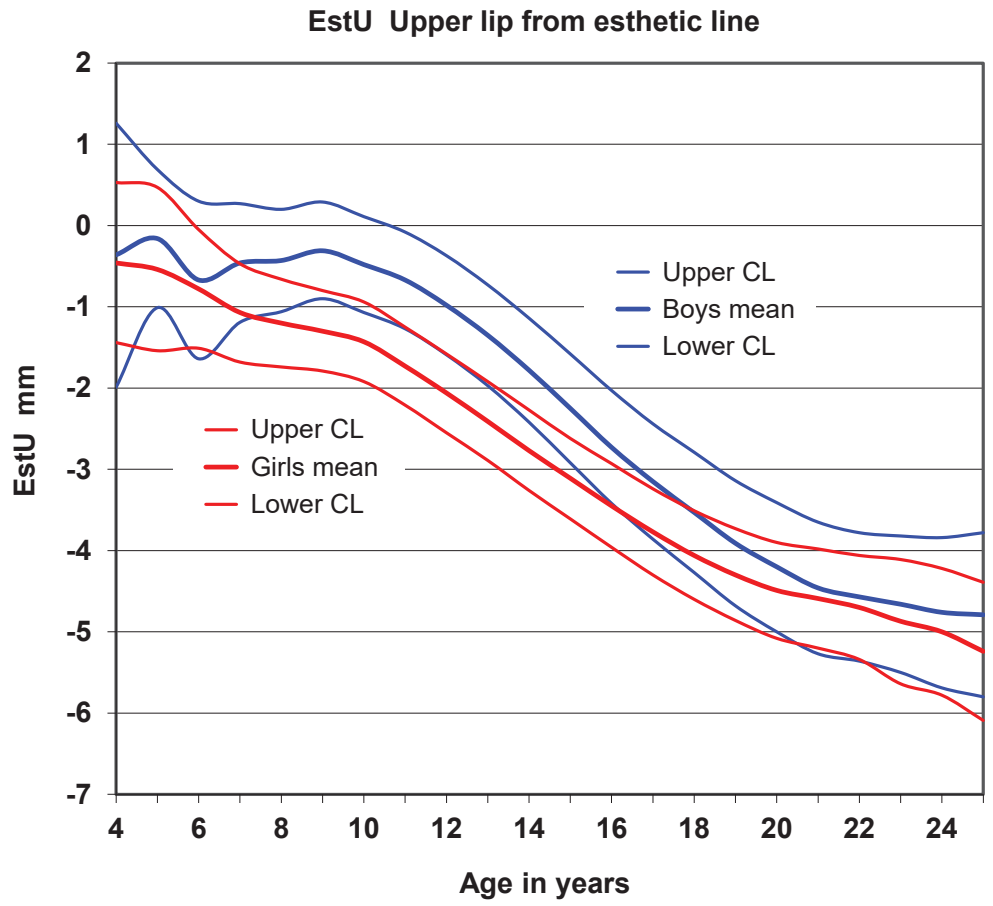

EstL Lower lip from esthetic line
EstL mm
3
2
1
0
-1
-2
-3
-4
-5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

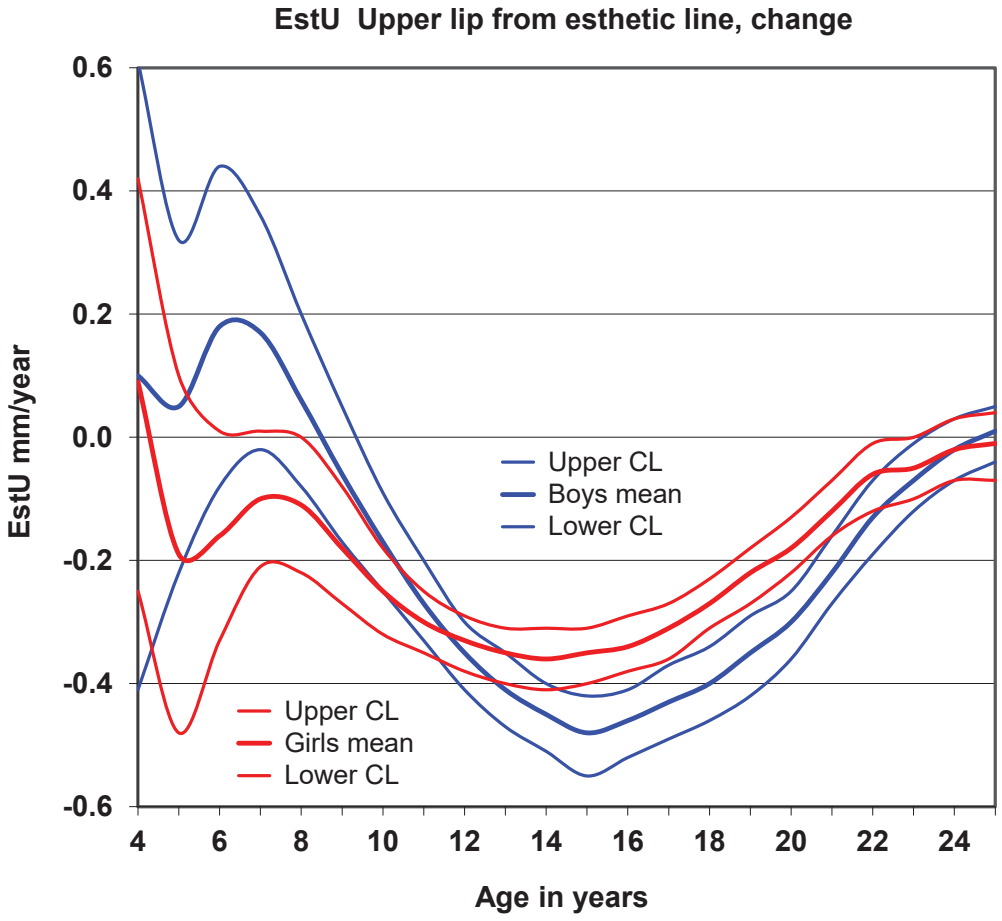

EstL Lower lip from esthetic line, change
EstL mm/year
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

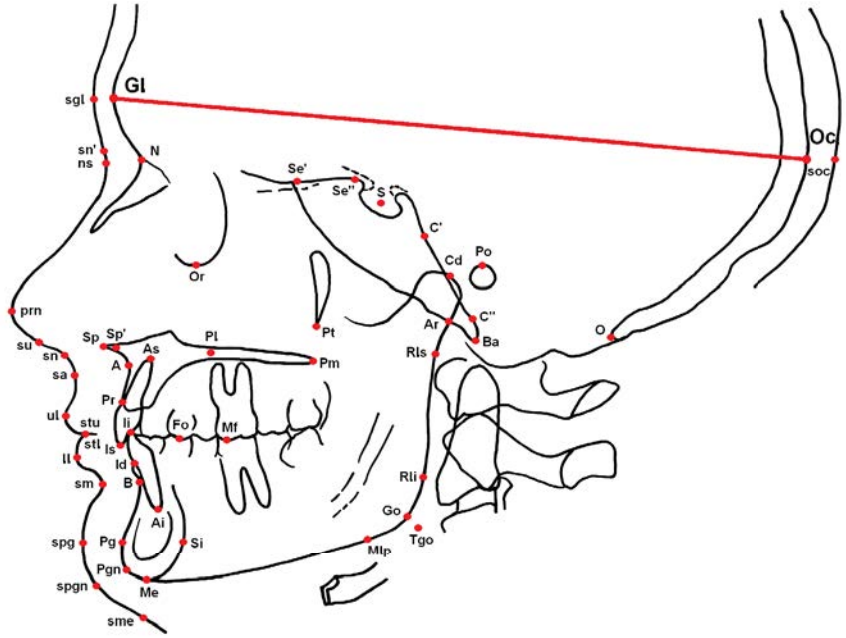


EstU (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.99	-0.36	1.26	2.19	0.09		6	-1.44	-0.46	0.53	1.23
5	18	-1.01	-0.16	0.69	1.83	0.56		18	-1.54	-0.54	0.47	2.18
6	35	-1.63	-0.66	0.30	2.92	0.18		26	-1.51	-0.78	-0.05	1.90
7	43	-1.19	-0.46	0.27	2.43	1.26		39	-1.68	-1.07	-0.47	1.92
8	48	-1.06	-0.43	0.20	2.22	1.83		49	-1.74	-1.20	-0.66	1.93
9	49	-0.91	-0.31	0.29	2.14	2.50	p<0.05	53	-1.79	-1.30	-0.80	1.84
10	50	-1.07	-0.48	0.11	2.13	2.44	p<0.05	54	-1.92	-1.43	-0.94	1.84
11	50	-1.28	-0.68	-0.08	2.16	2.71	p<0.01	55	-2.21	-1.73	-1.25	1.82
12	50	-1.59	-0.98	-0.37	2.20	2.75	p<0.01	55	-2.55	-2.06	-1.58	1.83
13	50	-1.97	-1.35	-0.73	2.24	2.64	p<0.01	55	-2.89	-2.41	-1.92	1.85
14	50	-2.42	-1.78	-1.14	2.31	2.42	p<0.05	55	-3.26	-2.77	-2.27	1.87
15	50	-2.91	-2.25	-1.58	2.41	2.07	p<0.05	55	-3.61	-3.11	-2.62	1.89
16	50	-3.41	-2.72	-2.03	2.49	1.67		55	-3.96	-3.45	-2.93	1.94
17	50	-3.85	-3.14	-2.43	2.56	1.41		55	-4.30	-3.77	-3.24	1.99
18	49	-4.26	-3.52	-2.78	2.64	1.16		55	-4.60	-4.06	-3.51	2.06
19	49	-4.67	-3.90	-3.13	2.74	0.83		55	-4.86	-4.30	-3.73	2.15
20	46	-4.99	-4.19	-3.39	2.75	0.60		55	-5.08	-4.49	-3.90	2.23
21	46	-5.26	-4.45	-3.64	2.80	0.28		54	-5.20	-4.59	-3.98	2.28
22	46	-5.35	-4.56	-3.76	2.75	0.27		53	-5.34	-4.70	-4.06	2.37
23	41	-5.49	-4.65	-3.81	2.75	0.39		42	-5.64	-4.87	-4.11	2.54
24	35	-5.68	-4.75	-3.83	2.79	0.40		41	-5.78	-5.00	-4.22	2.55
25	30	-5.79	-4.78	-3.77	2.82	0.68		35	-6.09	-5.24	-4.39	2.58

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.41	0.10	0.61	0.68	-0.05		6	-0.25	0.09	0.42	0.41
5	18	-0.22	0.05	0.32	0.58	-1.19		18	-0.48	-0.19	0.10	0.63
6	35	-0.09	0.18	0.44	0.79	-1.95		26	-0.33	-0.16	0.01	0.44
7	43	-0.02	0.17	0.36	0.64	-2.29	p<0.05	39	-0.21	-0.10	0.01	0.36
8	48	-0.08	0.06	0.20	0.49	-1.88		49	-0.22	-0.11	-0.00	0.39
9	49	-0.17	-0.06	0.05	0.40	-1.56		53	-0.27	-0.18	-0.08	0.36
10	50	-0.25	-0.17	-0.09	0.30	-1.47		54	-0.32	-0.25	-0.18	0.25
11	50	-0.33	-0.27	-0.20	0.24	-0.84		55	-0.35	-0.30	-0.25	0.18
12	50	-0.41	-0.35	-0.29	0.21	0.47		55	-0.38	-0.33	-0.29	0.18
13	50	-0.46	-0.41	-0.35	0.20	1.42		55	-0.40	-0.35	-0.31	0.18
14	50	-0.51	-0.45	-0.39	0.21	2.26	p<0.05	55	-0.41	-0.36	-0.31	0.19
15	50	-0.54	-0.48	-0.42	0.22	3.28	p<0.01	55	-0.40	-0.35	-0.31	0.18
16	50	-0.52	-0.46	-0.40	0.21	3.25	p<0.01	55	-0.38	-0.34	-0.29	0.17
17	50	-0.49	-0.43	-0.37	0.22	3.09	p<0.01	55	-0.36	-0.31	-0.27	0.17
18	49	-0.46	-0.40	-0.34	0.22	3.41	p<0.001	55	-0.31	-0.27	-0.23	0.16
19	49	-0.42	-0.35	-0.29	0.24	3.30	p<0.01	55	-0.27	-0.22	-0.18	0.16
20	46	-0.36	-0.30	-0.25	0.20	3.58	p<0.001	55	-0.22	-0.18	-0.13	0.16
21	46	-0.27	-0.22	-0.16	0.19	2.73	p<0.01	54	-0.16	-0.12	-0.07	0.17
22	46	-0.19	-0.13	-0.07	0.22	1.55		53	-0.12	-0.06	-0.01	0.20
23	41	-0.12	-0.07	-0.02	0.17	0.48		42	-0.10	-0.05	-0.00	0.15
24	35	-0.08	-0.03	0.02	0.15	0.18		41	-0.07	-0.02	0.03	0.15
25	30	-0.05	-0.00	0.05	0.14	-0.26		35	-0.07	-0.01	0.04	0.16

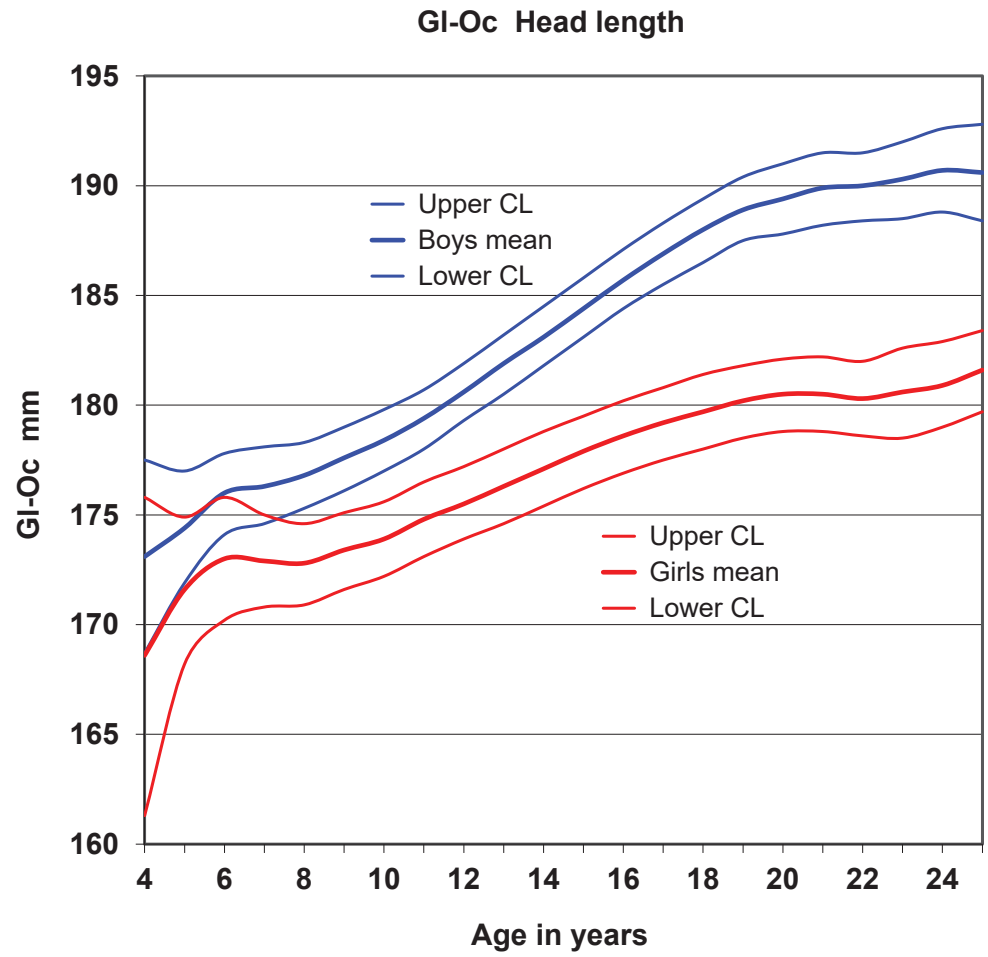

EstU Upper lip from esthetic line
EstU mm
2
1
0
-1
-2
-3
-4
-5
-6
-7
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

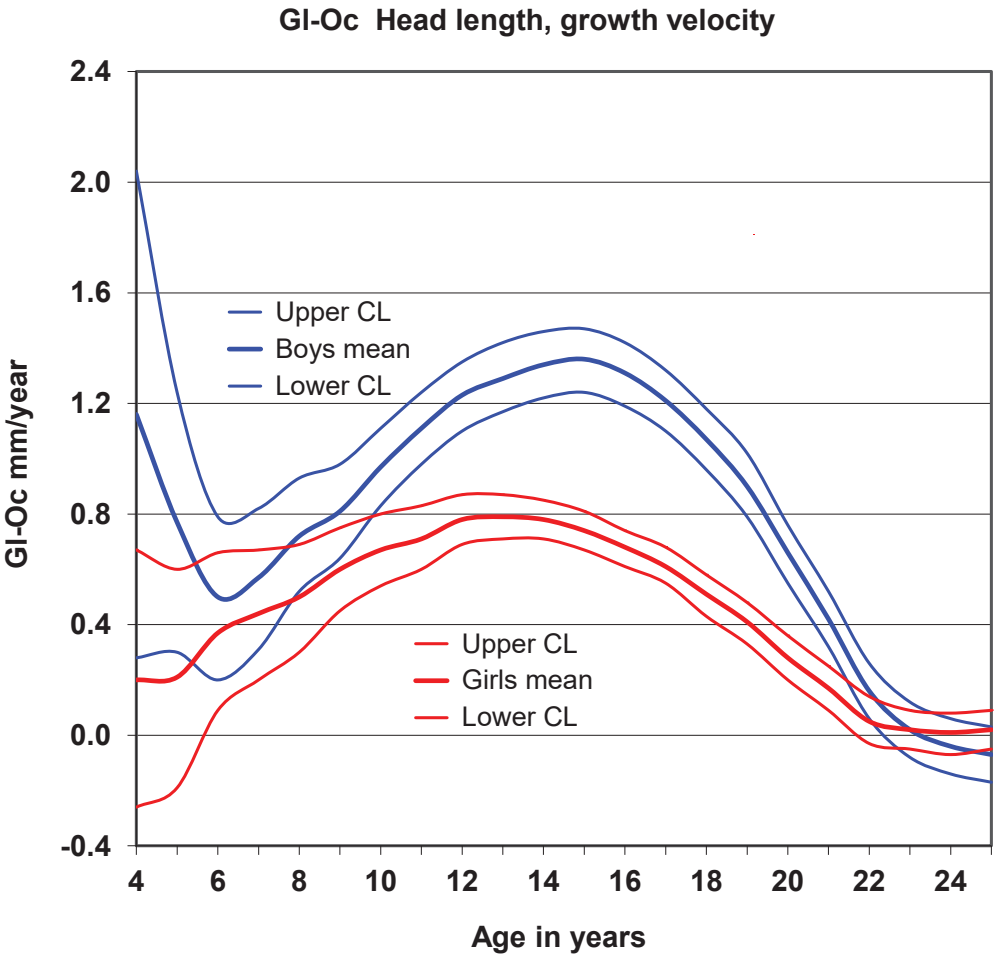

EstU Upper lip from esthetic line, change
EstU mm/year
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

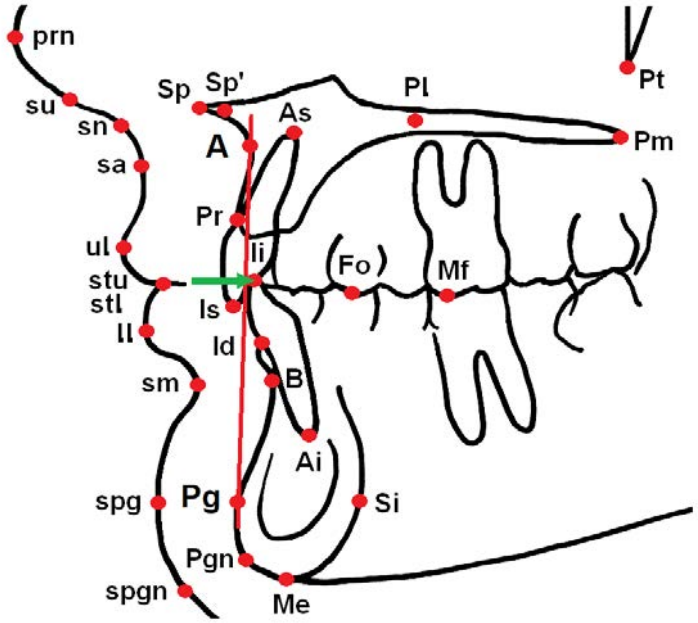


Gl-Oc (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	6	168.7	173.1	177.5	5.48	1.04		6	161.3	168.6	175.8	9.07
5	17	171.9	174.4	177.0	5.28	1.34		17	168.2	171.6	174.9	7.09
6	34	174.1	176.0	177.8	5.51	1.79		25	170.2	173.0	175.8	7.21
7	42	174.6	176.3	178.1	5.67	2.49	p<0.05	39	170.8	172.9	175.0	6.75
8	47	175.3	176.8	178.3	5.20	3.32	p<0.01	49	170.9	172.8	174.6	6.64
9	48	176.1	177.6	179.0	4.97	3.62	p<0.001	53	171.6	173.4	175.1	6.45
10	49	177.0	178.4	179.8	4.88	4.00	p<0.001	54	172.2	173.9	175.6	6.31
11	49	178.0	179.4	180.7	4.82	4.12	p<0.001	55	173.1	174.8	176.5	6.34
12	50	179.3	180.6	181.9	4.76	4.61	p<0.001	55	173.9	175.5	177.2	6.33
13	50	180.5	181.9	183.2	4.78	5.01	p<0.001	55	174.6	176.3	178.0	6.34
14	50	181.8	183.1	184.5	4.80	5.43	p<0.001	55	175.4	177.1	178.8	6.36
15	50	183.1	184.4	185.8	4.86	5.91	p<0.001	55	176.2	177.9	179.5	6.34
16	50	184.4	185.7	187.1	4.92	6.44	p<0.001	55	176.9	178.6	180.2	6.33
17	50	185.6	186.9	188.3	5.02	6.93	p<0.001	55	177.5	179.2	180.8	6.32
18	49	186.6	188.0	189.4	5.10	7.32	p<0.001	55	178.0	179.7	181.4	6.29
19	49	187.5	188.9	190.4	5.26	7.68	p<0.001	55	178.5	180.2	181.8	6.29
20	46	187.9	189.4	191.0	5.45	7.55	p<0.001	55	178.8	180.5	182.1	6.31
21	46	188.3	189.9	191.5	5.58	7.81	p<0.001	54	178.8	180.5	182.2	6.32
22	46	188.4	190.0	191.6	5.52	8.01	p<0.001	53	178.6	180.3	182.0	6.32
23	41	188.5	190.3	192.0	5.69	7.12	p<0.001	42	178.5	180.6	182.6	6.70
24	35	188.8	190.7	192.6	5.77	6.91	p<0.001	41	179.0	180.9	182.9	6.42
25	29	188.4	190.6	192.8	6.01	6.16	p<0.001	35	179.7	181.6	183.4	5.68

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	6	0.28	1.16	2.04	1.10	1.88		6	-0.26	0.20	0.67	0.58
5	17	0.30	0.77	1.24	0.99	1.80		17	-0.19	0.21	0.60	0.83
6	34	0.20	0.49	0.79	0.88	0.55		25	0.09	0.37	0.66	0.72
7	42	0.31	0.56	0.82	0.84	0.73		39	0.20	0.44	0.67	0.74
8	47	0.52	0.72	0.93	0.72	1.58		49	0.30	0.50	0.69	0.70
9	48	0.64	0.81	0.98	0.61	1.81		53	0.45	0.60	0.75	0.56
10	49	0.83	0.97	1.12	0.51	3.10	p<0.01	54	0.54	0.67	0.80	0.48
11	49	0.98	1.11	1.24	0.47	4.51	p<0.001	55	0.60	0.71	0.83	0.43
12	50	1.11	1.23	1.35	0.44	5.91	p<0.001	55	0.69	0.78	0.87	0.34
13	50	1.17	1.30	1.42	0.44	6.93	p<0.001	55	0.71	0.79	0.87	0.29
14	50	1.22	1.34	1.46	0.43	7.96	p<0.001	55	0.71	0.78	0.85	0.28
15	50	1.24	1.36	1.47	0.42	9.15	p<0.001	55	0.67	0.74	0.81	0.26
16	50	1.20	1.31	1.42	0.40	9.85	p<0.001	55	0.61	0.68	0.74	0.24
17	50	1.10	1.21	1.32	0.40	9.32	p<0.001	55	0.55	0.61	0.68	0.24
18	49	0.96	1.07	1.18	0.38	8.80	p<0.001	55	0.43	0.51	0.58	0.27
19	49	0.79	0.90	1.02	0.42	7.15	p<0.001	55	0.33	0.41	0.48	0.28
20	46	0.55	0.66	0.76	0.35	5.87	p<0.001	55	0.20	0.28	0.36	0.29
21	46	0.32	0.42	0.52	0.34	3.86	p<0.001	54	0.09	0.17	0.25	0.30
22	46	0.05	0.16	0.26	0.36	1.55		53	-0.03	0.05	0.14	0.31
23	41	-0.08	0.02	0.12	0.32	-0.05		42	-0.05	0.02	0.09	0.24
24	35	-0.14	-0.04	0.06	0.31	-0.82		41	-0.07	0.01	0.08	0.24
25	29	-0.18	-0.08	0.02	0.27	-1.53		35	-0.05	0.02	0.09	0.21


Gl-Oc Head length
Gl-Oc mm
195
190
185
180
175
170
165
160
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Gl-Oc Head length, growth velocity
Gl-Oc mm/year
2.4
2.0
1.6
1.2
0.8
0.4
0.0
-0.4
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

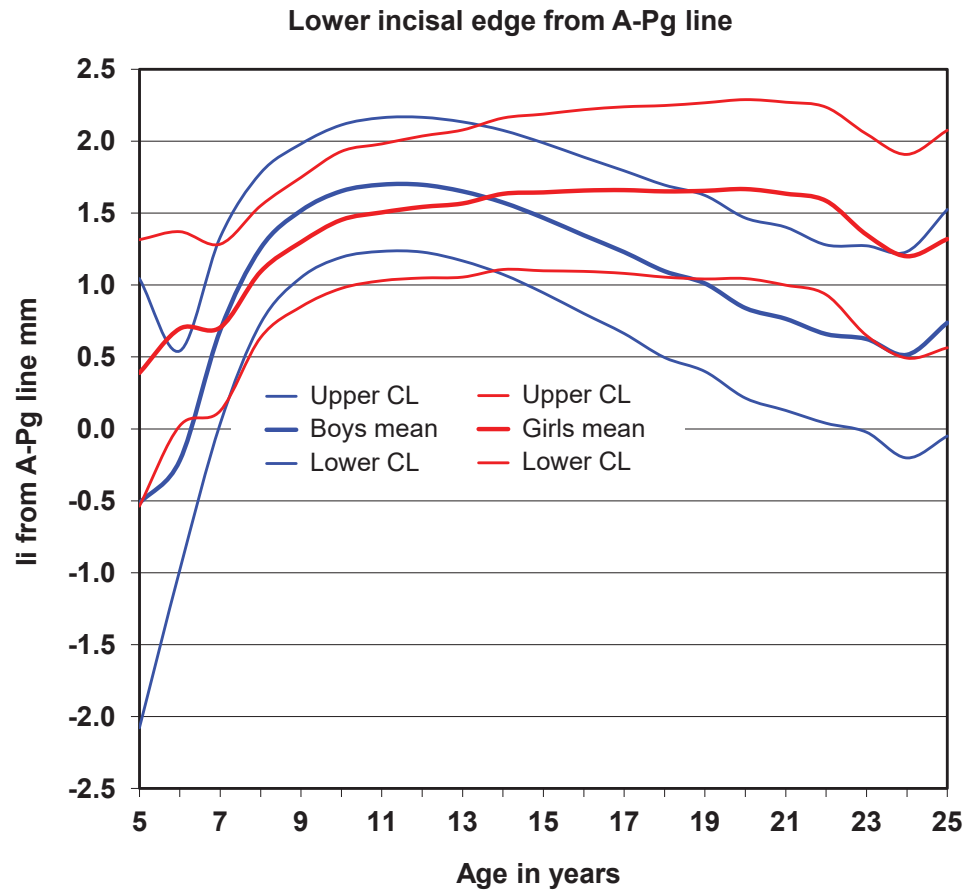


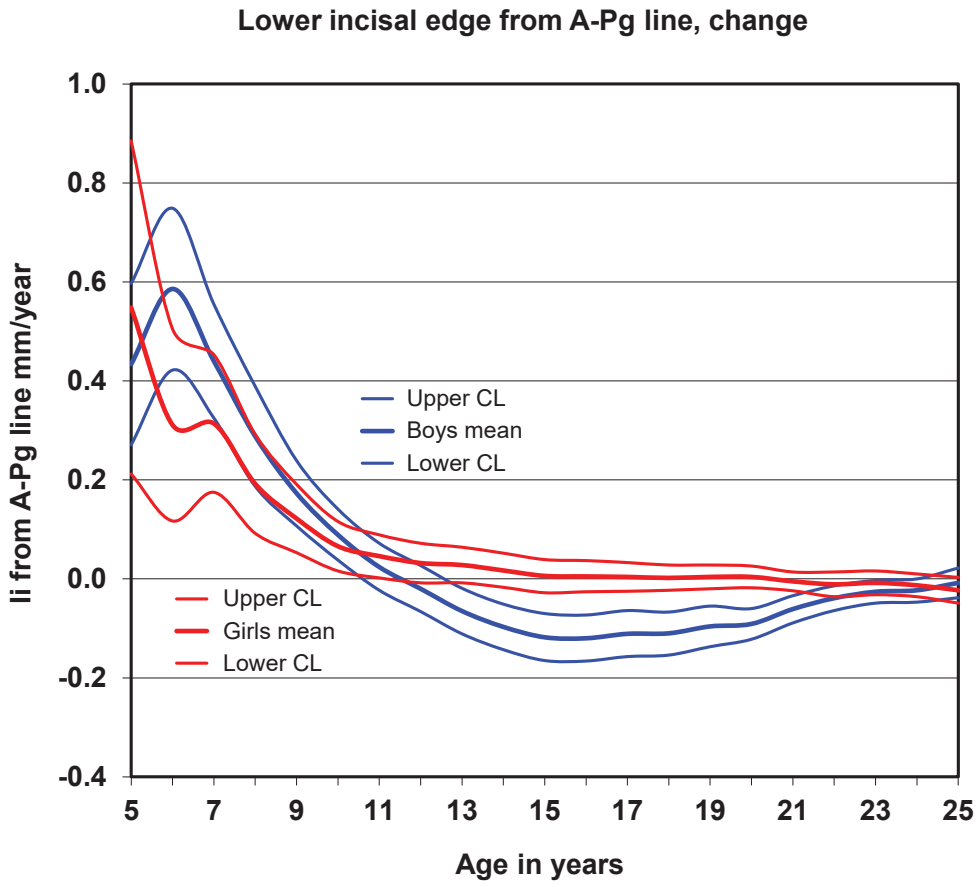
li from A-Pg (mm)

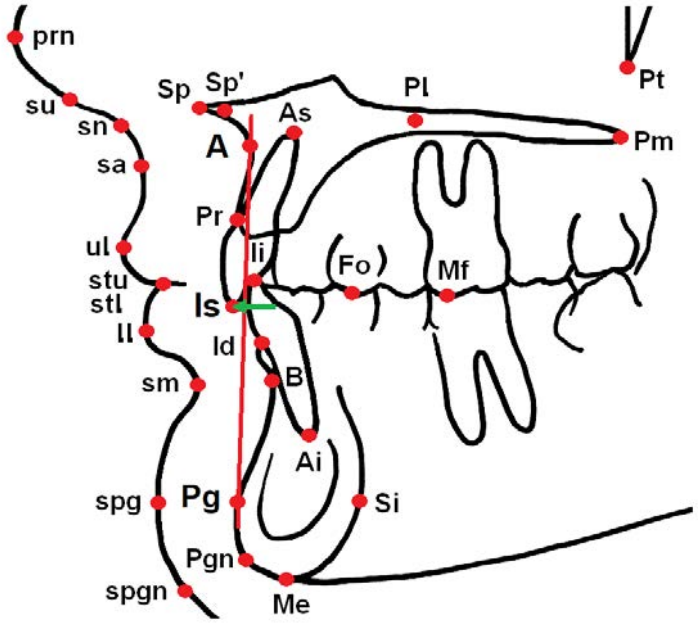
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	-2.08	-0.52	1.05	1.95	0.93		5	-0.54	0.39	1.31	1.06
6	20	-0.98	-0.22	0.54	1.74	1.67		14	0.02	0.70	1.37	1.29
7	31	0.04	0.68	1.33	1.84	0.04		34	0.12	0.70	1.28	1.73
8	40	0.73	1.26	1.78	1.69	-0.46		47	0.63	1.09	1.55	1.60
9	48	1.05	1.52	1.98	1.64	-0.66		52	0.85	1.30	1.75	1.65
10	49	1.19	1.65	2.11	1.64	-0.59		53	0.98	1.45	1.93	1.77
11	49	1.23	1.70	2.16	1.66	-0.57		54	1.03	1.51	1.98	1.78
12	49	1.23	1.70	2.17	1.67	-0.44		54	1.05	1.54	2.04	1.85
13	49	1.17	1.65	2.13	1.72	-0.23		54	1.06	1.57	2.08	1.92
14	49	1.07	1.57	2.07	1.79	0.16		55	1.11	1.63	2.16	1.99
15	49	0.95	1.47	1.99	1.86	0.46		55	1.10	1.64	2.19	2.06
16	49	0.80	1.35	1.89	1.94	0.78		55	1.09	1.66	2.22	2.13
17	49	0.66	1.23	1.79	2.02	1.04		55	1.08	1.66	2.24	2.19
18	48	0.50	1.10	1.70	2.12	1.28		55	1.05	1.65	2.25	2.26
19	49	0.40	1.01	1.62	2.19	1.45		55	1.04	1.65	2.27	2.32
20	46	0.21	0.84	1.47	2.17	1.82		55	1.05	1.67	2.29	2.35
21	46	0.13	0.77	1.40	2.20	1.88		54	1.00	1.64	2.27	2.38
22	45	0.04	0.66	1.28	2.12	2.00	p<0.05	53	0.93	1.58	2.24	2.42
23	40	-0.02	0.63	1.27	2.09	1.49		41	0.65	1.35	2.05	2.29
24	35	-0.20	0.52	1.23	2.16	1.33		39	0.49	1.20	1.91	2.26
25	29	-0.05	0.74	1.53	2.16	1.04		34	0.56	1.32	2.08	2.25
25	29	188.4	190.6	192.8	6.01	6.16	p<0.001	35	179.7	181.6	183.4	5.68

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	0.27	0.43	0.60	0.20	0.64		5	0.21	0.55	0.88	0.38
6	20	0.42	0.59	0.75	0.37	-2.12	p<0.05	14	0.12	0.31	0.51	0.37
7	31	0.32	0.44	0.55	0.33	-1.35		34	0.18	0.31	0.45	0.41
8	40	0.19	0.29	0.39	0.33	-1.32		47	0.09	0.19	0.29	0.35
9	48	0.11	0.17	0.24	0.23	-1.04		52	0.05	0.12	0.19	0.25
10	49	0.04	0.09	0.14	0.18	-0.64		53	0.02	0.07	0.12	0.19
11	49	-0.02	0.02	0.07	0.17	0.65		54	0.00	0.05	0.09	0.16
12	49	-0.07	-0.02	0.03	0.17	1.66		54	-0.01	0.03	0.07	0.15
13	49	-0.11	-0.06	-0.02	0.16	3.16	p<0.01	54	-0.01	0.03	0.06	0.13
14	49	-0.14	-0.10	-0.05	0.16	3.93	p<0.001	55	-0.02	0.02	0.05	0.13
15	49	-0.17	-0.12	-0.07	0.17	4.22	p<0.001	55	-0.03	0.01	0.04	0.13
16	49	-0.17	-0.12	-0.07	0.17	4.46	p<0.001	55	-0.03	0.01	0.04	0.12
17	49	-0.16	-0.11	-0.06	0.16	4.20	p<0.001	55	-0.03	0.00	0.03	0.11
18	48	-0.15	-0.11	-0.07	0.15	4.51	p<0.001	55	-0.02	0.00	0.03	0.10
19	49	-0.14	-0.10	-0.06	0.15	4.27	p<0.001	55	-0.02	0.00	0.03	0.09
20	46	-0.12	-0.09	-0.06	0.11	5.02	p<0.001	55	-0.02	0.00	0.03	0.08
21	46	-0.09	-0.06	-0.03	0.09	3.41	p<0.001	54	-0.02	-0.00	0.01	0.07
22	45	-0.06	-0.04	-0.01	0.09	1.55		53	-0.04	-0.01	0.01	0.09
23	40	-0.05	-0.03	-0.00	0.08	1.06		41	-0.03	-0.01	0.02	0.08
24	35	-0.05	-0.02	0.00	0.07	0.60		39	-0.04	-0.01	0.01	0.07
25	29	-0.04	-0.01	0.02	0.08	-0.72		34	-0.05	-0.02	0.00	0.08
25	29	-0.18	-0.08	0.02	0.27	-1.53		35	-0.05	0.02	0.09	0.21

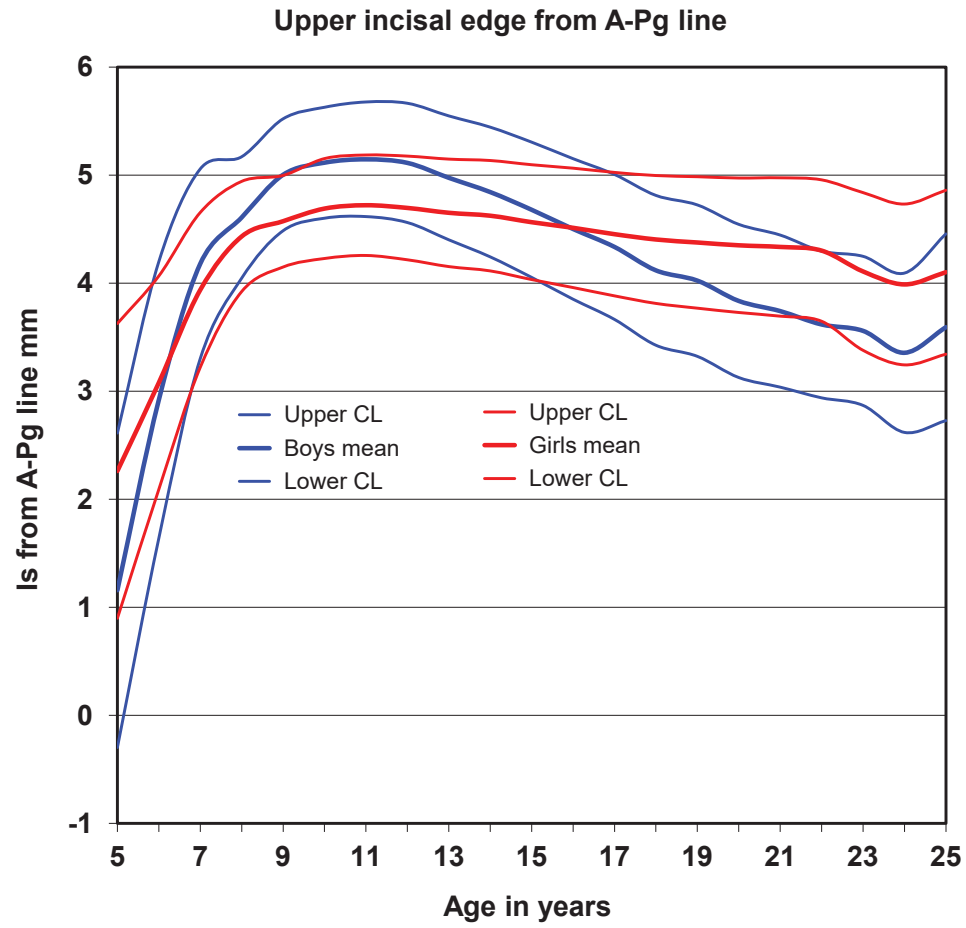

Lower incisal edge from A-Pg line
li from A-Pg line mm
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

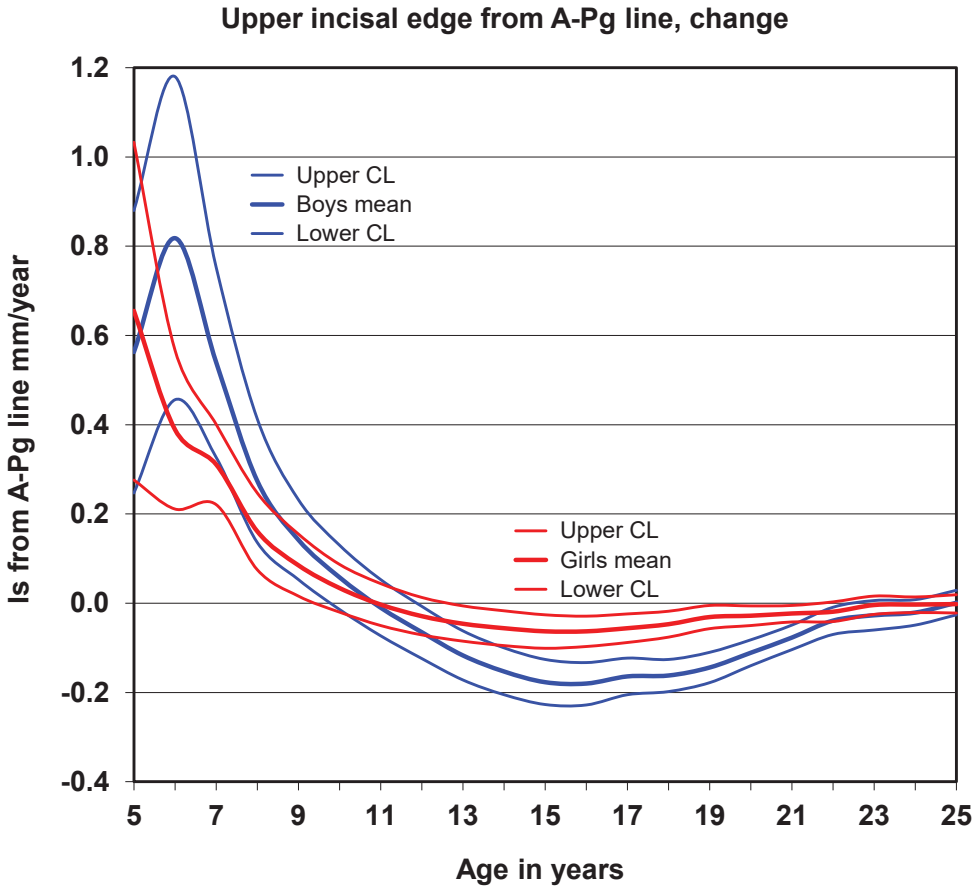

Lower incisal edge from A-Pg line, change
li from A-Pg line mm/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

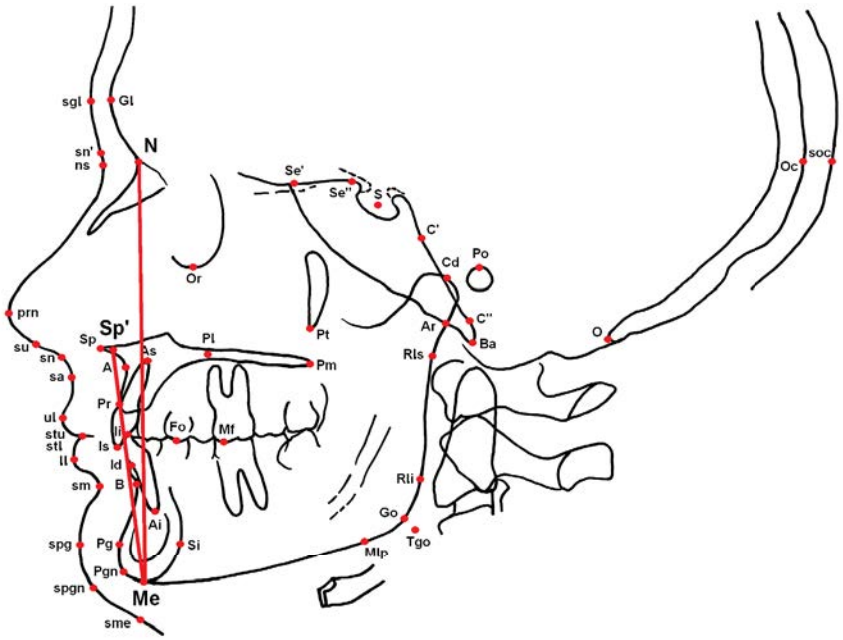


Is from A-Pg (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-0.30	1.16	2.61	1.49	1.05		3	0.90	2.26	3.63	1.21
6	9	1.64	2.92	4.20	1.96	0.19		8	2.09	3.08	4.07	1.43
7	17	3.30	4.18	5.06	1.85	-0.42		22	3.22	3.94	4.65	1.72
8	32	4.05	4.61	5.17	1.62	-0.45		40	3.92	4.43	4.94	1.65
9	46	4.49	5.00	5.52	1.79	-1.27		51	4.15	4.57	5.00	1.54
10	48	4.60	5.12	5.63	1.81	-1.21		53	4.23	4.69	5.15	1.72
11	48	4.62	5.15	5.68	1.88	-1.19		54	4.26	4.72	5.19	1.74
12	48	4.56	5.11	5.67	1.95	-1.12		54	4.22	4.70	5.18	1.80
13	49	4.40	4.98	5.55	2.05	-0.84		54	4.15	4.65	5.15	1.86
14	49	4.24	4.84	5.44	2.14	-0.55		55	4.11	4.62	5.14	1.93
15	49	4.05	4.68	5.31	2.24	-0.27		55	4.03	4.57	5.10	2.01
16	49	3.85	4.50	5.15	2.32	0.02		55	3.96	4.51	5.06	2.09
17	49	3.66	4.34	5.01	2.40	0.27		55	3.88	4.45	5.03	2.16
18	48	3.43	4.12	4.81	2.45	0.62		55	3.81	4.40	5.00	2.24
19	49	3.32	4.02	4.72	2.50	0.75		55	3.77	4.38	4.99	2.30
20	46	3.13	3.84	4.55	2.45	1.07		55	3.73	4.35	4.97	2.35
21	46	3.04	3.74	4.45	2.44	1.22		54	3.70	4.34	4.98	2.40
22	45	2.94	3.62	4.30	2.32	1.42		53	3.65	4.30	4.96	2.43
23	40	2.87	3.56	4.25	2.23	1.07		40	3.38	4.11	4.84	2.36
24	35	2.62	3.36	4.09	2.23	1.18		38	3.24	3.99	4.73	2.34
25	28	2.73	3.59	4.46	2.33	0.87		34	3.34	4.10	4.86	2.26
25	29	188.4	190.6	192.8	6.01	6.16	p<0.001	35	179.7	181.6	183.4	5.68

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	0.25	0.56	0.88	0.32	0.36		3	0.28	0.65	1.03	0.33
6	9	0.46	0.82	1.18	0.55	-2.00		8	0.21	0.39	0.57	0.26
7	17	0.33	0.54	0.75	0.45	-2.11	p<0.05	22	0.22	0.31	0.40	0.22
8	32	0.14	0.27	0.41	0.40	-1.41		40	0.07	0.16	0.25	0.28
9	46	0.05	0.14	0.23	0.31	-0.99		51	0.02	0.09	0.15	0.25
10	48	-0.01	0.06	0.13	0.25	-0.54		53	-0.02	0.03	0.09	0.20
11	48	-0.07	-0.01	0.05	0.22	0.17		54	-0.05	-0.00	0.04	0.18
12	48	-0.12	-0.07	-0.01	0.21	0.99		54	-0.07	-0.03	0.01	0.16
13	49	-0.17	-0.12	-0.06	0.20	2.08	p<0.05	54	-0.09	-0.05	-0.01	0.15
14	49	-0.20	-0.15	-0.10	0.19	2.95	p<0.01	55	-0.09	-0.06	-0.02	0.15
15	49	-0.23	-0.18	-0.13	0.18	3.58	p<0.001	55	-0.10	-0.06	-0.03	0.14
16	49	-0.23	-0.18	-0.13	0.17	3.99	p<0.001	55	-0.10	-0.06	-0.03	0.13
17	49	-0.20	-0.16	-0.12	0.15	4.14	p<0.001	55	-0.09	-0.06	-0.02	0.12
18	48	-0.20	-0.16	-0.13	0.13	4.93	p<0.001	55	-0.08	-0.05	-0.02	0.11
19	49	-0.18	-0.14	-0.11	0.12	5.22	p<0.001	55	-0.06	-0.03	-0.00	0.10
20	46	-0.14	-0.11	-0.08	0.10	4.59	p<0.001	55	-0.05	-0.03	-0.01	0.08
21	46	-0.10	-0.08	-0.05	0.10	3.25	p<0.01	54	-0.04	-0.02	-0.01	0.07
22	45	-0.07	-0.04	-0.01	0.11	1.08		53	-0.04	-0.02	0.00	0.08
23	40	-0.06	-0.03	0.01	0.11	1.14		40	-0.02	-0.00	0.02	0.07
24	35	-0.05	-0.02	0.01	0.09	1.03		38	-0.02	-0.00	0.01	0.06
25	28	-0.03	0.00	0.03	0.07	-0.19		34	-0.02	-0.00	0.02	0.06
25	29	-0.18	-0.08	0.02	0.27	-1.53		35	-0.05	0.02	0.09	0.21


Upper incisal edge from A-Pg line
Is from A-Pg line mm
6
5
4
3
2
1
0
-1
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Upper incisal edge from A-Pg line, change
Is from A-Pg line mm/year
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

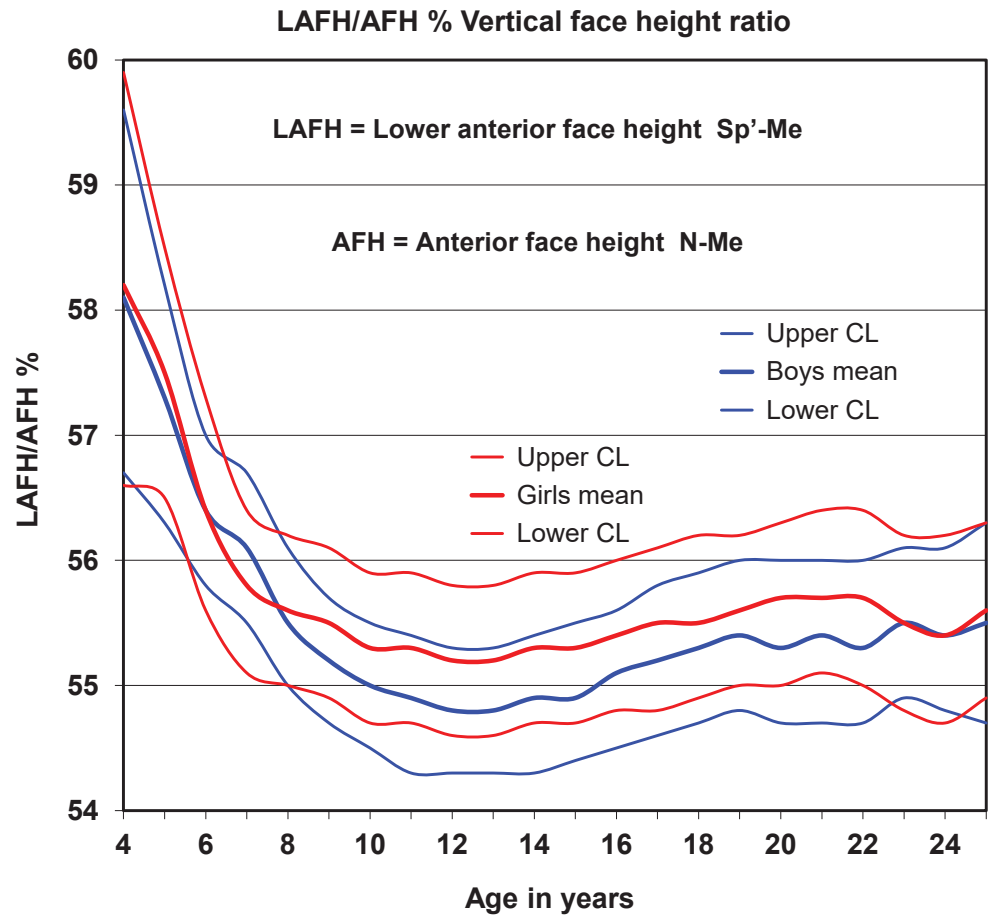


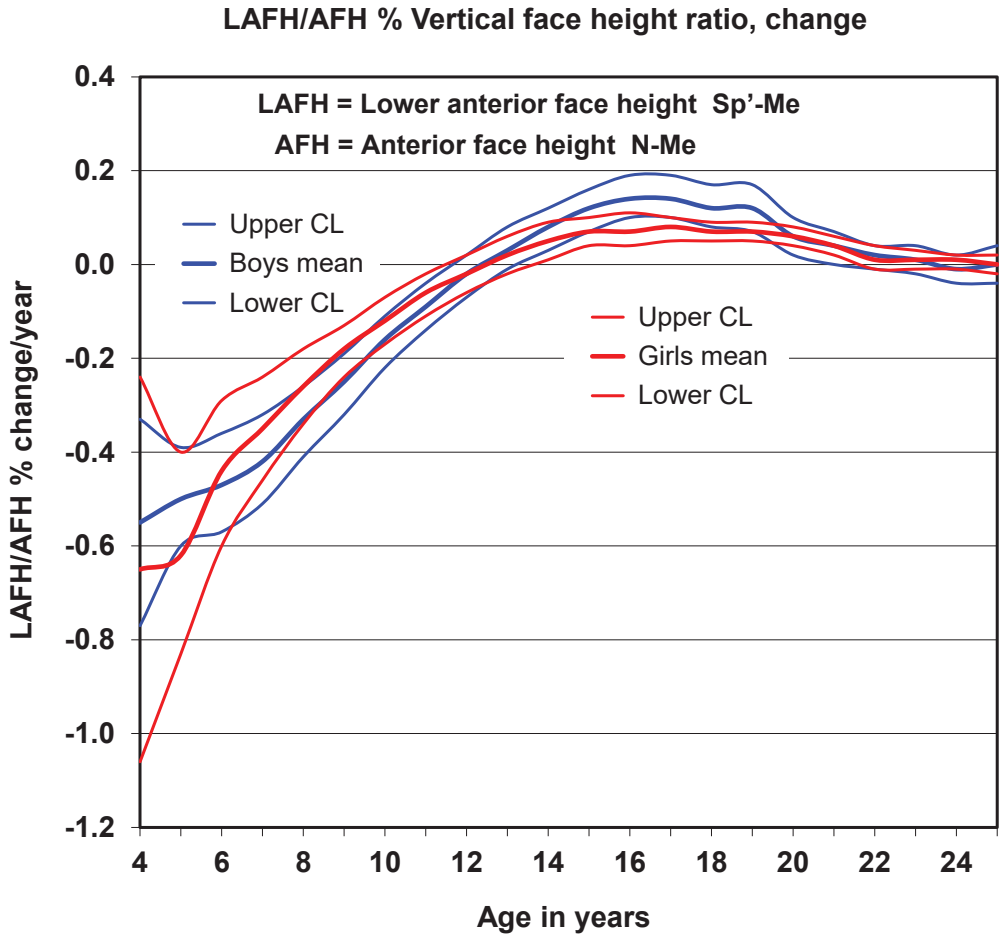
LAFH/AFH %

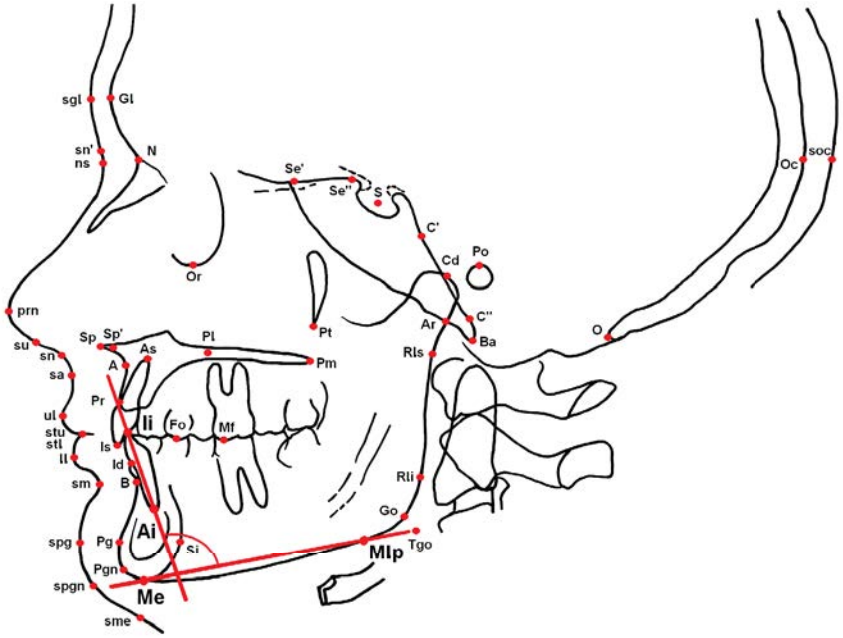
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	56.7	58.1	59.6	1.97	0.08		7	56.6	58.2	59.9	2.20
5	18	56.3	57.3	58.2	2.01	0.32		19	56.5	57.5	58.5	2.23
6	35	55.8	56.4	57.0	1.88	0.05		27	55.6	56.4	57.3	2.25
7	43	55.5	56.1	56.7	1.95	-0.68		39	55.1	55.8	56.4	2.09
8	48	55.0	55.5	56.1	1.91	0.08		49	55.0	55.6	56.2	2.15
9	49	54.7	55.2	55.7	1.87	0.66		53	54.9	55.5	56.1	2.22
10	50	54.5	55.0	55.5	1.84	0.81		54	54.7	55.3	55.9	2.26
11	50	54.3	54.9	55.4	1.87	0.98		55	54.7	55.3	55.9	2.25
12	50	54.3	54.8	55.3	1.89	1.03		55	54.6	55.2	55.8	2.27
13	50	54.3	54.8	55.3	1.91	1.04		55	54.6	55.2	55.8	2.30
14	50	54.3	54.8	55.4	1.94	1.00		55	54.7	55.3	55.9	2.32
15	50	54.4	54.9	55.5	1.97	0.90		55	54.7	55.3	55.9	2.34
16	50	54.5	55.1	55.6	2.01	0.76		55	54.8	55.4	56.0	2.36
17	50	54.6	55.2	55.8	2.06	0.61		55	54.8	55.5	56.1	2.38
18	49	54.7	55.3	55.9	2.11	0.57		55	54.9	55.5	56.2	2.39
19	49	54.8	55.4	56.0	2.16	0.44		55	55.0	55.6	56.2	2.39
20	46	54.7	55.3	56.0	2.17	0.75		55	55.0	55.7	56.3	2.39
21	46	54.7	55.4	56.0	2.22	0.79		54	55.1	55.7	56.4	2.40
22	46	54.7	55.3	56.0	2.23	0.76		53	55.0	55.7	56.4	2.43
23	41	54.9	55.5	56.1	2.00	0.02		42	54.8	55.5	56.2	2.37
24	35	54.8	55.4	56.1	2.08	-0.01		41	54.7	55.4	56.2	2.37
25	30	54.7	55.5	56.3	2.12	0.16		35	54.9	55.6	56.3	2.18

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.77	-0.55	-0.33	0.29	-0.44		7	-1.06	-0.65	-0.24	0.55
5	18	-0.60	-0.50	-0.39	0.23	-0.97		19	-0.83	-0.62	-0.40	0.48
6	35	-0.57	-0.46	-0.36	0.32	0.23		27	-0.60	-0.44	-0.29	0.40
7	43	-0.51	-0.42	-0.32	0.33	0.92		39	-0.46	-0.35	-0.24	0.34
8	48	-0.41	-0.33	-0.26	0.26	1.27		49	-0.34	-0.26	-0.18	0.29
9	49	-0.32	-0.25	-0.19	0.22	1.55		53	-0.24	-0.18	-0.13	0.22
10	50	-0.22	-0.17	-0.11	0.20	1.27		54	-0.17	-0.12	-0.07	0.19
11	50	-0.14	-0.09	-0.04	0.17	0.80		55	-0.11	-0.06	-0.02	0.17
12	50	-0.07	-0.02	0.02	0.16	0.14		55	-0.06	-0.02	0.02	0.15
13	50	-0.01	0.03	0.08	0.16	-0.41		55	-0.02	0.02	0.06	0.14
14	50	0.03	0.08	0.12	0.16	-1.00		55	0.01	0.05	0.09	0.14
15	50	0.07	0.12	0.16	0.16	-1.73		55	0.04	0.07	0.10	0.13
16	50	0.10	0.14	0.19	0.16	-2.43	p<0.05	55	0.04	0.07	0.11	0.12
17	50	0.10	0.14	0.19	0.17	-2.45	p<0.05	55	0.05	0.08	0.10	0.10
18	49	0.08	0.12	0.17	0.16	-2.11	p<0.05	55	0.05	0.07	0.09	0.09
19	49	0.07	0.12	0.17	0.18	-1.77		55	0.05	0.07	0.09	0.08
20	46	0.02	0.06	0.10	0.13	0.08		55	0.04	0.06	0.08	0.07
21	46	0.00	0.04	0.07	0.11	0.17		54	0.02	0.04	0.06	0.07
22	46	-0.01	0.02	0.04	0.10	-0.31		53	-0.01	0.01	0.04	0.09
23	41	-0.02	0.01	0.04	0.09	0.05		42	-0.01	0.01	0.03	0.06
24	35	-0.04	-0.01	0.02	0.09	0.91		41	-0.01	0.01	0.02	0.05
25	30	-0.03	0.00	0.04	0.10	-0.12		35	-0.02	0.00	0.02	0.05


LAFH/AFH % Vertical face height ratio
LAFH = Lower anterior face height Sp'-Me
AFH = Anterior face height N-Me
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
LAFH/AFH %
60
59
58
57
56
55
54
4
6
8
10
12
14
16
18
20
22
24
Age in years


LAFH/AFH % Vertical face height ratio, change
LAFH = Lower anterior face height Sp'-Me
AFH = Anterior face height N-Me
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
LAFH/AFH % change/year
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
4
6
8
10
12
14
16
18
20
22
24
Age in years

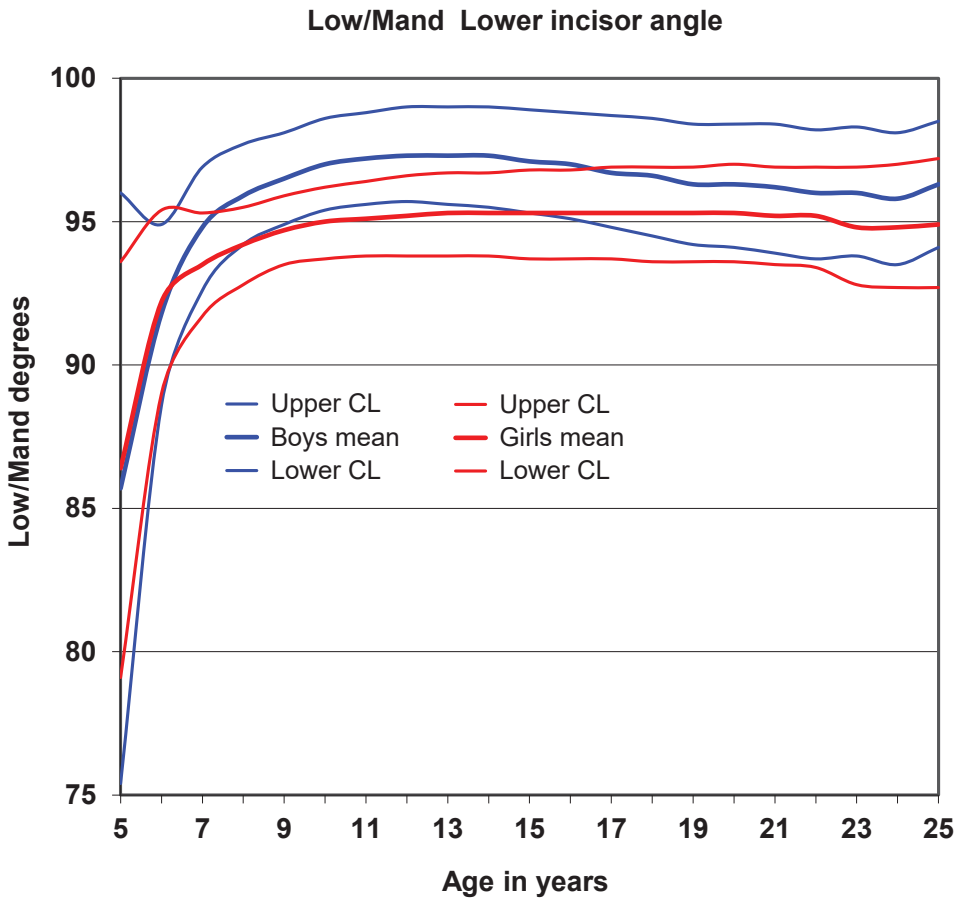


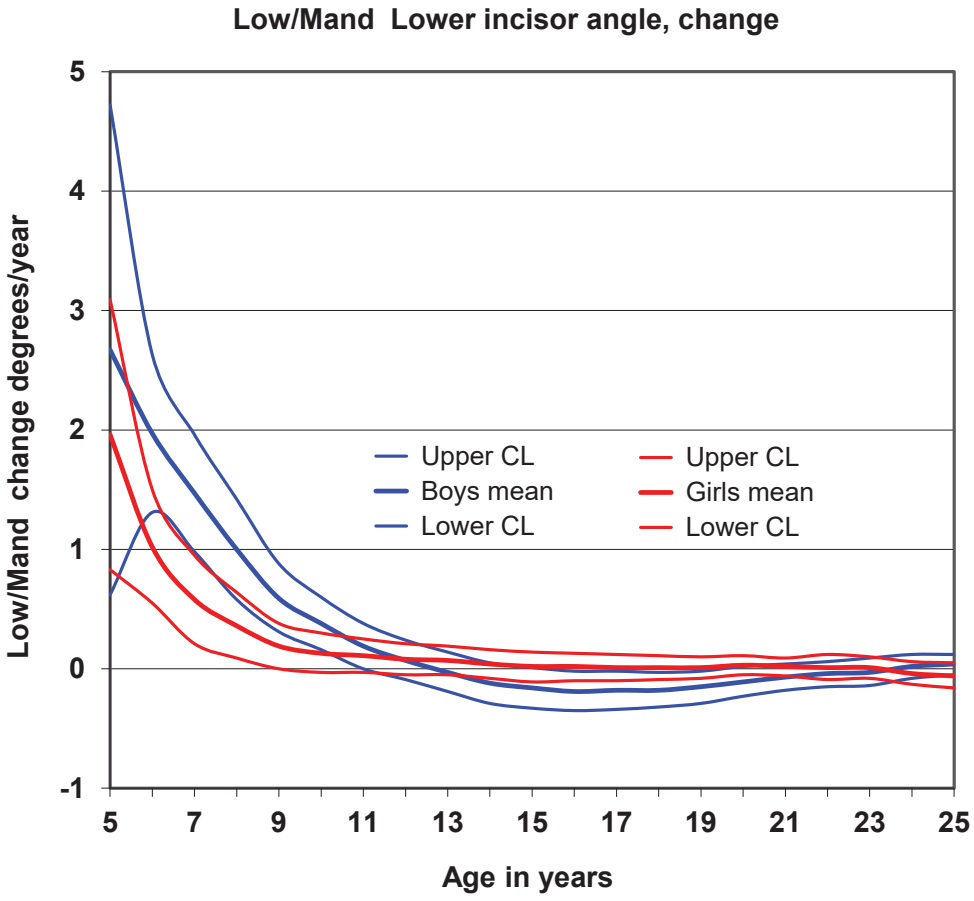
Low/Mand (degrees)

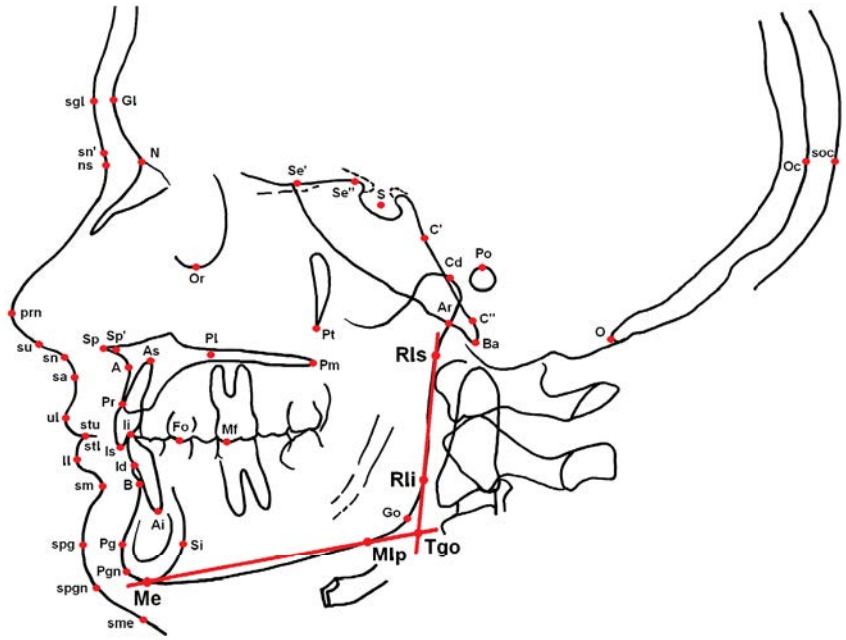
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	75.4	85.7	96.0	12.89	-0.10		5	79.1	86.4	93.6	8.28
6	20	88.6	91.8	95.0	7.26	-0.17		14	89.0	92.2	95.4	6.12
7	31	92.6	94.8	96.9	6.16	0.88		34	91.7	93.5	95.3	5.24
8	40	94.2	95.9	97.7	5.69	1.58		47	92.8	94.2	95.5	4.71
9	48	94.9	96.5	98.1	5.69	1.79		52	93.5	94.7	95.9	4.42
10	49	95.4	97.0	98.6	5.68	1.94		53	93.7	95.0	96.2	4.75
11	49	95.6	97.2	98.8	5.82	1.96		54	93.8	95.1	96.4	4.98
12	49	95.7	97.3	99.0	5.93	1.93		54	93.8	95.2	96.6	5.22
13	49	95.6	97.3	99.0	6.06	1.81		54	93.8	95.3	96.7	5.50
14	49	95.5	97.3	99.0	6.26	1.74		55	93.8	95.3	96.7	5.64
15	49	95.4	97.2	99.0	6.45	1.57		55	93.7	95.3	96.8	5.81
16	49	95.1	97.0	98.9	6.66	1.38		55	93.7	95.3	96.8	5.91
17	49	94.8	96.8	98.7	6.92	1.18		55	93.7	95.3	96.9	6.05
18	48	94.6	96.6	98.6	7.22	1.01		55	93.6	95.3	96.9	6.21
19	49	94.3	96.4	98.4	7.40	0.81		55	93.6	95.3	96.9	6.28
20	46	94.1	96.3	98.5	7.52	0.74		55	93.6	95.3	97.0	6.31
21	46	94.0	96.2	98.4	7.73	0.72		54	93.5	95.2	96.9	6.35
22	45	93.8	96.0	98.3	7.78	0.58		53	93.4	95.2	96.9	6.50
23	40	93.9	96.1	98.3	7.18	0.81		41	92.8	94.8	96.9	6.65
24	35	93.6	95.9	98.2	6.96	0.65		39	92.7	94.8	97.0	6.81
25	29	94.1	96.3	98.6	6.10	0.86		34	92.7	94.9	97.2	6.73
25	30	54.7	55.5	56.3	2.12	0.16		35	54.9	55.6	56.3	2.18

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	0.62	2.67	4.72	2.56	0.56		5	0.83	1.96	3.09	1.29
6	20	1.30	1.95	2.60	1.48	2.07	p<0.05	14	0.55	1.02	1.50	0.91
7	31	0.97	1.46	1.94	1.38	2.84	p<0.01	34	0.21	0.58	0.95	1.10
8	40	0.57	0.99	1.41	1.34	2.54	p<0.05	47	0.09	0.36	0.64	0.96
9	48	0.31	0.59	0.88	1.01	2.32	p<0.05	52	-0.00	0.19	0.38	0.71
10	49	0.16	0.38	0.61	0.79	1.80		53	-0.03	0.13	0.30	0.61
11	49	0.00	0.19	0.38	0.68	0.67		54	-0.03	0.11	0.25	0.52
12	49	-0.08	0.08	0.24	0.58	0.00		54	-0.05	0.08	0.21	0.50
13	49	-0.18	-0.02	0.14	0.58	-0.87		54	-0.05	0.07	0.19	0.44
14	49	-0.28	-0.11	0.06	0.60	-1.39		55	-0.08	0.04	0.16	0.46
15	49	-0.32	-0.15	0.01	0.59	-1.63		55	-0.11	0.02	0.14	0.46
16	49	-0.34	-0.18	-0.02	0.57	-1.99	p<0.05	55	-0.10	0.02	0.13	0.44
17	49	-0.33	-0.17	-0.02	0.55	-1.94		55	-0.10	0.01	0.12	0.41
18	48	-0.32	-0.17	-0.02	0.52	-2.06	p<0.05	55	-0.09	0.01	0.11	0.37
19	49	-0.29	-0.15	-0.02	0.48	-2.00	p<0.05	55	-0.08	0.01	0.10	0.33
20	46	-0.23	-0.11	0.02	0.43	-1.86		55	-0.05	0.03	0.11	0.30
21	46	-0.18	-0.07	0.04	0.38	-1.33		54	-0.06	0.02	0.09	0.29
22	45	-0.15	-0.05	0.06	0.36	-0.77		53	-0.09	0.01	0.12	0.40
23	40	-0.15	-0.03	0.08	0.36	-0.64		41	-0.08	0.01	0.10	0.30
24	35	-0.10	0.00	0.10	0.29	0.53		39	-0.13	-0.04	0.06	0.29
25	29	-0.06	0.01	0.08	0.19	0.95		34	-0.16	-0.06	0.05	0.31
25	30	-0.03	0.00	0.04	0.10	-0.12		35	-0.02	0.00	0.02	0.05


Low/Mand Lower incisor angle
Low/Mand degrees
100
95
90
85
80
75
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Low/Mand Lower incisor angle, change
Low/Mand change degrees/year
5
4
3
2
1
0
-1
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

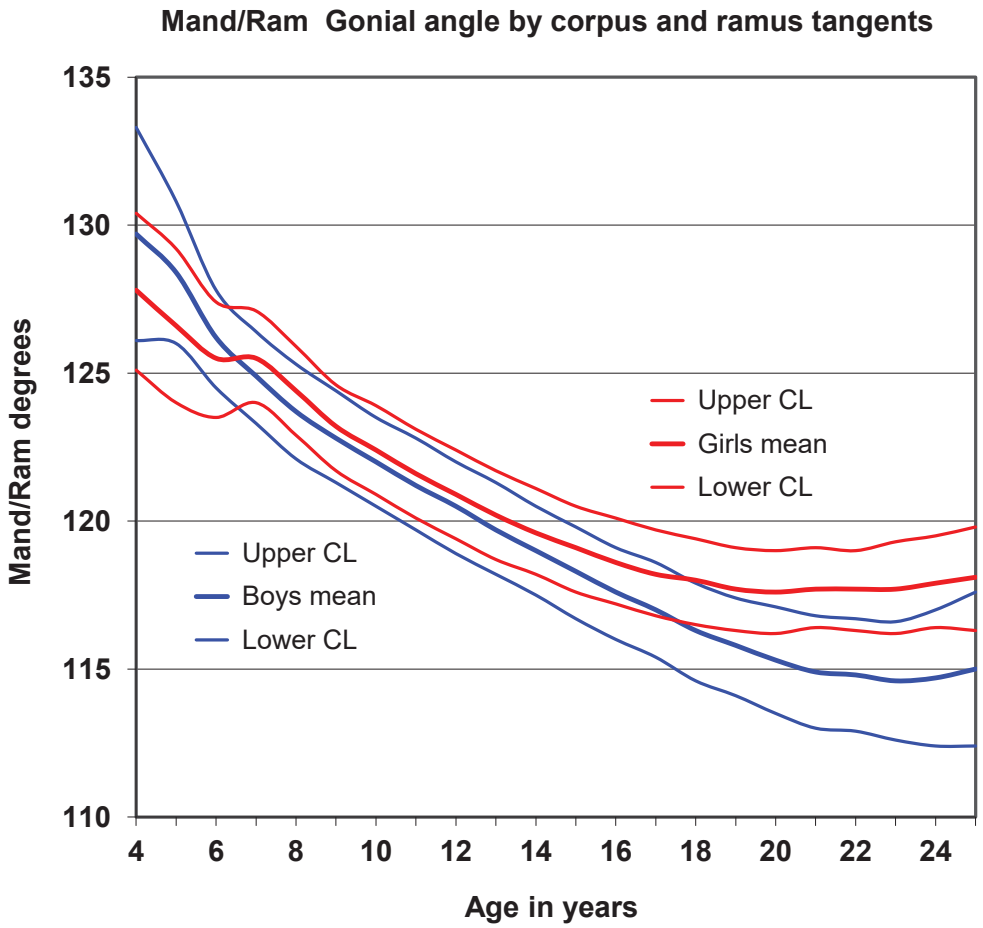


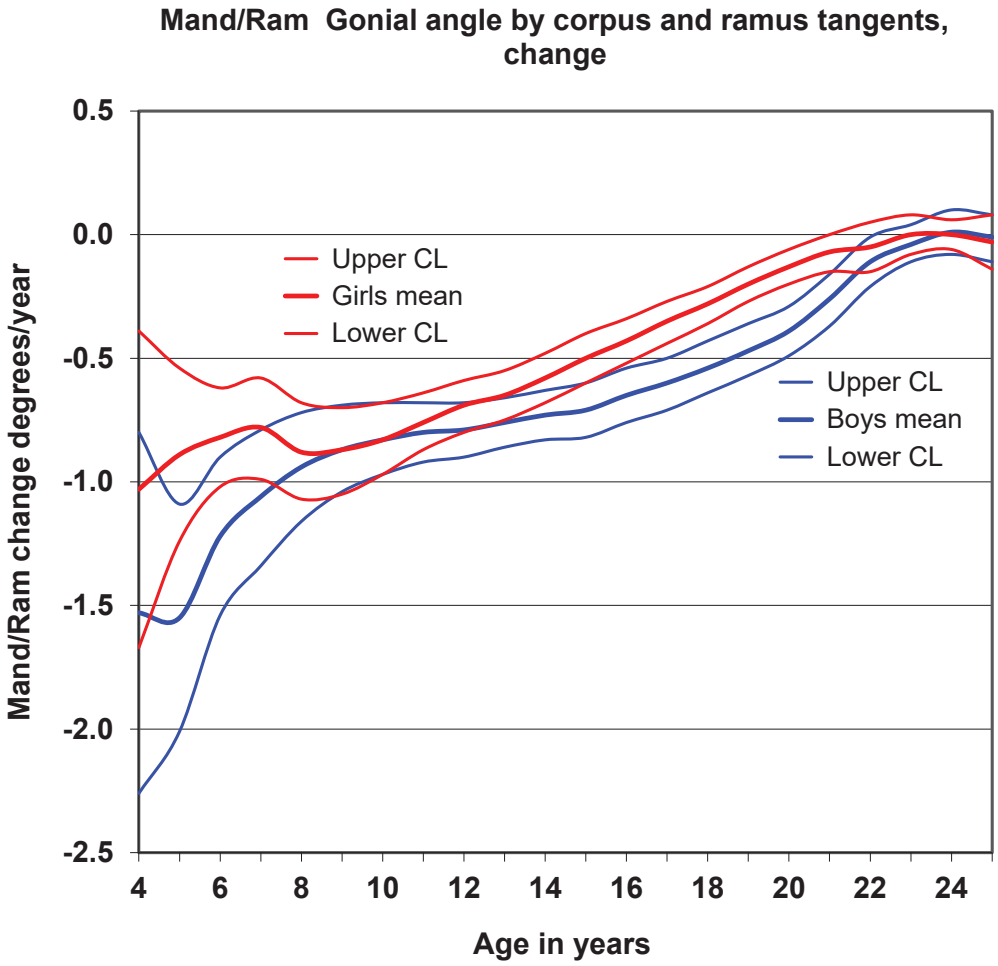
Mand/Ram (degrees)

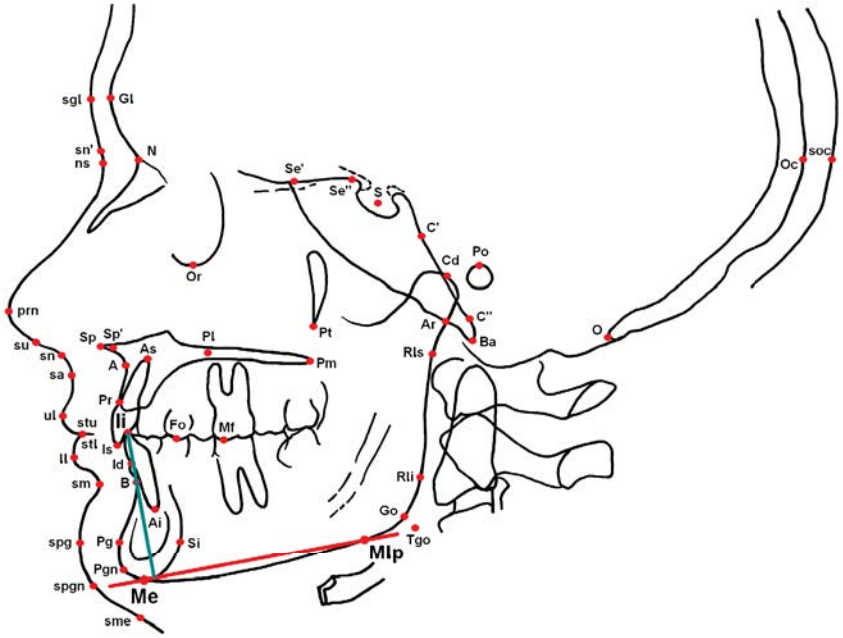
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	126.1	129.7	133.3	4.86	-0.85		7	125.1	127.8	130.4	3.58
5	18	126.0	128.4	130.8	5.26	-0.97		19	124.0	126.6	129.2	5.79
6	35	124.5	126.1	127.8	4.96	-0.54		27	123.5	125.5	127.4	5.15
7	43	123.3	124.9	126.4	5.18	0.60		39	124.0	125.5	127.1	5.01
8	48	122.1	123.7	125.3	5.56	0.63		49	122.9	124.4	125.9	5.29
9	49	121.3	122.9	124.4	5.51	0.29		53	121.7	123.2	124.6	5.34
10	50	120.5	122.0	123.5	5.41	0.41		54	120.9	122.4	123.9	5.54
11	50	119.7	121.3	122.8	5.44	0.31		55	120.1	121.6	123.1	5.60
12	50	118.9	120.5	122.0	5.50	0.37		55	119.4	120.9	122.4	5.63
13	50	118.2	119.7	121.3	5.49	0.45		55	118.7	120.2	121.7	5.59
14	50	117.4	119.0	120.5	5.52	0.60		55	118.2	119.6	121.1	5.55
15	50	116.7	118.2	119.8	5.59	0.77		55	117.6	119.1	120.5	5.50
16	50	116.0	117.5	119.1	5.68	1.00		55	117.2	118.6	120.1	5.45
17	50	115.3	116.9	118.5	5.79	1.19		55	116.8	118.2	119.7	5.43
18	49	114.6	116.2	117.9	5.85	1.56		55	116.5	118.0	119.4	5.38
19	49	114.0	115.7	117.4	6.00	1.81		55	116.3	117.7	119.1	5.34
20	46	113.4	115.2	117.0	6.30	2.03	p<0.05	55	116.2	117.6	119.0	5.30
21	46	113.0	114.8	116.7	6.49	2.48	p<0.05	54	116.4	117.7	119.1	5.08
22	46	112.8	114.8	116.7	6.64	2.45	p<0.05	53	116.3	117.7	119.0	5.12
23	41	112.5	114.5	116.5	6.58	2.47	p<0.05	42	116.2	117.7	119.3	5.14
24	35	112.4	114.7	116.9	6.88	2.35	p<0.05	41	116.4	117.9	119.5	5.06
25	30	112.4	115.0	117.6	7.27	1.97		35	116.3	118.1	119.8	5.31

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-2.26	-1.53	-0.80	0.98	1.02		7	-1.67	-1.03	-0.39	0.86
5	18	-2.01	-1.55	-1.09	1.00	2.26	p<0.05	19	-1.24	-0.89	-0.54	0.77
6	35	-1.52	-1.20	-0.89	0.95	1.86		27	-1.02	-0.82	-0.62	0.54
7	43	-1.33	-1.06	-0.78	0.93	1.52		39	-0.99	-0.78	-0.58	0.66
8	48	-1.15	-0.94	-0.72	0.77	0.40		49	-1.07	-0.88	-0.68	0.70
9	49	-1.04	-0.86	-0.69	0.63	-0.09		53	-1.05	-0.87	-0.70	0.66
10	50	-0.97	-0.83	-0.68	0.53	0.02		54	-0.97	-0.83	-0.68	0.53
11	50	-0.93	-0.81	-0.68	0.45	0.55		55	-0.87	-0.76	-0.64	0.44
12	50	-0.90	-0.80	-0.69	0.38	1.34		55	-0.80	-0.69	-0.59	0.39
13	50	-0.87	-0.77	-0.67	0.35	1.71		55	-0.75	-0.65	-0.55	0.38
14	50	-0.83	-0.74	-0.64	0.35	2.14	p<0.05	55	-0.68	-0.58	-0.48	0.38
15	50	-0.82	-0.72	-0.62	0.38	3.01	p<0.01	55	-0.60	-0.50	-0.40	0.37
16	50	-0.77	-0.66	-0.56	0.39	3.21	p<0.01	55	-0.52	-0.43	-0.34	0.35
17	50	-0.71	-0.61	-0.51	0.37	3.86	p<0.001	55	-0.44	-0.35	-0.27	0.33
18	49	-0.65	-0.54	-0.44	0.37	3.93	p<0.001	55	-0.36	-0.28	-0.21	0.29
19	49	-0.57	-0.47	-0.37	0.37	4.28	p<0.001	55	-0.27	-0.20	-0.13	0.27
20	46	-0.50	-0.40	-0.30	0.34	4.32	p<0.001	55	-0.20	-0.13	-0.06	0.28
21	46	-0.37	-0.26	-0.16	0.37	2.84	p<0.01	54	-0.15	-0.07	0.00	0.30
22	46	-0.21	-0.11	-0.01	0.34	0.76		53	-0.15	-0.05	0.05	0.37
23	41	-0.10	-0.03	0.05	0.25	0.48		42	-0.08	0.00	0.08	0.26
24	35	-0.05	0.03	0.11	0.24	-0.51		41	-0.06	0.00	0.06	0.19
25	30	-0.06	0.01	0.08	0.19	-0.65		35	-0.14	-0.03	0.08	0.32


Mand/Ram Gonial angle by corpus and ramus tangents
Mand/Ram degrees
135
130
125
120
115
110
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


Mand/Ram Gonial angle by corpus and ramus tangents, change
Mand/Ram change degrees/year
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

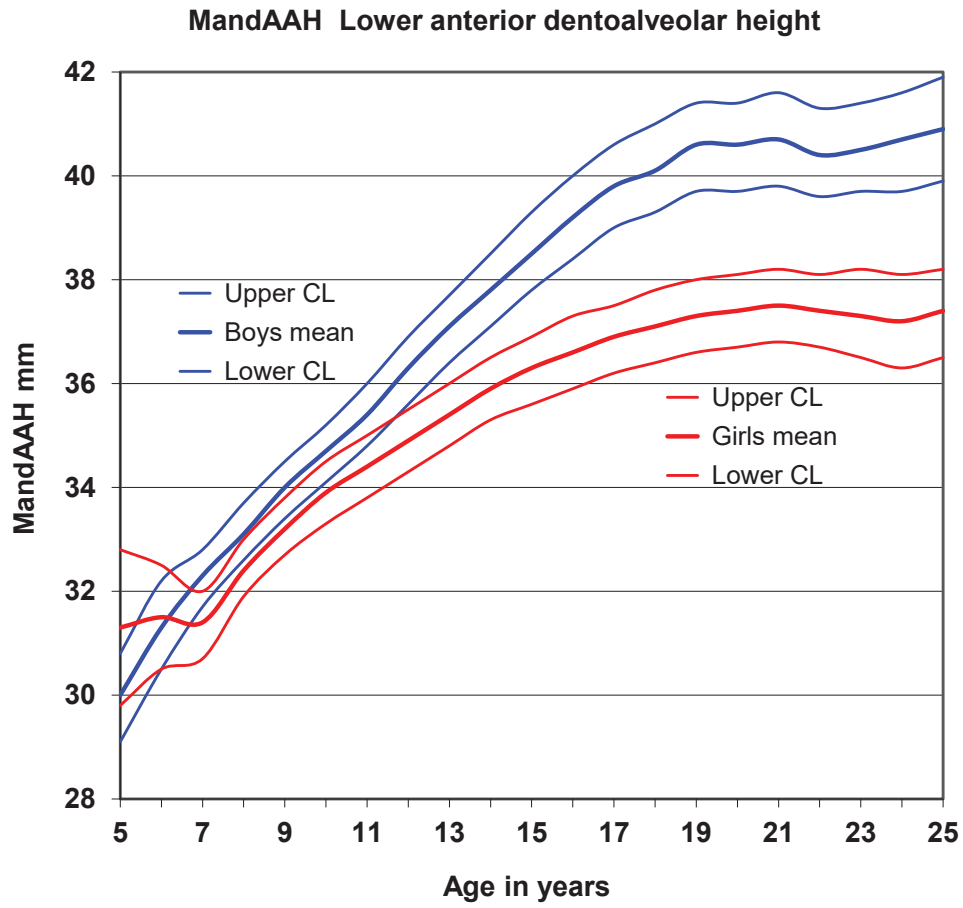


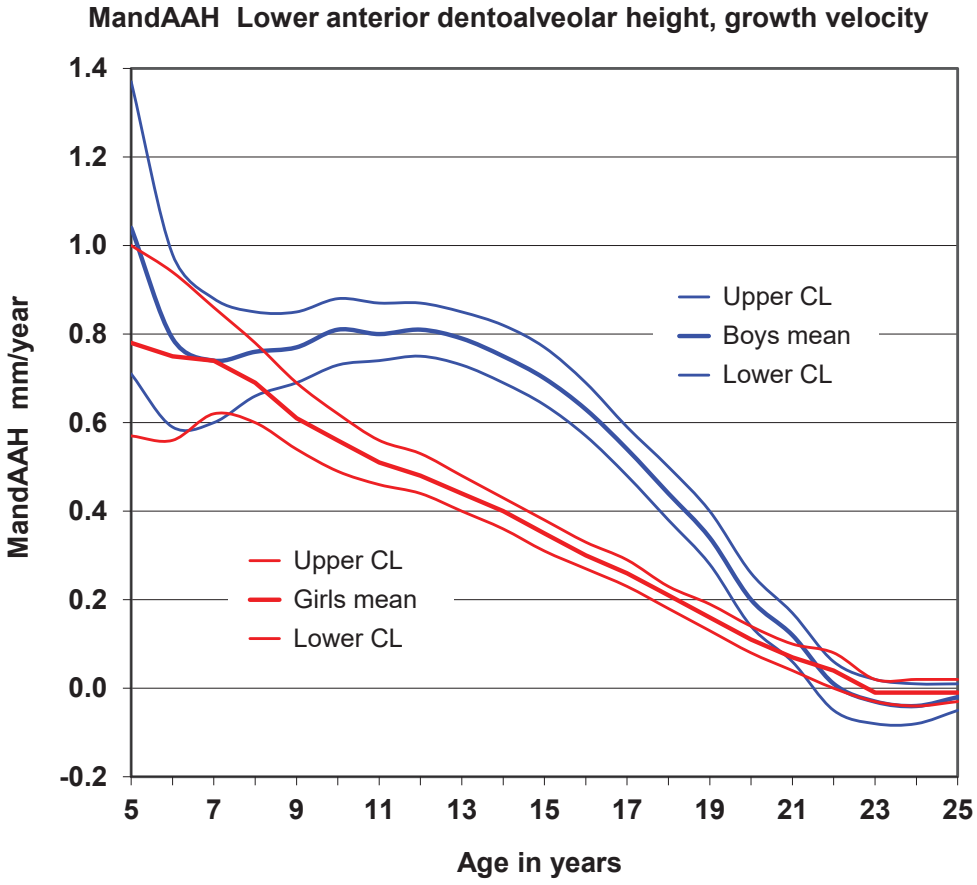
MandAAH (mm)

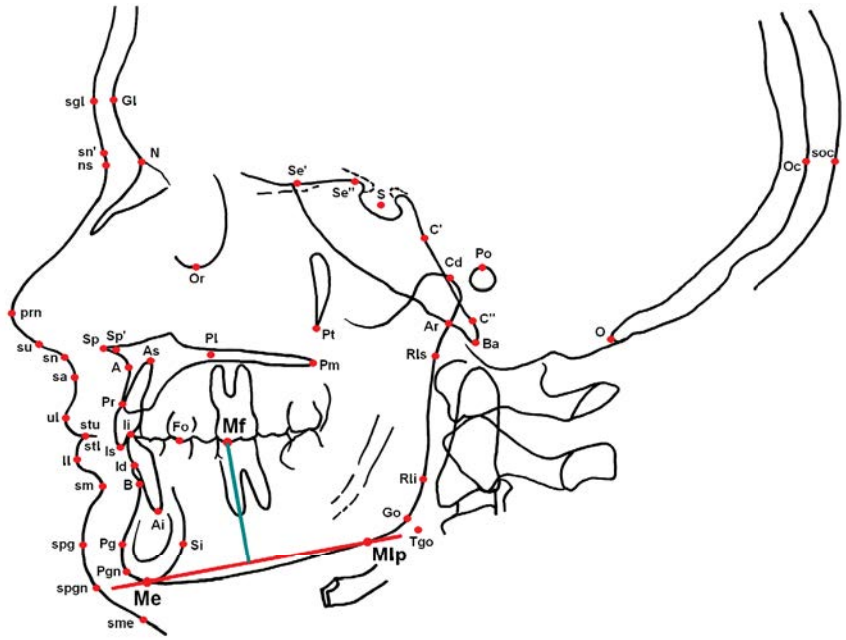
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	29.1	30.0	30.8	1.07	-1.60		5	29.8	31.3	32.8	1.70
6	20	30.5	31.3	32.2	1.96	-0.21		14	30.5	31.5	32.5	1.91
7	31	31.7	32.3	32.8	1.64	2.08	p<0.05	34	30.7	31.4	32.0	1.89
8	40	32.6	33.1	33.7	1.69	1.80		47	31.9	32.4	33.0	1.98
9	48	33.4	34.0	34.5	1.96	1.75		52	32.7	33.2	33.8	2.10
10	49	34.1	34.7	35.2	2.02	1.92		53	33.3	33.9	34.5	2.18
11	49	34.8	35.4	36.0	2.11	2.36	p<0.05	54	33.8	34.4	35.0	2.20
12	49	35.6	36.3	36.9	2.22	3.02	p<0.01	54	34.3	34.9	35.5	2.24
13	49	36.4	37.1	37.7	2.34	3.64	p<0.001	54	34.8	35.4	36.0	2.29
14	49	37.1	37.8	38.5	2.46	4.01	p<0.001	55	35.3	35.9	36.5	2.40
15	49	37.8	38.5	39.3	2.59	4.59	p<0.001	55	35.6	36.3	36.9	2.44
16	49	38.4	39.2	40.0	2.72	5.10	p<0.001	55	35.9	36.6	37.3	2.48
17	49	39.0	39.8	40.6	2.85	5.48	p<0.001	55	36.2	36.9	37.5	2.52
18	48	39.3	40.1	41.0	2.93	5.63	p<0.001	55	36.4	37.1	37.8	2.54
19	49	39.7	40.6	41.4	3.03	5.97	p<0.001	55	36.6	37.3	38.0	2.57
20	46	39.7	40.6	41.4	3.03	5.63	p<0.001	55	36.7	37.4	38.1	2.59
21	46	39.8	40.7	41.5	3.07	5.59	p<0.001	54	36.8	37.5	38.2	2.65
22	45	39.6	40.4	41.3	2.89	5.33	p<0.001	53	36.7	37.4	38.1	2.66
23	40	39.6	40.5	41.4	2.82	5.10	p<0.001	41	36.5	37.3	38.2	2.81
24	35	39.7	40.7	41.6	2.92	5.25	p<0.001	39	36.3	37.2	38.1	2.82
25	29	39.8	40.9	41.9	2.87	5.13	p<0.001	34	36.5	37.4	38.2	2.60

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	6	0.71	1.04	1.37	0.41	1.23		5	0.57	0.78	1.00	0.25
6	20	0.60	0.79	0.99	0.45	0.32		14	0.56	0.75	0.94	0.36
7	31	0.60	0.74	0.89	0.40	0.01		34	0.62	0.74	0.86	0.36
8	40	0.66	0.76	0.85	0.31	0.99		47	0.60	0.69	0.78	0.31
9	48	0.69	0.77	0.85	0.29	2.78	p<0.01	52	0.54	0.61	0.69	0.29
10	49	0.73	0.80	0.88	0.25	5.19	p<0.001	53	0.49	0.56	0.62	0.23
11	49	0.74	0.80	0.87	0.23	6.97	p<0.001	54	0.46	0.51	0.56	0.20
12	49	0.75	0.81	0.87	0.22	8.54	p<0.001	54	0.44	0.48	0.53	0.17
13	49	0.73	0.79	0.85	0.22	9.24	p<0.001	54	0.40	0.44	0.48	0.15
14	49	0.69	0.75	0.81	0.23	9.55	p<0.001	55	0.36	0.40	0.43	0.14
15	49	0.64	0.70	0.77	0.23	10.00	p<0.001	55	0.31	0.35	0.38	0.12
16	49	0.57	0.63	0.69	0.22	9.76	p<0.001	55	0.27	0.30	0.33	0.11
17	49	0.48	0.53	0.59	0.20	8.84	p<0.001	55	0.23	0.26	0.29	0.11
18	48	0.38	0.44	0.50	0.20	7.49	p<0.001	55	0.18	0.21	0.23	0.10
19	49	0.28	0.34	0.39	0.21	5.29	p<0.001	55	0.13	0.16	0.19	0.11
20	46	0.14	0.20	0.26	0.21	2.79	p<0.01	55	0.08	0.11	0.14	0.13
21	46	0.06	0.12	0.17	0.19	1.43		54	0.04	0.07	0.10	0.12
22	45	-0.04	0.01	0.06	0.17	-0.92		53	-0.00	0.04	0.08	0.15
23	40	-0.08	-0.03	0.02	0.15	-0.89		41	-0.03	-0.01	0.02	0.08
24	35	-0.08	-0.03	0.02	0.14	-0.81		39	-0.04	-0.01	0.02	0.09
25	29	-0.04	-0.01	0.02	0.08	-0.10		34	-0.03	-0.01	0.02	0.08


MandAAH Lower anterior dentoalveolar height
MandAAH mm
42
40
38
36
34
32
30
28
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


MandAAH Lower anterior dentoalveolar height, growth velocity
MandAAH mm/year
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

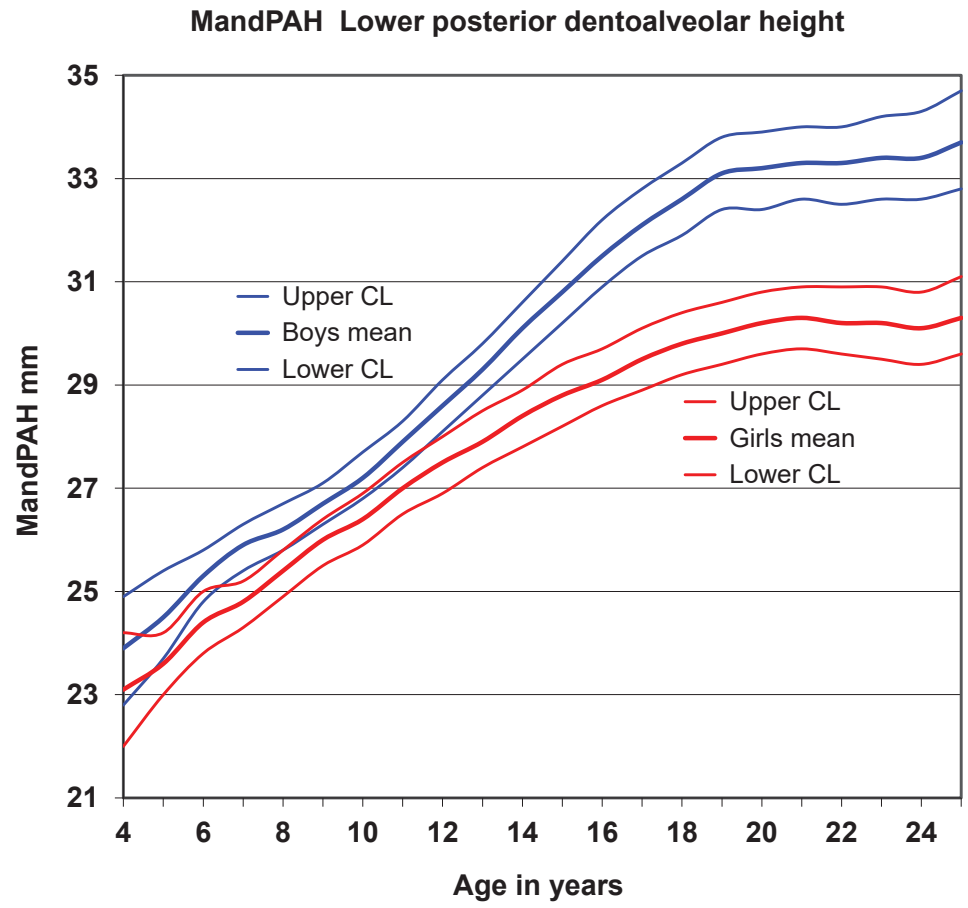


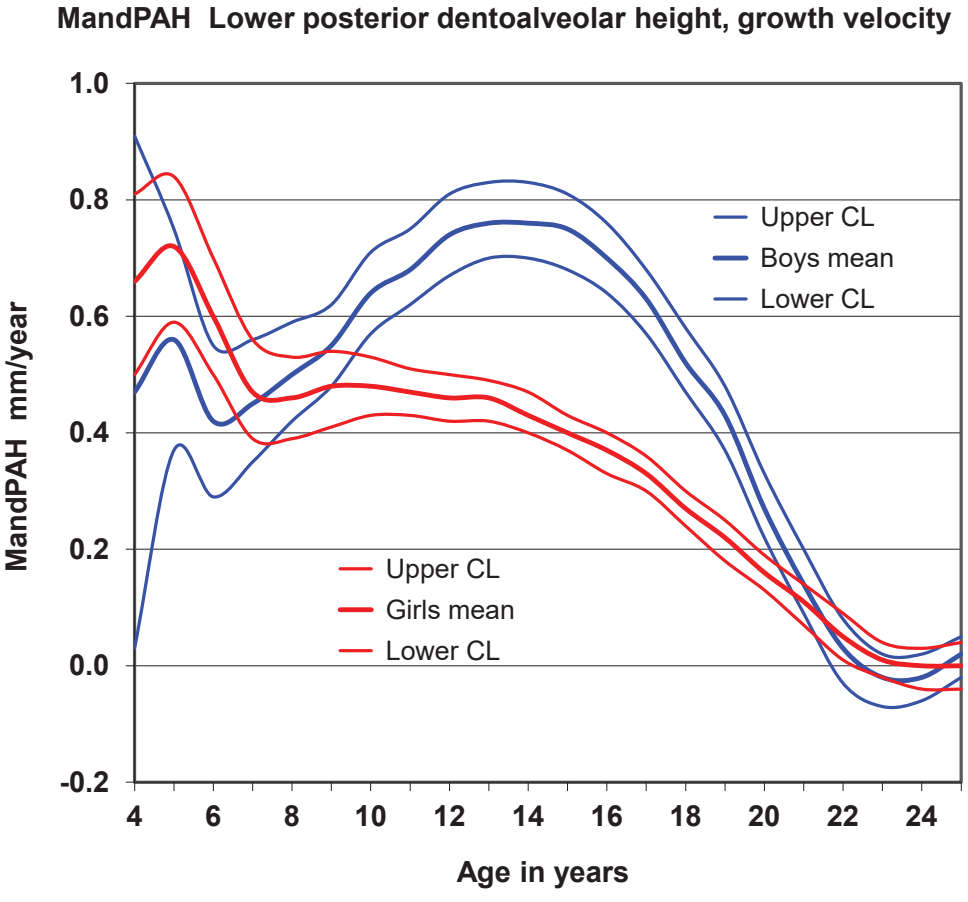
MandPAH (mm)

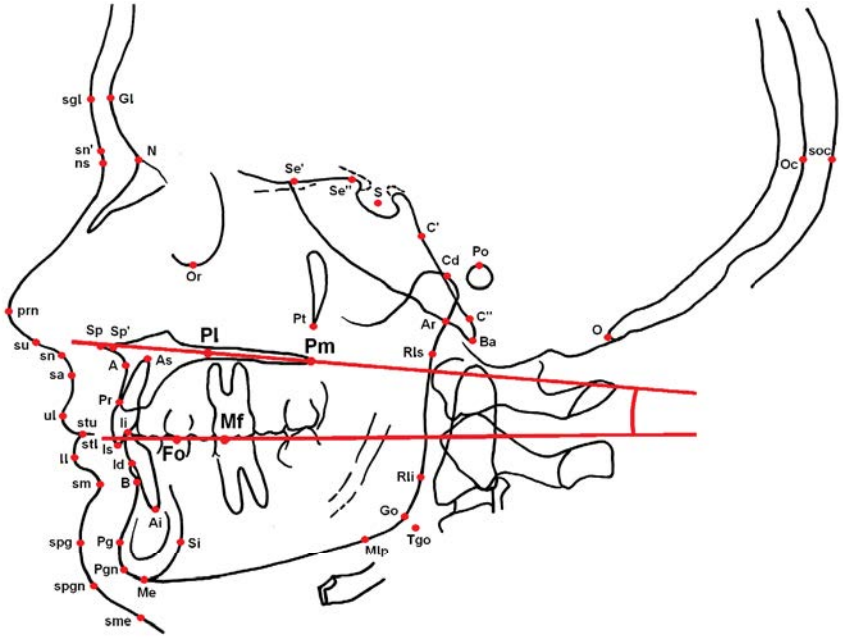
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	22.8	23.9	24.9	1.44	0.95		7	22.0	23.1	24.2	1.50
5	18	23.7	24.5	25.4	1.81	1.74		19	23.0	23.6	24.2	1.40
6	35	24.8	25.3	25.8	1.54	2.28	p<0.05	27	23.8	24.4	25.0	1.56
7	43	25.4	25.9	26.3	1.52	3.24	p<0.01	39	24.3	24.8	25.2	1.49
8	48	25.8	26.2	26.7	1.51	2.70	p<0.01	49	24.9	25.4	25.8	1.60
9	49	26.3	26.7	27.1	1.49	2.22	p<0.05	53	25.5	26.0	26.4	1.74
10	50	26.8	27.2	27.7	1.56	2.34	p<0.05	54	25.9	26.4	26.9	1.84
11	50	27.4	27.9	28.3	1.66	2.44	p<0.05	55	26.5	27.0	27.5	1.99
12	50	28.1	28.6	29.1	1.77	2.97	p<0.01	55	26.9	27.5	28.0	2.06
13	50	28.8	29.3	29.8	1.91	3.55	p<0.001	55	27.4	27.9	28.5	2.11
14	50	29.5	30.1	30.6	2.05	4.14	p<0.001	55	27.8	28.4	28.9	2.15
15	50	30.2	30.8	31.4	2.19	4.74	p<0.001	55	28.2	28.8	29.4	2.19
16	50	30.9	31.5	32.2	2.32	5.32	p<0.001	55	28.6	29.1	29.7	2.22
17	50	31.5	32.1	32.8	2.44	5.80	p<0.001	55	28.9	29.5	30.1	2.25
18	49	31.9	32.6	33.3	2.49	6.09	p<0.001	55	29.2	29.8	30.4	2.25
19	49	32.4	33.1	33.8	2.59	6.46	p<0.001	55	29.4	30.0	30.6	2.28
20	46	32.4	33.2	33.9	2.52	6.19	p<0.001	55	29.6	30.2	30.8	2.30
21	46	32.6	33.3	34.0	2.51	6.31	p<0.001	54	29.7	30.3	30.9	2.30
22	46	32.5	33.3	34.0	2.48	6.33	p<0.001	53	29.6	30.2	30.9	2.26
23	41	32.6	33.4	34.2	2.55	5.94	p<0.001	42	29.5	30.2	30.9	2.40
24	35	32.6	33.4	34.3	2.56	5.87	p<0.001	41	29.4	30.1	30.8	2.39
25	30	32.8	33.7	34.7	2.62	5.60	p<0.001	35	29.6	30.3	31.1	2.28

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.03	0.47	0.91	0.60	-0.77		7	0.50	0.66	0.81	0.21
5	18	0.37	0.56	0.75	0.42	-1.35		19	0.59	0.72	0.84	0.27
6	35	0.29	0.42	0.55	0.40	-2.00		27	0.50	0.60	0.70	0.26
7	43	0.35	0.45	0.56	0.35	-0.29		39	0.39	0.47	0.56	0.28
8	48	0.42	0.50	0.59	0.30	0.72		49	0.39	0.46	0.53	0.26
9	49	0.48	0.55	0.62	0.25	1.51		53	0.41	0.48	0.54	0.24
10	50	0.57	0.64	0.71	0.24	3.79	p<0.001	54	0.43	0.48	0.53	0.19
11	50	0.62	0.68	0.75	0.23	5.52	p<0.001	55	0.43	0.47	0.51	0.16
12	50	0.67	0.74	0.81	0.24	7.21	p<0.001	55	0.42	0.46	0.50	0.15
13	50	0.70	0.76	0.83	0.24	7.98	p<0.001	55	0.42	0.46	0.49	0.14
14	50	0.70	0.76	0.83	0.23	8.77	p<0.001	55	0.40	0.43	0.47	0.14
15	50	0.68	0.75	0.81	0.23	9.64	p<0.001	55	0.37	0.40	0.43	0.13
16	50	0.64	0.70	0.76	0.22	9.90	p<0.001	55	0.33	0.37	0.40	0.13
17	50	0.57	0.63	0.68	0.20	9.59	p<0.001	55	0.30	0.33	0.36	0.12
18	49	0.47	0.52	0.58	0.19	8.41	p<0.001	55	0.24	0.27	0.30	0.12
19	49	0.37	0.43	0.48	0.19	6.63	p<0.001	55	0.18	0.22	0.25	0.12
20	46	0.22	0.27	0.33	0.18	3.63	p<0.001	55	0.13	0.16	0.19	0.13
21	46	0.09	0.14	0.20	0.19	1.24		54	0.07	0.11	0.14	0.13
22	46	-0.03	0.03	0.08	0.19	-0.74		53	0.01	0.05	0.09	0.15
23	41	-0.07	-0.02	0.02	0.14	-1.27		42	-0.02	0.01	0.04	0.11
24	35	-0.06	-0.02	0.02	0.12	-0.65		41	-0.04	-0.00	0.03	0.11
25	30	-0.02	0.02	0.05	0.10	0.70		35	-0.04	-0.00	0.04	0.11


MandPAH Lower posterior dentoalveolar height
MandPAH mm
35
33
31
29
27
25
23
21
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


MandPAH Lower posterior dentoalveolar height, growth velocity
MandPAH mm/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

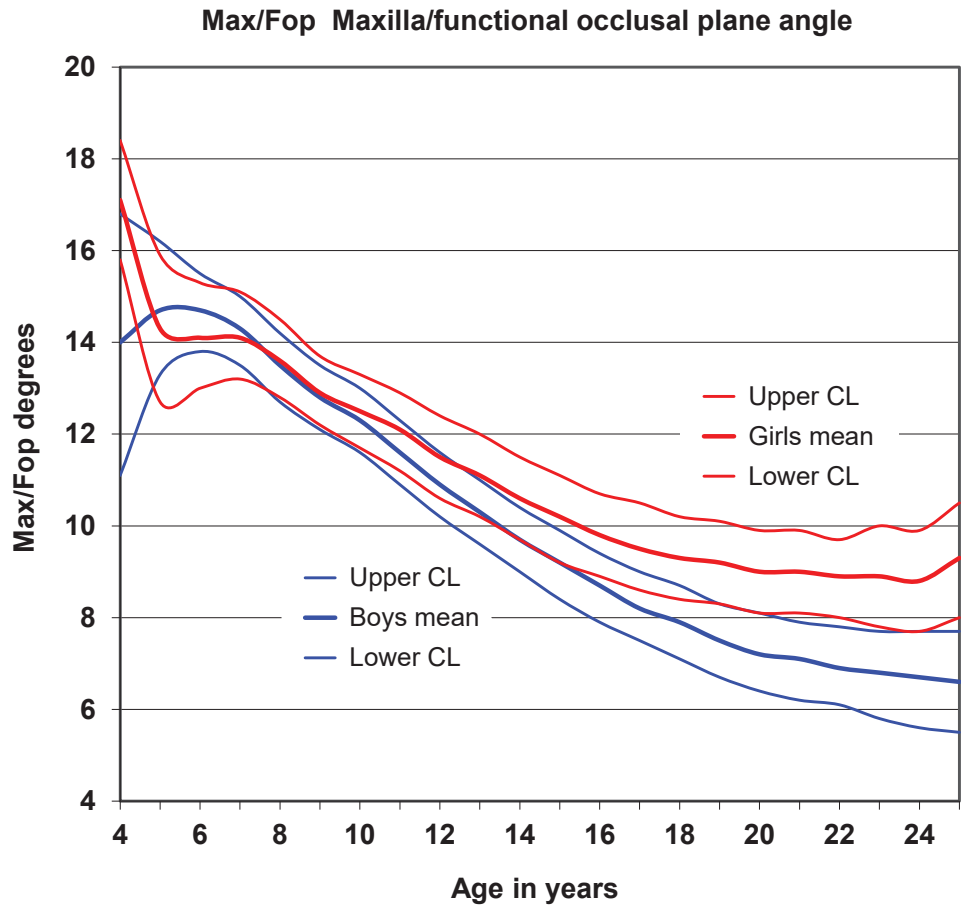


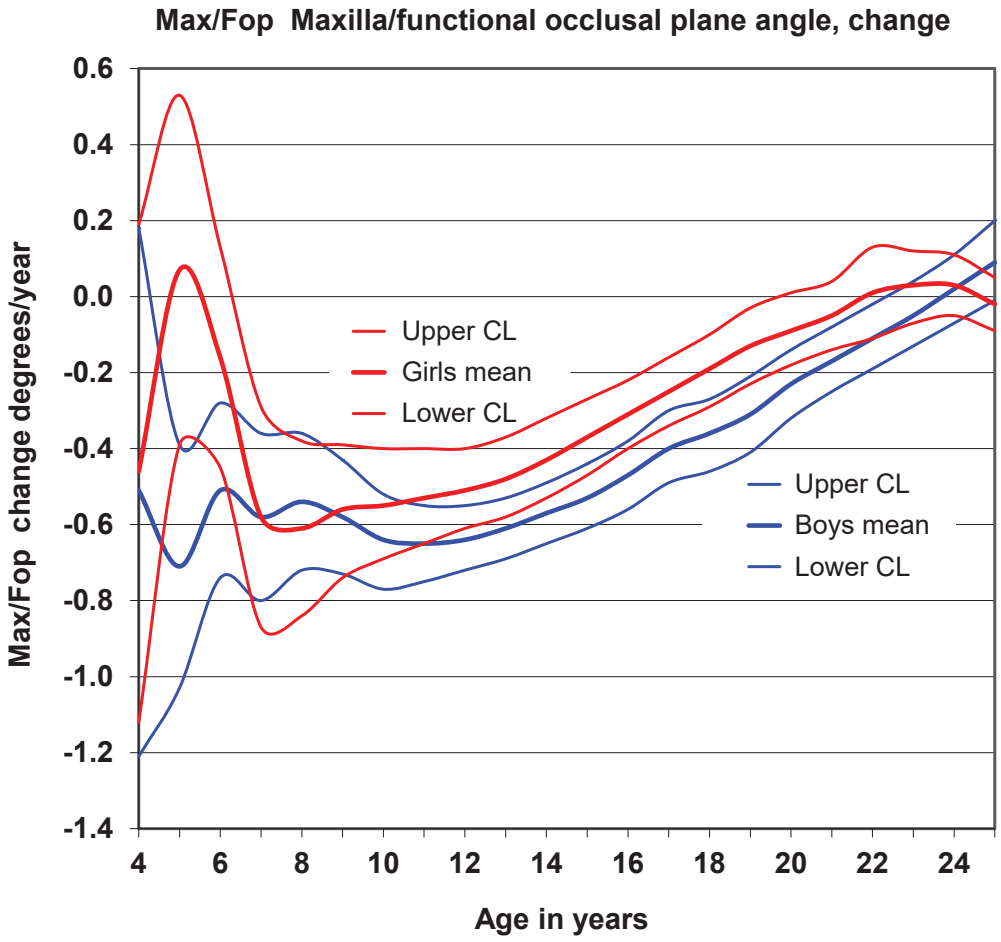
Max/Fop (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	11.14	13.97	16.79	3.81	1.99		7	15.81	17.13	18.45	1.78
5	18	13.30	14.73	16.15	3.08	-0.37		19	12.74	14.32	15.91	3.52
6	35	13.80	14.66	15.51	2.58	-0.77		27	12.96	14.11	15.26	3.04
7	43	13.54	14.28	15.01	2.45	-0.23		39	13.15	14.13	15.12	3.13
8	48	12.74	13.46	14.18	2.53	0.29		49	12.79	13.62	14.46	2.99
9	49	12.16	12.86	13.56	2.50	0.13		53	12.15	12.92	13.69	2.86
10	50	11.61	12.29	12.96	2.43	0.41		54	11.71	12.51	13.30	2.98
11	50	10.89	11.58	12.26	2.46	0.84		55	11.19	12.06	12.92	3.27
12	50	10.23	10.94	11.64	2.55	1.02		55	10.65	11.54	12.43	3.36
13	50	9.59	10.30	11.02	2.57	1.27		55	10.15	11.06	11.96	3.42
14	50	8.99	9.71	10.44	2.61	1.46		55	9.68	10.59	11.51	3.47
15	50	8.42	9.15	9.88	2.63	1.65		55	9.23	10.15	11.07	3.47
16	50	7.90	8.64	9.37	2.64	1.96		55	8.91	9.82	10.74	3.45
17	50	7.46	8.20	8.94	2.67	2.21	p<0.05	55	8.63	9.54	10.46	3.46
18	49	7.09	7.86	8.64	2.76	2.37	p<0.05	55	8.42	9.32	10.23	3.43
19	49	6.73	7.52	8.31	2.83	2.66	p<0.01	55	8.26	9.16	10.07	3.41
20	46	6.39	7.21	8.03	2.83	2.91	p<0.01	55	8.15	9.04	9.94	3.38
21	46	6.22	7.05	7.88	2.88	3.11	p<0.01	54	8.12	9.02	9.93	3.38
22	46	6.06	6.92	7.78	2.98	3.07	p<0.01	53	7.98	8.86	9.74	3.27
23	41	5.82	6.74	7.67	3.02	2.99	p<0.01	42	7.84	8.91	9.99	3.57
24	35	5.61	6.63	7.66	3.08	2.86	p<0.01	41	7.75	8.83	9.91	3.53
25	30	5.49	6.59	7.69	3.08	3.15	p<0.01	35	8.04	9.27	10.49	3.69

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.21	-0.51	0.18	0.94	0.10		7	-1.12	-0.46	0.19	0.88
5	18	-1.03	-0.71	-0.39	0.70	2.69	p<0.05	19	-0.39	0.07	0.53	1.02
6	35	-0.73	-0.51	-0.28	0.69	1.87		27	-0.45	-0.16	0.13	0.77
7	43	-0.80	-0.57	-0.35	0.74	-0.02		39	-0.87	-0.58	-0.29	0.93
8	48	-0.71	-0.54	-0.36	0.63	-0.48		49	-0.84	-0.61	-0.38	0.82
9	49	-0.73	-0.58	-0.43	0.53	0.13		53	-0.74	-0.56	-0.39	0.66
10	50	-0.77	-0.64	-0.52	0.46	0.95		54	-0.69	-0.55	-0.40	0.55
11	50	-0.75	-0.66	-0.56	0.35	1.56		55	-0.65	-0.53	-0.40	0.47
12	50	-0.72	-0.64	-0.56	0.30	1.90		55	-0.61	-0.51	-0.40	0.40
13	50	-0.69	-0.61	-0.53	0.29	1.94		55	-0.58	-0.48	-0.37	0.41
14	50	-0.65	-0.57	-0.49	0.29	2.16	p<0.05	55	-0.53	-0.43	-0.32	0.39
15	50	-0.62	-0.53	-0.45	0.31	2.38	p<0.05	55	-0.47	-0.37	-0.27	0.38
16	50	-0.56	-0.48	-0.39	0.32	2.55	p<0.05	55	-0.40	-0.31	-0.22	0.34
17	50	-0.49	-0.40	-0.31	0.33	2.36	p<0.05	55	-0.34	-0.25	-0.16	0.34
18	49	-0.46	-0.36	-0.27	0.34	2.46	p<0.05	55	-0.29	-0.19	-0.10	0.36
19	49	-0.41	-0.31	-0.21	0.36	2.46	p<0.05	55	-0.23	-0.13	-0.03	0.38
20	46	-0.32	-0.23	-0.14	0.32	2.12	p<0.05	55	-0.18	-0.09	0.01	0.35
21	46	-0.25	-0.17	-0.08	0.30	1.85		54	-0.14	-0.05	0.04	0.33
22	46	-0.19	-0.11	-0.02	0.29	1.48		53	-0.11	0.01	0.13	0.45
23	41	-0.13	-0.04	0.04	0.28	1.07		42	-0.07	0.03	0.12	0.30
24	35	-0.06	0.03	0.12	0.27	-0.01		41	-0.05	0.03	0.11	0.26
25	30	-0.00	0.11	0.22	0.31	-1.97		35	-0.09	-0.02	0.05	0.20


Max/Fop Maxilla/functional occlusal plane angle
Max/Fop degrees
20
18
16
14
12
10
8
6
4
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


Max/Fop Maxilla/functional occlusal plane angle, change
Max/Fop change degrees/year
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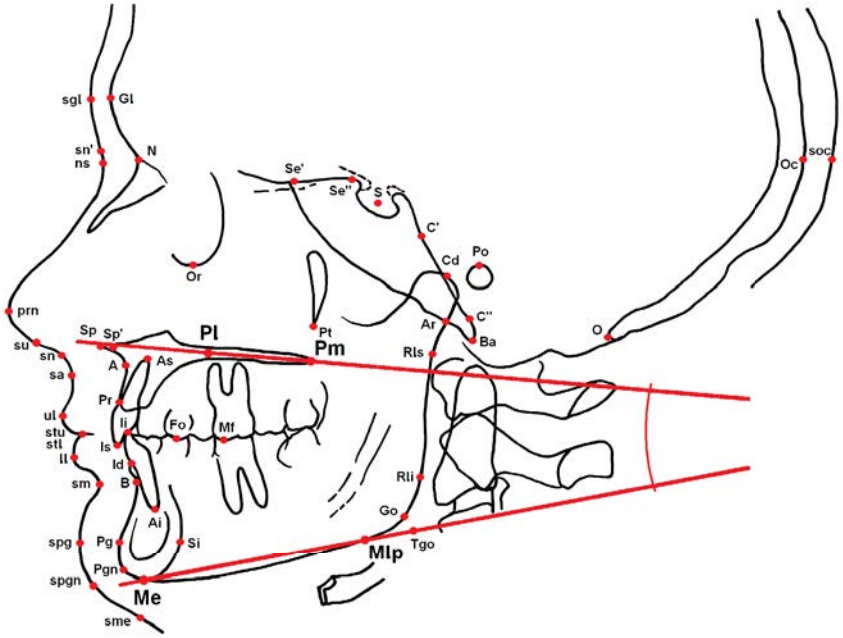
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

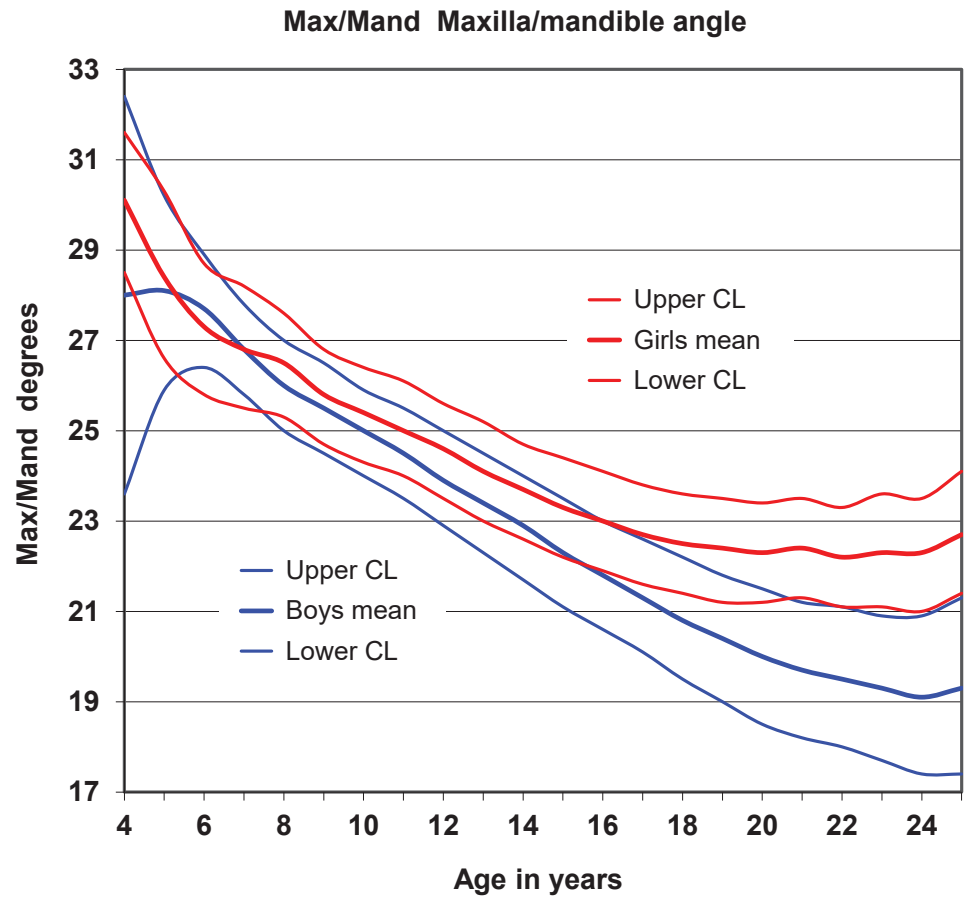


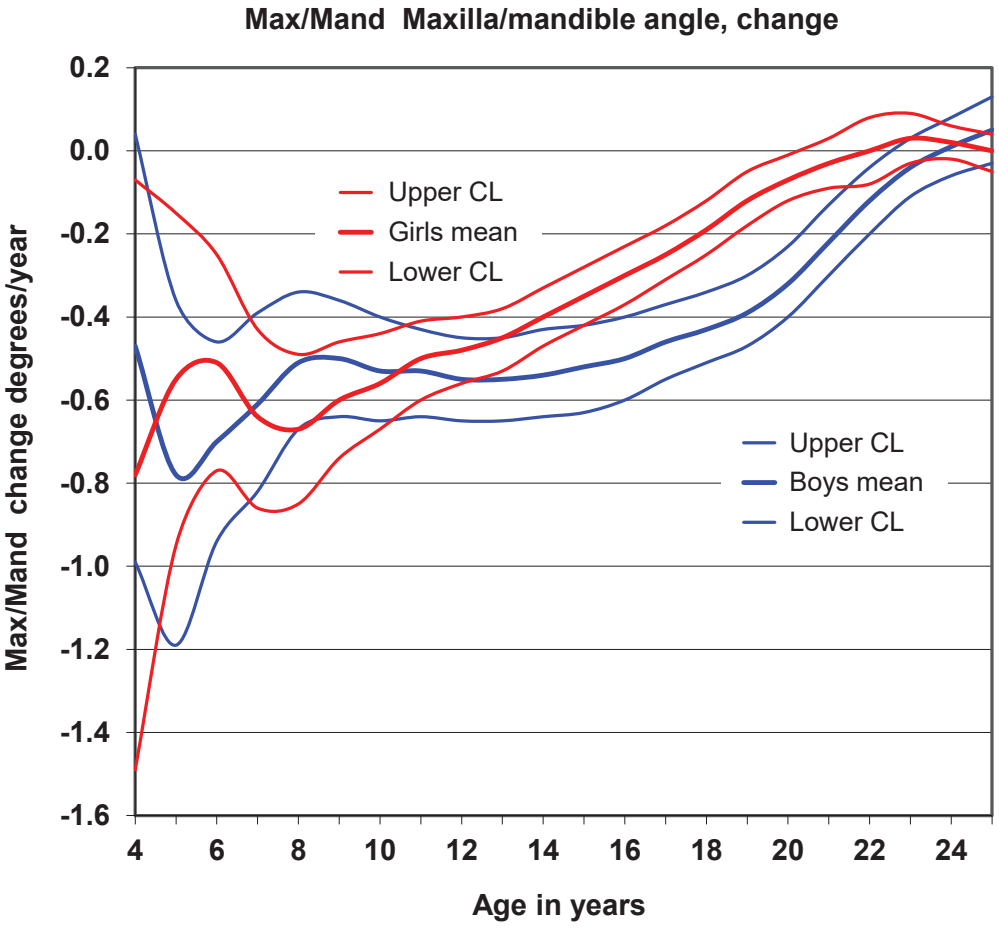
Max/Mand (degrees)

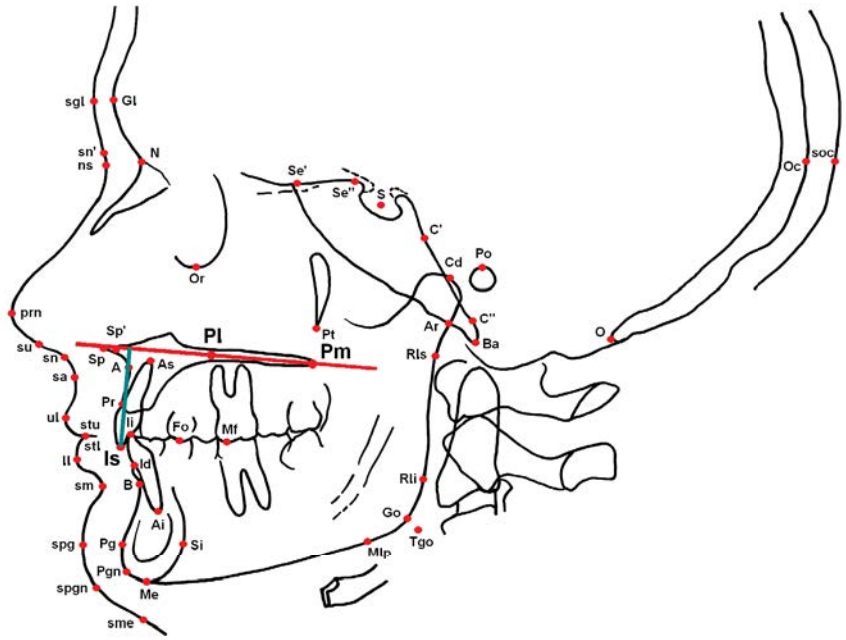
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	23.6	28.0	32.4	5.94	0.87		7	28.5	30.1	31.6	2.06
5	18	25.9	28.1	30.2	4.61	0.26		19	26.6	28.4	30.3	4.10
6	35	26.4	27.7	28.9	3.69	-0.41		27	25.8	27.3	28.7	3.81
7	43	25.8	26.8	27.8	3.25	0.03		39	25.5	26.8	28.2	4.34
8	48	25.0	26.0	27.0	3.46	0.60		49	25.3	26.5	27.6	4.09
9	49	24.5	25.5	26.5	3.47	0.36		53	24.7	25.8	26.8	3.88
10	50	24.1	25.0	26.0	3.44	0.49		54	24.3	25.4	26.4	3.92
11	50	23.5	24.5	25.5	3.58	0.73		55	24.0	25.0	26.1	4.08
12	50	22.9	23.9	25.0	3.73	0.79		55	23.5	24.6	25.6	4.07
13	50	22.3	23.4	24.5	3.89	0.90		55	23.0	24.1	25.2	4.08
14	50	21.7	22.8	24.0	4.09	1.02		55	22.6	23.7	24.7	4.09
15	50	21.1	22.3	23.5	4.28	1.18		55	22.2	23.3	24.4	4.08
16	50	20.5	21.8	23.0	4.45	1.42		55	21.9	23.0	24.1	4.12
17	50	20.0	21.3	22.6	4.61	1.62		55	21.6	22.7	23.8	4.17
18	49	19.5	20.8	22.2	4.79	1.90		55	21.4	22.5	23.6	4.20
19	49	19.0	20.4	21.8	4.91	2.19	p<0.05	55	21.2	22.4	23.5	4.22
20	46	18.5	20.0	21.5	5.14	2.47	p<0.05	55	21.2	22.3	23.4	4.23
21	46	18.2	19.7	21.2	5.26	2.88	p<0.01	54	21.3	22.4	23.5	4.17
22	46	18.0	19.5	21.1	5.40	2.84	p<0.01	53	21.1	22.2	23.3	4.05
23	41	17.6	19.3	20.9	5.25	3.01	p<0.01	42	21.1	22.3	23.6	4.07
24	35	17.3	19.1	20.9	5.31	2.94	p<0.01	41	21.0	22.3	23.5	4.08
25	30	17.4	19.3	21.3	5.44	2.92	p<0.01	35	21.4	22.7	24.1	4.02

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.99	-0.47	0.04	0.70	-0.67		7	-1.49	-0.78	-0.07	0.96
5	18	-1.19	-0.78	-0.36	0.89	0.78		19	-0.95	-0.55	-0.15	0.88
6	35	-0.92	-0.69	-0.46	0.71	0.99		27	-0.77	-0.51	-0.25	0.69
7	43	-0.82	-0.60	-0.39	0.71	-0.26		39	-0.86	-0.64	-0.43	0.68
8	48	-0.67	-0.50	-0.34	0.58	-1.34		49	-0.85	-0.67	-0.49	0.63
9	49	-0.64	-0.50	-0.36	0.49	-0.99		53	-0.74	-0.60	-0.46	0.52
10	50	-0.65	-0.53	-0.40	0.44	-0.36		54	-0.67	-0.56	-0.44	0.43
11	50	-0.64	-0.54	-0.43	0.38	0.46		55	-0.60	-0.50	-0.41	0.36
12	50	-0.66	-0.55	-0.45	0.38	1.12		55	-0.56	-0.48	-0.40	0.30
13	50	-0.66	-0.55	-0.45	0.37	1.58		55	-0.53	-0.45	-0.38	0.28
14	50	-0.65	-0.54	-0.44	0.38	2.21	p<0.05	55	-0.47	-0.40	-0.33	0.27
15	50	-0.63	-0.53	-0.42	0.38	2.90	p<0.01	55	-0.42	-0.35	-0.28	0.26
16	50	-0.60	-0.50	-0.40	0.36	3.38	p<0.01	55	-0.37	-0.30	-0.23	0.25
17	50	-0.55	-0.46	-0.37	0.33	3.88	p<0.001	55	-0.31	-0.25	-0.18	0.25
18	49	-0.52	-0.43	-0.34	0.31	4.38	p<0.001	55	-0.25	-0.19	-0.12	0.25
19	49	-0.48	-0.39	-0.30	0.31	4.93	p<0.001	55	-0.18	-0.12	-0.05	0.26
20	46	-0.40	-0.32	-0.23	0.29	4.96	p<0.001	55	-0.12	-0.07	-0.01	0.22
21	46	-0.30	-0.22	-0.13	0.30	3.66	p<0.001	54	-0.09	-0.03	0.03	0.21
22	46	-0.20	-0.12	-0.04	0.28	1.97		53	-0.08	-0.00	0.08	0.29
23	41	-0.10	-0.03	0.03	0.22	1.34		42	-0.03	0.03	0.09	0.20
24	35	-0.05	0.02	0.09	0.21	-0.03		41	-0.02	0.02	0.06	0.14
25	30	-0.01	0.07	0.14	0.20	-1.67		35	-0.05	-0.00	0.04	0.14


Max/Mand Maxilla/mandible angle
Max/Mand degrees
33
31
29
27
25
23
21
19
17
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


Max/Mand Maxilla/mandible angle, change
Max/Mand change degrees/year
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

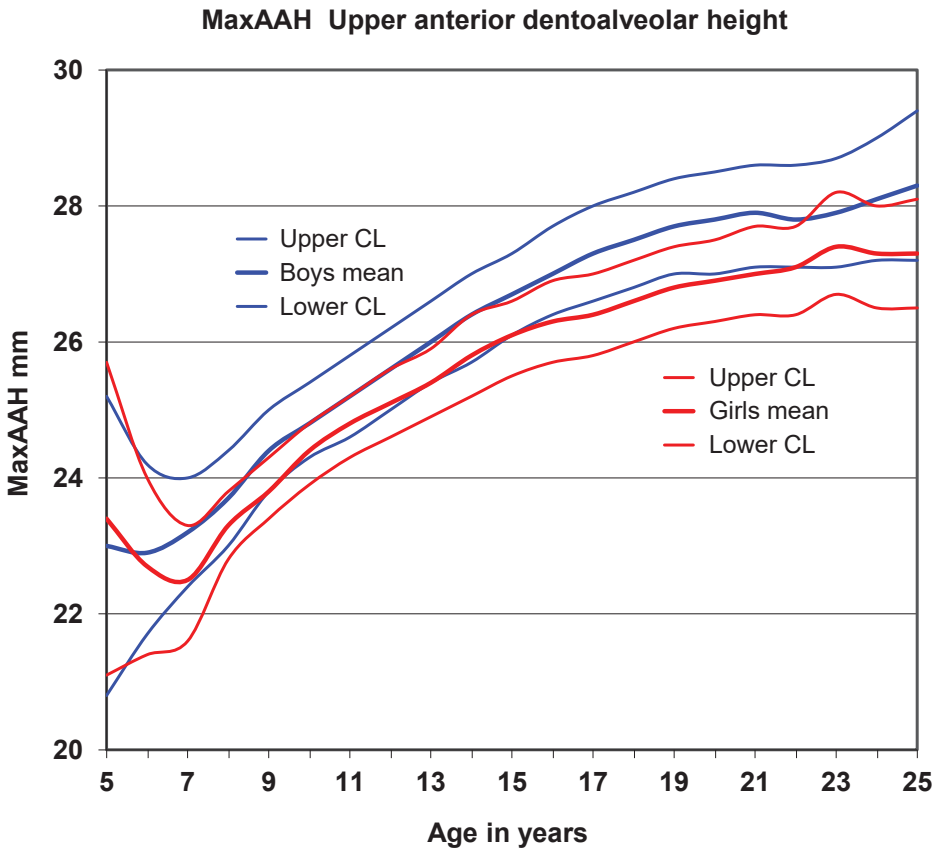


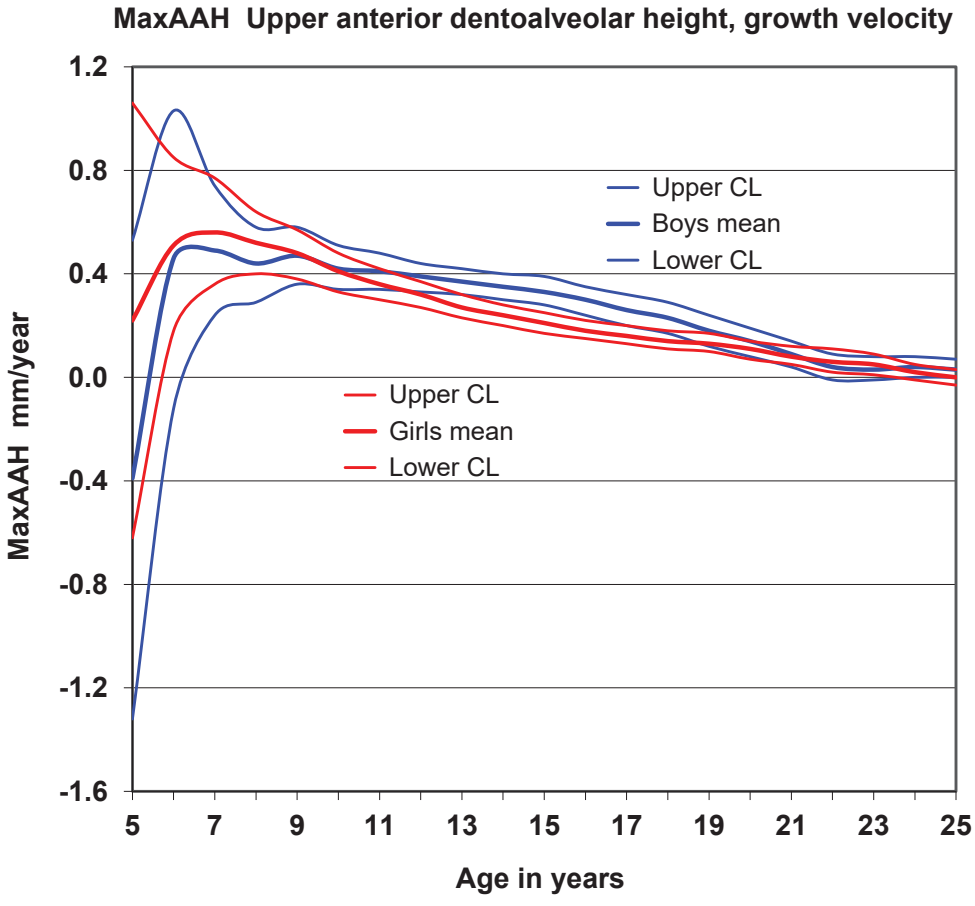
MaxAAH (mm)

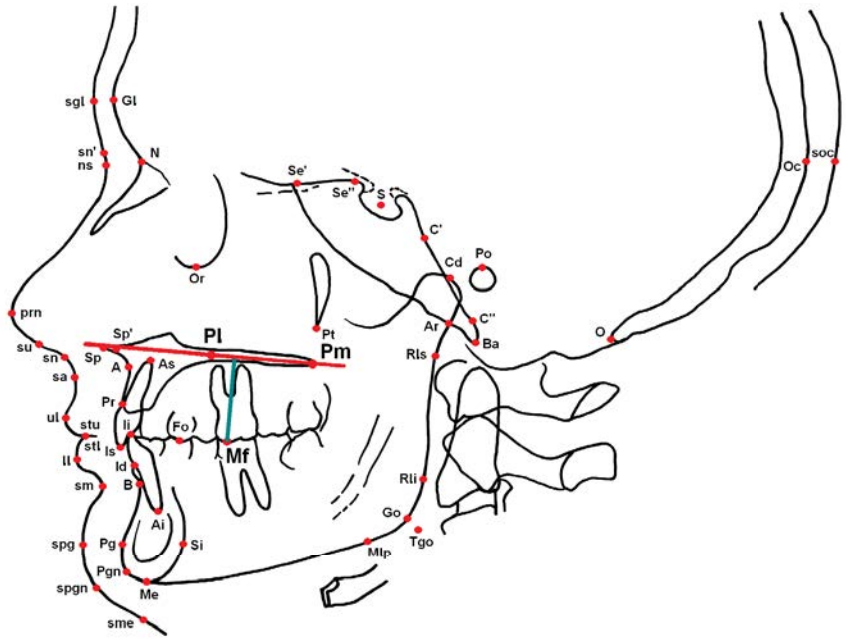
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	20.8	23.0	25.2	2.24	-0.23		3	21.1	23.4	25.7	2.04
6	9	21.7	22.9	24.2	1.92	0.23		8	21.4	22.7	24.0	1.91
7	17	22.4	23.2	24.0	1.69	1.03		22	21.8	22.6	23.4	1.92
8	32	23.0	23.7	24.4	2.05	0.80		40	22.9	23.4	23.9	1.55
9	46	23.8	24.4	24.9	1.97	1.44		51	23.4	23.9	24.3	1.65
10	48	24.3	24.8	25.4	1.99	1.35		53	23.9	24.3	24.8	1.71
11	48	24.6	25.2	25.8	2.09	1.19		54	24.3	24.8	25.2	1.78
12	48	25.0	25.6	26.2	2.18	1.26		54	24.6	25.1	25.6	1.86
13	49	25.4	26.0	26.6	2.22	1.40		54	24.9	25.4	25.9	1.92
14	49	25.7	26.4	27.0	2.29	1.24		55	25.2	25.8	26.4	2.18
15	49	26.1	26.7	27.3	2.30	1.48		55	25.5	26.0	26.6	2.22
16	49	26.4	27.0	27.7	2.34	1.71		55	25.7	26.3	26.9	2.26
17	49	26.6	27.3	28.0	2.37	1.88		55	25.8	26.4	27.0	2.30
18	48	26.8	27.5	28.2	2.40	1.86		55	26.0	26.6	27.2	2.32
19	49	27.0	27.7	28.4	2.47	1.92		55	26.2	26.8	27.4	2.33
20	46	27.1	27.8	28.5	2.49	1.80		55	26.3	26.9	27.5	2.36
21	46	27.1	27.9	28.6	2.57	1.72		54	26.4	27.0	27.7	2.39
22	45	27.1	27.9	28.6	2.63	1.57		53	26.4	27.1	27.7	2.43
23	40	27.1	27.9	28.7	2.59	0.88		40	26.7	27.4	28.2	2.46
24	35	27.2	28.1	29.0	2.75	1.42		38	26.5	27.3	28.0	2.31
25	28	27.2	28.3	29.4	2.90	1.45		34	26.5	27.3	28.1	2.38

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-1.32	-0.39	0.53	0.95	-0.93		3	-0.62	0.22	1.06	0.74
6	9	-0.12	0.46	1.03	0.88	-0.17		8	0.18	0.51	0.85	0.48
7	17	0.24	0.49	0.74	0.52	-0.15		22	0.32	0.52	0.71	0.47
8	32	0.29	0.44	0.58	0.42	-0.69		40	0.38	0.50	0.62	0.38
9	46	0.36	0.47	0.58	0.38	0.21		51	0.37	0.46	0.55	0.33
10	48	0.34	0.43	0.52	0.31	0.48		53	0.32	0.40	0.47	0.28
11	48	0.34	0.41	0.48	0.25	1.21		54	0.29	0.35	0.41	0.23
12	48	0.33	0.39	0.44	0.19	1.91		54	0.26	0.32	0.37	0.19
13	49	0.32	0.37	0.42	0.17	3.03	p<0.01	54	0.23	0.27	0.32	0.17
14	49	0.31	0.35	0.40	0.17	3.67	p<0.001	55	0.20	0.24	0.28	0.15
15	49	0.28	0.33	0.39	0.19	3.75	p<0.001	55	0.17	0.21	0.25	0.14
16	49	0.24	0.30	0.36	0.21	3.35	p<0.01	55	0.15	0.19	0.22	0.14
17	49	0.21	0.27	0.32	0.21	3.13	p<0.01	55	0.13	0.16	0.20	0.13
18	48	0.17	0.23	0.29	0.22	2.49	p<0.05	55	0.11	0.14	0.18	0.13
19	49	0.12	0.18	0.25	0.22	1.44		55	0.10	0.13	0.17	0.14
20	46	0.08	0.14	0.19	0.19	1.01		55	0.07	0.11	0.14	0.13
21	46	0.04	0.09	0.14	0.17	0.18		54	0.05	0.08	0.12	0.13
22	45	-0.01	0.04	0.09	0.17	-0.68		53	0.02	0.06	0.11	0.17
23	40	-0.01	0.03	0.08	0.15	-0.59		40	0.01	0.05	0.09	0.11
24	35	-0.01	0.03	0.08	0.13	0.52		38	-0.01	0.02	0.05	0.10
25	28	-0.01	0.03	0.06	0.09	1.09		34	-0.03	0.00	0.03	0.08


MaxAAH Upper anterior dentoalveolar height
MaxAAH mm
30
28
26
24
22
20
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


MaxAAH Upper anterior dentoalveolar height, growth velocity
MaxAAH mm/year
1.2
0.8
0.4
0.0
-0.4
-0.8
-1.2
-1.6
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

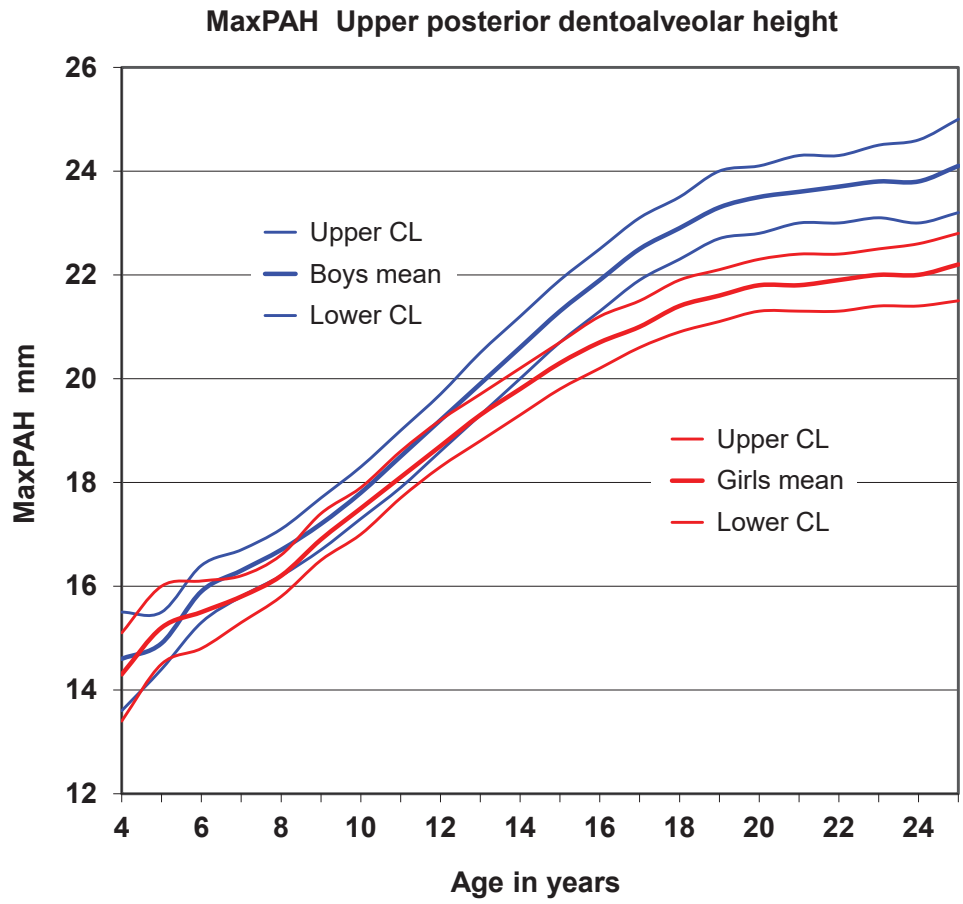


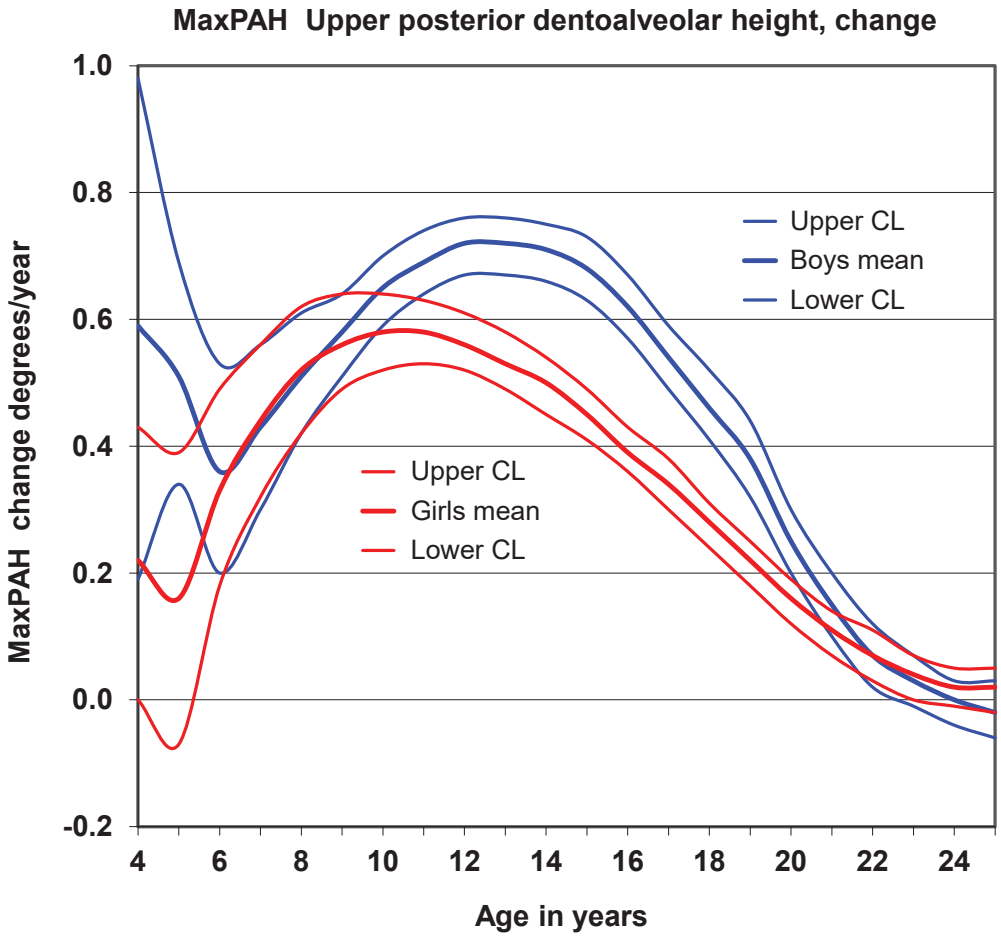
MaxPAH (mm)

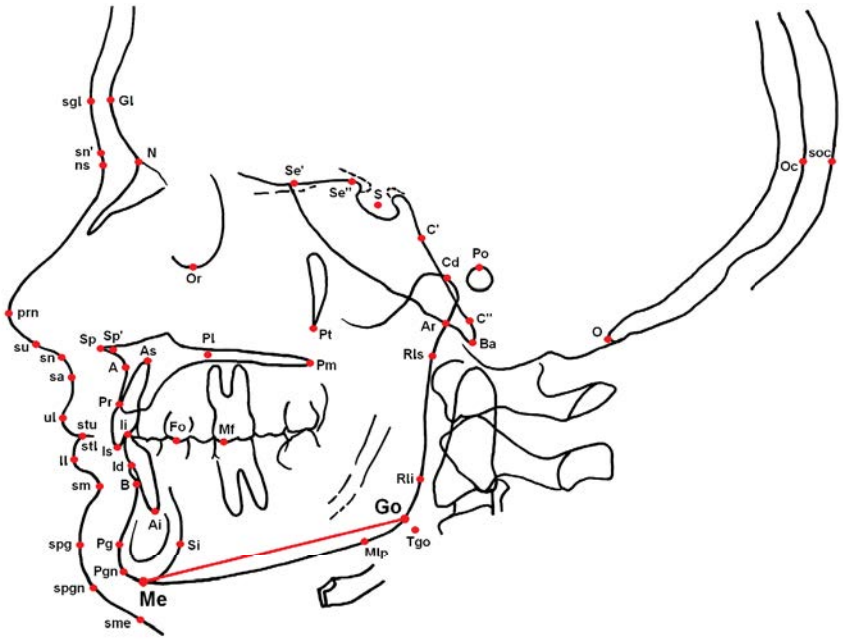
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	13.6	14.6	15.5	1.28	0.48		7	13.4	14.3	15.1	1.16
5	18	14.4	14.9	15.5	1.23	-0.65		19	14.5	15.2	16.0	1.64
6	35	15.3	15.9	16.4	1.59	0.91		27	14.8	15.5	16.1	1.69
7	43	15.8	16.3	16.7	1.61	1.40		39	15.3	15.8	16.2	1.50
8	48	16.2	16.7	17.1	1.68	1.35		49	15.8	16.2	16.6	1.46
9	49	16.7	17.2	17.6	1.77	0.68		53	16.5	16.9	17.4	1.57
10	50	17.3	17.8	18.3	1.85	0.90		54	17.0	17.5	17.9	1.63
11	50	17.9	18.5	19.0	1.95	0.93		55	17.7	18.1	18.6	1.68
12	50	18.6	19.2	19.7	2.02	1.24		55	18.3	18.7	19.2	1.72
13	50	19.3	19.9	20.5	2.06	1.67		55	18.8	19.3	19.7	1.74
14	50	20.0	20.6	21.2	2.10	2.14	p<0.05	55	19.3	19.8	20.2	1.77
15	50	20.7	21.3	21.9	2.14	2.64	p<0.01	55	19.8	20.3	20.7	1.80
16	50	21.3	21.9	22.5	2.18	3.20	p<0.01	55	20.2	20.7	21.2	1.83
17	50	21.9	22.5	23.1	2.24	3.59	p<0.001	55	20.6	21.0	21.5	1.87
18	49	22.3	22.9	23.5	2.24	3.82	p<0.001	55	20.9	21.4	21.9	1.89
19	49	22.7	23.3	24.0	2.31	4.22	p<0.001	55	21.1	21.6	22.1	1.92
20	46	22.9	23.5	24.2	2.24	4.17	p<0.001	55	21.3	21.8	22.3	1.95
21	46	23.0	23.6	24.3	2.26	4.28	p<0.001	54	21.3	21.8	22.4	1.96
22	46	23.0	23.7	24.3	2.31	4.16	p<0.001	53	21.3	21.9	22.4	1.99
23	41	23.1	23.8	24.5	2.31	3.93	p<0.001	42	21.4	22.0	22.5	1.97
24	35	23.0	23.8	24.7	2.47	3.56	p<0.001	41	21.4	22.0	22.6	1.98
25	30	23.2	24.1	25.0	2.42	3.51	p<0.001	35	21.5	22.2	22.8	2.01

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.19	0.59	0.98	0.53	1.62		7	0.00	0.22	0.43	0.29
5	18	0.34	0.51	0.69	0.38	2.37	p<0.05	19	-0.07	0.16	0.39	0.51
6	35	0.20	0.36	0.52	0.49	0.23		27	0.18	0.33	0.49	0.41
7	43	0.30	0.43	0.56	0.44	-0.12		39	0.32	0.44	0.56	0.39
8	48	0.42	0.51	0.60	0.33	-0.10		49	0.42	0.52	0.62	0.36
9	49	0.51	0.58	0.64	0.23	0.21		53	0.49	0.56	0.64	0.29
10	50	0.59	0.65	0.70	0.20	1.51		54	0.52	0.58	0.64	0.22
11	50	0.65	0.69	0.74	0.17	3.33	p<0.01	55	0.53	0.58	0.63	0.19
12	50	0.67	0.72	0.77	0.17	4.59	p<0.001	55	0.52	0.56	0.61	0.18
13	50	0.67	0.72	0.77	0.17	5.67	p<0.001	55	0.49	0.53	0.58	0.17
14	50	0.66	0.71	0.76	0.17	6.19	p<0.001	55	0.45	0.50	0.54	0.17
15	50	0.63	0.68	0.73	0.18	6.89	p<0.001	55	0.41	0.45	0.49	0.16
16	50	0.57	0.62	0.67	0.18	7.07	p<0.001	55	0.36	0.39	0.43	0.15
17	50	0.49	0.54	0.59	0.18	6.53	p<0.001	55	0.30	0.34	0.38	0.14
18	49	0.41	0.46	0.52	0.19	5.96	p<0.001	55	0.24	0.28	0.31	0.13
19	49	0.32	0.38	0.44	0.21	4.93	p<0.001	55	0.18	0.22	0.25	0.12
20	46	0.20	0.25	0.30	0.18	2.97	p<0.01	55	0.12	0.16	0.19	0.13
21	46	0.10	0.15	0.20	0.17	1.23		54	0.07	0.11	0.14	0.13
22	46	0.02	0.07	0.12	0.16	-0.05		53	0.03	0.07	0.11	0.15
23	41	-0.01	0.03	0.06	0.12	-0.45		42	0.00	0.04	0.07	0.11
24	35	-0.04	-0.01	0.03	0.10	-1.14		41	-0.01	0.02	0.05	0.10
25	30	-0.07	-0.02	0.02	0.12	-1.46		35	-0.02	0.02	0.05	0.10

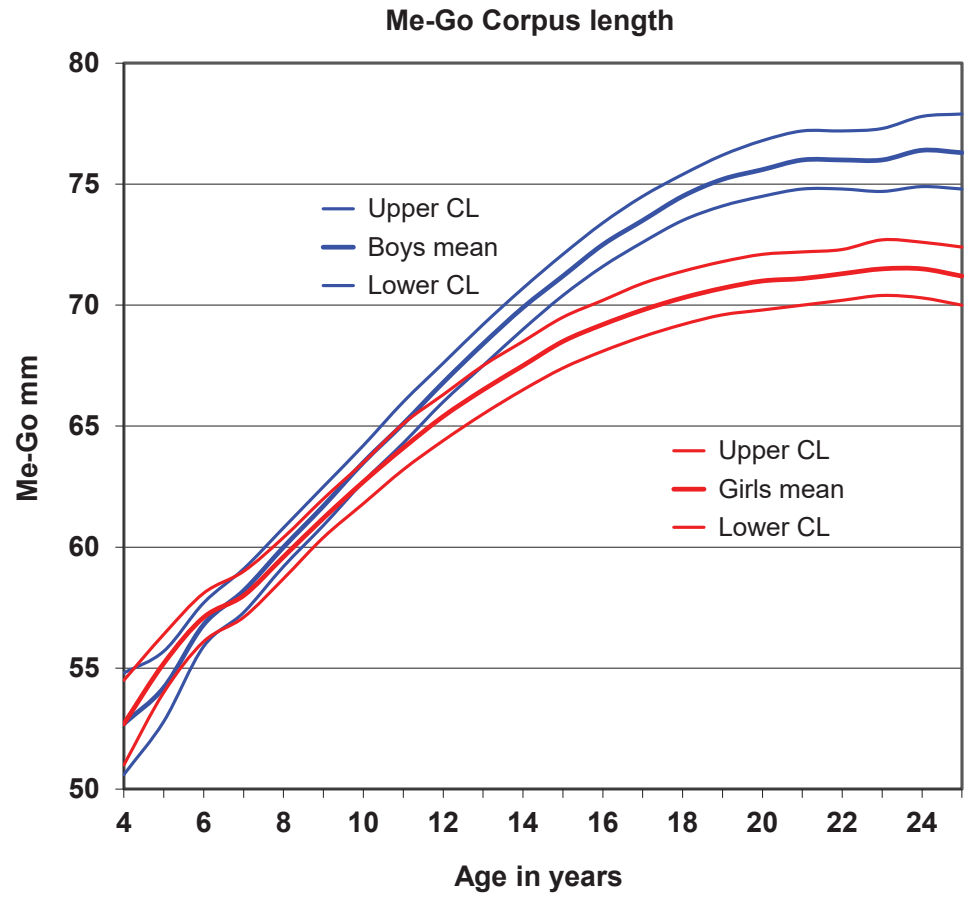

MaxPAH Upper posterior dentoalveolar height
MaxPAH mm
26
24
22
20
18
16
14
12
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

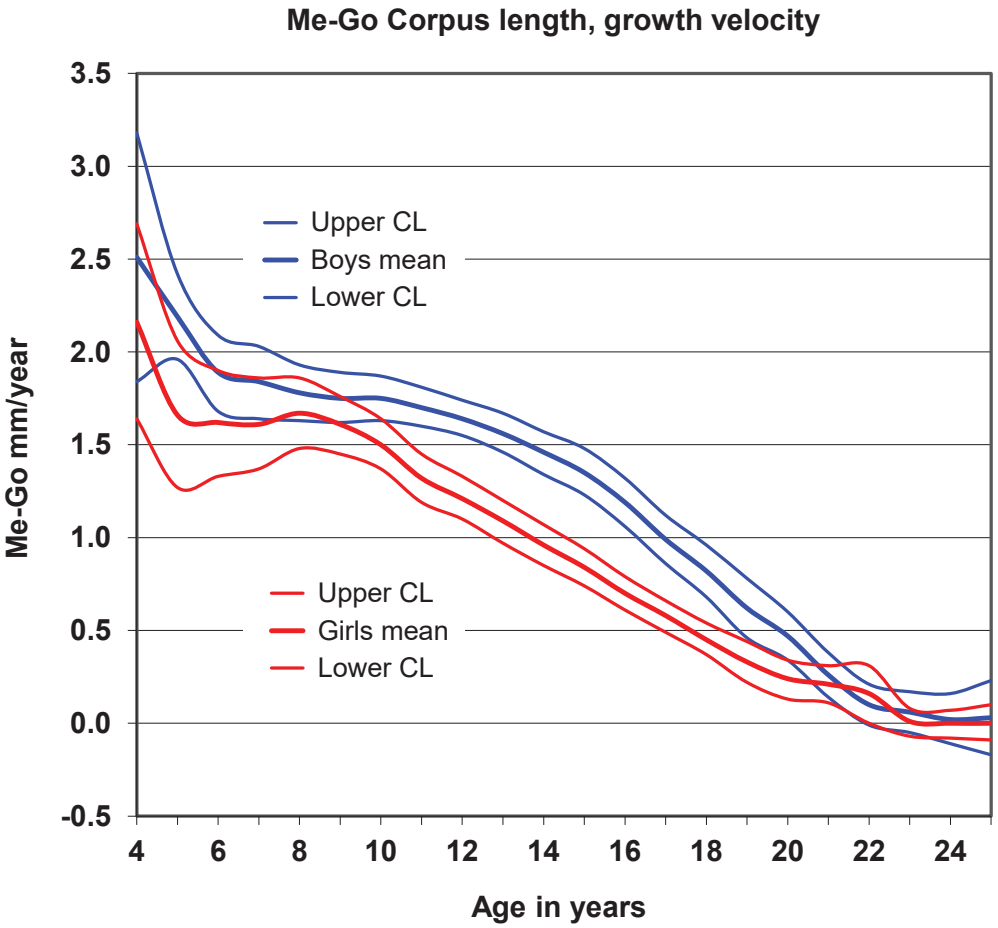

MaxPAH Upper posterior dentoalveolar height, change
MaxPAH change degrees/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

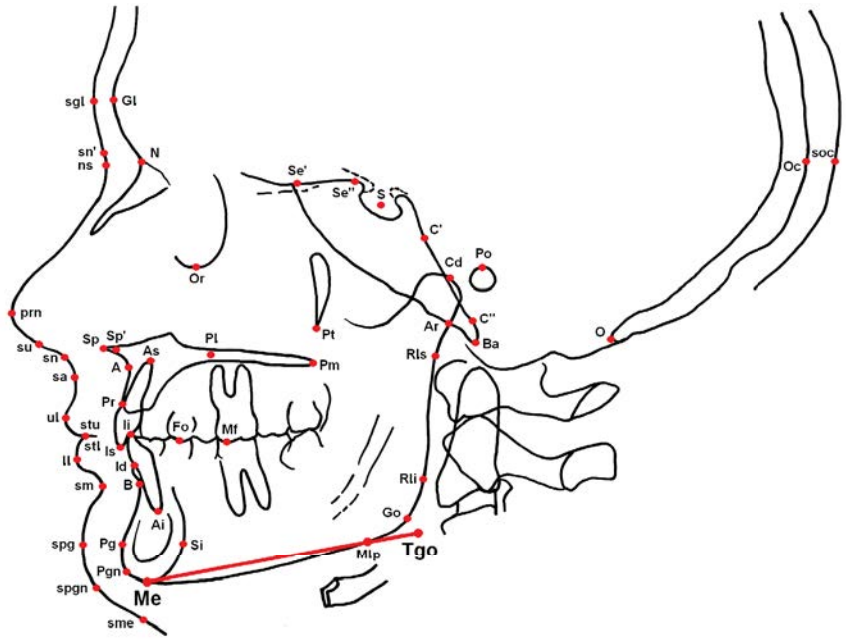


Me-Go (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	50.6	52.7	54.8	2.89	-0.02		7	51.0	52.7	54.5	2.38
5	18	52.8	54.2	55.7	3.13	-1.02		19	54.0	55.2	56.4	2.66
6	35	55.9	56.8	57.7	2.67	-0.42		27	56.1	57.1	58.1	2.73
7	43	57.3	58.2	59.1	2.93	0.27		39	57.1	58.0	59.0	3.03
8	48	59.2	60.0	60.8	2.71	0.75		49	58.7	59.6	60.4	3.17
9	49	60.9	61.7	62.4	2.72	0.80		53	60.4	61.2	62.0	3.03
10	50	62.6	63.4	64.2	2.80	1.22		54	61.8	62.7	63.5	3.20
11	50	64.3	65.1	65.9	2.97	1.51		55	63.2	64.1	65.1	3.42
12	50	65.9	66.8	67.6	3.04	2.13	p<0.05	55	64.4	65.4	66.3	3.59
13	50	67.5	68.4	69.2	3.08	2.79	p<0.01	55	65.5	66.5	67.5	3.67
14	50	69.0	69.9	70.8	3.13	3.44	p<0.001	55	66.5	67.5	68.5	3.81
15	50	70.4	71.3	72.2	3.18	4.07	p<0.001	55	67.4	68.5	69.5	3.93
16	50	71.7	72.6	73.5	3.24	4.75	p<0.001	55	68.1	69.2	70.2	4.01
17	50	72.7	73.6	74.5	3.29	5.24	p<0.001	55	68.7	69.8	70.9	4.09
18	49	73.6	74.6	75.5	3.35	5.73	p<0.001	55	69.2	70.3	71.4	4.12
19	49	74.3	75.3	76.3	3.57	6.03	p<0.001	55	69.6	70.7	71.8	4.12
20	46	74.7	75.8	76.9	3.74	6.08	p<0.001	55	69.8	71.0	72.1	4.18
21	46	75.0	76.1	77.2	3.87	6.24	p<0.001	54	70.0	71.1	72.2	4.09
22	46	75.0	76.1	77.2	3.93	6.12	p<0.001	53	70.2	71.3	72.3	3.91
23	41	74.9	76.1	77.4	4.10	5.30	p<0.001	42	70.4	71.5	72.7	3.76
24	35	75.1	76.5	77.9	4.22	5.51	p<0.001	41	70.3	71.5	72.6	3.74
25	30	74.9	76.4	77.9	4.18	5.34	p<0.001	35	70.0	71.2	72.4	3.66

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.84	2.51	3.18	0.90	0.81		7	1.64	2.16	2.69	0.71
5	18	1.96	2.19	2.42	0.50	2.24	p<0.05	19	1.27	1.66	2.06	0.88
6	35	1.66	1.84	2.03	0.55	1.40		27	1.33	1.62	1.90	0.74
7	43	1.63	1.81	1.99	0.61	1.28		39	1.37	1.61	1.86	0.77
8	48	1.62	1.77	1.91	0.50	0.77		49	1.48	1.67	1.86	0.67
9	49	1.61	1.75	1.88	0.48	1.31		53	1.45	1.61	1.76	0.58
10	50	1.63	1.75	1.88	0.44	2.68	p<0.01	54	1.37	1.50	1.64	0.51
11	50	1.61	1.72	1.82	0.38	4.55	p<0.001	55	1.19	1.32	1.45	0.50
12	50	1.58	1.67	1.75	0.31	6.07	p<0.001	55	1.10	1.21	1.33	0.43
13	50	1.49	1.59	1.68	0.33	6.67	p<0.001	55	0.97	1.09	1.20	0.43
14	50	1.39	1.48	1.58	0.35	6.86	p<0.001	55	0.85	0.96	1.07	0.43
15	50	1.28	1.38	1.49	0.38	7.19	p<0.001	55	0.74	0.84	0.94	0.39
16	50	1.10	1.22	1.33	0.40	7.09	p<0.001	55	0.61	0.70	0.79	0.34
17	50	0.89	1.01	1.13	0.43	5.88	p<0.001	55	0.49	0.58	0.66	0.33
18	49	0.70	0.84	0.97	0.48	4.86	p<0.001	55	0.37	0.45	0.54	0.32
19	49	0.48	0.63	0.79	0.56	3.18	p<0.01	55	0.22	0.33	0.44	0.41
20	46	0.34	0.47	0.60	0.45	2.74	p<0.01	55	0.13	0.24	0.34	0.40
21	46	0.14	0.26	0.38	0.41	0.65		54	0.11	0.21	0.31	0.38
22	46	-0.02	0.09	0.20	0.38	-0.68		53	0.00	0.16	0.31	0.57
23	41	-0.07	0.03	0.13	0.32	0.37		42	-0.07	0.01	0.08	0.24
24	35	-0.13	-0.03	0.08	0.31	-0.36		41	-0.08	-0.00	0.07	0.25
25	30	-0.18	-0.05	0.08	0.37	-0.67		35	-0.09	0.00	0.10	0.30


Me-Go Corpus length
Me-Go mm
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Me-Go Corpus length, growth velocity
Me-Go mm/year
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

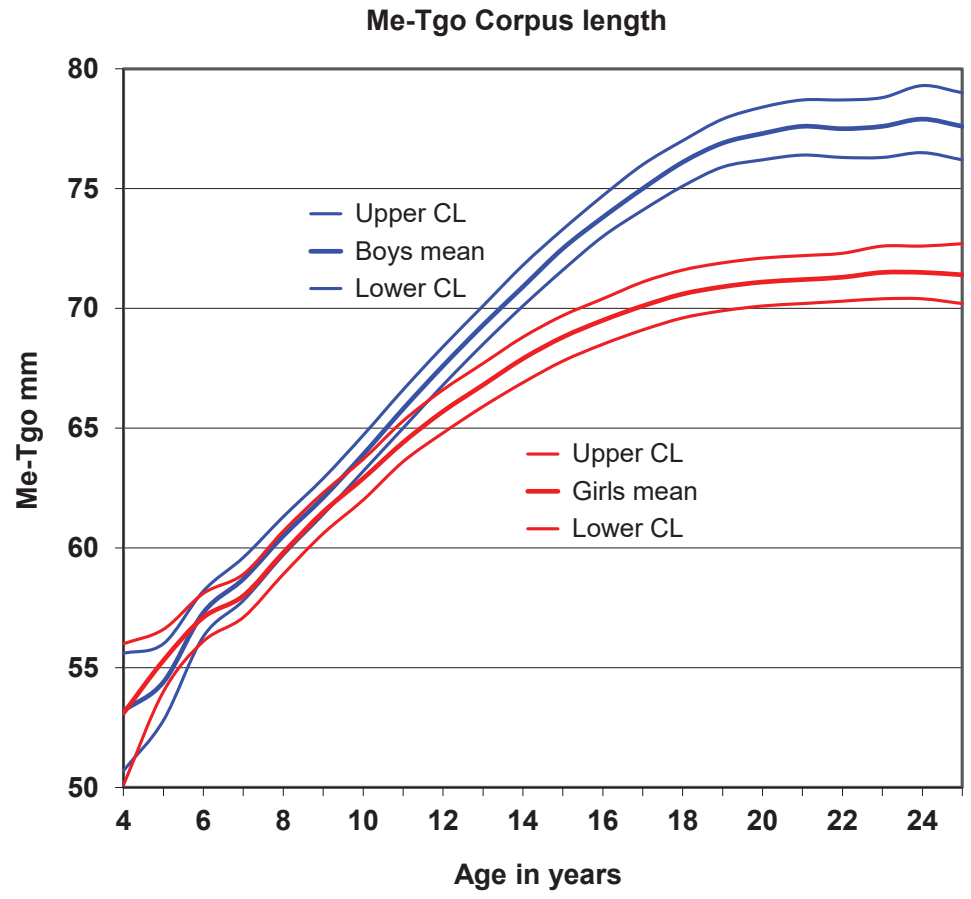


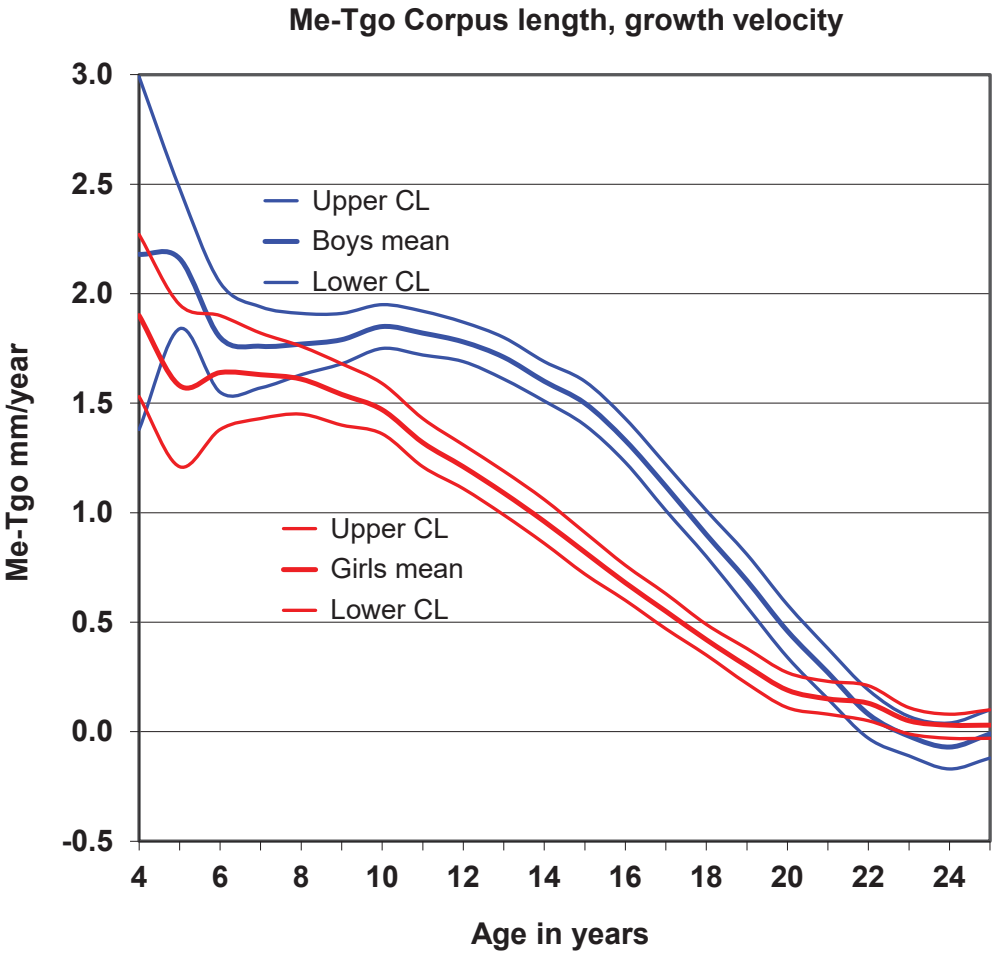
Me-Tgo (mm)

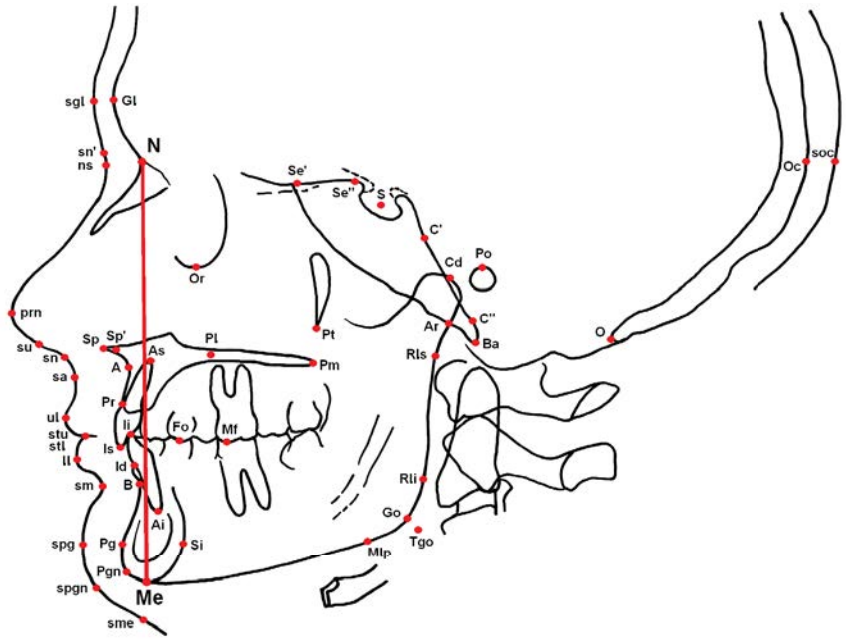
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	50.7	53.2	55.6	3.28	0.05		7	50.1	53.1	56.0	3.97
5	18	52.8	54.4	56.0	3.43	-0.85		19	54.0	55.3	56.6	2.82
6	35	56.3	57.3	58.2	2.89	0.28		27	56.1	57.1	58.1	2.66
7	43	57.9	58.7	59.6	3.00	1.10		39	57.1	58.0	58.9	2.92
8	48	59.7	60.5	61.3	2.80	1.15		49	58.9	59.8	60.7	3.12
9	49	61.3	62.1	62.9	2.83	1.12		53	60.6	61.5	62.3	3.08
10	50	63.1	63.9	64.7	2.83	1.77		54	62.0	62.9	63.7	3.22
11	50	65.0	65.8	66.6	2.93	2.22	p<0.05	55	63.6	64.4	65.3	3.29
12	50	66.8	67.6	68.4	2.95	3.04	p<0.01	55	64.8	65.7	66.6	3.37
13	50	68.5	69.3	70.1	2.97	3.91	p<0.001	55	65.9	66.8	67.7	3.42
14	50	70.1	70.9	71.8	3.03	4.79	p<0.001	55	66.9	67.9	68.8	3.51
15	50	71.6	72.5	73.3	3.13	5.61	p<0.001	55	67.8	68.8	69.7	3.59
16	50	73.0	73.9	74.8	3.22	6.52	p<0.001	55	68.5	69.5	70.4	3.65
17	50	74.1	75.0	76.0	3.33	7.18	p<0.001	55	69.1	70.1	71.1	3.71
18	49	75.1	76.1	77.0	3.41	7.81	p<0.001	55	69.6	70.6	71.6	3.76
19	49	75.9	76.9	77.9	3.60	8.18	p<0.001	55	69.9	70.9	71.9	3.82
20	46	76.2	77.3	78.4	3.81	8.11	p<0.001	55	70.1	71.1	72.1	3.83
21	46	76.4	77.6	78.8	3.99	8.16	p<0.001	54	70.2	71.2	72.2	3.82
22	46	76.4	77.5	78.7	4.00	7.94	p<0.001	53	70.3	71.3	72.3	3.79
23	41	76.3	77.6	78.9	4.13	7.15	p<0.001	42	70.4	71.5	72.6	3.63
24	35	76.6	77.9	79.3	4.06	7.29	p<0.001	41	70.4	71.5	72.6	3.62
25	30	76.2	77.6	79.0	3.98	6.49	p<0.001	35	70.2	71.4	72.7	3.69

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.38	2.18	2.99	1.08	0.63		7	1.53	1.90	2.27	0.50
5	18	1.84	2.16	2.48	0.70	2.34	p<0.05	19	1.21	1.58	1.95	0.81
6	35	1.55	1.79	2.03	0.74	0.81		27	1.38	1.64	1.90	0.69
7	43	1.57	1.75	1.94	0.62	0.93		39	1.43	1.63	1.82	0.61
8	48	1.63	1.77	1.91	0.50	1.52		49	1.45	1.61	1.76	0.55
9	49	1.68	1.79	1.90	0.40	2.68	p<0.01	53	1.40	1.54	1.68	0.53
10	50	1.75	1.85	1.95	0.36	4.83	p<0.001	54	1.36	1.47	1.59	0.43
11	50	1.73	1.82	1.92	0.35	6.58	p<0.001	55	1.21	1.32	1.43	0.43
12	50	1.70	1.78	1.87	0.31	8.46	p<0.001	55	1.11	1.21	1.31	0.38
13	50	1.62	1.71	1.80	0.33	8.88	p<0.001	55	0.99	1.09	1.19	0.38
14	50	1.51	1.61	1.70	0.33	9.23	p<0.001	55	0.86	0.96	1.06	0.38
15	50	1.41	1.50	1.60	0.35	10.16	p<0.001	55	0.72	0.82	0.91	0.35
16	50	1.24	1.34	1.44	0.35	10.17	p<0.001	55	0.60	0.68	0.76	0.31
17	50	1.02	1.12	1.22	0.37	8.74	p<0.001	55	0.47	0.55	0.63	0.30
18	49	0.80	0.91	1.01	0.37	7.83	p<0.001	55	0.35	0.42	0.49	0.26
19	49	0.57	0.69	0.81	0.43	5.47	p<0.001	55	0.22	0.30	0.38	0.30
20	46	0.34	0.46	0.58	0.42	3.71	p<0.001	55	0.11	0.19	0.27	0.31
21	46	0.15	0.27	0.38	0.39	1.70		54	0.08	0.15	0.23	0.28
22	46	-0.03	0.08	0.18	0.37	-0.84		53	0.05	0.13	0.21	0.29
23	41	-0.12	-0.03	0.06	0.29	-1.41		42	-0.01	0.05	0.11	0.21
24	35	-0.18	-0.08	0.03	0.31	-1.73		41	-0.03	0.03	0.08	0.19
25	30	-0.14	-0.03	0.08	0.30	-0.98		35	-0.03	0.03	0.10	0.20


Me-Tgo Corpus length
Me-Tgo mm
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Me-Tgo Corpus length, growth velocity
Me-Tgo mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

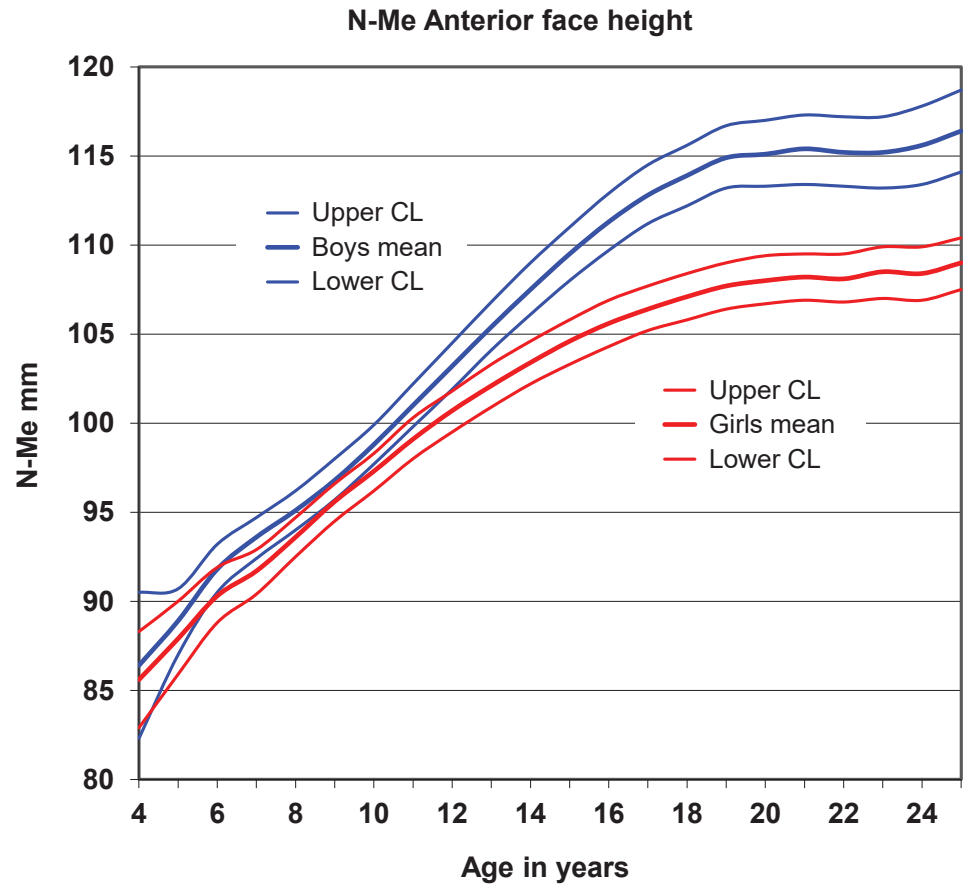


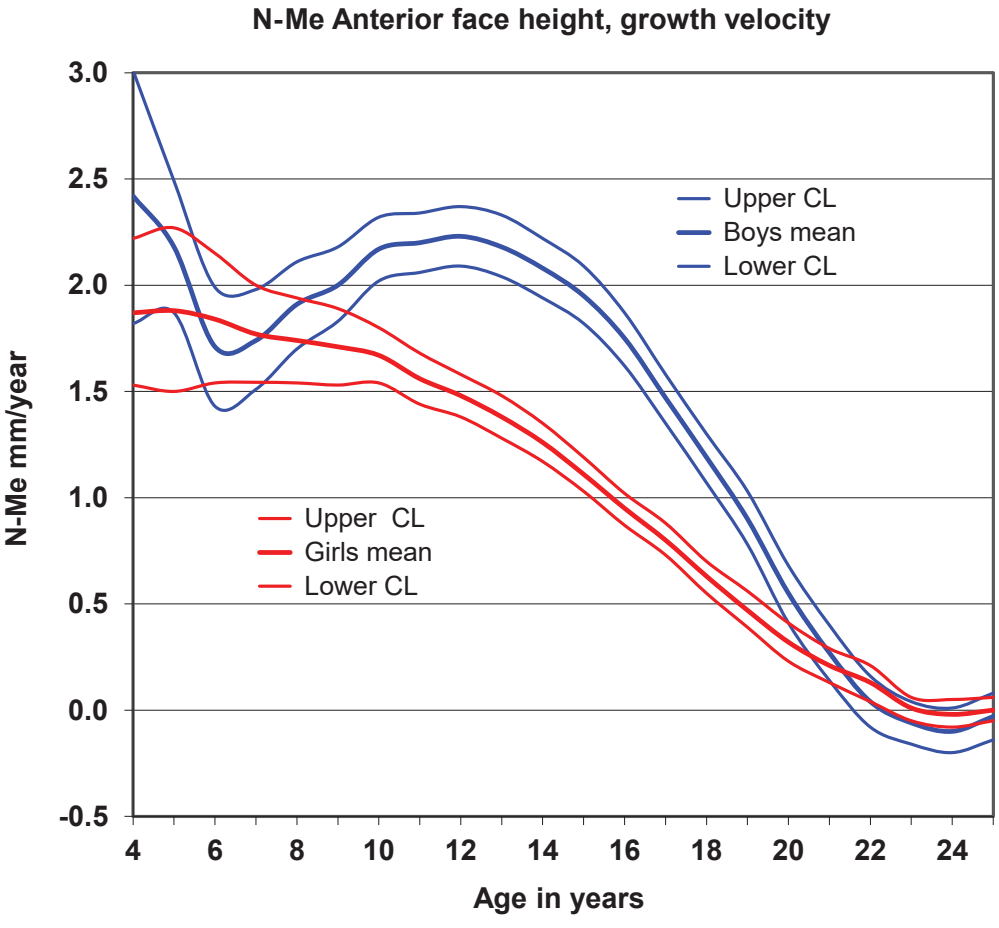
N-Me (mm)

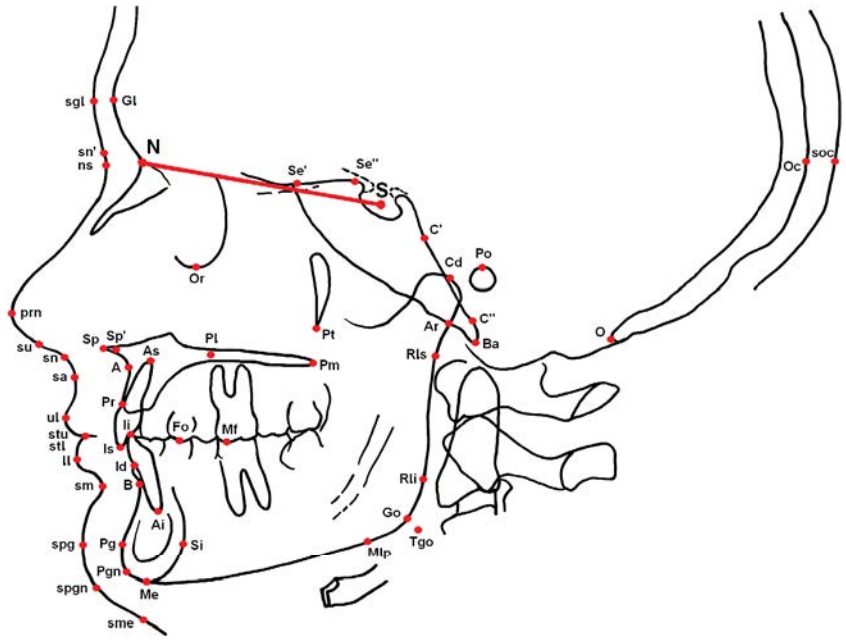
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	82.3	86.4	90.5	5.49	0.33		7	82.9	85.6	88.3	3.66
5	18	87.0	88.9	90.7	3.94	0.66		19	85.9	87.9	90.0	4.59
6	35	90.5	91.8	93.2	4.11	1.43		27	88.8	90.3	91.9	4.15
7	43	92.4	93.6	94.8	3.90	2.20	p<0.05	39	90.4	91.7	92.9	3.97
8	48	94.0	95.1	96.2	4.00	1.89		49	92.5	93.6	94.7	3.84
9	49	95.7	96.8	98.0	4.00	1.62		53	94.5	95.6	96.6	3.96
10	50	97.7	98.8	99.9	4.12	1.91		54	96.2	97.3	98.3	4.04
11	50	99.8	101.0	102.2	4.42	2.18	p<0.05	55	98.0	99.1	100.3	4.39
12	50	101.9	103.2	104.5	4.64	2.87	p<0.01	55	99.5	100.7	101.8	4.48
13	50	104.1	105.4	106.8	4.92	3.60	p<0.001	55	100.9	102.1	103.3	4.56
14	50	106.1	107.5	109.0	5.21	4.27	p<0.001	55	102.2	103.4	104.6	4.66
15	50	108.0	109.5	111.0	5.49	4.91	p<0.001	55	103.3	104.6	105.8	4.74
16	50	109.7	111.3	112.9	5.75	5.55	p<0.001	55	104.3	105.6	106.9	4.82
17	50	111.2	112.8	114.5	6.00	6.02	p<0.001	55	105.2	106.4	107.7	4.88
18	49	112.2	113.9	115.6	6.06	6.27	p<0.001	55	105.8	107.1	108.4	4.92
19	49	113.2	114.9	116.7	6.30	6.56	p<0.001	55	106.4	107.7	109.0	4.96
20	46	113.3	115.1	117.0	6.36	6.28	p<0.001	55	106.7	108.0	109.4	5.00
21	46	113.5	115.4	117.3	6.47	6.24	p<0.001	54	106.9	108.2	109.5	5.03
22	46	113.3	115.2	117.1	6.50	6.22	p<0.001	53	106.8	108.1	109.4	4.88
23	41	113.2	115.2	117.2	6.53	5.40	p<0.001	42	107.0	108.5	109.9	4.77
24	35	113.4	115.6	117.8	6.60	5.48	p<0.001	41	106.9	108.4	109.9	4.79
25	30	114.1	116.4	118.7	6.38	5.53	p<0.001	35	107.5	109.0	110.4	4.47

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.82	2.42	3.01	0.80	1.55		7	1.53	1.87	2.22	0.47
5	18	1.87	2.18	2.49	0.68	1.16		19	1.50	1.88	2.27	0.86
6	35	1.43	1.71	1.99	0.83	-0.65		27	1.54	1.84	2.15	0.80
7	43	1.51	1.74	1.98	0.80	-0.14		39	1.54	1.77	2.00	0.73
8	48	1.70	1.91	2.11	0.74	1.15		49	1.54	1.74	1.94	0.71
9	49	1.83	2.00	2.18	0.61	2.32	p<0.05	53	1.53	1.71	1.89	0.67
10	50	2.02	2.17	2.32	0.53	4.93	p<0.001	54	1.54	1.67	1.80	0.50
11	50	2.06	2.20	2.34	0.51	6.82	p<0.001	55	1.44	1.56	1.68	0.45
12	50	2.09	2.23	2.37	0.52	8.42	p<0.001	55	1.38	1.48	1.58	0.38
13	50	2.04	2.18	2.33	0.53	9.16	p<0.001	55	1.28	1.38	1.48	0.36
14	50	1.94	2.08	2.22	0.51	9.72	p<0.001	55	1.17	1.26	1.35	0.34
15	50	1.82	1.95	2.09	0.49	10.64	p<0.001	55	1.03	1.11	1.19	0.31
16	50	1.62	1.75	1.87	0.45	10.94	p<0.001	55	0.87	0.95	1.02	0.29
17	50	1.35	1.47	1.58	0.41	9.86	p<0.001	55	0.73	0.80	0.88	0.28
18	49	1.07	1.19	1.30	0.40	8.33	p<0.001	55	0.55	0.63	0.70	0.27
19	49	0.78	0.90	1.03	0.44	5.81	p<0.001	55	0.39	0.47	0.56	0.31
20	46	0.41	0.55	0.68	0.47	2.86	p<0.01	55	0.23	0.32	0.41	0.33
21	46	0.14	0.27	0.40	0.45	0.71		54	0.13	0.21	0.29	0.30
22	46	-0.08	0.04	0.16	0.42	-1.22		53	0.04	0.13	0.21	0.31
23	41	-0.16	-0.06	0.04	0.33	-1.10		42	-0.05	0.01	0.06	0.19
24	35	-0.20	-0.10	0.01	0.31	-1.31		41	-0.08	-0.02	0.05	0.21
25	30	-0.14	-0.03	0.08	0.31	-0.55		35	-0.05	0.00	0.06	0.17

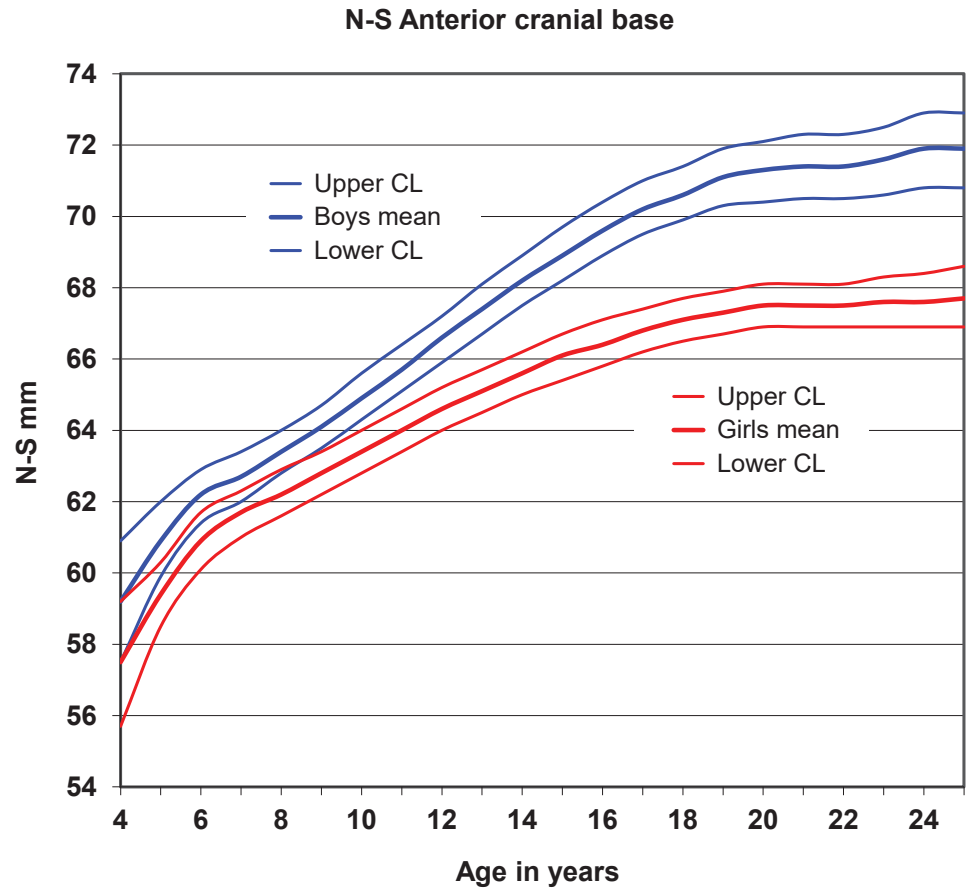

N-Me Anterior face height
N-Me mm
120
115
110
105
100
95
90
85
80
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

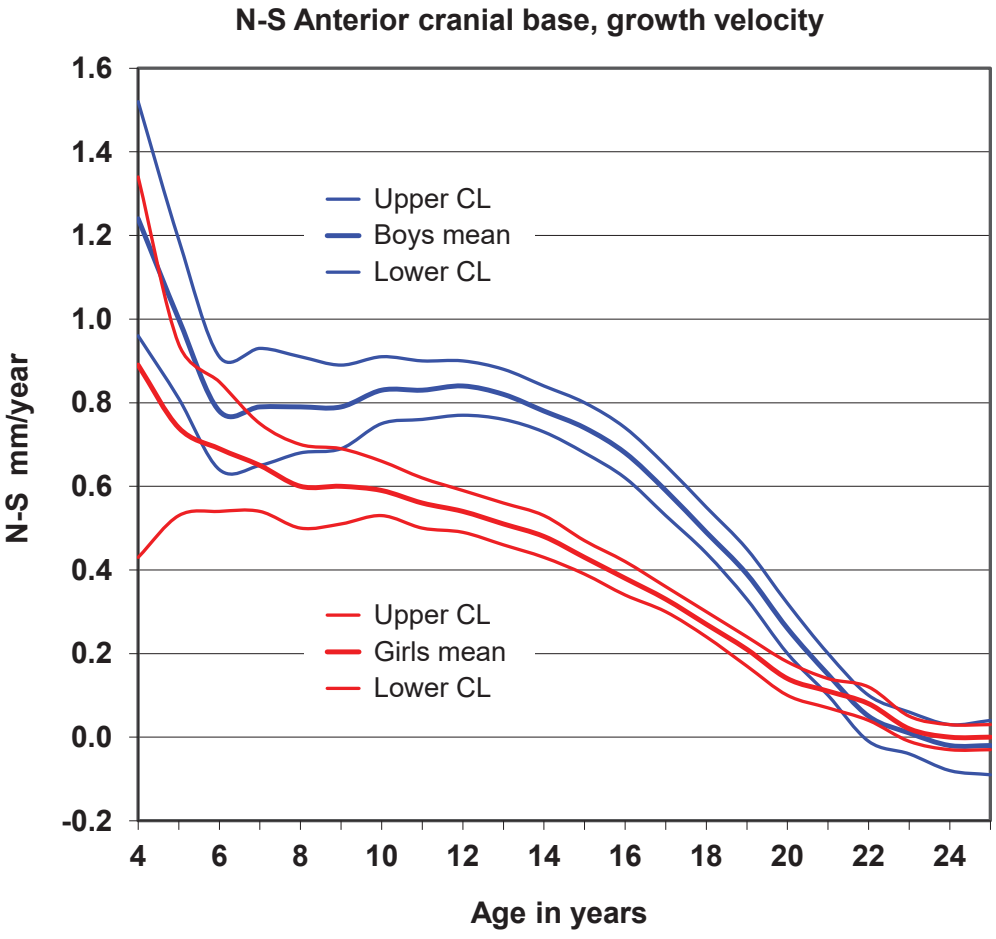

N-Me Anterior face height, growth velocity
N-Me mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

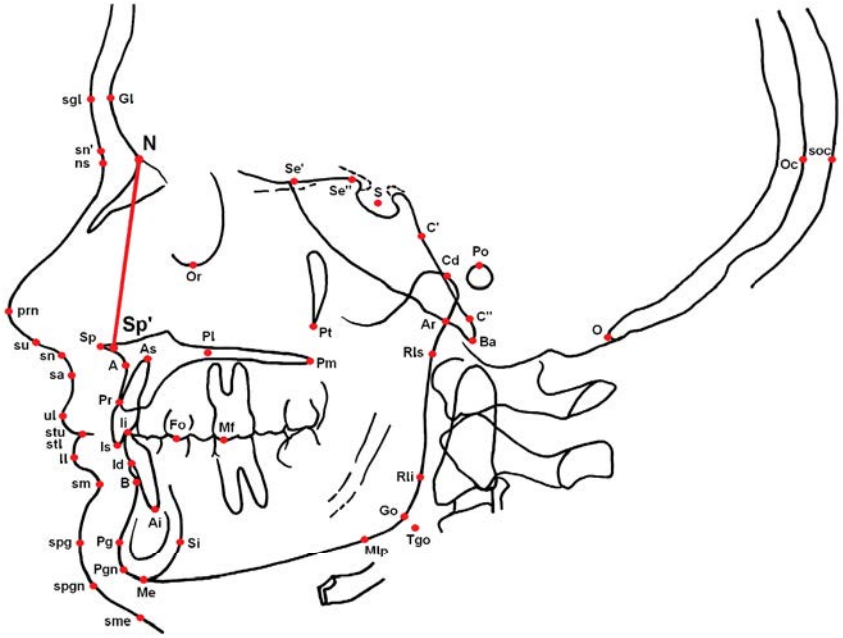


N-S (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	57.5	59.2	60.9	2.25	1.41		7	55.7	57.5	59.2	2.42
5	18	59.9	60.9	62.0	2.30	2.21	p<0.05	19	58.5	59.4	60.3	2.01
6	35	61.4	62.2	62.9	2.16	2.34	p<0.05	27	60.1	60.9	61.7	2.06
7	43	62.0	62.7	63.4	2.25	2.16	p<0.05	39	61.0	61.7	62.3	2.21
8	48	62.8	63.4	64.0	2.12	2.61	p<0.05	49	61.6	62.2	62.9	2.30
9	49	63.5	64.1	64.7	2.10	2.98	p<0.01	53	62.2	62.8	63.4	2.29
10	50	64.3	64.9	65.6	2.23	3.47	p<0.001	54	62.8	63.4	64.0	2.30
11	50	65.1	65.7	66.4	2.33	3.81	p<0.001	55	63.4	64.0	64.6	2.32
12	50	65.9	66.6	67.2	2.41	4.32	p<0.001	55	64.0	64.6	65.2	2.32
13	50	66.7	67.4	68.1	2.50	4.86	p<0.001	55	64.5	65.1	65.7	2.33
14	50	67.5	68.2	68.9	2.59	5.36	p<0.001	55	65.0	65.6	66.2	2.34
15	50	68.2	68.9	69.7	2.64	5.91	p<0.001	55	65.4	66.1	66.7	2.34
16	50	68.9	69.6	70.4	2.71	6.45	p<0.001	55	65.8	66.4	67.1	2.34
17	50	69.5	70.2	71.0	2.78	6.89	p<0.001	55	66.2	66.8	67.4	2.33
18	49	69.9	70.6	71.4	2.80	7.13	p<0.001	55	66.5	67.1	67.7	2.30
19	49	70.3	71.1	71.9	2.87	7.43	p<0.001	55	66.7	67.3	67.9	2.29
20	46	70.4	71.3	72.1	2.93	7.26	p<0.001	55	66.9	67.5	68.1	2.31
21	46	70.5	71.4	72.3	3.02	7.40	p<0.001	54	66.9	67.5	68.1	2.26
22	46	70.5	71.4	72.3	3.03	7.25	p<0.001	53	66.9	67.5	68.1	2.27
23	41	70.6	71.6	72.5	3.06	6.67	p<0.001	42	66.9	67.6	68.3	2.32
24	35	70.8	71.9	72.9	3.09	6.72	p<0.001	41	66.9	67.6	68.4	2.36
25	30	70.9	71.9	72.9	2.92	6.21	p<0.001	35	66.9	67.7	68.6	2.48

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.96	1.24	1.52	0.37	1.30		7	0.43	0.89	1.34	0.61
5	18	0.81	1.00	1.19	0.41	1.82		19	0.53	0.74	0.94	0.45
6	35	0.64	0.78	0.91	0.41	0.78		27	0.54	0.69	0.85	0.42
7	43	0.65	0.79	0.93	0.47	1.55		39	0.54	0.65	0.75	0.35
8	48	0.68	0.79	0.91	0.40	2.54	p<0.05	49	0.50	0.60	0.70	0.35
9	49	0.69	0.79	0.89	0.36	2.77	p<0.01	53	0.51	0.60	0.69	0.33
10	50	0.75	0.83	0.91	0.30	4.43	p<0.001	54	0.53	0.59	0.66	0.25
11	50	0.76	0.83	0.90	0.26	5.73	p<0.001	55	0.50	0.56	0.62	0.23
12	50	0.77	0.84	0.90	0.23	7.09	p<0.001	55	0.49	0.54	0.59	0.19
13	50	0.76	0.82	0.88	0.21	7.89	p<0.001	55	0.46	0.51	0.56	0.19
14	50	0.73	0.78	0.84	0.20	8.14	p<0.001	55	0.43	0.48	0.53	0.18
15	50	0.68	0.74	0.80	0.20	8.83	p<0.001	55	0.39	0.43	0.47	0.15
16	50	0.62	0.68	0.74	0.20	9.01	p<0.001	55	0.34	0.38	0.42	0.14
17	50	0.53	0.59	0.65	0.20	8.00	p<0.001	55	0.30	0.33	0.36	0.12
18	49	0.44	0.49	0.55	0.19	7.20	p<0.001	55	0.24	0.27	0.30	0.12
19	49	0.33	0.39	0.45	0.20	5.53	p<0.001	55	0.17	0.21	0.24	0.13
20	46	0.20	0.26	0.32	0.21	3.39	p<0.01	55	0.10	0.14	0.18	0.15
21	46	0.10	0.15	0.20	0.19	1.35		54	0.07	0.11	0.14	0.13
22	46	-0.01	0.05	0.10	0.19	-0.86		53	0.04	0.08	0.12	0.14
23	41	-0.04	0.01	0.06	0.16	-0.28		42	-0.01	0.02	0.05	0.11
24	35	-0.08	-0.02	0.03	0.17	-0.78		41	-0.03	0.00	0.03	0.10
25	30	-0.09	-0.02	0.04	0.18	-0.72		35	-0.03	0.00	0.03	0.09


N-S Anterior cranial base
74
72
70
68
66
64
62
60
58
56
54
N-S mm
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years


N-S Anterior cranial base, growth velocity
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
N-S mm/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

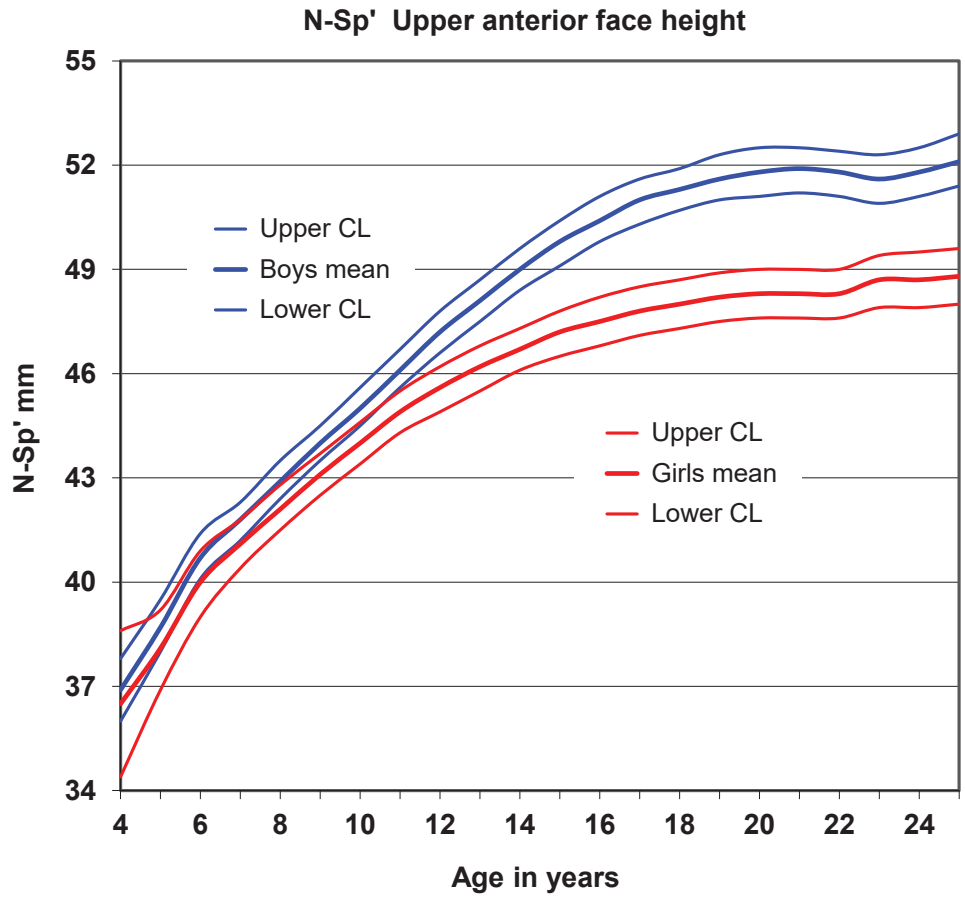


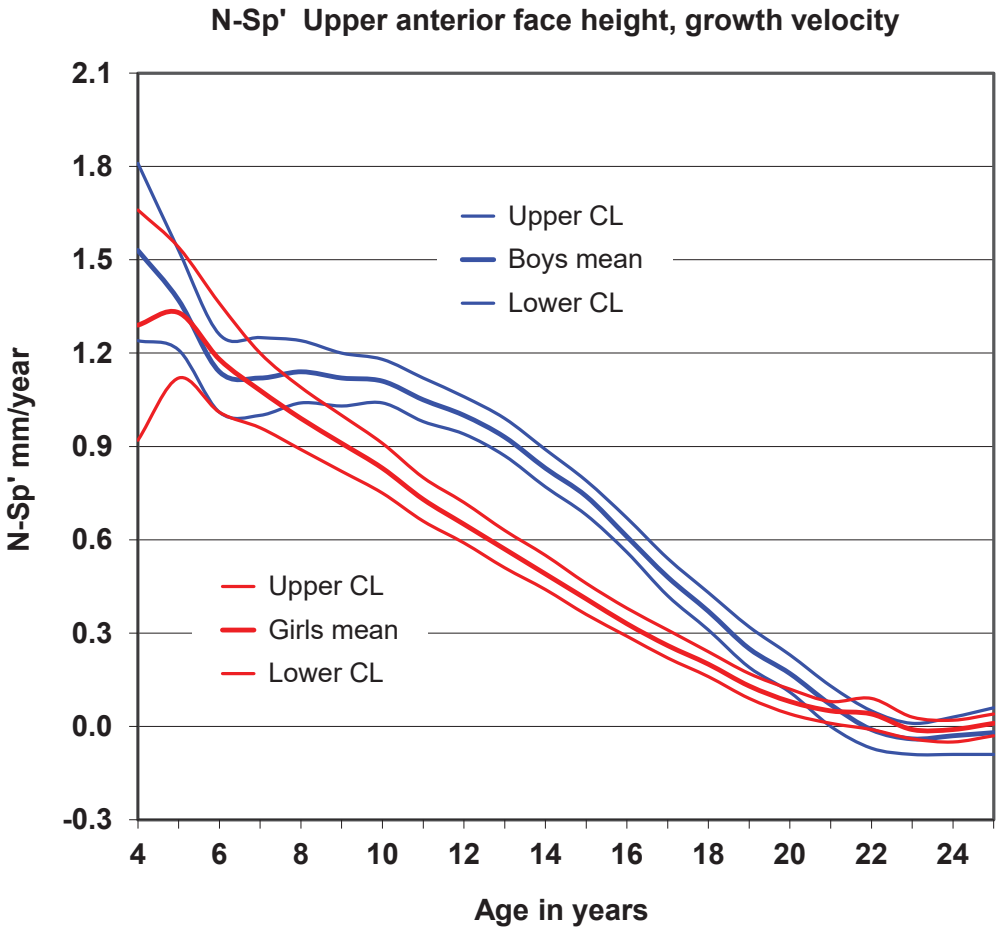
N-Sp' (mm)

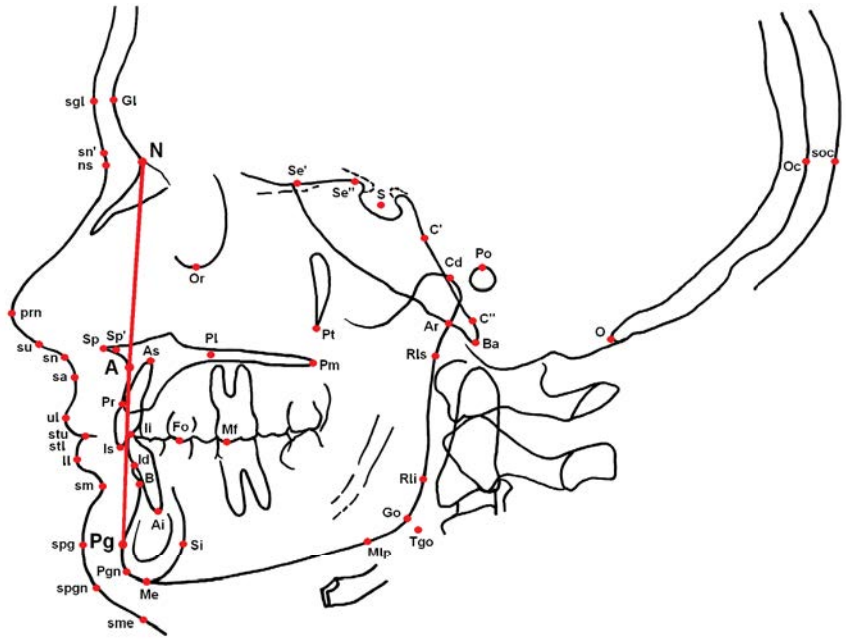
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	36.0	36.9	37.8	1.21	0.36		7	34.4	36.5	38.6	2.85
5	18	38.0	38.7	39.5	1.59	0.93		19	36.9	38.1	39.2	2.64
6	35	40.1	40.7	41.4	1.88	1.43		27	39.0	40.0	40.9	2.47
7	43	41.2	41.8	42.3	1.85	1.54		39	40.4	41.1	41.8	2.18
8	48	42.4	42.9	43.5	1.93	1.80		49	41.5	42.1	42.8	2.27
9	49	43.5	44.0	44.5	1.91	2.09	p<0.05	53	42.5	43.1	43.7	2.27
10	50	44.5	45.0	45.6	1.93	2.49	p<0.05	54	43.4	44.0	44.6	2.26
11	50	45.6	46.1	46.7	2.07	2.94	p<0.01	55	44.3	44.9	45.5	2.32
12	50	46.6	47.2	47.8	2.13	3.64	p<0.001	55	44.9	45.6	46.2	2.35
13	50	47.5	48.1	48.7	2.18	4.38	p<0.001	55	45.5	46.2	46.8	2.39
14	50	48.4	49.0	49.6	2.22	5.05	p<0.001	55	46.1	46.7	47.3	2.45
15	50	49.1	49.8	50.4	2.25	5.64	p<0.001	55	46.5	47.2	47.8	2.49
16	50	49.8	50.4	51.1	2.26	6.25	p<0.001	55	46.8	47.5	48.2	2.53
17	50	50.3	51.0	51.6	2.25	6.69	p<0.001	55	47.1	47.8	48.5	2.56
18	49	50.7	51.3	51.9	2.23	6.92	p<0.001	55	47.3	48.0	48.7	2.57
19	49	51.0	51.6	52.3	2.26	7.17	p<0.001	55	47.5	48.2	48.9	2.58
20	46	51.1	51.8	52.5	2.29	7.17	p<0.001	55	47.6	48.3	49.0	2.59
21	46	51.2	51.9	52.5	2.28	7.26	p<0.001	54	47.6	48.3	49.0	2.57
22	46	51.1	51.8	52.4	2.30	7.11	p<0.001	53	47.6	48.3	49.0	2.56
23	41	50.9	51.6	52.3	2.32	5.59	p<0.001	42	47.9	48.7	49.4	2.48
24	35	51.1	51.8	52.5	2.12	5.83	p<0.001	41	47.9	48.7	49.5	2.47
25	30	51.4	52.1	52.9	2.09	5.89	p<0.001	35	48.0	48.8	49.6	2.40

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.24	1.53	1.81	0.38	0.99		7	0.92	1.29	1.66	0.50
5	18	1.21	1.37	1.53	0.35	0.27		19	1.12	1.33	1.54	0.47
6	35	1.01	1.14	1.26	0.37	-0.45		27	1.01	1.18	1.36	0.47
7	43	1.00	1.12	1.25	0.41	0.49		39	0.96	1.08	1.20	0.39
8	48	1.04	1.14	1.24	0.36	1.98		49	0.89	0.99	1.09	0.36
9	49	1.03	1.12	1.20	0.32	3.16	p<0.01	53	0.82	0.91	1.00	0.34
10	50	1.04	1.11	1.18	0.27	5.12	p<0.001	54	0.75	0.83	0.91	0.29
11	50	0.99	1.05	1.12	0.24	6.36	p<0.001	55	0.66	0.73	0.80	0.27
12	50	0.94	1.00	1.06	0.22	7.76	p<0.001	55	0.59	0.65	0.72	0.24
13	50	0.87	0.93	0.99	0.22	8.20	p<0.001	55	0.51	0.57	0.63	0.22
14	50	0.78	0.83	0.89	0.21	8.23	p<0.001	55	0.44	0.49	0.55	0.21
15	50	0.68	0.74	0.79	0.20	8.50	p<0.001	55	0.36	0.41	0.46	0.19
16	50	0.56	0.61	0.67	0.21	7.67	p<0.001	55	0.29	0.33	0.38	0.17
17	50	0.42	0.48	0.54	0.22	5.80	p<0.001	55	0.22	0.26	0.31	0.16
18	49	0.31	0.37	0.43	0.21	4.99	p<0.001	55	0.16	0.20	0.24	0.15
19	49	0.19	0.25	0.32	0.23	3.19	p<0.01	55	0.09	0.13	0.17	0.15
20	46	0.11	0.17	0.23	0.21	2.51	p<0.05	55	0.04	0.08	0.12	0.15
21	46	0.00	0.07	0.13	0.22	0.51		54	0.01	0.05	0.08	0.14
22	46	-0.07	-0.01	0.05	0.21	-1.25		53	-0.01	0.04	0.09	0.19
23	41	-0.09	-0.04	0.01	0.17	-1.09		42	-0.04	-0.01	0.03	0.11
24	35	-0.09	-0.03	0.03	0.18	-0.64		41	-0.05	-0.01	0.02	0.12
25	30	-0.09	-0.02	0.05	0.21	-0.61		35	-0.03	0.01	0.04	0.11

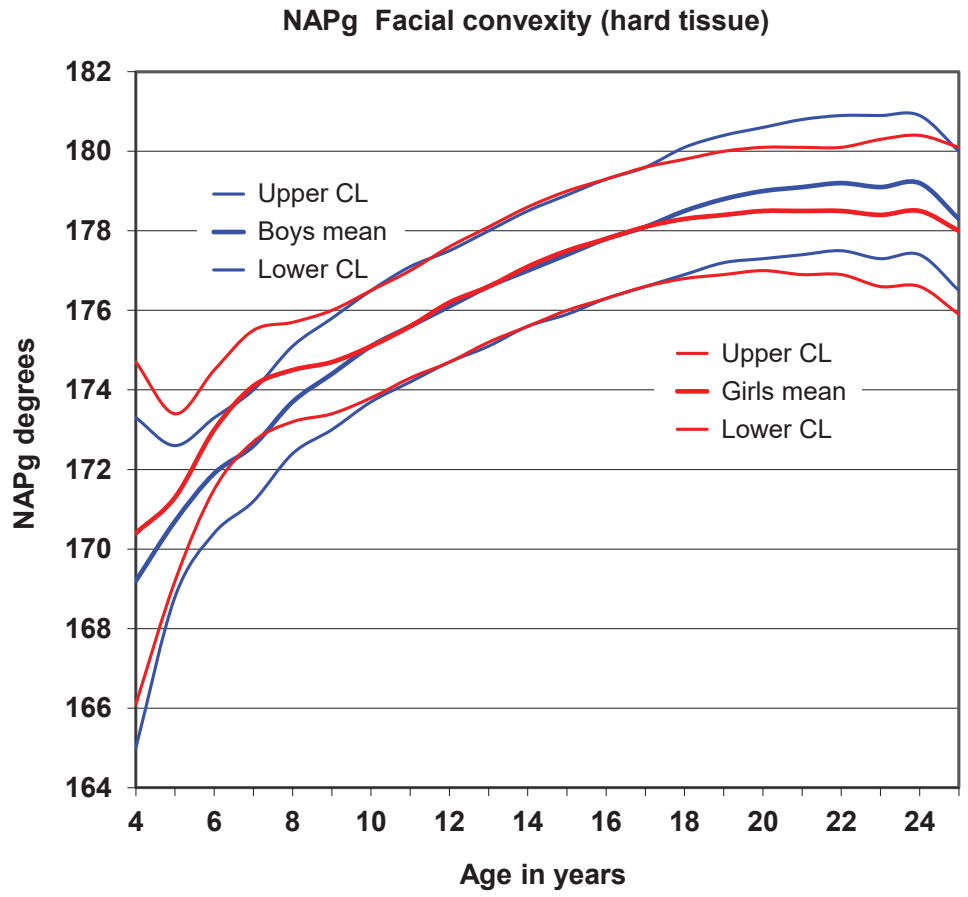

N-Sp' Upper anterior face height
N-Sp' mm
55
52
49
46
43
40
37
34
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

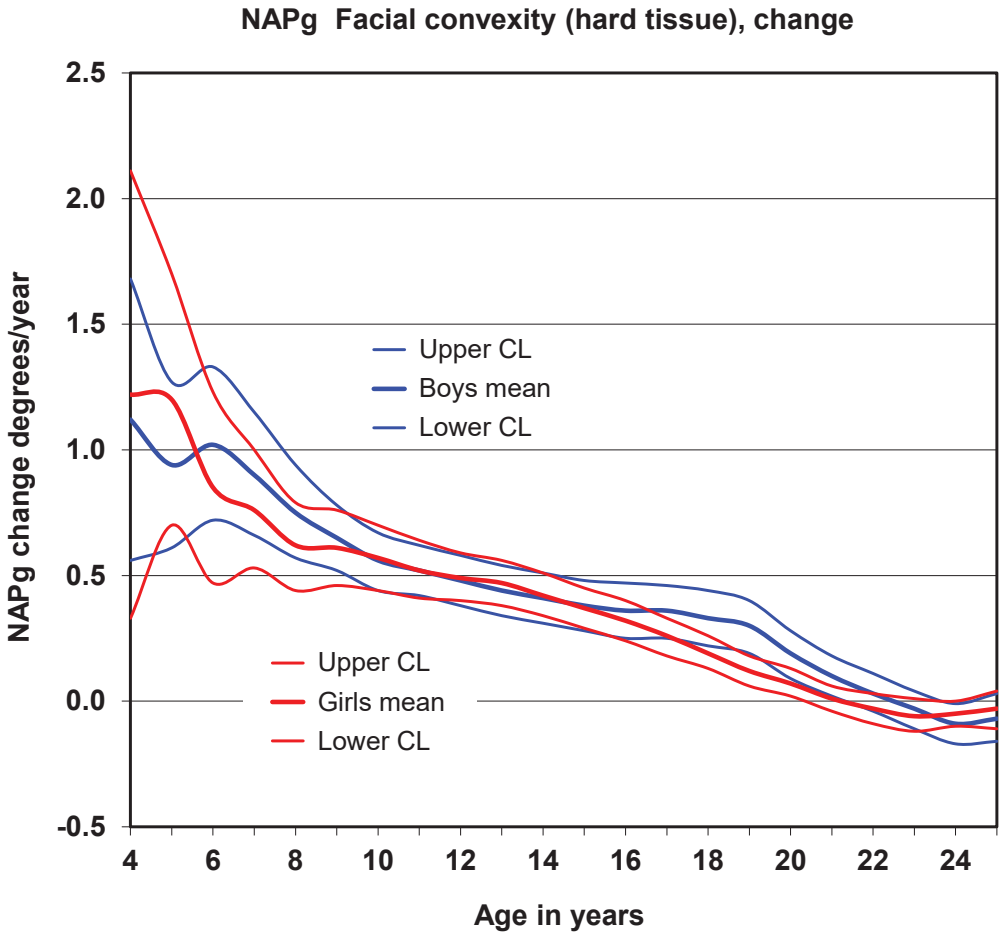

N-Sp' Upper anterior face height, growth velocity
N-Sp' mm/year
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.0
-0.3
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

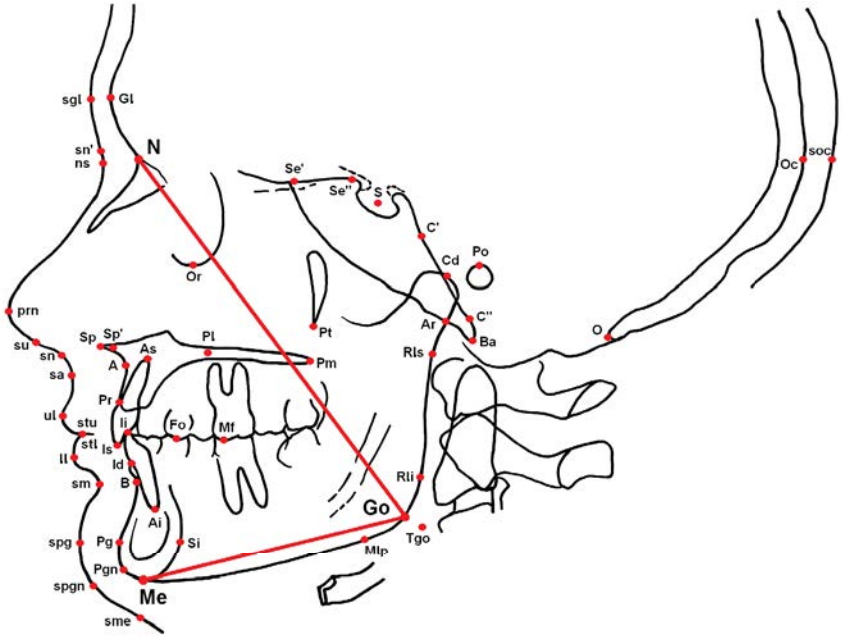


NAPg (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	165.0	169.2	173.3	5.61	0.40		7	166.1	170.4	174.7	5.83
5	18	168.8	170.7	172.6	4.03	0.42		19	169.2	171.3	173.4	4.61
6	35	170.4	171.8	173.3	4.37	1.06		27	171.5	173.0	174.5	4.09
7	43	171.2	172.6	174.0	4.64	1.47		39	172.7	174.1	175.5	4.39
8	48	172.4	173.7	175.1	4.85	0.75		49	173.2	174.5	175.7	4.57
9	49	173.0	174.4	175.8	4.93	0.32		53	173.4	174.7	176.0	4.82
10	50	173.7	175.1	176.5	5.06	-0.02		54	173.8	175.1	176.5	5.09
11	50	174.2	175.7	177.1	5.09	-0.01		55	174.3	175.6	177.0	5.24
12	50	174.7	176.1	177.6	5.16	0.04		55	174.7	176.2	177.6	5.37
13	50	175.1	176.6	178.0	5.21	0.04		55	175.2	176.6	178.1	5.51
14	50	175.6	177.0	178.5	5.28	0.07		55	175.6	177.1	178.6	5.60
15	50	175.9	177.4	178.9	5.35	0.07		55	176.0	177.5	179.0	5.66
16	50	176.3	177.7	179.2	5.40	0.05		55	176.3	177.8	179.3	5.71
17	50	176.6	178.1	179.6	5.51	0.01		55	176.6	178.1	179.6	5.75
18	49	176.9	178.4	180.0	5.67	-0.13		55	176.8	178.3	179.8	5.78
19	49	177.2	178.8	180.4	5.81	-0.32		55	176.9	178.4	180.0	5.80
20	46	177.2	178.9	180.6	5.84	-0.34		55	177.0	178.5	180.1	5.83
21	46	177.3	179.1	180.8	5.92	-0.46		54	176.9	178.5	180.1	5.90
22	46	177.4	179.1	180.8	5.93	-0.51		53	176.9	178.5	180.1	5.97
23	41	177.3	179.1	180.9	5.87	-0.46		42	176.6	178.4	180.3	6.25
24	35	177.4	179.1	180.9	5.38	-0.46		41	176.6	178.5	180.4	6.31
25	30	176.5	178.3	180.0	4.93	-0.17		35	175.9	178.0	180.1	6.41

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.56	1.12	1.68	0.76	-0.18		7	0.33	1.22	2.11	1.20
5	18	0.61	0.94	1.27	0.71	-0.84		19	0.70	1.20	1.70	1.12
6	35	0.72	1.03	1.33	0.92	0.73		27	0.47	0.85	1.23	1.01
7	43	0.66	0.91	1.15	0.82	0.82		39	0.53	0.76	1.00	0.76
8	48	0.57	0.76	0.94	0.65	1.09		49	0.44	0.62	0.79	0.62
9	49	0.52	0.65	0.78	0.47	0.43		53	0.46	0.61	0.76	0.55
10	50	0.44	0.56	0.67	0.41	-0.16		54	0.44	0.57	0.70	0.47
11	50	0.41	0.51	0.61	0.36	-0.14		55	0.41	0.52	0.64	0.42
12	50	0.38	0.48	0.58	0.35	-0.22		55	0.40	0.49	0.59	0.36
13	50	0.34	0.44	0.54	0.36	-0.46		55	0.38	0.47	0.56	0.34
14	50	0.31	0.41	0.51	0.36	-0.26		55	0.34	0.42	0.51	0.31
15	50	0.27	0.37	0.48	0.38	0.10		55	0.29	0.37	0.45	0.30
16	50	0.25	0.36	0.46	0.39	0.58		55	0.24	0.32	0.40	0.30
17	50	0.24	0.35	0.46	0.40	1.38		55	0.18	0.26	0.33	0.28
18	49	0.22	0.33	0.43	0.38	2.14	p<0.05	55	0.13	0.19	0.26	0.24
19	49	0.19	0.30	0.40	0.38	2.90	p<0.01	55	0.06	0.12	0.18	0.23
20	46	0.09	0.19	0.28	0.32	2.13	p<0.05	55	0.02	0.07	0.13	0.20
21	46	0.02	0.10	0.18	0.28	1.90		54	-0.04	0.01	0.06	0.19
22	46	-0.04	0.03	0.11	0.26	1.42		53	-0.09	-0.03	0.03	0.21
23	41	-0.10	-0.03	0.05	0.24	0.61		42	-0.12	-0.06	0.01	0.22
24	35	-0.16	-0.08	-0.01	0.23	-0.69		41	-0.10	-0.05	0.00	0.17
25	30	-0.15	-0.05	0.04	0.26	-0.35		35	-0.11	-0.03	0.04	0.23

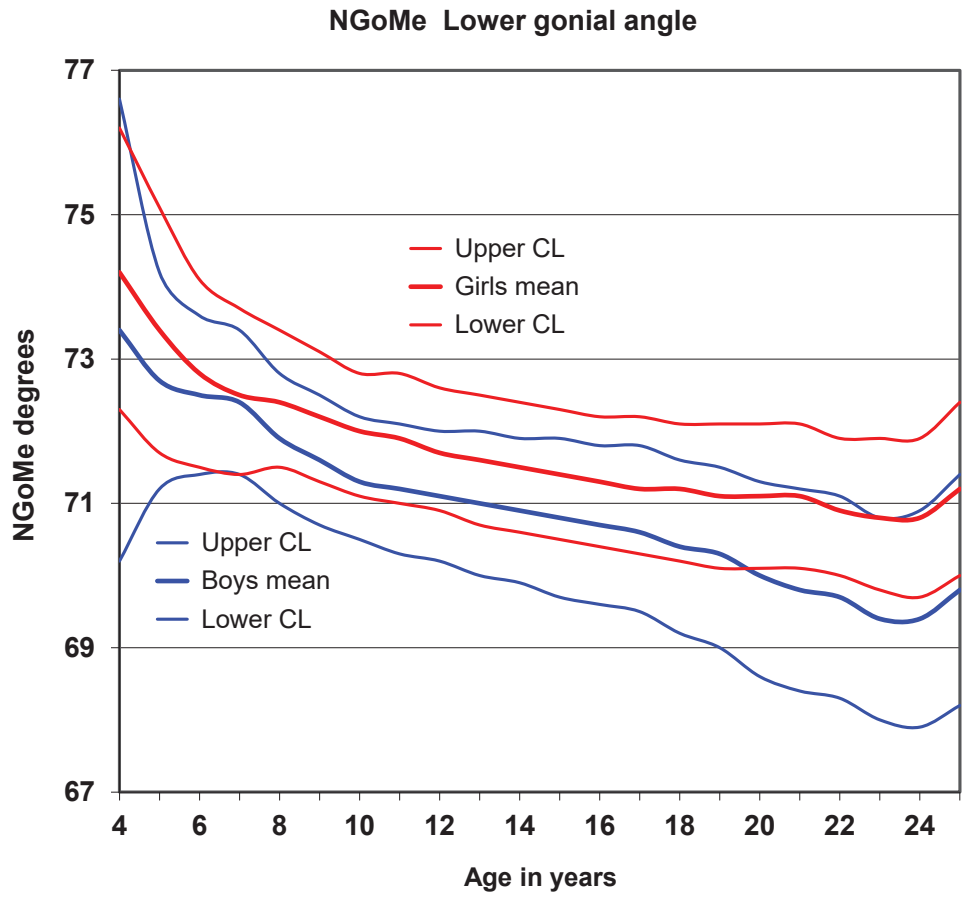

NAPg Facial convexity (hard tissue)
NAPg degrees
182
180
178
176
174
172
170
168
166
164
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

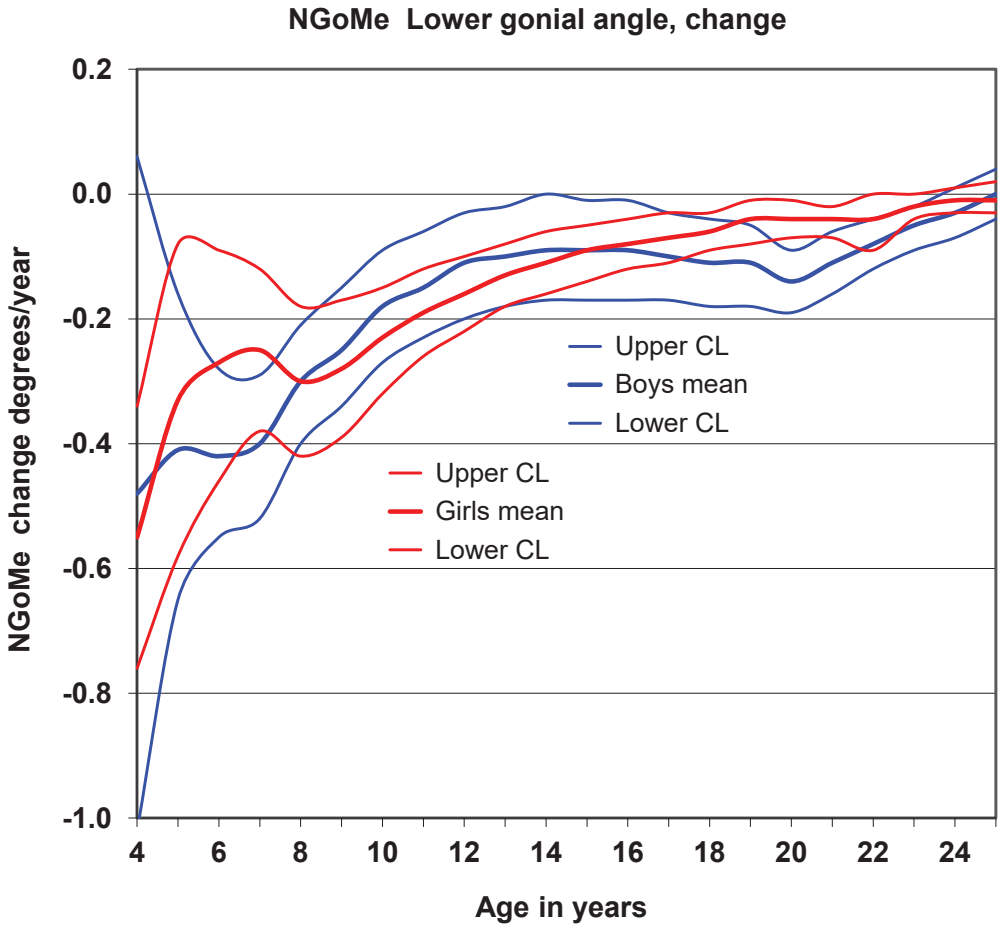

NAPg Facial convexity (hard tissue), change
NAPg change degrees/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

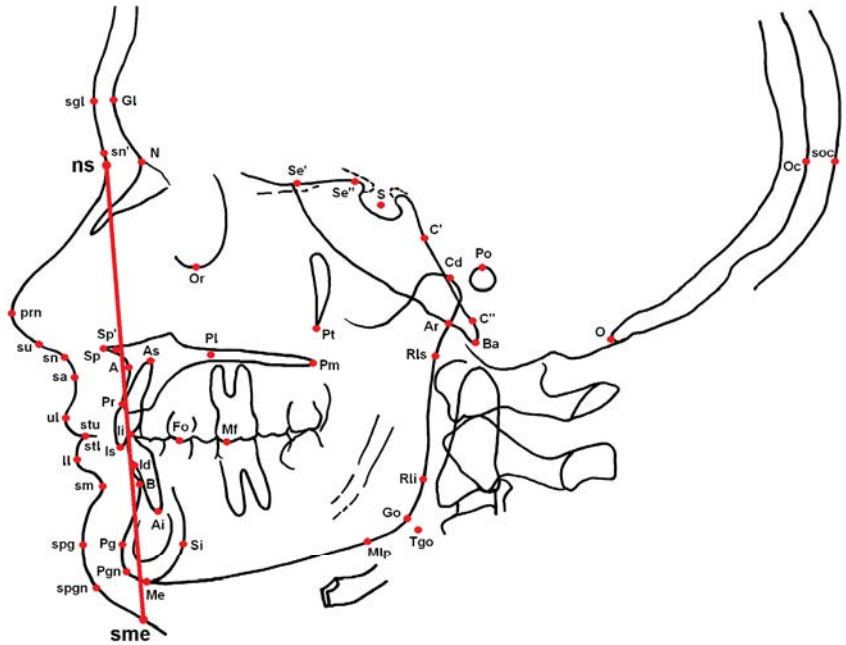


NGoMe (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	70.2	73.4	76.6	4.35	0.44		7	72.3	74.2	76.2	2.58
5	18	71.2	72.7	74.2	3.28	0.62		19	71.7	73.4	75.1	3.80
6	35	71.4	72.5	73.6	3.30	0.36		27	71.5	72.8	74.1	3.38
7	43	71.4	72.4	73.4	3.21	0.16		39	71.4	72.5	73.7	3.67
8	48	71.0	71.9	72.8	3.14	0.75		49	71.5	72.4	73.4	3.46
9	49	70.8	71.6	72.5	3.08	0.91		53	71.3	72.2	73.1	3.26
10	50	70.5	71.3	72.2	3.10	1.04		54	71.1	72.0	72.8	3.23
11	50	70.3	71.2	72.1	3.22	1.09		55	71.0	71.9	72.8	3.35
12	50	70.2	71.1	72.0	3.35	1.01		55	70.9	71.7	72.6	3.37
13	50	70.0	71.0	72.0	3.47	0.91		55	70.7	71.6	72.5	3.40
14	50	69.9	70.9	71.9	3.63	0.86		55	70.6	71.5	72.4	3.43
15	50	69.7	70.8	71.9	3.82	0.82		55	70.5	71.4	72.3	3.47
16	50	69.6	70.7	71.8	4.01	0.81		55	70.4	71.3	72.2	3.53
17	50	69.4	70.6	71.8	4.19	0.81		55	70.3	71.2	72.2	3.59
18	49	69.2	70.4	71.6	4.34	0.98		55	70.2	71.2	72.1	3.63
19	49	69.0	70.3	71.5	4.49	1.05		55	70.1	71.1	72.1	3.70
20	46	68.6	69.9	71.3	4.68	1.34		55	70.1	71.1	72.1	3.75
21	46	68.4	69.8	71.2	4.77	1.57		54	70.1	71.1	72.1	3.73
22	46	68.3	69.7	71.0	4.80	1.50		53	70.0	70.9	71.9	3.59
23	41	68.0	69.4	70.8	4.63	1.61		42	69.8	70.8	71.9	3.53
24	35	67.8	69.3	70.9	4.54	1.56		41	69.7	70.8	71.9	3.60
25	30	68.2	69.8	71.4	4.53	1.40		35	70.0	71.2	72.4	3.53

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.02	-0.48	0.06	0.73	-0.24		7	-0.76	-0.55	-0.34	0.29
5	18	-0.65	-0.41	-0.16	0.54	0.45		19	-0.58	-0.33	-0.08	0.56
6	35	-0.54	-0.41	-0.28	0.39	1.25		27	-0.46	-0.27	-0.09	0.49
7	43	-0.52	-0.40	-0.28	0.40	1.65		39	-0.38	-0.25	-0.12	0.42
8	48	-0.40	-0.30	-0.20	0.35	0.01		49	-0.42	-0.30	-0.18	0.42
9	49	-0.34	-0.24	-0.15	0.33	-0.49		53	-0.39	-0.28	-0.17	0.41
10	50	-0.27	-0.18	-0.09	0.31	-0.85		54	-0.32	-0.23	-0.15	0.33
11	50	-0.23	-0.15	-0.07	0.29	-0.76		55	-0.26	-0.19	-0.12	0.27
12	50	-0.20	-0.12	-0.03	0.30	-0.88		55	-0.22	-0.16	-0.10	0.22
13	50	-0.18	-0.10	-0.02	0.29	-0.70		55	-0.18	-0.13	-0.08	0.19
14	50	-0.17	-0.09	-0.01	0.29	-0.43		55	-0.16	-0.11	-0.06	0.18
15	50	-0.17	-0.09	-0.01	0.29	-0.03		55	-0.14	-0.09	-0.05	0.17
16	50	-0.17	-0.09	-0.02	0.28	0.26		55	-0.12	-0.08	-0.04	0.15
17	50	-0.18	-0.10	-0.03	0.26	0.92		55	-0.11	-0.07	-0.03	0.15
18	49	-0.18	-0.11	-0.04	0.25	1.36		55	-0.09	-0.06	-0.03	0.13
19	49	-0.18	-0.11	-0.05	0.23	1.97		55	-0.08	-0.04	-0.01	0.14
20	46	-0.19	-0.14	-0.09	0.17	3.59	p<0.001	55	-0.07	-0.04	-0.01	0.11
21	46	-0.16	-0.11	-0.06	0.17	2.42	p<0.05	54	-0.07	-0.04	-0.02	0.10
22	46	-0.12	-0.08	-0.04	0.15	1.11		53	-0.09	-0.04	-0.00	0.16
23	41	-0.08	-0.05	-0.02	0.11	1.46		42	-0.04	-0.02	-0.00	0.07
24	35	-0.06	-0.02	0.01	0.11	0.73		41	-0.03	-0.01	0.01	0.07
25	30	-0.02	0.01	0.05	0.10	-0.95		35	-0.03	-0.01	0.02	0.07


NGoMe Lower gonial angle
77
75
73
71
69
67
NGoMe degrees
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years


NGoMe Lower gonial angle, change
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
NGoMe change degrees/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

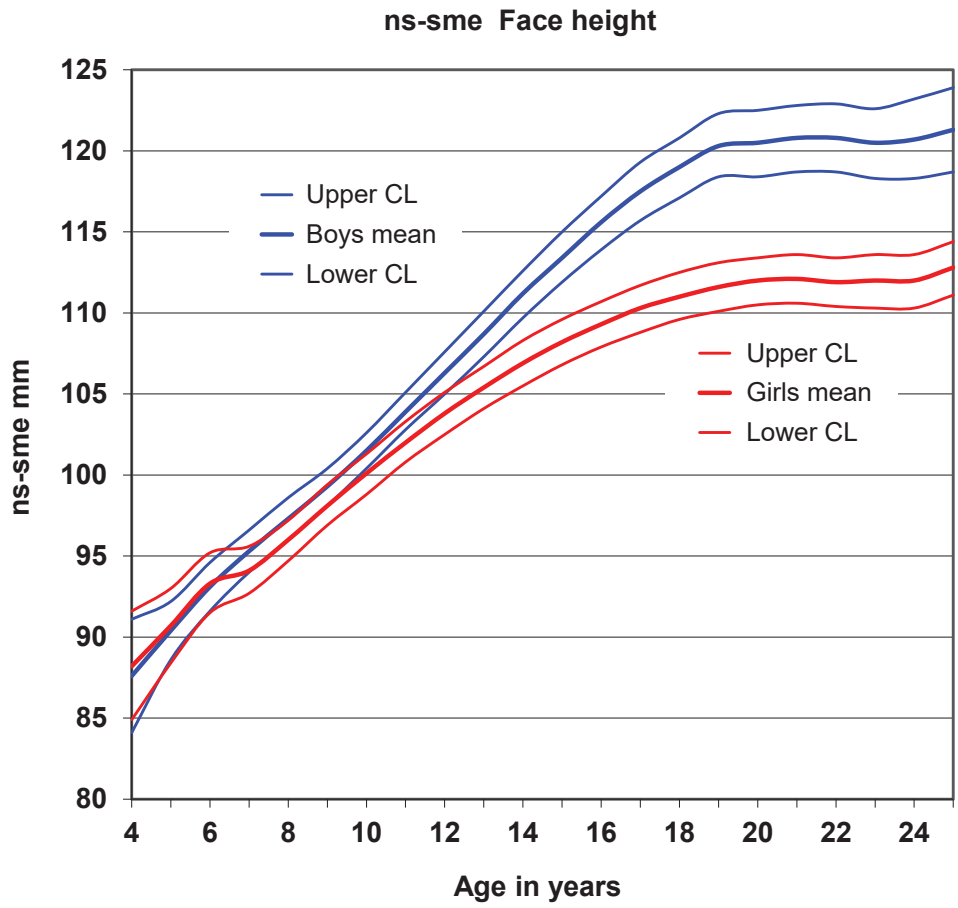


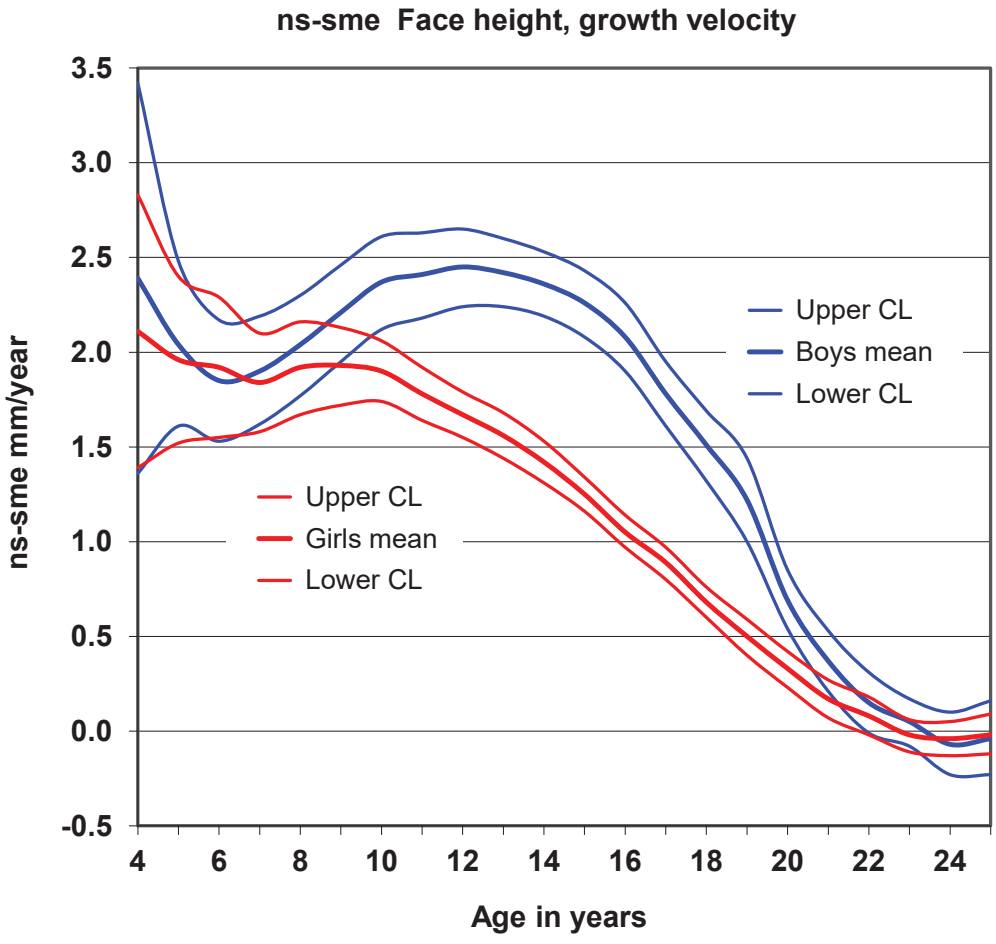
ns-sme (mm)

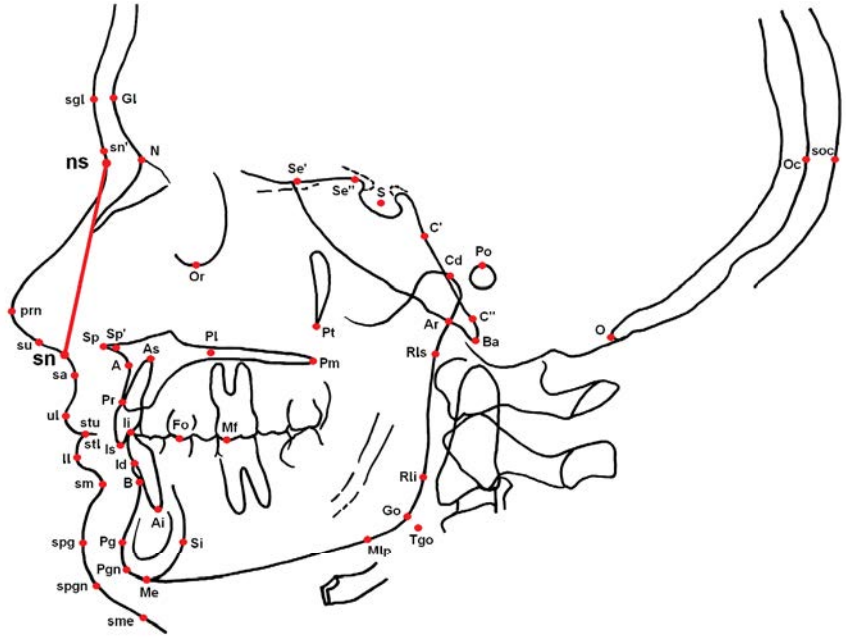
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	84.1	87.6	91.1	4.73	-0.24		7	84.9	88.2	91.6	4.55
5	18	88.6	90.4	92.2	3.89	-0.19		18	88.4	90.7	93.0	4.94
6	33	91.6	93.1	94.6	4.35	-0.16		26	91.5	93.3	95.2	4.79
7	41	94.0	95.3	96.6	4.16	1.17		39	92.7	94.1	95.6	4.66
8	46	96.0	97.3	98.6	4.38	1.44		49	94.7	96.0	97.2	4.49
9	48	98.1	99.3	100.4	4.01	1.29		53	96.9	98.1	99.4	4.73
10	50	100.4	101.5	102.6	3.96	1.65		54	98.8	100.1	101.3	4.75
11	50	102.7	103.9	105.1	4.25	2.12	p<0.05	55	100.8	102.0	103.3	4.83
12	50	105.0	106.3	107.6	4.62	2.71	p<0.01	55	102.5	103.8	105.1	4.93
13	50	107.3	108.7	110.1	5.02	3.38	p<0.01	55	104.1	105.4	106.7	5.04
14	50	109.7	111.2	112.6	5.31	4.17	p<0.001	55	105.5	106.9	108.3	5.17
15	50	111.9	113.4	115.0	5.65	4.90	p<0.001	55	106.8	108.2	109.6	5.29
16	50	113.9	115.6	117.3	5.99	5.65	p<0.001	55	107.9	109.3	110.7	5.40
17	49	115.7	117.5	119.3	6.40	6.21	p<0.001	55	108.8	110.3	111.7	5.49
18	48	117.1	119.0	120.9	6.69	6.58	p<0.001	55	109.6	111.0	112.5	5.53
19	48	118.4	120.4	122.3	7.02	7.07	p<0.001	55	110.1	111.6	113.1	5.55
20	44	118.4	120.5	122.5	6.87	6.81	p<0.001	55	110.5	112.0	113.4	5.57
21	44	118.7	120.8	122.8	6.93	6.83	p<0.001	54	110.6	112.1	113.6	5.64
22	44	118.7	120.8	122.9	7.11	6.86	p<0.001	53	110.4	111.9	113.4	5.58
23	39	118.3	120.5	122.6	6.76	6.28	p<0.001	42	110.3	112.0	113.6	5.37
24	33	118.3	120.8	123.2	7.14	6.02	p<0.001	41	110.3	112.0	113.6	5.43
25	28	118.7	121.3	123.9	7.05	5.61	p<0.001	35	111.1	112.8	114.4	5.02

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.36	2.39	3.42	1.39	0.43		7	1.39	2.11	2.83	0.97
5	18	1.61	2.04	2.48	0.94	0.25		18	1.52	1.96	2.40	0.95
6	33	1.53	1.85	2.17	0.94	-0.29		26	1.55	1.92	2.29	0.96
7	41	1.62	1.90	2.19	0.93	0.30		39	1.58	1.84	2.10	0.83
8	46	1.77	2.04	2.30	0.91	0.65		49	1.67	1.92	2.16	0.87
9	48	1.95	2.21	2.46	0.90	1.69		53	1.72	1.93	2.13	0.76
10	50	2.12	2.37	2.61	0.89	3.16	p<0.01	54	1.74	1.90	2.06	0.61
11	50	2.18	2.41	2.63	0.81	4.76	p<0.001	55	1.64	1.78	1.92	0.52
12	50	2.25	2.45	2.65	0.73	6.54	p<0.001	55	1.55	1.67	1.79	0.47
13	50	2.24	2.42	2.60	0.65	8.00	p<0.001	55	1.44	1.56	1.68	0.44
14	50	2.20	2.37	2.54	0.61	9.33	p<0.001	55	1.31	1.42	1.53	0.41
15	50	2.09	2.26	2.43	0.62	10.31	p<0.001	55	1.16	1.25	1.34	0.36
16	50	1.90	2.08	2.26	0.65	10.48	p<0.001	55	0.97	1.05	1.14	0.32
17	49	1.62	1.78	1.95	0.60	9.79	p<0.001	55	0.80	0.89	0.97	0.30
18	48	1.32	1.51	1.70	0.66	8.35	p<0.001	55	0.60	0.68	0.76	0.31
19	48	1.00	1.22	1.44	0.77	6.22	p<0.001	55	0.40	0.50	0.59	0.36
20	44	0.54	0.69	0.85	0.52	4.11	p<0.001	55	0.23	0.33	0.42	0.38
21	44	0.21	0.37	0.53	0.54	2.14	p<0.05	54	0.07	0.17	0.27	0.37
22	44	-0.01	0.15	0.31	0.54	0.78		53	-0.02	0.08	0.18	0.38
23	39	-0.08	0.04	0.17	0.40	0.91		42	-0.11	-0.02	0.06	0.27
24	33	-0.23	-0.07	0.09	0.47	-0.33		41	-0.13	-0.04	0.05	0.30
25	28	-0.24	-0.04	0.15	0.52	-0.24		35	-0.12	-0.02	0.09	0.32


ns-sme Face height
ns-sme mm
125
120
115
110
105
100
95
90
85
80
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


ns-sme Face height, growth velocity
ns-sme mm/year
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

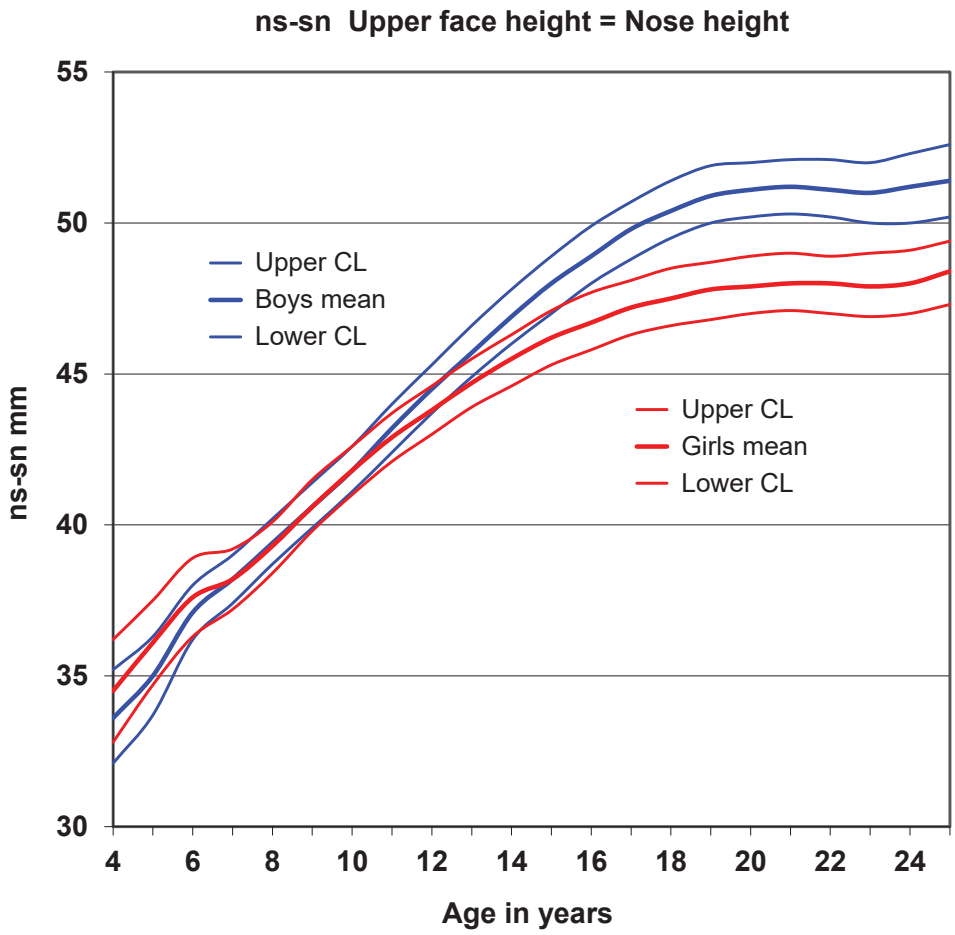


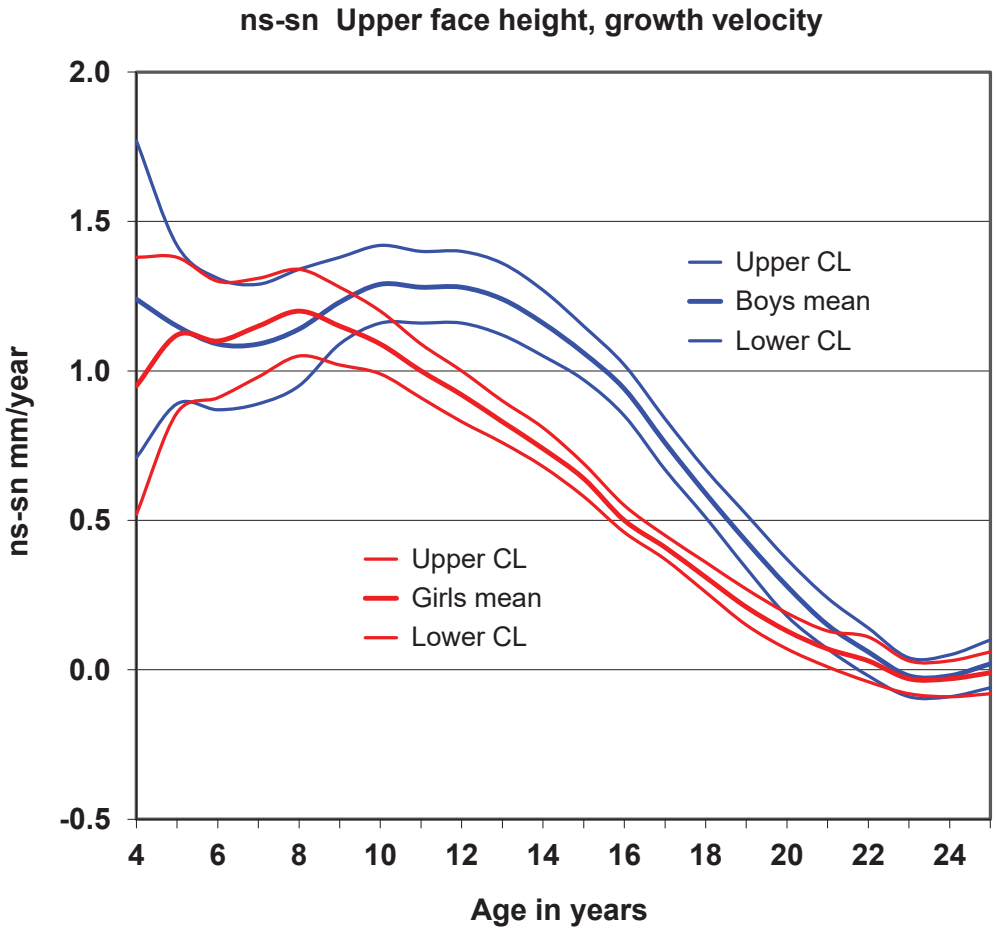
ns-sn (mm)

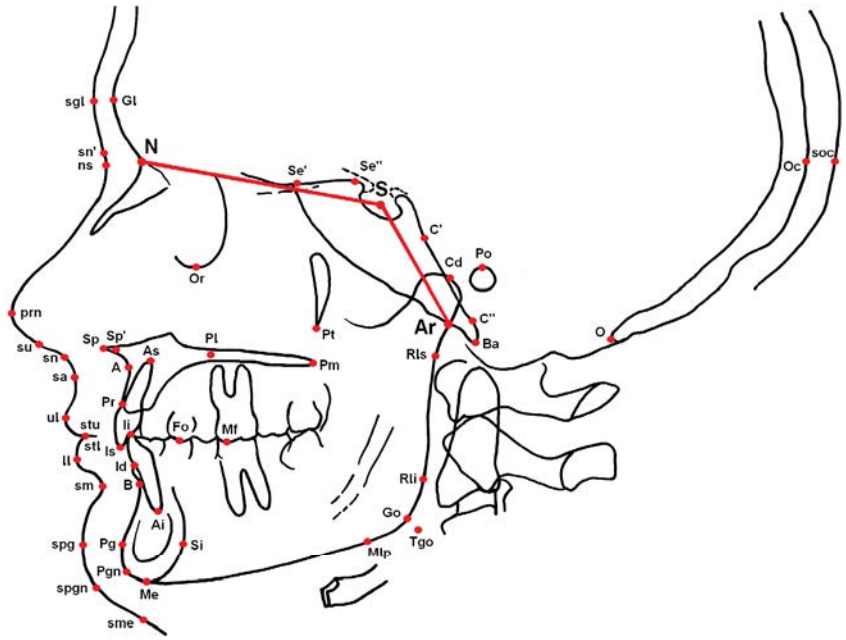
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	32.1	33.6	35.2	2.09	-0.77		7	32.8	34.5	36.2	2.28
5	18	33.7	35.0	36.3	2.74	-1.07		19	34.7	36.1	37.5	3.12
6	35	36.2	37.1	38.0	2.81	-0.62		27	36.3	37.6	38.9	3.32
7	43	37.4	38.2	39.0	2.69	-0.07		39	37.2	38.2	39.2	3.24
8	48	38.7	39.4	40.2	2.71	0.28		49	38.4	39.3	40.1	3.06
9	49	39.9	40.6	41.4	2.72	0.01		53	39.8	40.6	41.5	3.04
10	50	41.1	41.8	42.6	2.71	0.12		54	41.0	41.8	42.6	2.95
11	50	42.4	43.2	44.0	2.73	0.59		55	42.1	42.9	43.7	2.96
12	50	43.7	44.5	45.3	2.88	1.07		55	43.0	43.8	44.6	3.04
13	50	44.9	45.7	46.6	3.07	1.66		55	43.9	44.7	45.5	3.13
14	50	46.0	46.9	47.8	3.25	2.22	p<0.05	55	44.6	45.5	46.3	3.24
15	50	47.0	48.0	48.9	3.37	2.71	p<0.01	55	45.3	46.2	47.1	3.34
16	50	48.0	48.9	49.9	3.44	3.28	p<0.01	55	45.8	46.7	47.7	3.43
17	50	48.8	49.7	50.7	3.43	3.77	p<0.001	55	46.3	47.2	48.1	3.48
18	49	49.5	50.4	51.4	3.36	4.25	p<0.001	55	46.6	47.5	48.5	3.53
19	49	50.0	50.9	51.9	3.31	4.68	p<0.001	55	46.8	47.8	48.7	3.54
20	46	50.2	51.1	52.0	3.11	4.70	p<0.001	55	47.0	47.9	48.9	3.55
21	46	50.3	51.2	52.1	3.15	4.70	p<0.001	54	47.1	48.0	49.0	3.53
22	46	50.2	51.1	52.1	3.29	4.64	p<0.001	53	47.0	48.0	48.9	3.51
23	41	50.0	51.0	52.0	3.39	4.08	p<0.001	42	46.9	47.9	49.0	3.48
24	35	50.0	51.2	52.3	3.39	4.04	p<0.001	41	47.0	48.0	49.1	3.35
25	30	50.2	51.4	52.6	3.32	3.76	p<0.001	35	47.3	48.4	49.4	3.16

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.71	1.24	1.77	0.72	0.85		7	0.52	0.95	1.38	0.58
5	18	0.89	1.15	1.42	0.58	0.18		19	0.86	1.12	1.38	0.57
6	35	0.87	1.09	1.31	0.66	-0.08		27	0.91	1.10	1.30	0.52
7	43	0.89	1.09	1.29	0.68	-0.41		39	0.98	1.15	1.31	0.52
8	48	0.95	1.14	1.34	0.69	-0.41		49	1.05	1.20	1.34	0.52
9	49	1.09	1.23	1.38	0.51	0.86		53	1.02	1.15	1.28	0.47
10	50	1.16	1.29	1.42	0.46	2.36	p<0.05	54	0.99	1.09	1.20	0.39
11	50	1.16	1.28	1.40	0.44	3.65	p<0.001	55	0.91	1.00	1.09	0.35
12	50	1.16	1.28	1.40	0.44	4.89	p<0.001	55	0.83	0.92	1.00	0.31
13	50	1.12	1.24	1.36	0.44	5.79	p<0.001	55	0.76	0.83	0.90	0.27
14	50	1.05	1.16	1.27	0.39	6.53	p<0.001	55	0.68	0.74	0.81	0.25
15	50	0.96	1.06	1.15	0.34	7.63	p<0.001	55	0.58	0.64	0.69	0.22
16	50	0.85	0.93	1.02	0.30	8.96	p<0.001	55	0.46	0.50	0.55	0.18
17	50	0.67	0.76	0.84	0.31	7.22	p<0.001	55	0.37	0.41	0.45	0.17
18	49	0.51	0.59	0.67	0.29	5.91	p<0.001	55	0.26	0.31	0.36	0.18
19	49	0.34	0.43	0.52	0.31	4.23	p<0.001	55	0.15	0.21	0.27	0.22
20	46	0.18	0.28	0.37	0.32	2.64	p<0.01	55	0.07	0.13	0.19	0.22
21	46	0.07	0.15	0.24	0.29	1.60		54	0.01	0.07	0.13	0.23
22	46	-0.02	0.06	0.14	0.28	0.40		53	-0.04	0.03	0.11	0.28
23	41	-0.08	-0.02	0.04	0.21	0.15		42	-0.08	-0.03	0.03	0.18
24	35	-0.09	-0.02	0.05	0.21	0.14		41	-0.09	-0.03	0.03	0.20
25	30	-0.06	0.02	0.11	0.23	0.63		35	-0.08	-0.01	0.06	0.21

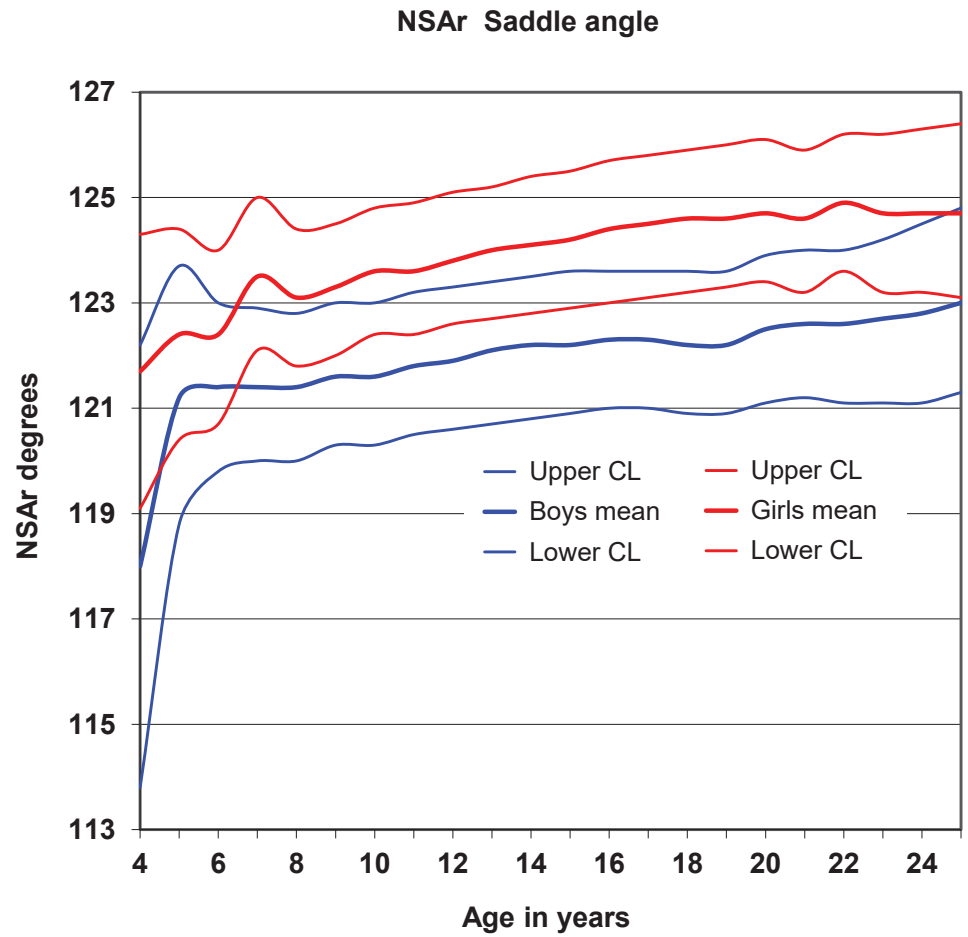

ns-sn Upper face height = Nose height
55
50
45
40
35
30
ns-sn mm
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

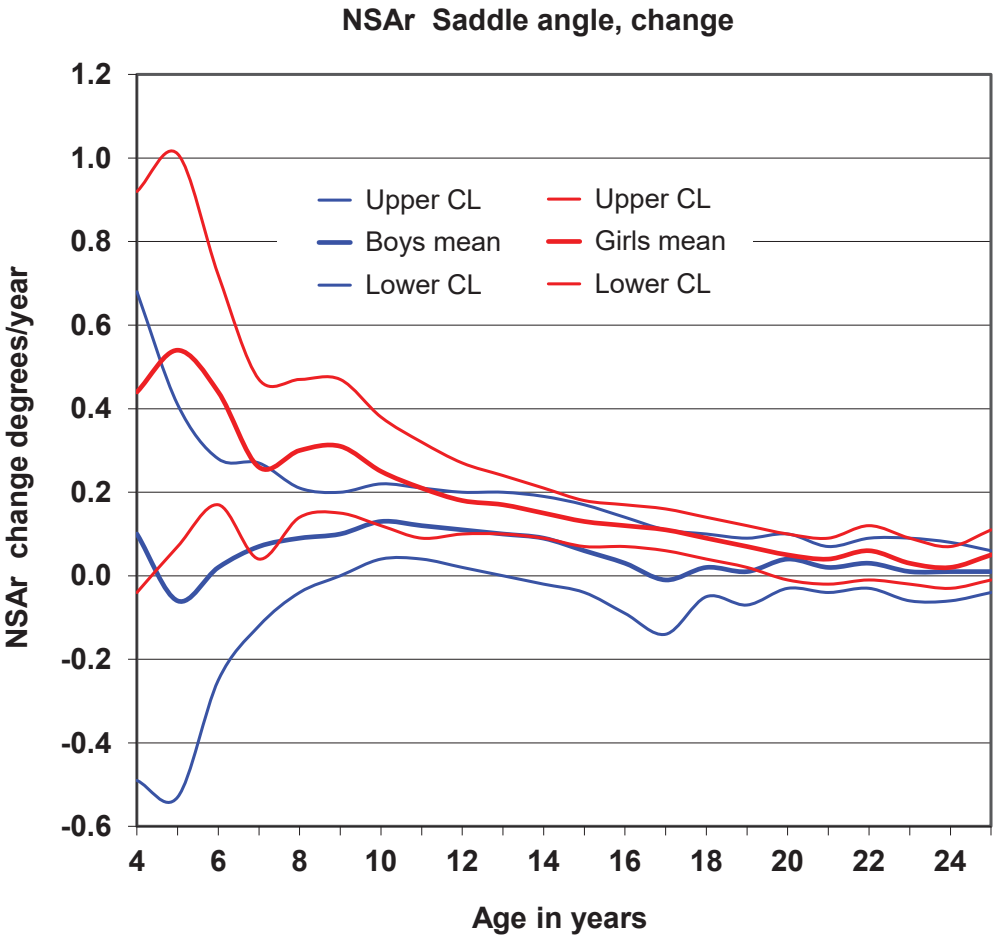

ns-sn Upper face height, growth velocity
2.0
1.5
1.0
0.5
0.0
-0.5
ns-sn mm/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

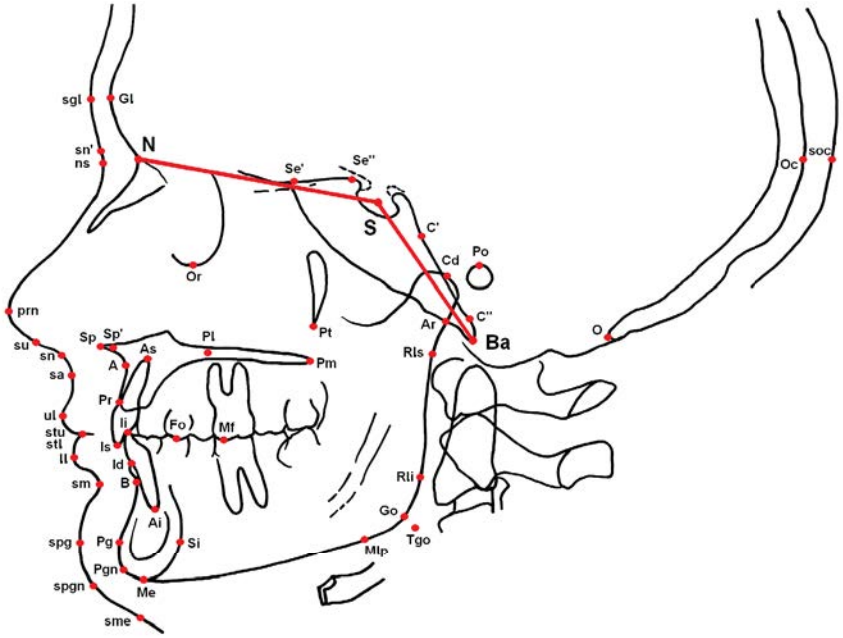


NSAr (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	113.8	118.0	122.2	5.63	1.47		7	119.1	121.7	124.3	3.55
5	18	118.8	121.2	123.7	5.31	0.73		19	120.4	122.4	124.4	4.42
6	35	119.8	121.4	123.0	4.81	0.81		27	120.7	122.4	124.0	4.36
7	43	120.0	121.4	122.9	4.77	2.02	p<0.05	39	122.1	123.5	125.0	4.70
8	48	120.0	121.4	122.8	4.83	1.81		49	121.8	123.1	124.4	4.61
9	49	120.3	121.6	123.0	4.91	1.75		53	122.0	123.3	124.5	4.62
10	50	120.3	121.6	123.0	4.94	2.15	p<0.05	54	122.4	123.6	124.8	4.54
11	50	120.5	121.8	123.2	4.90	1.93		55	122.4	123.6	124.9	4.76
12	50	120.6	121.9	123.3	4.85	2.00	p<0.05	55	122.6	123.8	125.1	4.78
13	50	120.7	122.1	123.4	4.83	2.03	p<0.05	55	122.7	124.0	125.2	4.83
14	50	120.8	122.2	123.5	4.79	2.07	p<0.05	55	122.8	124.1	125.4	4.89
15	50	120.9	122.2	123.6	4.73	2.11	p<0.05	55	122.9	124.2	125.5	4.94
16	50	121.0	122.3	123.6	4.72	2.17	p<0.05	55	123.0	124.4	125.7	4.97
17	50	121.0	122.3	123.6	4.73	2.30	p<0.05	55	123.1	124.5	125.8	5.01
18	49	120.9	122.2	123.6	4.80	2.42	p<0.05	55	123.2	124.6	125.9	5.06
19	49	120.9	122.2	123.6	4.84	2.46	p<0.05	55	123.3	124.6	126.0	5.08
20	46	121.1	122.5	123.9	4.79	2.21	p<0.05	55	123.4	124.7	126.1	5.11
21	46	121.2	122.6	124.0	4.84	2.04	p<0.05	54	123.2	124.6	125.9	5.07
22	46	121.1	122.6	124.0	4.94	2.39	p<0.05	53	123.6	124.9	126.2	4.73
23	41	121.1	122.7	124.2	5.01	1.84		42	123.2	124.7	126.2	4.92
24	35	121.1	122.8	124.5	5.09	1.66		41	123.2	124.7	126.3	5.03
25	30	121.3	123.0	124.8	4.95	1.35		35	123.1	124.7	126.4	4.98

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.49	0.10	0.68	0.79	0.88		7	-0.04	0.44	0.92	0.65
5	18	-0.53	-0.06	0.41	1.02	1.77		19	0.07	0.54	1.01	1.04
6	35	-0.25	0.01	0.28	0.79	2.20	p<0.05	27	0.17	0.44	0.72	0.72
7	43	-0.12	0.07	0.26	0.65	1.27		39	0.04	0.26	0.47	0.69
8	48	-0.04	0.09	0.21	0.46	2.02	p<0.05	49	0.14	0.30	0.47	0.60
9	49	-0.00	0.10	0.20	0.36	2.12	p<0.05	53	0.15	0.31	0.47	0.60
10	50	0.04	0.13	0.22	0.33	1.43		54	0.12	0.25	0.38	0.49
11	50	0.04	0.12	0.21	0.32	1.12		55	0.09	0.21	0.32	0.42
12	50	0.02	0.11	0.20	0.33	1.11		55	0.10	0.18	0.27	0.32
13	50	-0.00	0.10	0.20	0.37	1.13		55	0.10	0.17	0.24	0.26
14	50	-0.02	0.09	0.19	0.36	1.08		55	0.09	0.15	0.21	0.23
15	50	-0.04	0.06	0.17	0.39	1.03		55	0.07	0.13	0.18	0.21
16	50	-0.09	0.03	0.14	0.42	1.47		55	0.07	0.12	0.17	0.19
17	50	-0.14	-0.01	0.11	0.44	1.87		55	0.06	0.11	0.16	0.19
18	49	-0.05	0.02	0.10	0.27	1.55		55	0.04	0.09	0.14	0.19
19	49	-0.07	0.01	0.09	0.27	1.33		55	0.02	0.07	0.12	0.19
20	46	-0.03	0.04	0.10	0.22	0.19		55	-0.01	0.05	0.10	0.20
21	46	-0.04	0.02	0.07	0.19	0.53		54	-0.02	0.04	0.09	0.20
22	46	-0.03	0.03	0.09	0.21	0.60		53	-0.01	0.06	0.12	0.23
23	41	-0.06	0.01	0.09	0.25	0.44		42	-0.02	0.03	0.09	0.18
24	35	-0.06	0.01	0.08	0.21	0.29		41	-0.03	0.02	0.07	0.17
25	30	-0.04	0.01	0.06	0.14	1.04		35	-0.01	0.05	0.11	0.18


NSAr Saddle angle
NSAr degrees
127
125
123
121
119
117
115
113
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


NSAr Saddle angle, change
NSAr change degrees/year
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

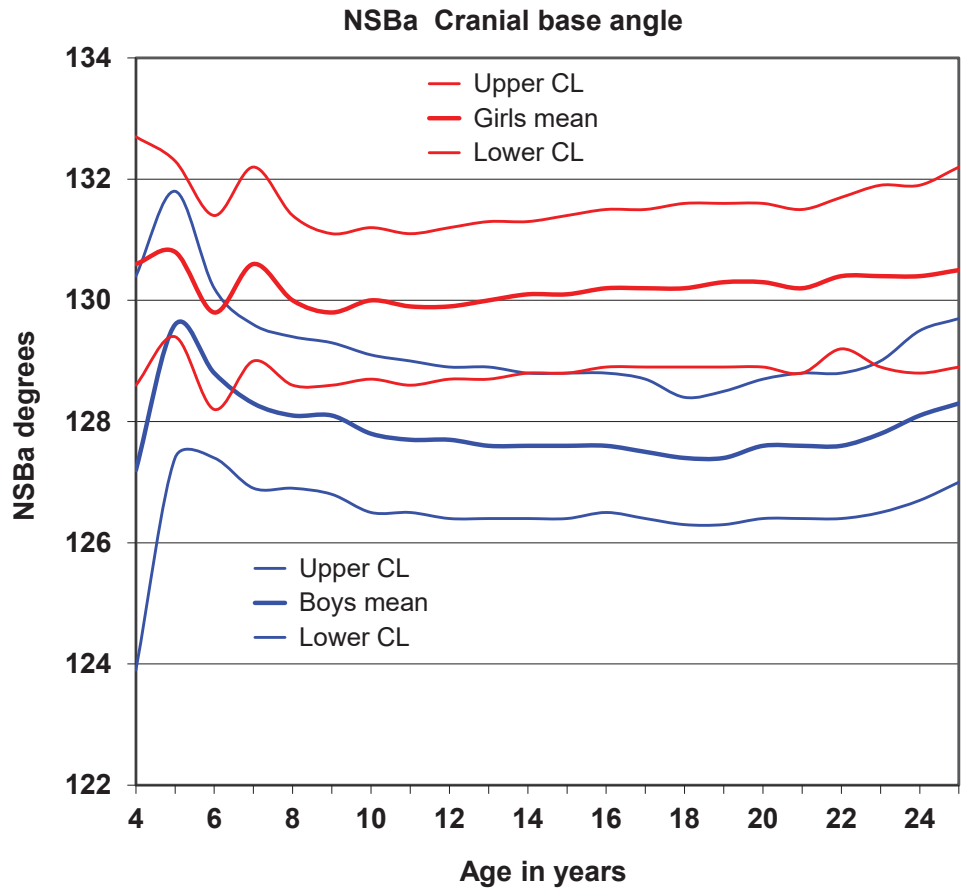


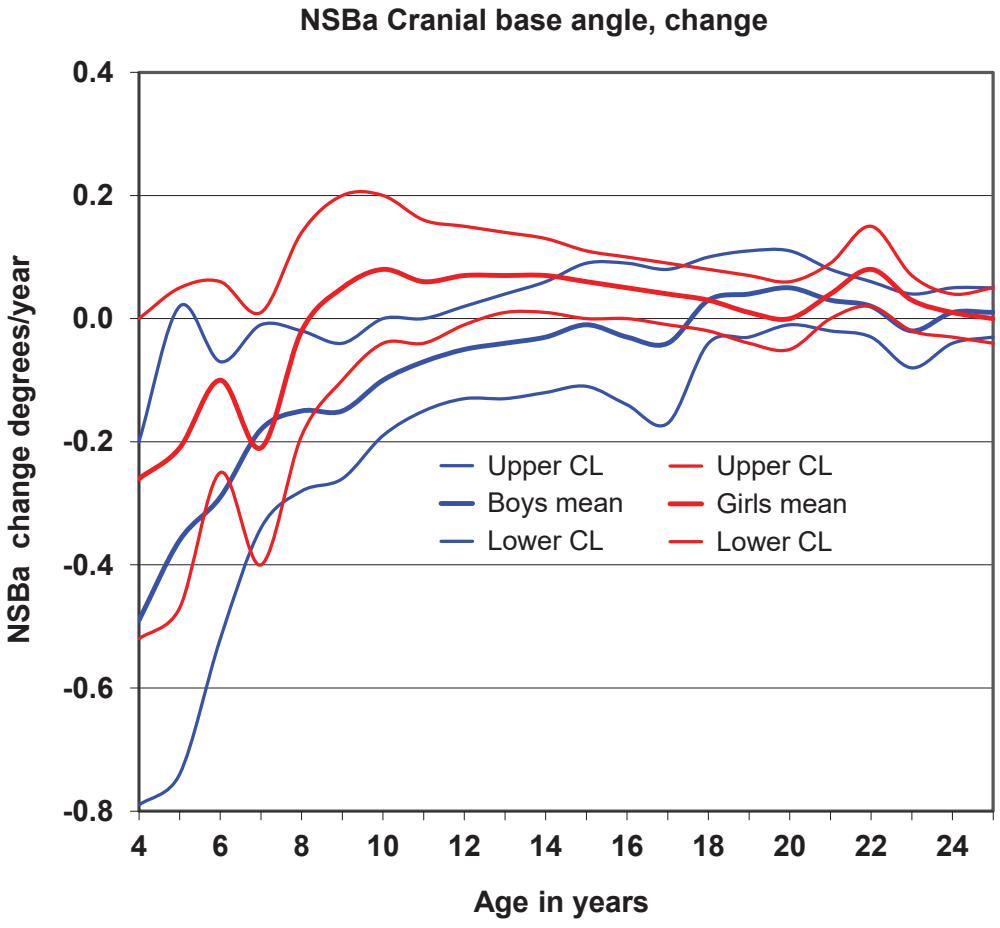
NSBa (degrees)

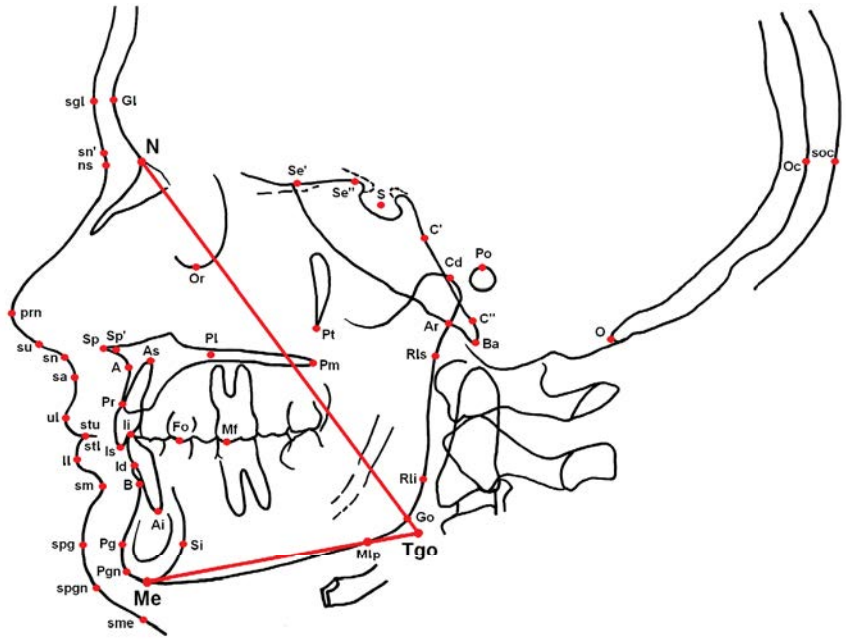
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	123.9	127.1	130.4	4.36	1.79		7	128.6	130.6	132.7	2.78
5	18	127.4	129.6	131.8	4.83	0.90		19	129.4	130.8	132.3	3.21
6	35	127.4	128.8	130.2	4.24	0.89		27	128.2	129.8	131.4	4.15
7	43	126.9	128.3	129.6	4.46	2.25	p<0.05	39	129.0	130.6	132.2	5.00
8	48	126.9	128.1	129.4	4.43	1.98		49	128.6	130.0	131.4	4.92
9	49	126.8	128.1	129.3	4.51	1.94		53	128.6	129.8	131.1	4.73
10	50	126.5	127.8	129.1	4.54	2.41	p<0.05	54	128.7	130.0	131.2	4.58
11	50	126.5	127.8	129.0	4.53	2.33	p<0.05	55	128.6	129.9	131.1	4.79
12	50	126.4	127.7	128.9	4.50	2.46	p<0.05	55	128.7	129.9	131.2	4.78
13	50	126.4	127.6	128.9	4.47	2.59	p<0.05	55	128.7	130.0	131.3	4.80
14	50	126.4	127.6	128.8	4.39	2.72	p<0.01	55	128.8	130.1	131.3	4.84
15	50	126.4	127.6	128.8	4.25	2.82	p<0.01	55	128.8	130.1	131.4	4.89
16	50	126.5	127.6	128.7	4.14	2.88	p<0.01	55	128.9	130.2	131.5	4.91
17	50	126.4	127.5	128.6	4.03	3.02	p<0.01	55	128.9	130.2	131.5	4.95
18	49	126.2	127.3	128.4	3.91	3.27	p<0.01	55	128.9	130.2	131.6	4.98
19	49	126.3	127.4	128.5	3.94	3.22	p<0.01	55	128.9	130.3	131.6	4.98
20	46	126.4	127.6	128.7	4.04	2.92	p<0.01	55	128.9	130.3	131.6	5.00
21	46	126.4	127.6	128.8	4.10	2.75	p<0.01	54	128.8	130.2	131.5	4.98
22	46	126.4	127.6	128.8	4.12	3.18	p<0.01	53	129.2	130.4	131.7	4.67
23	41	126.5	127.8	129.0	4.17	2.62	p<0.05	42	128.9	130.4	131.9	4.93
24	35	126.7	128.1	129.5	4.18	2.15	p<0.05	41	128.8	130.4	131.9	5.00
25	30	126.9	128.3	129.7	3.85	2.00		35	128.9	130.5	132.2	4.95

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.79	-0.49	-0.20	0.40	1.16		7	-0.52	-0.26	0.00	0.35
5	18	-0.74	-0.36	0.02	0.82	0.66		19	-0.47	-0.21	0.05	0.58
6	35	-0.52	-0.29	-0.06	0.68	1.30		27	-0.25	-0.10	0.06	0.42
7	43	-0.34	-0.18	-0.01	0.55	-0.23		39	-0.40	-0.21	-0.01	0.63
8	48	-0.28	-0.15	-0.02	0.46	1.16		49	-0.19	-0.02	0.14	0.58
9	49	-0.26	-0.15	-0.04	0.39	2.08	p<0.05	53	-0.10	0.05	0.20	0.54
10	50	-0.19	-0.10	-0.00	0.34	2.17	p<0.05	54	-0.04	0.08	0.20	0.46
11	50	-0.16	-0.08	0.00	0.29	2.04	p<0.05	55	-0.04	0.06	0.16	0.39
12	50	-0.13	-0.05	0.02	0.27	2.22	p<0.05	55	-0.01	0.07	0.15	0.30
13	50	-0.13	-0.05	0.03	0.29	2.29	p<0.05	55	0.01	0.07	0.14	0.25
14	50	-0.12	-0.03	0.06	0.32	1.83		55	0.01	0.07	0.13	0.23
15	50	-0.12	-0.01	0.09	0.37	1.22		55	0.00	0.06	0.11	0.20
16	50	-0.14	-0.03	0.08	0.41	1.30		55	0.00	0.05	0.10	0.18
17	50	-0.17	-0.04	0.08	0.45	1.21		55	-0.01	0.04	0.09	0.19
18	49	-0.04	0.03	0.10	0.25	-0.11		55	-0.02	0.03	0.08	0.19
19	49	-0.04	0.04	0.11	0.26	-0.48		55	-0.04	0.01	0.07	0.20
20	46	-0.01	0.05	0.11	0.21	-1.02		55	-0.05	0.00	0.06	0.20
21	46	-0.02	0.03	0.08	0.18	0.33		54	-0.00	0.04	0.09	0.18
22	46	-0.03	0.02	0.06	0.16	1.58		53	0.02	0.08	0.15	0.24
23	41	-0.07	-0.02	0.04	0.19	1.10		42	-0.02	0.03	0.07	0.15
24	35	-0.03	0.01	0.05	0.13	-0.09		41	-0.03	0.01	0.04	0.11
25	30	-0.02	0.02	0.06	0.11	-0.46		35	-0.04	0.00	0.05	0.13

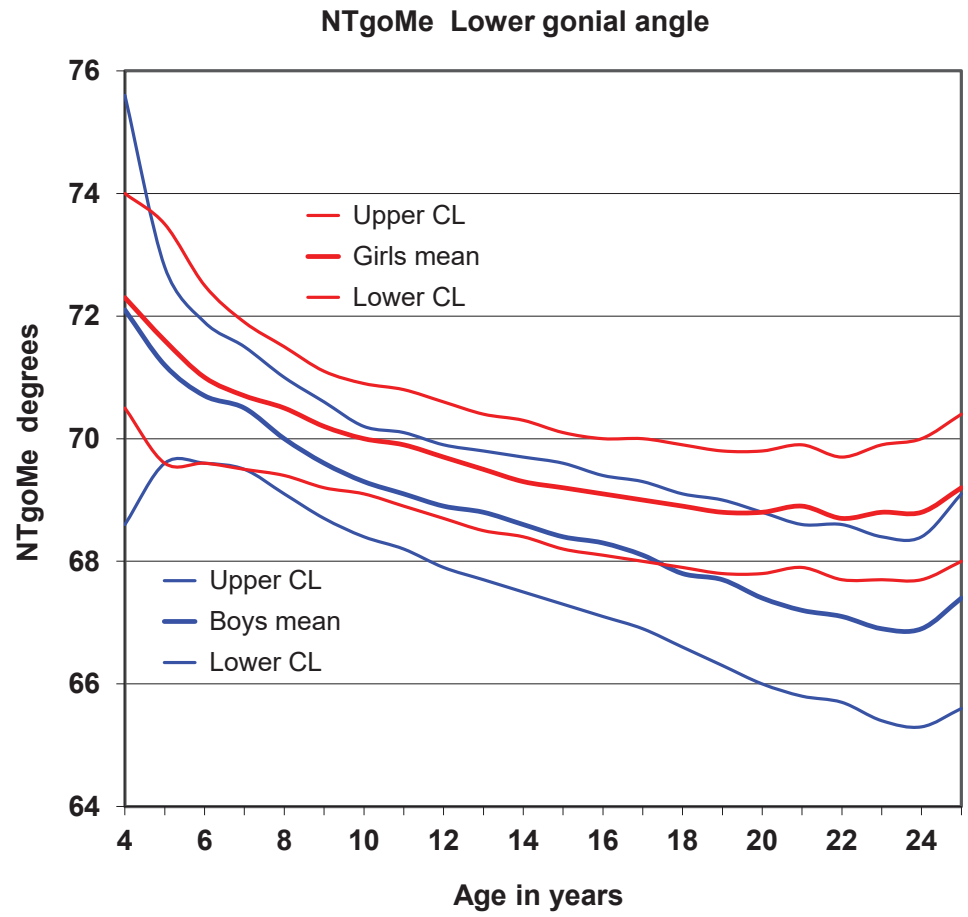

NSBa Cranial base angle
NSBa degrees
134
132
130
128
126
124
122
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

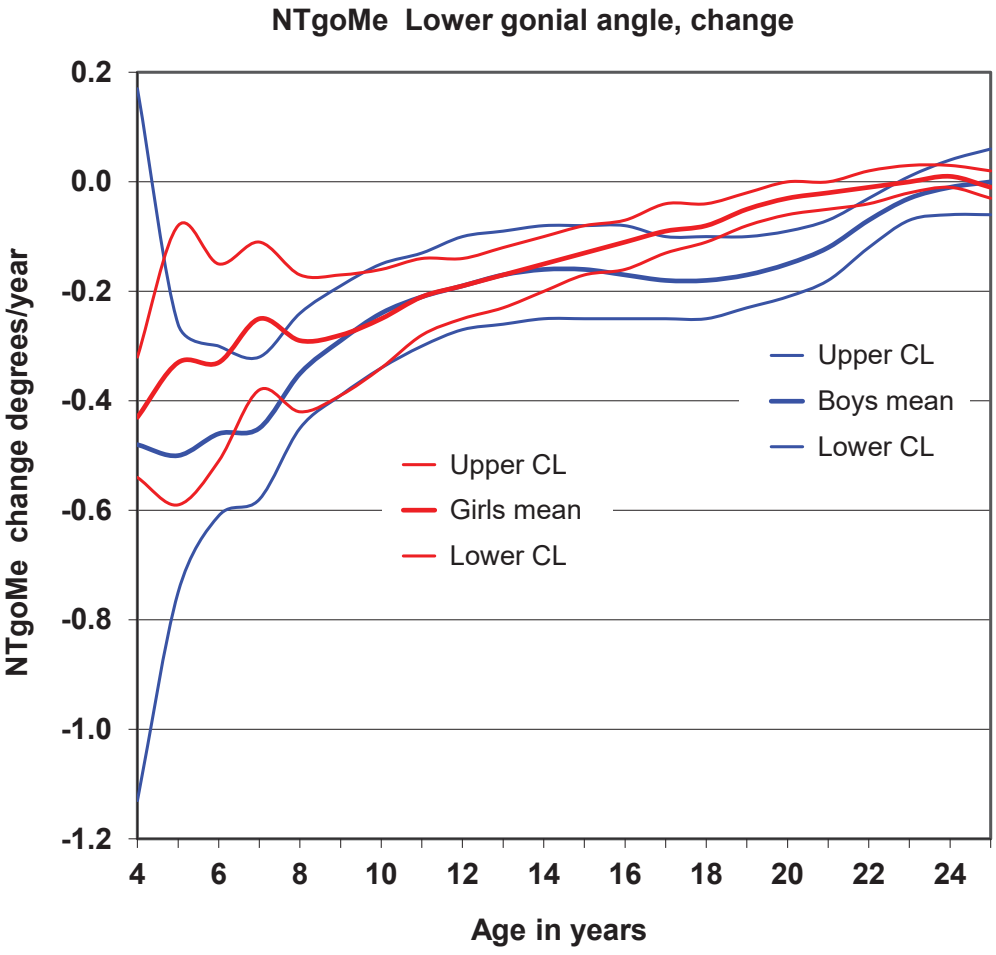

NSBa Cranial base angle, change
NSBa change degrees/year
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

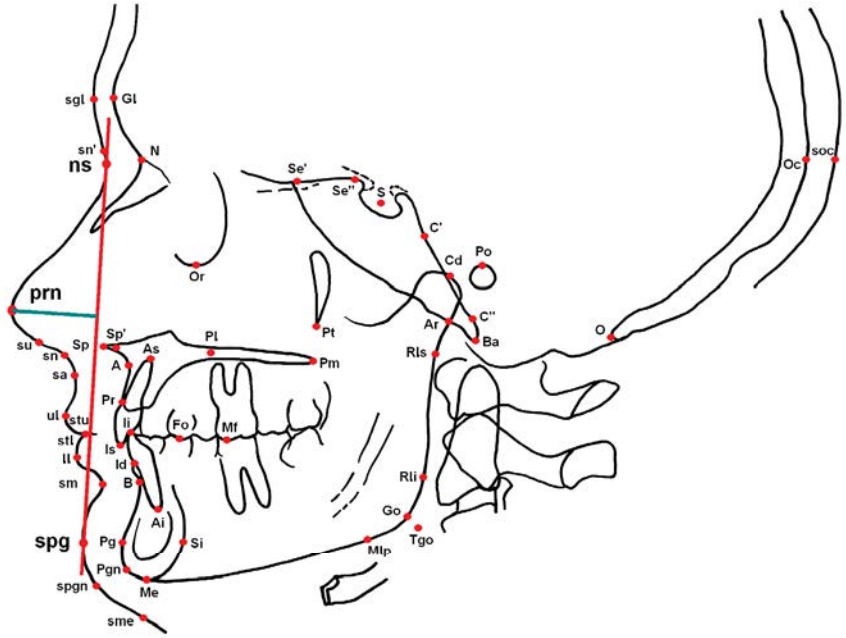


NTgoMe (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	68.6	72.1	75.6	4.69	0.09		7	70.5	72.3	74.0	2.37
5	18	69.6	71.2	72.8	3.45	0.27		19	69.6	71.6	73.5	4.28
6	35	69.6	70.7	71.9	3.49	0.35		27	69.6	71.0	72.5	3.76
7	43	69.5	70.5	71.5	3.36	0.21		39	69.5	70.7	71.9	3.89
8	48	69.1	70.0	71.0	3.37	0.63		49	69.4	70.5	71.5	3.70
9	49	68.7	69.6	70.6	3.33	0.79		53	69.2	70.2	71.1	3.50
10	50	68.4	69.3	70.3	3.35	0.98		54	69.1	70.0	70.9	3.51
11	50	68.2	69.1	70.1	3.48	1.05		55	68.9	69.9	70.8	3.58
12	50	67.9	68.9	69.9	3.60	1.04		55	68.7	69.7	70.6	3.60
13	50	67.7	68.8	69.8	3.71	1.01		55	68.5	69.5	70.4	3.62
14	50	67.5	68.6	69.7	3.86	1.00		55	68.4	69.3	70.3	3.64
15	50	67.3	68.4	69.5	4.03	1.01		55	68.2	69.2	70.1	3.67
16	50	67.1	68.2	69.4	4.19	1.07		55	68.1	69.1	70.0	3.71
17	50	66.9	68.1	69.3	4.36	1.14		55	68.0	69.0	70.0	3.74
18	49	66.5	67.8	69.1	4.51	1.34		55	67.9	68.9	69.9	3.76
19	49	66.3	67.6	68.9	4.64	1.46		55	67.8	68.8	69.8	3.80
20	46	65.9	67.3	68.7	4.87	1.68		55	67.8	68.8	69.8	3.83
21	46	65.7	67.2	68.6	4.96	1.96		54	67.9	68.9	69.9	3.80
22	46	65.6	67.1	68.5	5.01	1.90		53	67.7	68.7	69.7	3.70
23	41	65.4	66.8	68.3	4.81	2.13	p<0.05	42	67.7	68.8	69.9	3.68
24	35	65.2	66.8	68.4	4.75	2.06	p<0.05	41	67.7	68.8	70.0	3.76
25	30	65.6	67.3	69.1	4.84	1.75		35	68.0	69.2	70.4	3.74

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.13	-0.48	0.17	0.87	0.16		7	-0.54	-0.43	-0.32	0.15
5	18	-0.75	-0.50	-0.26	0.53	0.94		19	-0.59	-0.33	-0.08	0.57
6	35	-0.59	-0.45	-0.30	0.44	1.00		27	-0.51	-0.33	-0.15	0.47
7	43	-0.57	-0.44	-0.31	0.42	2.02	p<0.05	39	-0.38	-0.25	-0.11	0.43
8	48	-0.45	-0.34	-0.24	0.37	0.57		49	-0.42	-0.29	-0.17	0.45
9	49	-0.39	-0.29	-0.19	0.36	0.16		53	-0.39	-0.28	-0.17	0.40
10	50	-0.34	-0.25	-0.15	0.34	-0.10		54	-0.34	-0.25	-0.16	0.33
11	50	-0.30	-0.22	-0.13	0.31	0.08		55	-0.28	-0.21	-0.14	0.26
12	50	-0.28	-0.19	-0.11	0.31	-0.00		55	-0.25	-0.19	-0.14	0.22
13	50	-0.26	-0.18	-0.10	0.30	0.09		55	-0.23	-0.17	-0.12	0.19
14	50	-0.25	-0.17	-0.09	0.30	0.40		55	-0.20	-0.15	-0.10	0.19
15	50	-0.25	-0.17	-0.09	0.29	0.97		55	-0.17	-0.13	-0.08	0.17
16	50	-0.25	-0.17	-0.10	0.28	1.35		55	-0.16	-0.11	-0.07	0.17
17	50	-0.25	-0.18	-0.11	0.26	2.25	p<0.05	55	-0.13	-0.09	-0.04	0.16
18	49	-0.25	-0.18	-0.11	0.25	2.65	p<0.01	55	-0.11	-0.08	-0.04	0.14
19	49	-0.23	-0.17	-0.10	0.23	3.30	p<0.01	55	-0.08	-0.05	-0.02	0.13
20	46	-0.21	-0.15	-0.10	0.20	3.97	p<0.001	55	-0.06	-0.03	-0.00	0.11
21	46	-0.17	-0.12	-0.07	0.19	3.32	p<0.01	54	-0.05	-0.02	0.00	0.10
22	46	-0.11	-0.07	-0.03	0.15	2.30	p<0.05	53	-0.04	-0.01	0.02	0.11
23	41	-0.06	-0.02	0.01	0.12	1.15		42	-0.02	0.00	0.03	0.09
24	35	-0.04	0.00	0.04	0.13	0.28		41	-0.01	0.01	0.03	0.07
25	30	-0.02	0.02	0.06	0.11	-1.31		35	-0.03	-0.01	0.02	0.07

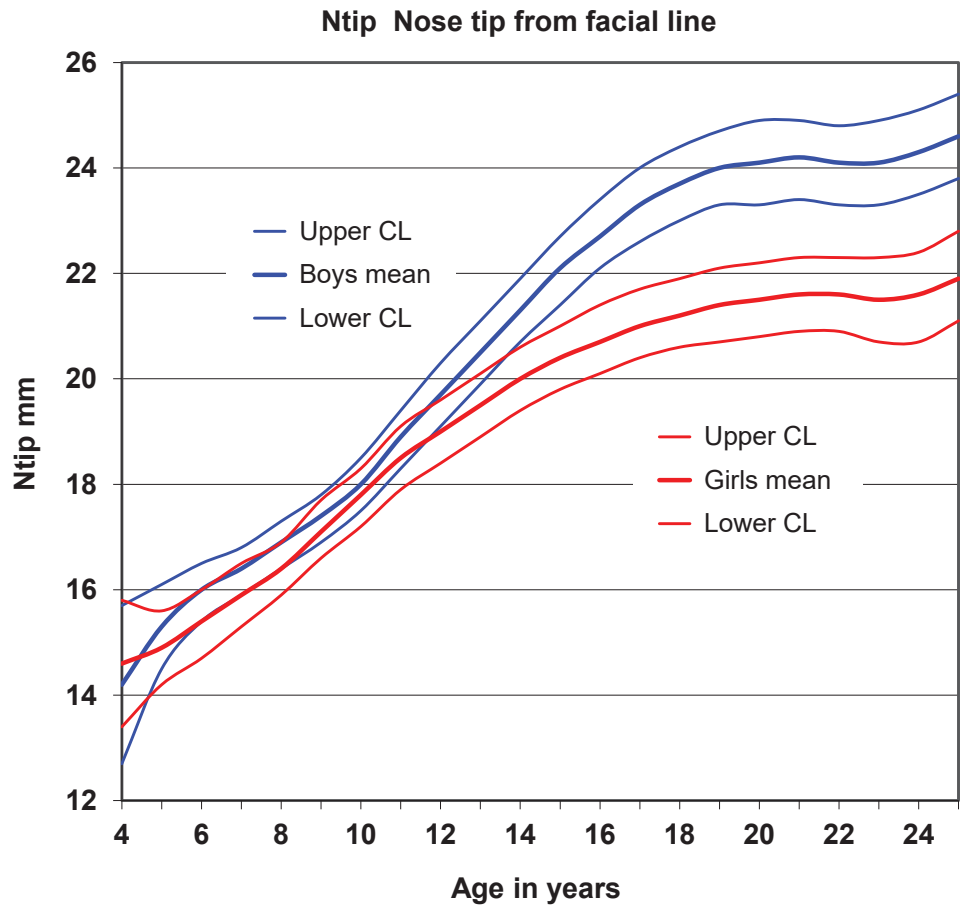

NTgoMe Lower gonial angle
NTgoMe degrees
76
74
72
70
68
66
64
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

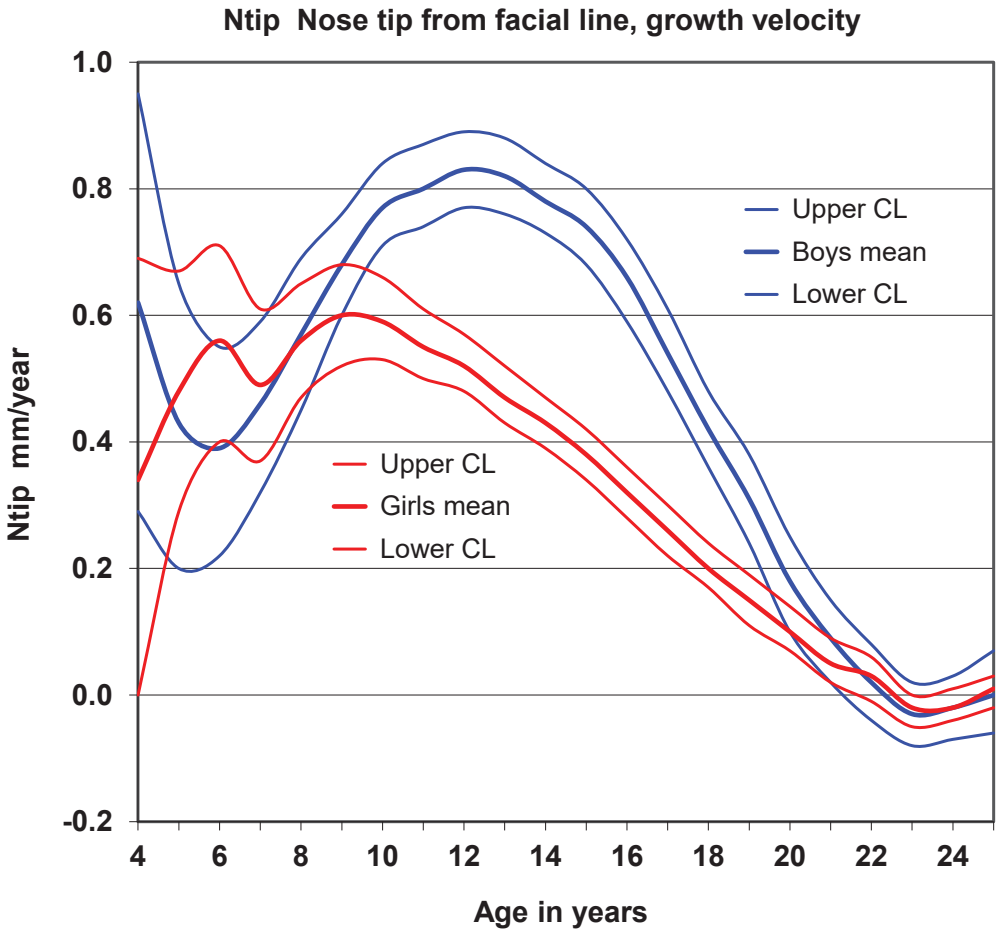

NTgoMe Lower gonial angle, change
NTgoMe change degrees/year
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

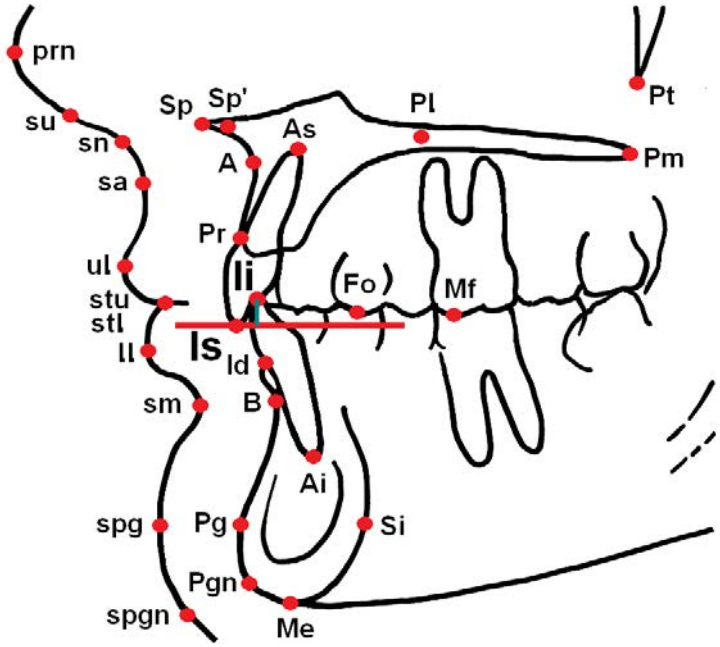


Ntip (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	12.7	14.2	15.7	2.05	-0.36		6	13.4	14.6	15.8	1.52
5	18	14.5	15.3	16.1	1.72	0.67		18	14.2	14.9	15.6	1.56
6	35	15.4	16.0	16.5	1.62	1.40		26	14.7	15.4	16.0	1.71
7	43	15.9	16.4	16.8	1.55	1.30		39	15.3	15.9	16.5	1.81
8	48	16.4	16.9	17.3	1.59	1.21		49	15.9	16.4	16.9	1.86
9	49	16.9	17.4	17.8	1.69	0.64		53	16.6	17.1	17.7	1.96
10	50	17.5	18.0	18.5	1.81	0.66		54	17.2	17.8	18.3	2.03
11	50	18.3	18.9	19.4	1.94	0.93		55	17.9	18.5	19.1	2.21
12	50	19.1	19.7	20.3	2.07	1.56		55	18.4	19.0	19.6	2.27
13	50	19.9	20.5	21.1	2.20	2.22	p<0.05	55	18.9	19.5	20.1	2.32
14	50	20.7	21.3	21.9	2.30	2.89	p<0.01	55	19.4	20.0	20.6	2.37
15	50	21.4	22.1	22.7	2.38	3.53	p<0.001	55	19.8	20.4	21.0	2.42
16	50	22.1	22.7	23.4	2.44	4.18	p<0.001	55	20.1	20.7	21.4	2.45
17	50	22.6	23.3	24.0	2.48	4.66	p<0.001	55	20.4	21.0	21.7	2.50
18	49	23.0	23.7	24.4	2.50	4.87	p<0.001	55	20.6	21.2	21.9	2.55
19	49	23.3	24.0	24.7	2.56	5.16	p<0.001	55	20.7	21.4	22.1	2.58
20	46	23.3	24.1	24.9	2.61	4.90	p<0.001	55	20.8	21.5	22.2	2.62
21	46	23.4	24.2	24.9	2.67	4.77	p<0.001	54	20.9	21.6	22.3	2.63
22	46	23.3	24.1	24.8	2.71	4.65	p<0.001	53	20.9	21.6	22.3	2.62
23	41	23.3	24.1	24.9	2.67	4.34	p<0.001	42	20.7	21.5	22.3	2.65
24	35	23.5	24.3	25.1	2.48	4.59	p<0.001	41	20.7	21.6	22.4	2.65
25	30	23.7	24.6	25.4	2.37	4.33	p<0.001	35	21.1	21.9	22.8	2.53

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.29	0.62	0.95	0.44	1.14		6	0.00	0.34	0.69	0.43
5	18	0.20	0.43	0.65	0.48	-0.36		18	0.29	0.48	0.67	0.41
6	35	0.22	0.39	0.55	0.51	-1.42		26	0.40	0.56	0.71	0.41
7	43	0.32	0.46	0.59	0.46	-0.33		39	0.37	0.49	0.61	0.39
8	48	0.45	0.57	0.69	0.43	0.11		49	0.47	0.56	0.65	0.33
9	49	0.60	0.68	0.76	0.30	1.41		53	0.52	0.60	0.68	0.29
10	50	0.71	0.77	0.84	0.24	3.85	p<0.001	54	0.53	0.59	0.66	0.23
11	50	0.74	0.80	0.87	0.23	6.02	p<0.001	55	0.50	0.55	0.61	0.20
12	50	0.76	0.83	0.89	0.23	7.87	p<0.001	55	0.48	0.52	0.57	0.17
13	50	0.76	0.82	0.88	0.23	9.02	p<0.001	55	0.43	0.47	0.52	0.16
14	50	0.72	0.78	0.84	0.21	9.86	p<0.001	55	0.39	0.43	0.47	0.16
15	50	0.68	0.74	0.80	0.21	9.93	p<0.001	55	0.34	0.38	0.42	0.16
16	50	0.59	0.65	0.72	0.23	8.67	p<0.001	55	0.28	0.32	0.36	0.16
17	50	0.48	0.54	0.61	0.24	7.38	p<0.001	55	0.22	0.26	0.30	0.14
18	49	0.35	0.42	0.48	0.23	5.82	p<0.001	55	0.17	0.20	0.24	0.14
19	49	0.24	0.31	0.38	0.26	4.06	p<0.001	55	0.11	0.15	0.19	0.14
20	46	0.10	0.18	0.25	0.25	1.83		55	0.07	0.10	0.14	0.14
21	46	0.02	0.09	0.15	0.24	0.83		54	0.02	0.05	0.09	0.13
22	46	-0.04	0.02	0.08	0.21	-0.09		53	-0.01	0.03	0.06	0.13
23	41	-0.08	-0.03	0.02	0.16	-0.35		42	-0.05	-0.02	0.00	0.08
24	35	-0.07	-0.02	0.03	0.15	-0.27		41	-0.04	-0.02	0.01	0.07
25	30	-0.06	0.01	0.07	0.18	-0.05		35	-0.02	0.01	0.03	0.07


Ntip Nose tip from facial line
Ntip mm
26
24
22
20
18
16
14
12
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Ntip Nose tip from facial line, growth velocity
Ntip mm/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

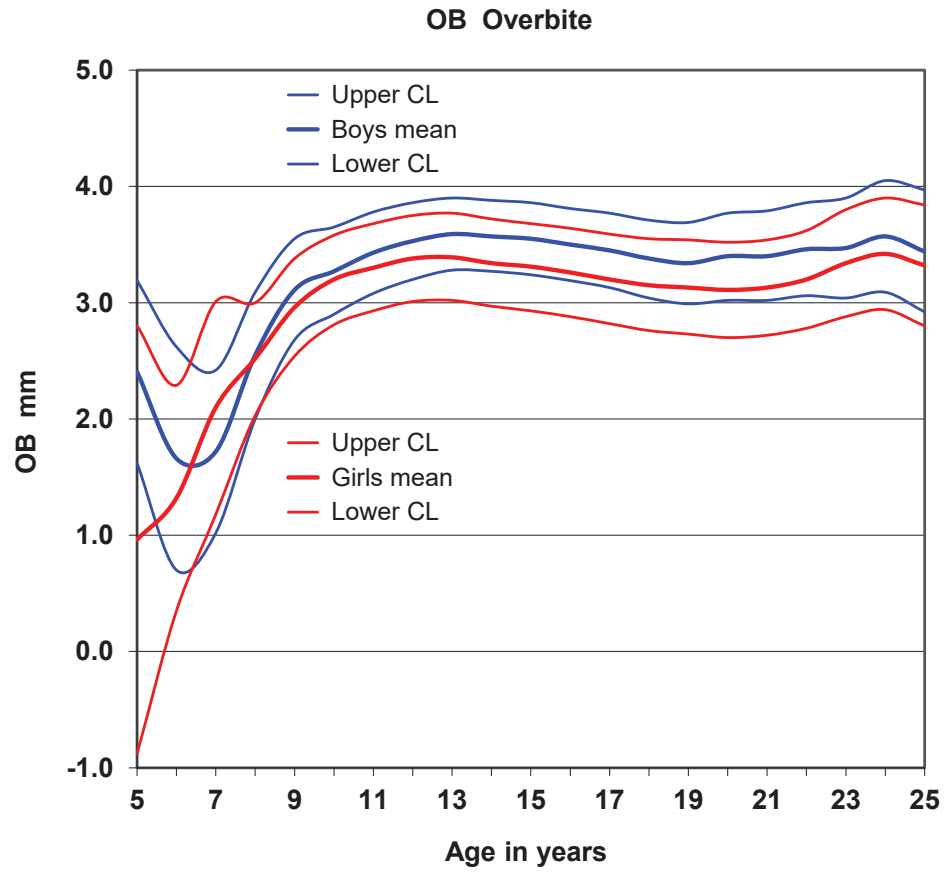


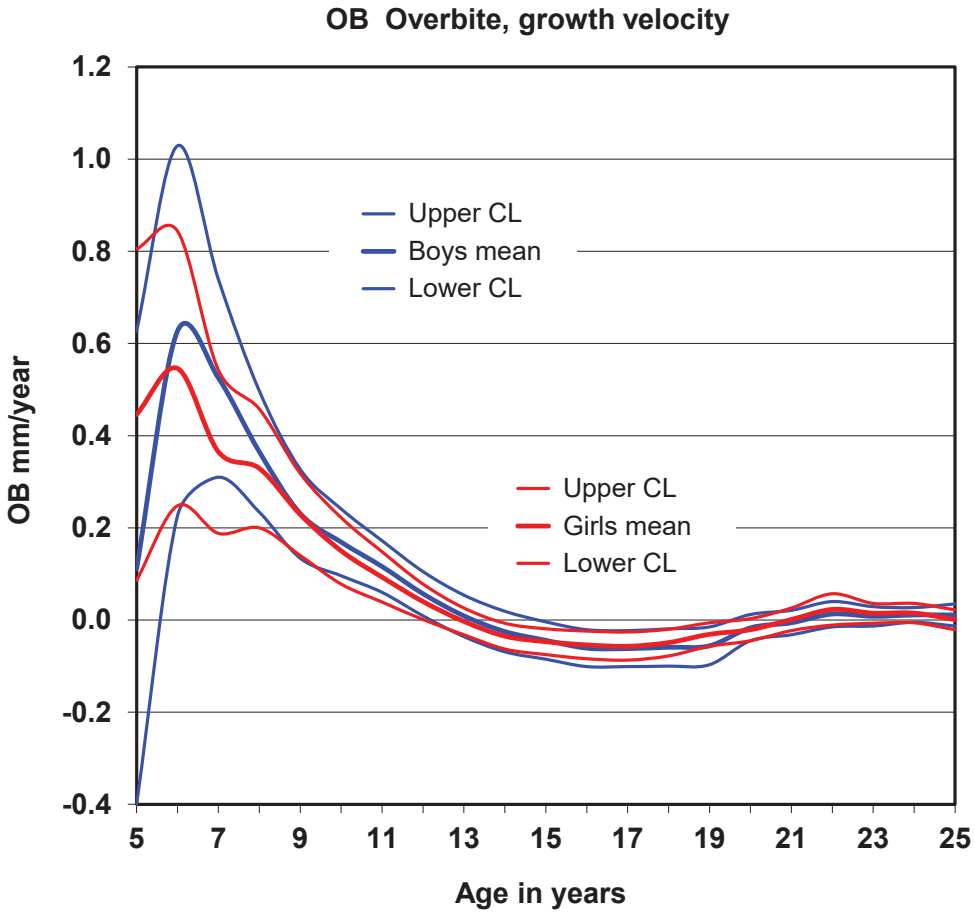
OB (mm)

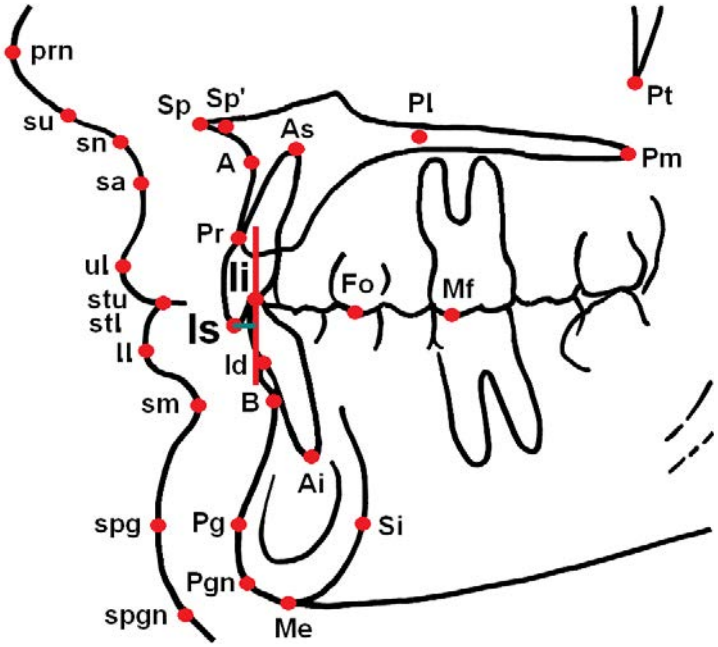
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	1.62	2.41	3.19	0.80	1.57		3	-0.88	0.96	2.80	1.63
6	9	0.70	1.66	2.62	1.47	0.49		8	0.35	1.32	2.29	1.40
7	17	1.02	1.72	2.42	1.47	-1.14		22	1.57	2.36	3.15	1.89
8	32	2.00	2.55	3.09	1.58	-0.22		40	2.18	2.62	3.07	1.44
9	46	2.68	3.11	3.55	1.51	0.47		51	2.55	2.97	3.38	1.51
10	48	2.90	3.27	3.65	1.33	0.30		53	2.80	3.19	3.58	1.44
11	48	3.08	3.43	3.78	1.24	0.50		54	2.93	3.30	3.68	1.40
12	48	3.20	3.53	3.86	1.17	0.62		54	3.00	3.37	3.74	1.40
13	49	3.28	3.59	3.90	1.11	0.81		54	3.01	3.38	3.76	1.41
14	49	3.27	3.57	3.88	1.09	0.96		55	2.96	3.33	3.71	1.42
15	49	3.24	3.55	3.86	1.09	1.01		55	2.92	3.30	3.67	1.43
16	49	3.19	3.50	3.82	1.12	0.96		55	2.87	3.26	3.64	1.45
17	49	3.13	3.45	3.77	1.15	0.94		55	2.82	3.20	3.59	1.47
18	48	3.04	3.38	3.72	1.20	0.83		55	2.76	3.15	3.55	1.50
19	49	2.99	3.34	3.69	1.25	0.76		55	2.73	3.13	3.54	1.53
20	46	3.02	3.40	3.78	1.31	1.01		55	2.70	3.11	3.52	1.55
21	46	3.02	3.41	3.79	1.34	0.95		54	2.72	3.13	3.54	1.55
22	45	3.06	3.46	3.86	1.37	0.86		53	2.78	3.20	3.62	1.56
23	40	3.04	3.47	3.90	1.39	0.40		40	2.88	3.34	3.80	1.49
24	35	3.10	3.57	4.05	1.44	0.44		38	2.94	3.42	3.90	1.52
25	28	2.92	3.44	3.97	1.42	0.32		34	2.80	3.32	3.84	1.54

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-0.41	0.11	0.63	0.53	0.96		3	0.09	0.45	0.81	0.32
6	9	0.23	0.63	1.03	0.62	-0.31		8	0.25	0.55	0.84	0.43
7	17	0.31	0.52	0.74	0.45	-1.13		22	0.19	0.36	0.54	0.42
8	32	0.23	0.37	0.50	0.38	-0.39		40	0.20	0.33	0.46	0.42
9	46	0.13	0.23	0.33	0.33	-0.02		51	0.14	0.23	0.32	0.32
10	48	0.10	0.17	0.24	0.26	-0.36		53	0.08	0.15	0.22	0.27
11	48	0.06	0.12	0.17	0.20	-0.57		54	0.04	0.09	0.15	0.20
12	48	0.01	0.06	0.10	0.17	-0.56		54	0.00	0.04	0.08	0.15
13	49	-0.04	0.01	0.05	0.16	-0.45		54	-0.03	-0.00	0.03	0.11
14	49	-0.07	-0.03	0.02	0.16	-0.37		55	-0.06	-0.03	-0.01	0.11
15	49	-0.09	-0.04	-0.00	0.15	-0.11		55	-0.08	-0.05	-0.02	0.11
16	49	-0.10	-0.06	-0.02	0.14	0.28		55	-0.08	-0.05	-0.02	0.11
17	49	-0.10	-0.06	-0.02	0.14	0.21		55	-0.09	-0.06	-0.03	0.11
18	48	-0.10	-0.06	-0.02	0.14	0.42		55	-0.08	-0.05	-0.02	0.11
19	49	-0.10	-0.06	-0.02	0.15	1.02		55	-0.06	-0.03	-0.01	0.10
20	46	-0.05	-0.02	0.01	0.10	-0.24		55	-0.05	-0.02	0.00	0.09
21	46	-0.03	-0.01	0.02	0.09	0.39		54	-0.02	0.00	0.03	0.09
22	45	-0.01	0.01	0.04	0.09	0.45		53	-0.01	0.02	0.06	0.13
23	40	-0.01	0.01	0.03	0.07	0.43		40	-0.01	0.01	0.04	0.07
24	35	-0.00	0.01	0.03	0.05	0.27		38	-0.01	0.01	0.04	0.07
25	28	-0.01	0.01	0.04	0.07	-0.62		34	-0.02	0.00	0.02	0.06


OB Overbite
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
OB mm
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
5
7
9
11
13
15
17
19
21
23
25
Age in years


OB Overbite, growth velocity
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
OB mm/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
5
7
9
11
13
15
17
19
21
23
25
Age in years

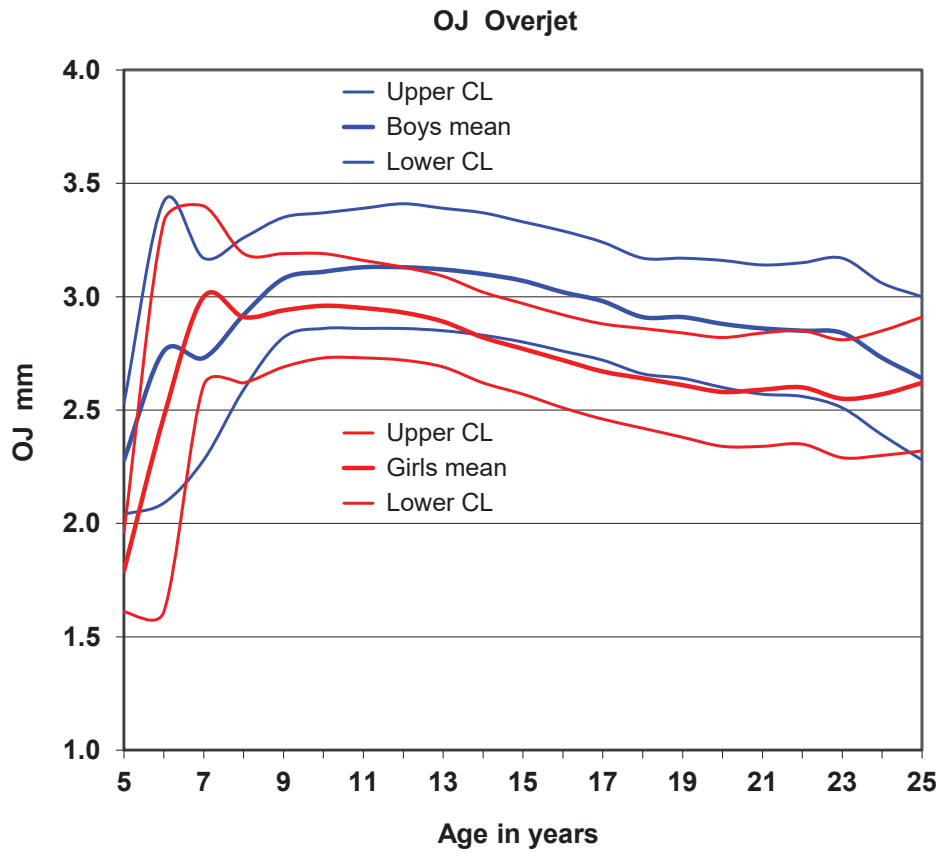


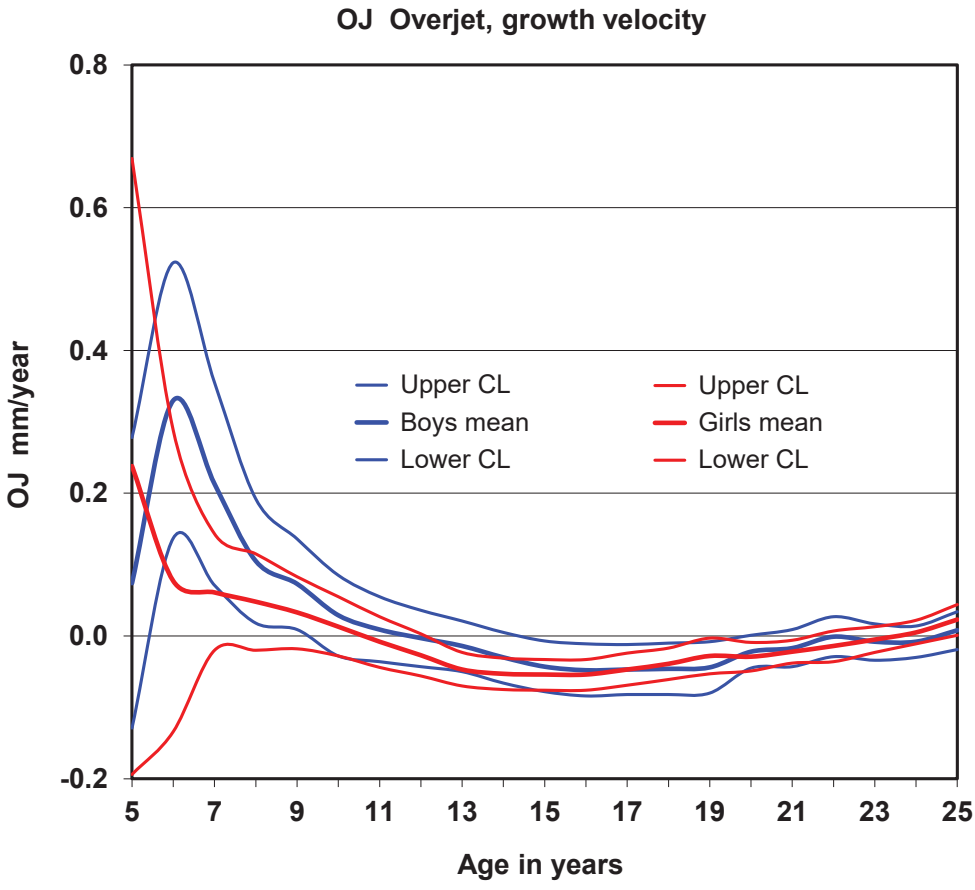
OJ (mm)

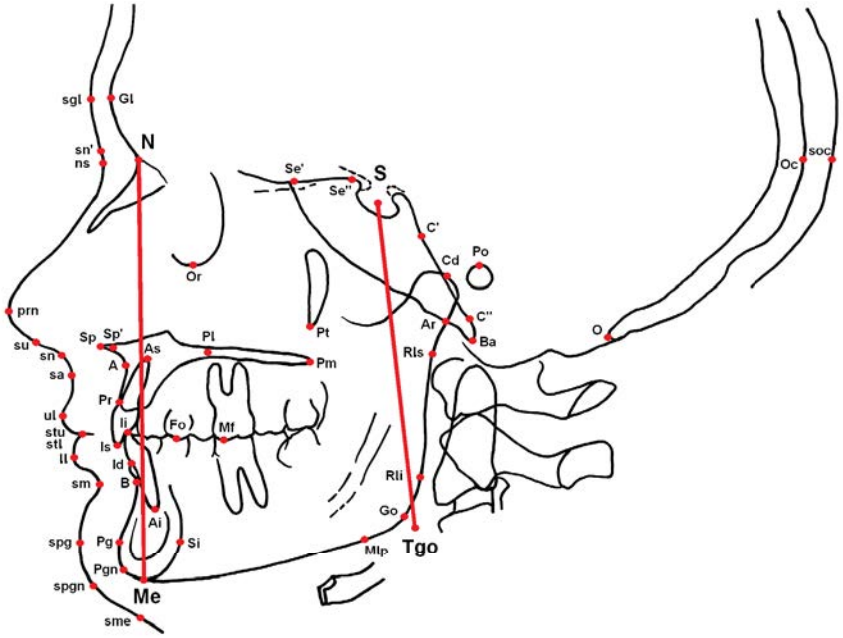
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	2.04	2.28	2.53	0.25	2.97	p<0.05	3	1.61	1.79	1.96	0.15
6	9	2.09	2.76	3.42	1.02	0.53		8	1.61	2.47	3.33	1.24
7	17	2.28	2.73	3.17	0.93	-0.75		22	2.55	2.96	3.36	0.97
8	32	2.59	2.92	3.26	0.96	0.13		40	2.60	2.89	3.19	0.94
9	46	2.82	3.09	3.35	0.92	0.81		51	2.69	2.94	3.19	0.91
10	48	2.86	3.12	3.37	0.90	0.88		53	2.73	2.96	3.19	0.85
11	48	2.86	3.13	3.39	0.93	1.04		54	2.73	2.95	3.16	0.80
12	48	2.86	3.13	3.40	0.96	1.14		54	2.73	2.93	3.14	0.77
13	49	2.85	3.12	3.39	0.96	1.33		54	2.69	2.90	3.10	0.76
14	49	2.83	3.10	3.37	0.96	1.63		55	2.63	2.83	3.03	0.76
15	49	2.80	3.07	3.33	0.95	1.76		55	2.57	2.77	2.98	0.76
16	49	2.76	3.02	3.29	0.94	1.79		55	2.51	2.72	2.93	0.78
17	49	2.72	2.98	3.24	0.93	1.85		55	2.46	2.67	2.88	0.80
18	48	2.65	2.91	3.16	0.91	1.57		55	2.42	2.64	2.86	0.82
19	49	2.64	2.90	3.17	0.94	1.62		55	2.38	2.61	2.84	0.87
20	46	2.59	2.87	3.15	0.97	1.59		55	2.34	2.58	2.82	0.90
21	46	2.56	2.85	3.13	0.99	1.36		54	2.34	2.59	2.84	0.94
22	45	2.55	2.84	3.14	1.02	1.24		53	2.35	2.60	2.85	0.93
23	40	2.50	2.83	3.17	1.07	1.31		40	2.29	2.55	2.81	0.84
24	35	2.38	2.72	3.06	1.02	0.66		38	2.30	2.57	2.85	0.86
25	28	2.28	2.64	3.00	0.98	0.08		34	2.32	2.62	2.91	0.88

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-0.13	0.07	0.28	0.21	-0.74		3	-0.19	0.24	0.67	0.38
6	9	0.14	0.33	0.52	0.30	1.74		8	-0.13	0.08	0.29	0.30
7	17	0.07	0.21	0.35	0.30	1.91		22	-0.02	0.06	0.14	0.20
8	32	0.02	0.11	0.19	0.25	1.04		40	-0.02	0.05	0.11	0.22
9	46	0.01	0.07	0.14	0.22	0.97		51	-0.02	0.03	0.08	0.18
10	48	-0.03	0.03	0.08	0.20	0.43		53	-0.03	0.01	0.06	0.16
11	48	-0.04	0.01	0.06	0.16	0.61		54	-0.04	-0.01	0.03	0.13
12	48	-0.04	-0.00	0.04	0.14	0.95		54	-0.06	-0.03	0.00	0.11
13	49	-0.05	-0.01	0.02	0.13	1.52		54	-0.07	-0.05	-0.02	0.09
14	49	-0.07	-0.03	0.01	0.13	1.09		55	-0.07	-0.05	-0.03	0.08
15	49	-0.08	-0.04	-0.01	0.13	0.57		55	-0.08	-0.05	-0.03	0.08
16	49	-0.08	-0.05	-0.01	0.13	0.32		55	-0.08	-0.05	-0.03	0.08
17	49	-0.08	-0.05	-0.01	0.13	-0.01		55	-0.07	-0.05	-0.02	0.08
18	48	-0.08	-0.05	-0.01	0.13	-0.33		55	-0.06	-0.04	-0.02	0.08
19	49	-0.08	-0.04	-0.01	0.13	-0.72		55	-0.05	-0.03	-0.00	0.09
20	46	-0.04	-0.02	0.00	0.08	0.44		55	-0.05	-0.03	-0.01	0.08
21	46	-0.04	-0.02	0.01	0.09	0.33		54	-0.04	-0.02	-0.01	0.06
22	45	-0.03	-0.00	0.03	0.10	0.76		53	-0.04	-0.01	0.01	0.08
23	40	-0.03	-0.01	0.02	0.08	-0.22		40	-0.02	-0.00	0.01	0.06
24	35	-0.03	-0.01	0.01	0.07	-0.97		38	-0.01	0.01	0.02	0.05
25	28	-0.02	0.01	0.03	0.07	-0.86		34	0.00	0.02	0.04	0.06


OJ Overjet
4.0
3.5
3.0
2.5
2.0
1.5
1.0
OJ mm
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
5
7
9
11
13
15
17
19
21
23
25
Age in years


OJ Overjet, growth velocity
0.8
0.6
0.4
0.2
0.0
-0.2
OJ mm/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
5
7
9
11
13
15
17
19
21
23
25
Age in years

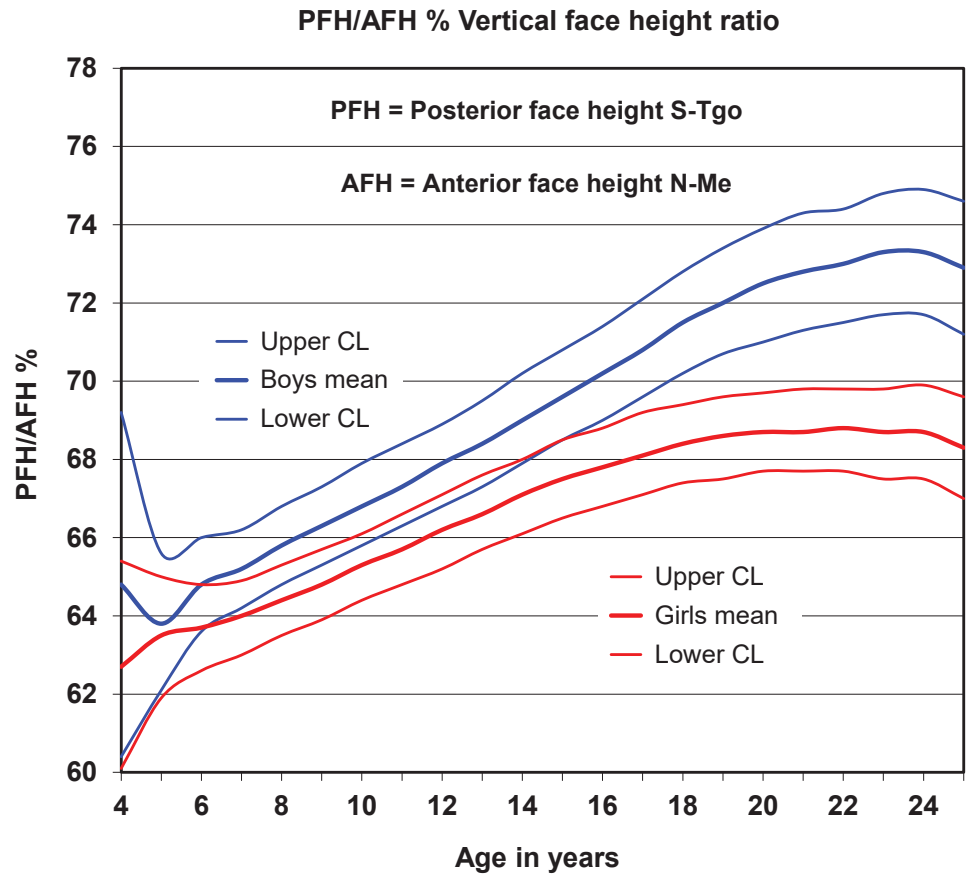


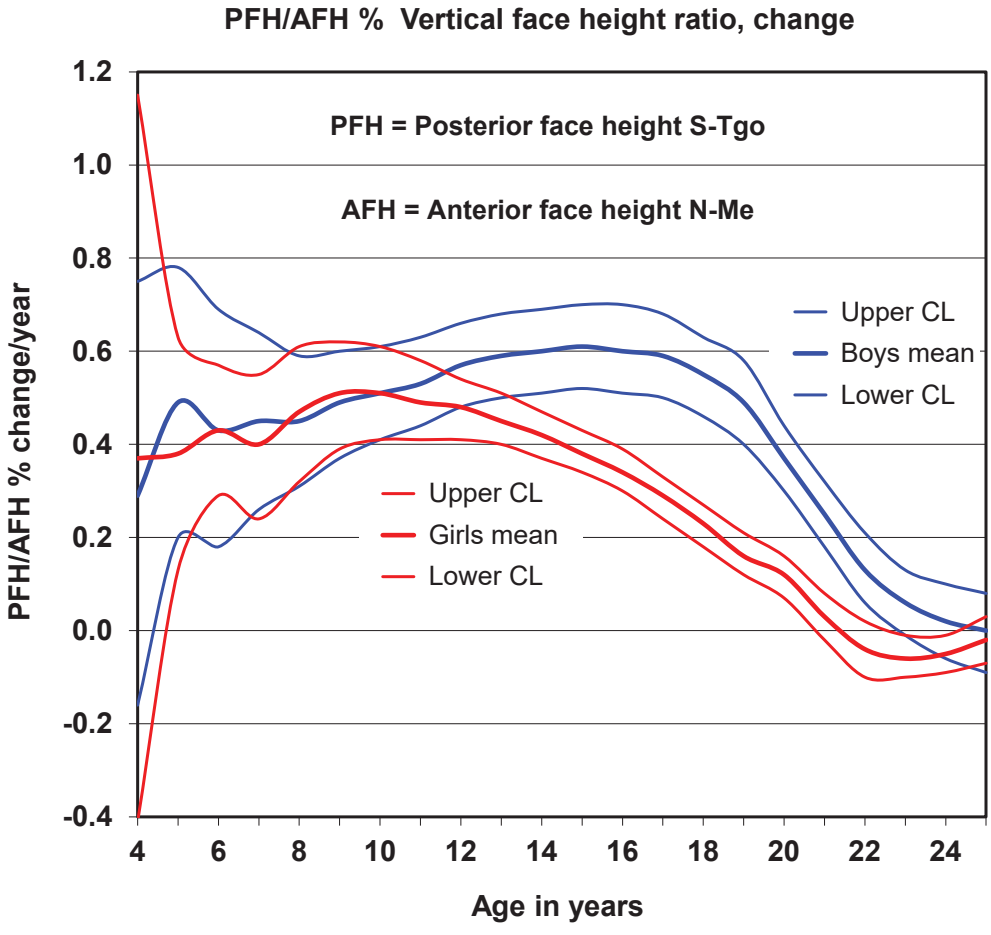
PFH/AFH %

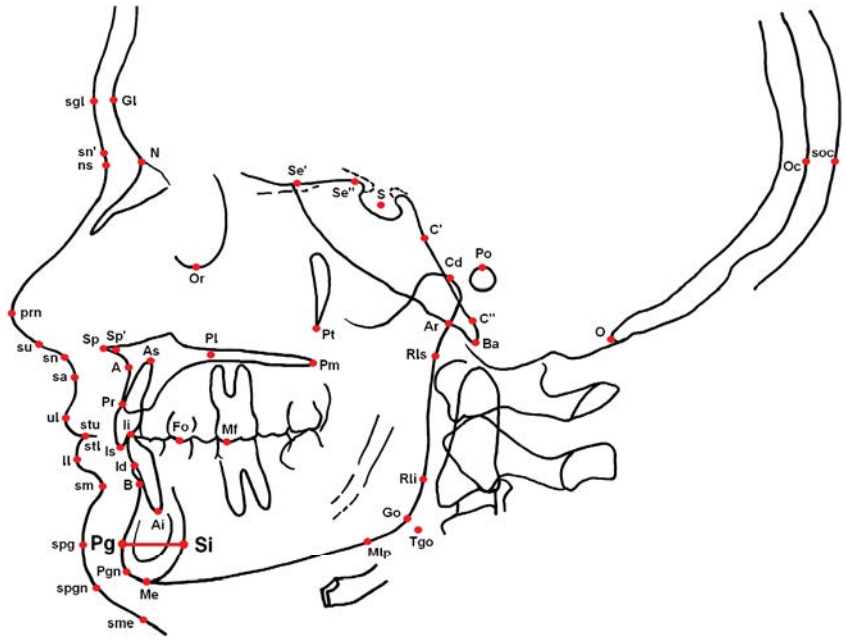
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	60.4	64.8	69.2	5.96	0.78		7	60.1	62.7	65.4	3.59
5	18	62.1	63.8	65.6	3.77	0.31		19	61.9	63.5	65.0	3.38
6	35	63.6	64.8	66.0	3.55	1.33		27	62.6	63.7	64.8	2.97
7	43	64.3	65.2	66.2	3.30	1.77		39	63.0	64.0	64.9	3.04
8	48	64.8	65.8	66.8	3.50	2.06	p<0.05	49	63.5	64.4	65.3	3.33
9	49	65.3	66.3	67.3	3.55	2.21	p<0.05	53	63.9	64.8	65.7	3.24
10	50	65.8	66.8	67.8	3.63	2.31	p<0.05	54	64.4	65.3	66.1	3.29
11	50	66.3	67.3	68.4	3.74	2.35	p<0.05	55	64.8	65.7	66.6	3.44
12	50	66.8	67.9	68.9	3.86	2.36	p<0.05	55	65.2	66.2	67.1	3.54
13	50	67.4	68.5	69.6	3.97	2.48	p<0.05	55	65.7	66.6	67.6	3.63
14	50	67.9	69.1	70.2	4.10	2.63	p<0.01	55	66.1	67.1	68.0	3.70
15	50	68.5	69.7	70.8	4.23	2.82	p<0.01	55	66.5	67.5	68.5	3.76
16	50	69.1	70.3	71.5	4.34	3.09	p<0.01	55	66.8	67.8	68.8	3.80
17	50	69.6	70.9	72.1	4.46	3.37	p<0.01	55	67.1	68.1	69.2	3.86
18	49	70.3	71.6	72.8	4.57	3.82	p<0.001	55	67.4	68.4	69.4	3.88
19	49	70.8	72.1	73.4	4.72	4.17	p<0.001	55	67.5	68.6	69.6	3.90
20	46	71.1	72.5	74.0	4.99	4.33	p<0.001	55	67.7	68.7	69.7	3.92
21	46	71.4	72.9	74.3	5.06	4.59	p<0.001	54	67.7	68.7	69.8	3.96
22	46	71.6	73.0	74.5	5.08	4.69	p<0.001	53	67.7	68.8	69.8	3.94
23	41	71.8	73.3	74.8	5.00	4.76	p<0.001	42	67.5	68.7	69.8	3.78
24	35	71.7	73.3	74.9	4.79	4.69	p<0.001	41	67.5	68.7	69.9	3.86
25	30	71.2	72.9	74.7	4.85	4.31	p<0.001	35	67.0	68.3	69.6	3.81

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.16	0.29	0.75	0.62	-0.17		7	-0.41	0.37	1.15	1.05
5	18	0.20	0.49	0.78	0.63	0.53		19	0.13	0.38	0.63	0.56
6	35	0.18	0.42	0.66	0.72	-0.08		27	0.29	0.43	0.57	0.38
7	43	0.26	0.44	0.62	0.59	0.36		39	0.24	0.40	0.55	0.50
8	48	0.31	0.44	0.58	0.48	-0.25		49	0.32	0.47	0.61	0.52
9	49	0.37	0.48	0.60	0.41	-0.26		53	0.39	0.51	0.62	0.44
10	50	0.41	0.51	0.62	0.37	0.10		54	0.41	0.51	0.61	0.38
11	50	0.44	0.54	0.64	0.36	0.72		55	0.41	0.49	0.58	0.32
12	50	0.48	0.58	0.67	0.34	1.75		55	0.41	0.48	0.54	0.26
13	50	0.51	0.60	0.69	0.32	2.80	p<0.01	55	0.40	0.45	0.51	0.21
14	50	0.53	0.61	0.70	0.31	3.87	p<0.001	55	0.37	0.42	0.47	0.19
15	50	0.53	0.62	0.71	0.32	4.77	p<0.001	55	0.34	0.38	0.43	0.17
16	50	0.52	0.61	0.70	0.32	5.48	p<0.001	55	0.30	0.34	0.39	0.17
17	50	0.52	0.60	0.69	0.31	6.56	p<0.001	55	0.24	0.29	0.33	0.17
18	49	0.47	0.55	0.63	0.30	6.86	p<0.001	55	0.18	0.23	0.27	0.17
19	49	0.41	0.49	0.58	0.30	6.95	p<0.001	55	0.12	0.16	0.21	0.18
20	46	0.30	0.37	0.44	0.25	5.98	p<0.001	55	0.07	0.12	0.16	0.18
21	46	0.18	0.25	0.32	0.25	4.98	p<0.001	54	-0.02	0.03	0.08	0.19
22	46	0.05	0.13	0.20	0.26	3.47	p<0.001	53	-0.10	-0.04	0.02	0.22
23	41	-0.02	0.05	0.11	0.22	2.46	p<0.05	42	-0.10	-0.06	-0.01	0.15
24	35	-0.07	0.00	0.07	0.20	1.35		41	-0.09	-0.05	-0.01	0.13
25	30	-0.09	-0.03	0.02	0.15	-0.38		35	-0.07	-0.02	0.03	0.14

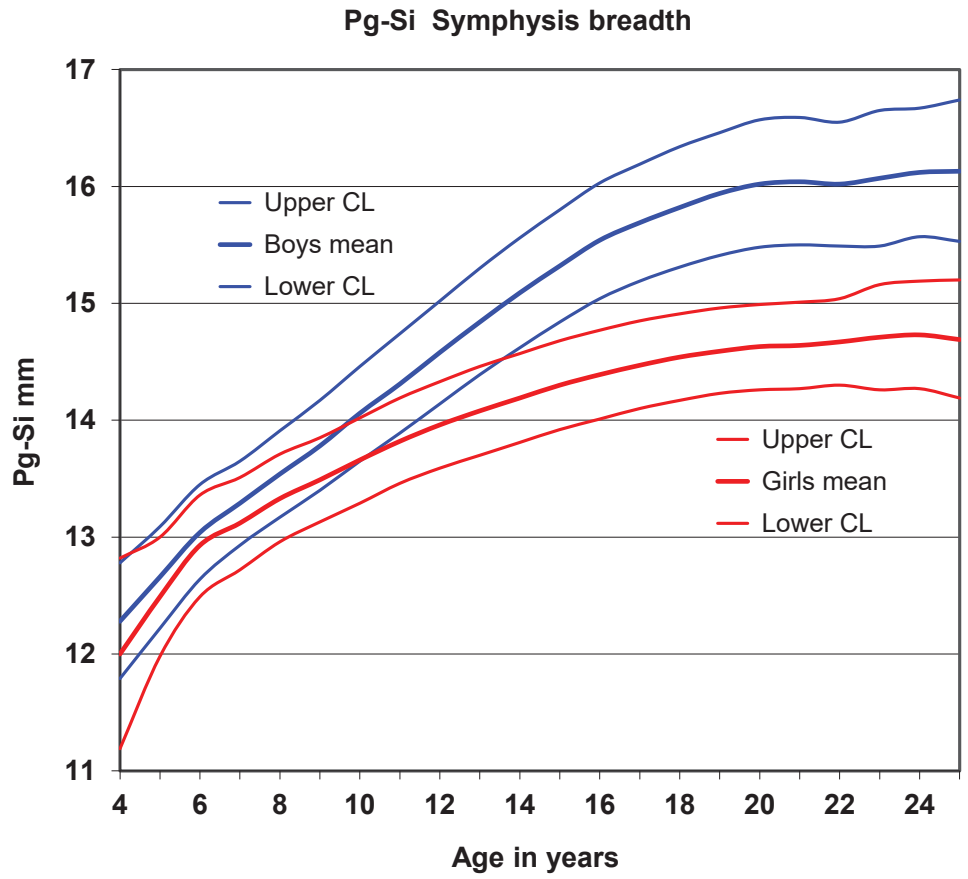

PFH/AFH % Vertical face height ratio
PFH = Posterior face height S-Tgo
AFH = Anterior face height N-Me
PFH/AFH %
78
76
74
72
70
68
66
64
62
60
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

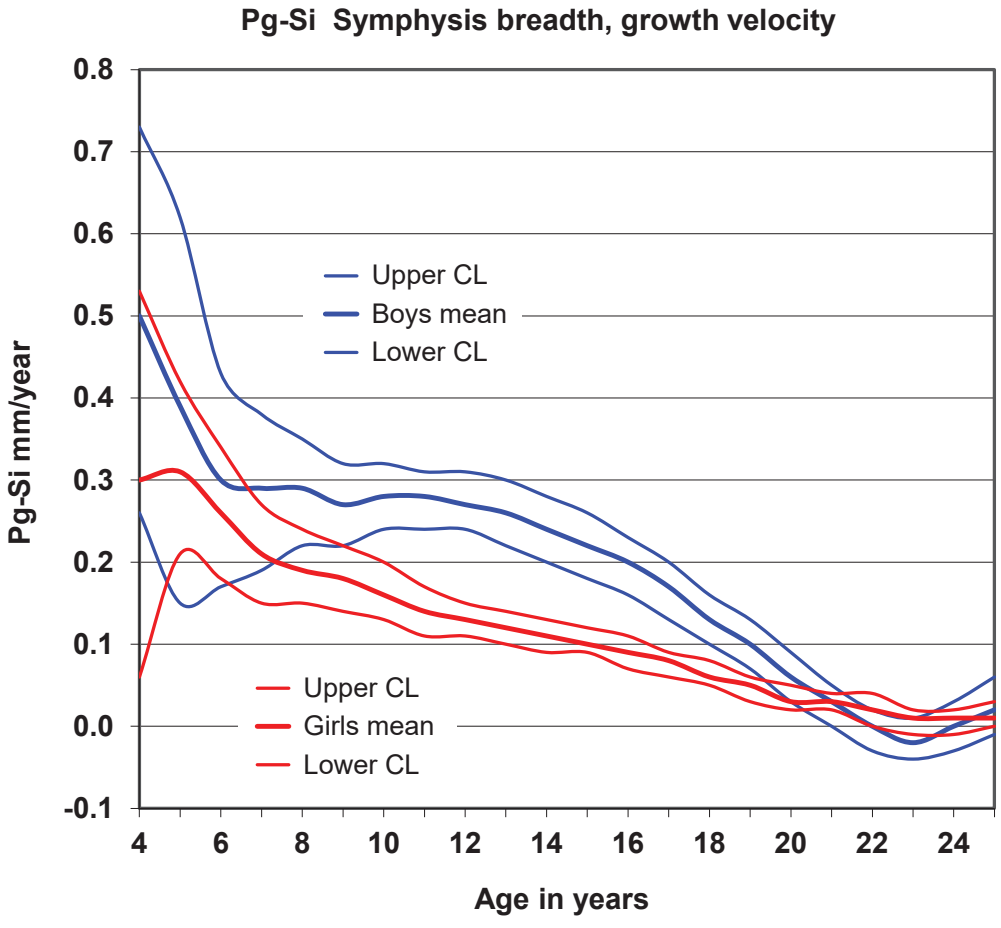

PFH/AFH % Vertical face height ratio, change
PFH = Posterior face height S-Tgo
AFH = Anterior face height N-Me
PFH/AFH % change/year
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

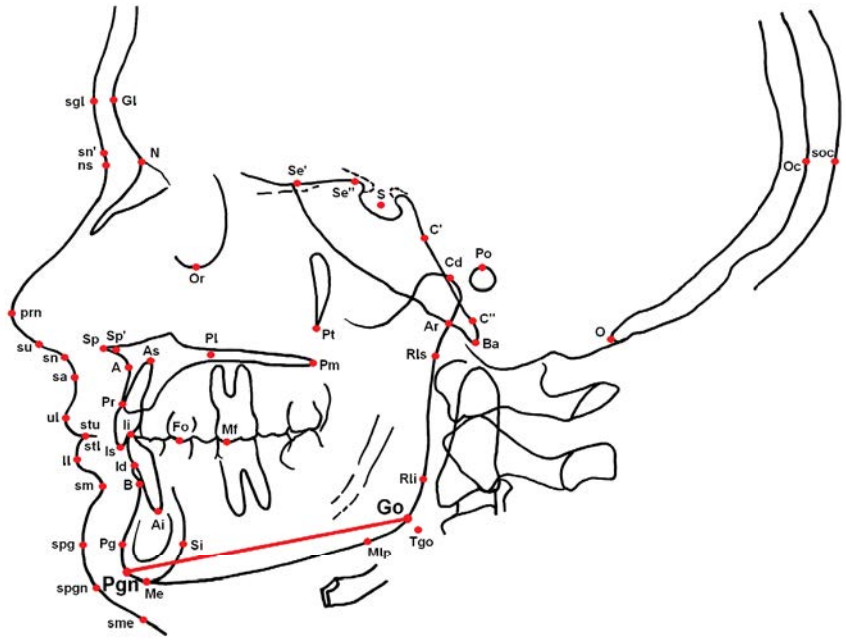


Pg-Si (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	11.8	12.3	12.8	0.67	0.58		7	11.2	12.0	12.8	1.10
5	18	12.2	12.7	13.1	0.94	0.49		19	12.0	12.5	13.0	1.14
6	35	12.6	13.0	13.4	1.22	0.39		27	12.5	12.9	13.4	1.16
7	43	12.9	13.3	13.6	1.21	0.62		39	12.7	13.1	13.5	1.26
8	48	13.2	13.5	13.9	1.31	0.75		49	13.0	13.3	13.7	1.33
9	49	13.4	13.8	14.2	1.38	1.08		53	13.1	13.5	13.9	1.34
10	50	13.6	14.1	14.5	1.47	1.42		54	13.3	13.7	14.0	1.37
11	50	13.9	14.3	14.7	1.54	1.72		55	13.5	13.8	14.2	1.38
12	50	14.1	14.6	15.0	1.60	2.11	p<0.05	55	13.6	14.0	14.3	1.40
13	50	14.4	14.8	15.3	1.65	2.54	p<0.05	55	13.7	14.1	14.5	1.43
14	50	14.6	15.1	15.6	1.70	2.95	p<0.01	55	13.8	14.2	14.6	1.44
15	50	14.8	15.3	15.8	1.74	3.31	p<0.01	55	13.9	14.3	14.7	1.44
16	50	15.0	15.5	16.0	1.77	3.66	p<0.001	55	14.0	14.4	14.8	1.43
17	50	15.2	15.7	16.2	1.80	3.88	p<0.001	55	14.1	14.5	14.8	1.42
18	49	15.3	15.8	16.3	1.85	4.03	p<0.001	55	14.2	14.5	14.9	1.40
19	49	15.4	15.9	16.5	1.88	4.19	p<0.001	55	14.2	14.6	15.0	1.39
20	46	15.5	16.0	16.6	1.88	4.32	p<0.001	55	14.3	14.6	15.0	1.37
21	46	15.5	16.0	16.6	1.90	4.28	p<0.001	54	14.3	14.6	15.0	1.38
22	46	15.5	16.0	16.6	1.84	4.19	p<0.001	53	14.3	14.7	15.0	1.36
23	41	15.5	16.1	16.7	1.89	3.65	p<0.001	42	14.3	14.7	15.2	1.49
24	35	15.6	16.1	16.7	1.66	3.82	p<0.001	41	14.3	14.7	15.2	1.51
25	30	15.5	16.1	16.7	1.69	3.61	p<0.001	35	14.2	14.7	15.2	1.52

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.26	0.50	0.73	0.32	1.18		7	0.06	0.30	0.53	0.32
5	18	0.15	0.39	0.62	0.51	0.57		19	0.21	0.31	0.42	0.23
6	35	0.17	0.30	0.42	0.38	0.43		27	0.18	0.26	0.34	0.22
7	43	0.19	0.29	0.38	0.32	1.24		39	0.15	0.21	0.27	0.19
8	48	0.22	0.29	0.35	0.22	2.38	p<0.05	49	0.15	0.19	0.24	0.17
9	49	0.22	0.27	0.32	0.16	3.00	p<0.01	53	0.14	0.18	0.22	0.14
10	50	0.24	0.28	0.32	0.14	4.49	p<0.001	54	0.13	0.16	0.20	0.13
11	50	0.24	0.28	0.31	0.13	5.78	p<0.001	55	0.11	0.14	0.17	0.11
12	50	0.24	0.27	0.31	0.13	6.78	p<0.001	55	0.11	0.13	0.15	0.08
13	50	0.22	0.26	0.30	0.14	6.70	p<0.001	55	0.10	0.12	0.14	0.07
14	50	0.20	0.24	0.28	0.14	6.21	p<0.001	55	0.09	0.11	0.13	0.07
15	50	0.18	0.22	0.26	0.14	5.83	p<0.001	55	0.09	0.10	0.12	0.06
16	50	0.16	0.20	0.23	0.13	5.38	p<0.001	55	0.07	0.09	0.11	0.06
17	50	0.13	0.17	0.20	0.13	4.62	p<0.001	55	0.06	0.08	0.09	0.06
18	49	0.10	0.13	0.16	0.12	3.72	p<0.001	55	0.05	0.06	0.08	0.06
19	49	0.07	0.10	0.13	0.12	2.99	p<0.01	55	0.03	0.05	0.06	0.05
20	46	0.03	0.06	0.09	0.10	1.77		55	0.02	0.03	0.05	0.06
21	46	-0.00	0.03	0.05	0.09	-0.19		54	0.02	0.03	0.04	0.05
22	46	-0.03	-0.00	0.02	0.09	-1.30		53	-0.00	0.02	0.04	0.08
23	41	-0.04	-0.02	0.01	0.08	-1.97		42	-0.01	0.01	0.02	0.05
24	35	-0.03	-0.00	0.03	0.09	-0.60		41	-0.01	0.01	0.02	0.05
25	30	-0.01	0.02	0.05	0.10	0.43		35	-0.00	0.01	0.03	0.05


Pg-Si Symphysis breadth
Pg-Si mm
17
16
15
14
13
12
11
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Pg-Si Symphysis breadth, growth velocity
Pg-Si mm/year
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

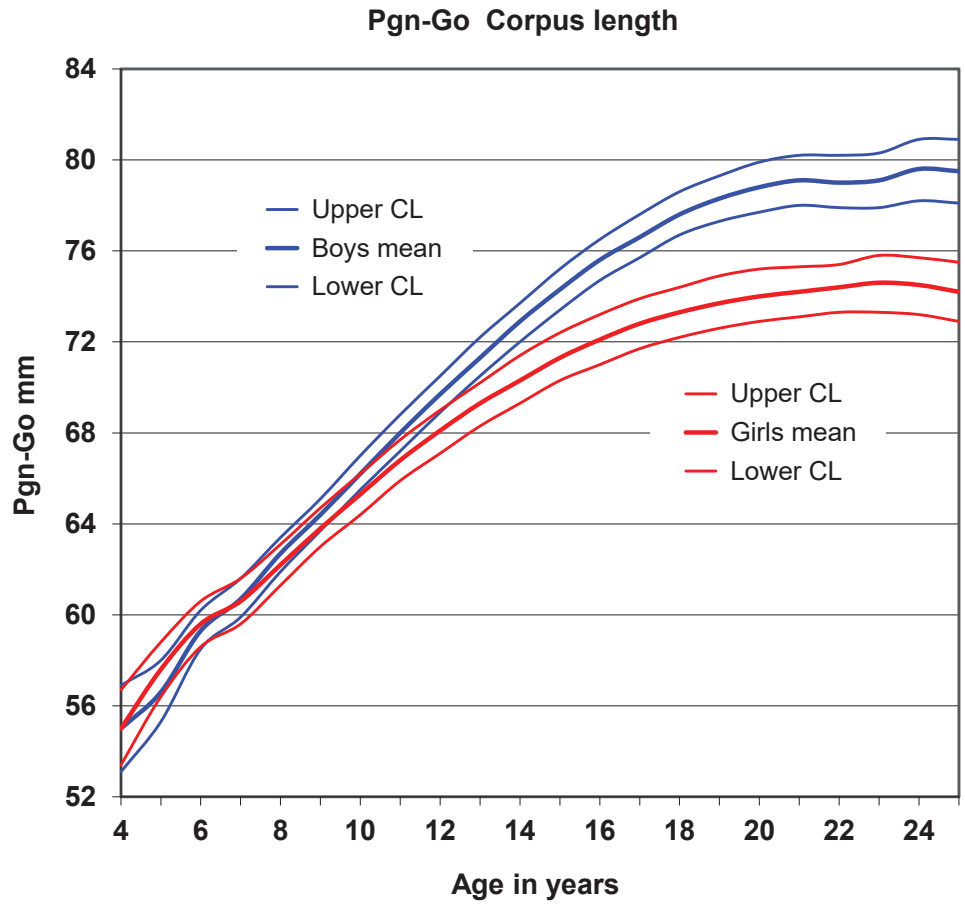


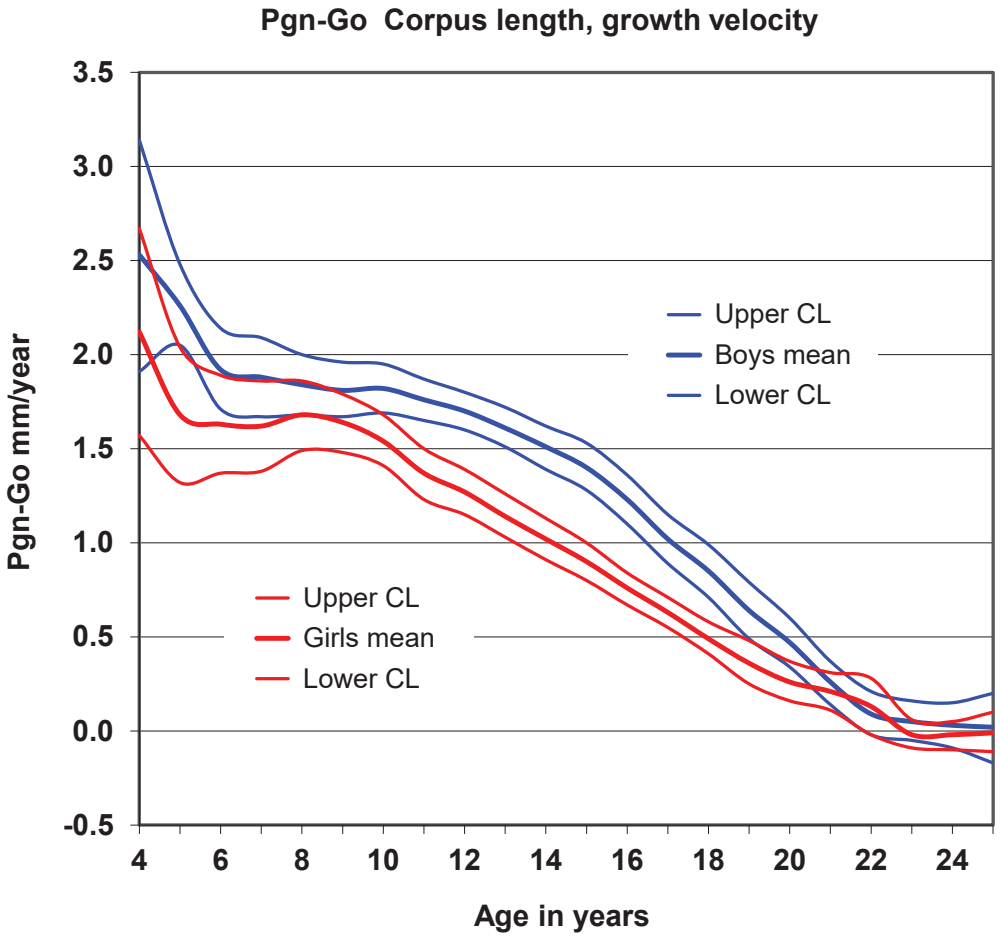
Pgn-Go (mm)

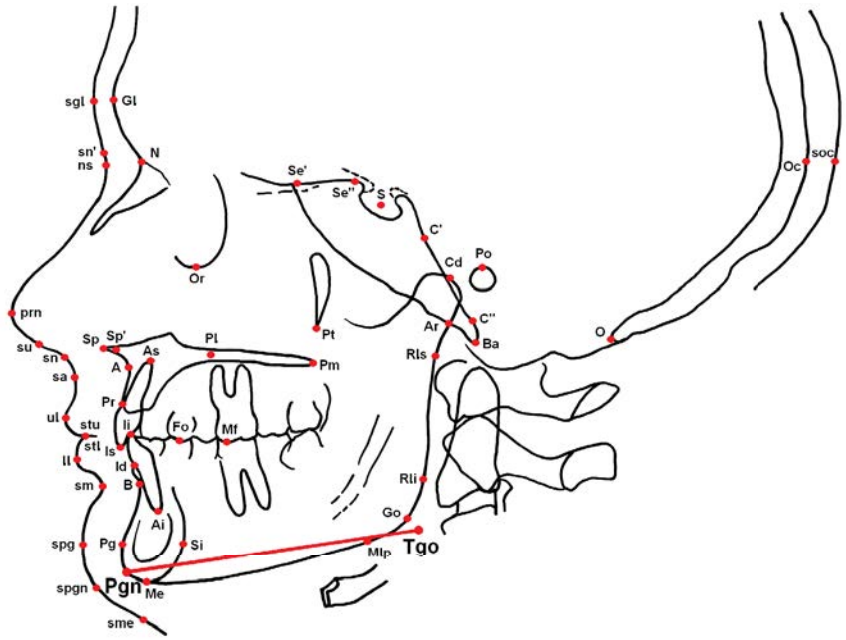
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	53.1	55.0	56.9	2.57	-0.02		7	53.4	55.0	56.7	2.22
5	18	55.3	56.6	58.0	2.94	-1.08		19	56.4	57.6	58.8	2.62
6	35	58.5	59.4	60.2	2.54	-0.41		27	58.6	59.6	60.6	2.69
7	43	59.9	60.7	61.6	2.82	0.20		39	59.6	60.6	61.6	3.11
8	48	61.9	62.7	63.4	2.62	0.81		49	61.3	62.2	63.1	3.26
9	49	63.6	64.4	65.1	2.60	0.92		53	63.0	63.8	64.7	3.15
10	50	65.4	66.2	66.9	2.68	1.46		54	64.4	65.3	66.2	3.31
11	50	67.1	68.0	68.8	2.90	1.86		55	65.9	66.8	67.7	3.46
12	50	68.9	69.7	70.5	3.00	2.47	p<0.05	55	67.1	68.1	69.0	3.61
13	50	70.5	71.3	72.2	3.04	3.10	p<0.01	55	68.3	69.3	70.2	3.70
14	50	72.0	72.9	73.7	3.09	3.72	p<0.001	55	69.3	70.3	71.4	3.84
15	50	73.5	74.4	75.2	3.14	4.32	p<0.001	55	70.3	71.3	72.4	3.97
16	50	74.8	75.7	76.5	3.21	4.94	p<0.001	55	71.0	72.1	73.2	4.07
17	50	75.8	76.7	77.6	3.26	5.40	p<0.001	55	71.7	72.8	73.9	4.14
18	49	76.8	77.7	78.6	3.30	5.86	p<0.001	55	72.2	73.3	74.4	4.20
19	49	77.4	78.4	79.4	3.48	6.10	p<0.001	55	72.6	73.7	74.9	4.23
20	46	77.9	78.9	79.9	3.60	6.08	p<0.001	55	72.9	74.0	75.2	4.31
21	46	78.2	79.2	80.3	3.68	6.27	p<0.001	54	73.1	74.2	75.3	4.24
22	46	78.1	79.2	80.2	3.69	6.15	p<0.001	53	73.3	74.4	75.4	4.04
23	41	78.0	79.2	80.4	3.84	5.43	p<0.001	42	73.3	74.6	75.8	3.99
24	35	78.4	79.7	81.0	3.91	5.70	p<0.001	41	73.2	74.5	75.7	4.00
25	30	78.2	79.6	81.0	3.87	5.56	p<0.001	35	72.9	74.2	75.5	3.93

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.91	2.53	3.14	0.83	0.97		7	1.57	2.12	2.67	0.74
5	18	2.05	2.26	2.48	0.47	2.67	p<0.05	19	1.32	1.68	2.04	0.81
6	35	1.71	1.89	2.08	0.56	1.66		27	1.37	1.63	1.89	0.68
7	43	1.66	1.86	2.06	0.66	1.51		39	1.38	1.62	1.86	0.76
8	48	1.68	1.83	1.98	0.54	1.22		49	1.49	1.68	1.86	0.66
9	49	1.66	1.81	1.95	0.51	1.60		53	1.48	1.64	1.79	0.56
10	50	1.69	1.82	1.95	0.47	2.90	p<0.01	54	1.41	1.54	1.68	0.51
11	50	1.67	1.78	1.88	0.39	4.56	p<0.001	55	1.23	1.37	1.50	0.52
12	50	1.63	1.72	1.81	0.33	5.82	p<0.001	55	1.15	1.27	1.39	0.45
13	50	1.54	1.63	1.73	0.34	6.49	p<0.001	55	1.03	1.14	1.26	0.42
14	50	1.43	1.53	1.63	0.36	6.62	p<0.001	55	0.91	1.02	1.13	0.42
15	50	1.31	1.42	1.53	0.41	6.81	p<0.001	55	0.80	0.90	1.00	0.38
16	50	1.13	1.25	1.37	0.43	6.65	p<0.001	55	0.67	0.76	0.84	0.33
17	50	0.92	1.04	1.16	0.43	5.55	p<0.001	55	0.55	0.63	0.71	0.32
18	49	0.73	0.86	0.99	0.47	4.64	p<0.001	55	0.41	0.49	0.58	0.33
19	49	0.49	0.65	0.80	0.55	2.94	p<0.01	55	0.25	0.36	0.48	0.43
20	46	0.35	0.47	0.60	0.43	2.52	p<0.05	55	0.16	0.26	0.37	0.40
21	46	0.13	0.25	0.37	0.41	0.60		54	0.11	0.21	0.31	0.38
22	46	-0.03	0.09	0.20	0.38	-0.49		53	-0.02	0.13	0.28	0.56
23	41	-0.06	0.03	0.13	0.31	0.77		42	-0.09	-0.02	0.06	0.24
24	35	-0.11	-0.01	0.09	0.30	0.25		41	-0.10	-0.02	0.05	0.26
25	30	-0.18	-0.05	0.08	0.37	-0.50		35	-0.11	-0.01	0.10	0.31


Pgn-Go Corpus length
Pgn-Go mm
84
80
76
72
68
64
60
56
52
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Pgn-Go Corpus length, growth velocity
Pgn-Go mm/year
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

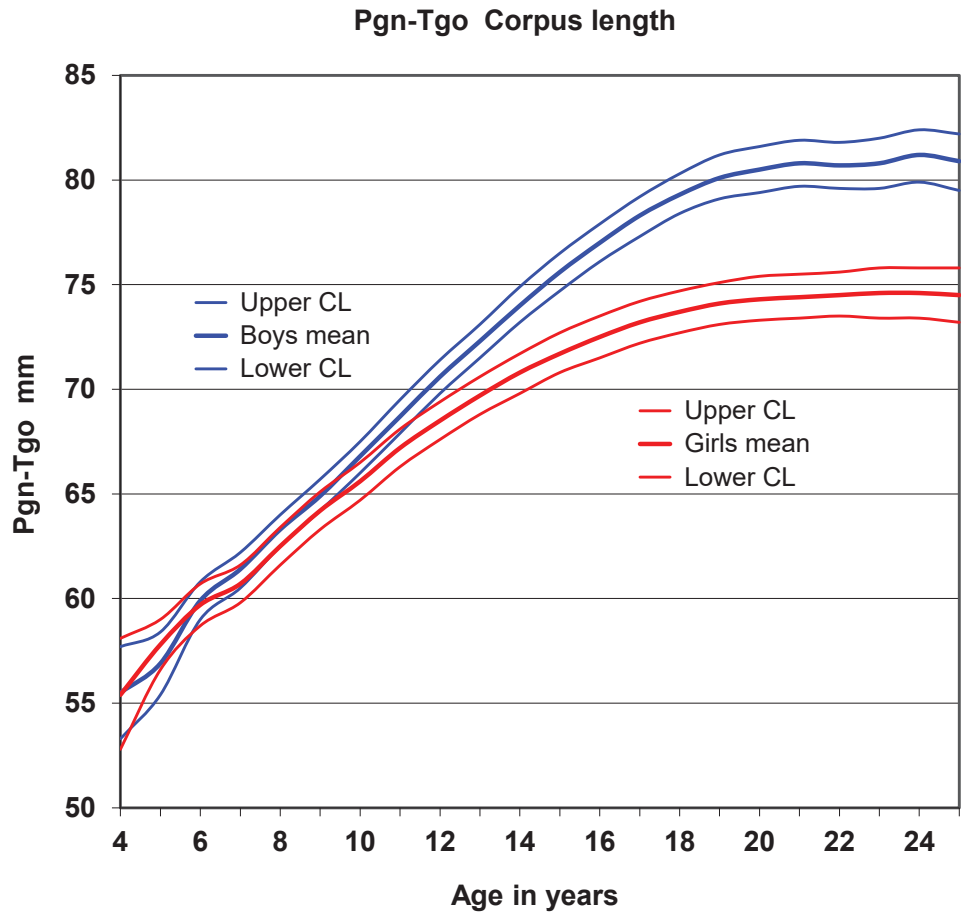


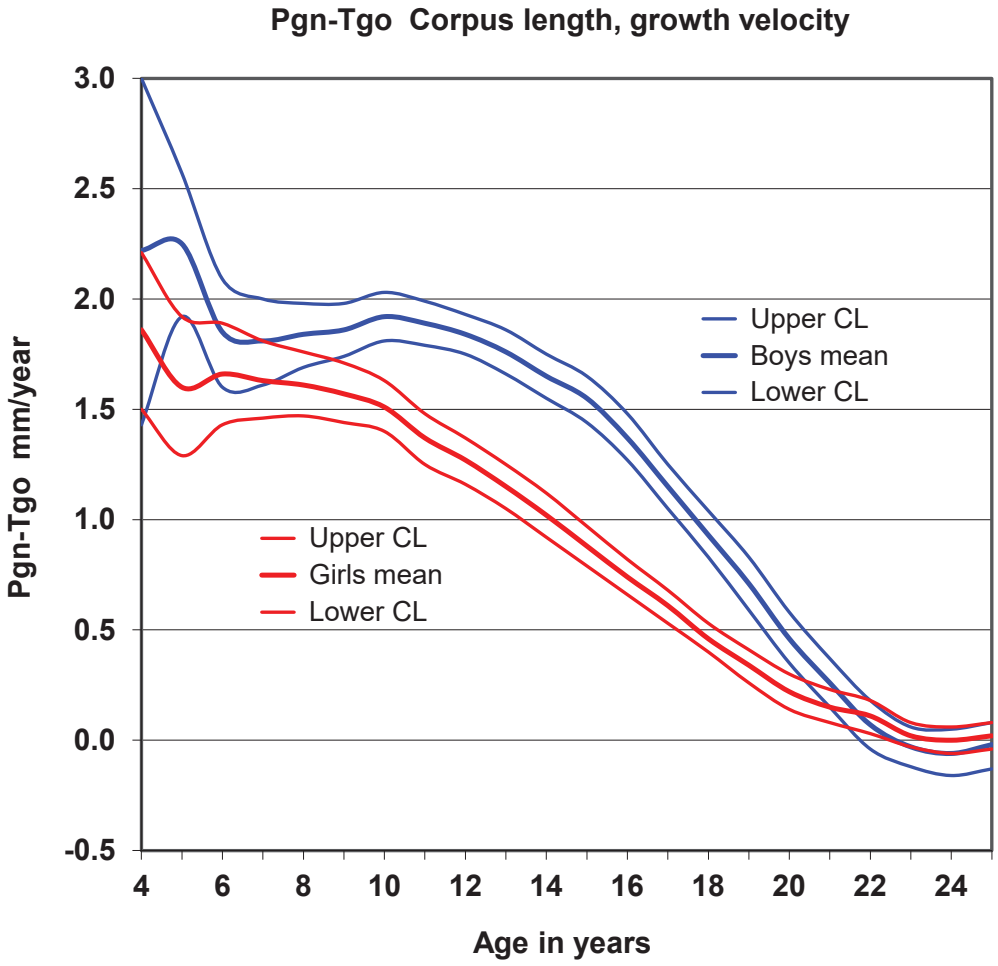
Pgn-Tgo (mm)

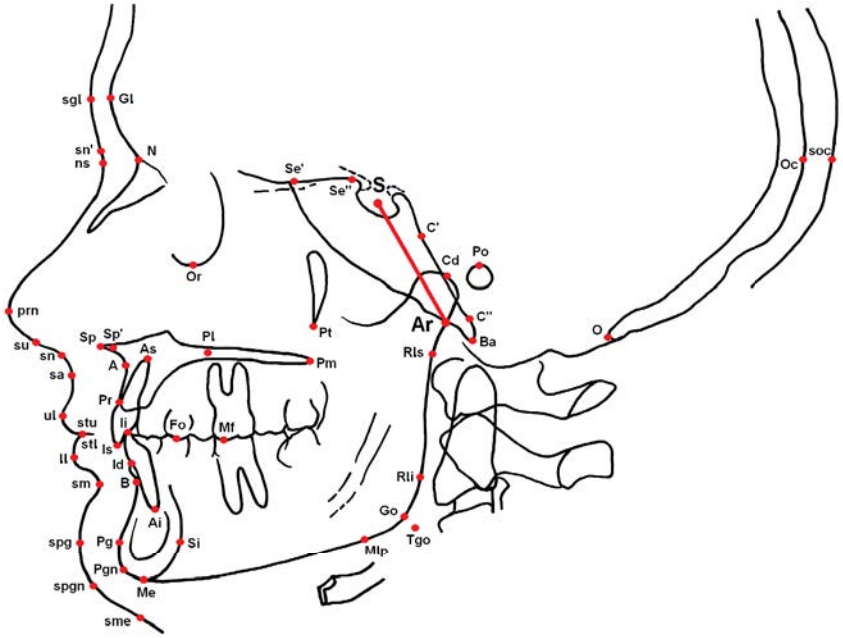
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	53.3	55.5	57.7	2.93	0.04		7	52.8	55.4	58.1	3.56
5	18	55.4	56.9	58.4	3.29	-0.91		19	56.6	57.8	59.0	2.71
6	35	59.0	59.9	60.8	2.80	0.29		27	58.7	59.7	60.7	2.69
7	43	60.5	61.4	62.2	2.92	0.99		39	59.8	60.7	61.6	3.00
8	48	62.5	63.3	64.0	2.72	1.19		49	61.6	62.5	63.4	3.22
9	49	64.2	64.9	65.7	2.71	1.22		53	63.3	64.2	65.1	3.22
10	50	66.0	66.8	67.5	2.71	1.97		54	64.7	65.6	66.5	3.38
11	50	67.9	68.7	69.5	2.82	2.56	p<0.05	55	66.3	67.2	68.1	3.37
12	50	69.8	70.6	71.4	2.86	3.40	p<0.001	55	67.6	68.5	69.4	3.42
13	50	71.5	72.3	73.1	2.91	4.24	p<0.001	55	68.8	69.7	70.6	3.46
14	50	73.2	74.0	74.9	2.99	5.08	p<0.001	55	69.8	70.8	71.7	3.54
15	50	74.7	75.6	76.5	3.12	5.86	p<0.001	55	70.8	71.7	72.7	3.62
16	50	76.2	77.0	77.9	3.23	6.69	p<0.001	55	71.5	72.5	73.5	3.69
17	50	77.3	78.3	79.2	3.36	7.30	p<0.001	55	72.2	73.2	74.2	3.75
18	49	78.4	79.3	80.3	3.43	7.88	p<0.001	55	72.7	73.7	74.7	3.81
19	49	79.1	80.1	81.2	3.60	8.21	p<0.001	55	73.1	74.1	75.1	3.88
20	46	79.4	80.5	81.6	3.76	8.09	p<0.001	55	73.3	74.3	75.4	3.90
21	46	79.7	80.8	81.9	3.89	8.17	p<0.001	54	73.4	74.4	75.5	3.92
22	46	79.6	80.7	81.8	3.86	7.92	p<0.001	53	73.5	74.5	75.6	3.89
23	41	79.6	80.8	82.0	3.95	7.18	p<0.001	42	73.4	74.6	75.8	3.90
24	35	79.9	81.2	82.4	3.81	7.40	p<0.001	41	73.4	74.6	75.8	3.90
25	30	79.5	80.9	82.2	3.73	6.62	p<0.001	35	73.2	74.5	75.8	3.99

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.43	2.22	3.00	1.05	0.82		7	1.50	1.86	2.21	0.48
5	18	1.92	2.25	2.57	0.70	2.78	p<0.01	19	1.29	1.60	1.92	0.70
6	35	1.60	1.84	2.09	0.74	1.03		27	1.43	1.66	1.89	0.62
7	43	1.61	1.81	2.00	0.65	1.28		39	1.46	1.63	1.81	0.56
8	48	1.69	1.84	1.98	0.51	2.10	p<0.05	49	1.47	1.61	1.76	0.52
9	49	1.74	1.86	1.98	0.44	3.03	p<0.01	53	1.44	1.57	1.71	0.50
10	50	1.81	1.92	2.03	0.39	5.04	p<0.001	54	1.40	1.51	1.63	0.43
11	50	1.79	1.89	1.99	0.36	6.59	p<0.001	55	1.25	1.37	1.48	0.44
12	50	1.75	1.84	1.93	0.33	8.07	p<0.001	55	1.16	1.27	1.37	0.39
13	50	1.67	1.76	1.86	0.35	8.54	p<0.001	55	1.05	1.15	1.25	0.38
14	50	1.55	1.65	1.75	0.35	8.84	p<0.001	55	0.92	1.02	1.12	0.37
15	50	1.44	1.55	1.65	0.38	9.69	p<0.001	55	0.79	0.88	0.97	0.33
16	50	1.27	1.37	1.48	0.38	9.65	p<0.001	55	0.66	0.74	0.82	0.29
17	50	1.05	1.15	1.26	0.38	8.52	p<0.001	55	0.53	0.61	0.68	0.28
18	49	0.83	0.93	1.04	0.37	7.70	p<0.001	55	0.40	0.46	0.53	0.25
19	49	0.59	0.71	0.83	0.42	5.33	p<0.001	55	0.26	0.34	0.41	0.29
20	46	0.35	0.46	0.58	0.40	3.54	p<0.001	55	0.14	0.22	0.30	0.29
21	46	0.15	0.26	0.37	0.38	1.65		54	0.08	0.15	0.23	0.28
22	46	-0.04	0.07	0.18	0.38	-0.53		53	0.03	0.11	0.18	0.29
23	41	-0.12	-0.03	0.06	0.29	-0.96		42	-0.03	0.02	0.08	0.19
24	35	-0.16	-0.06	0.04	0.31	-1.04		41	-0.06	0.00	0.06	0.19
25	30	-0.13	-0.03	0.08	0.29	-0.77		35	-0.04	0.02	0.08	0.19

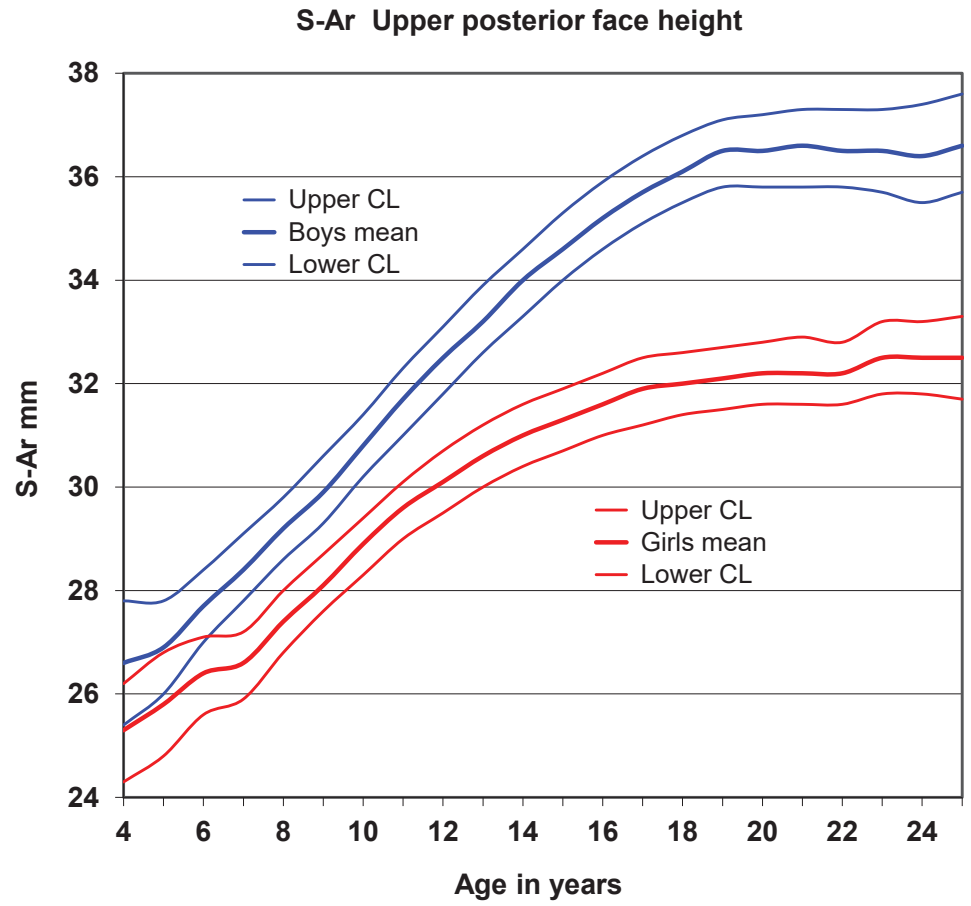

Pgn-Tgo Corpus length
Pgn-Tgo mm
85
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

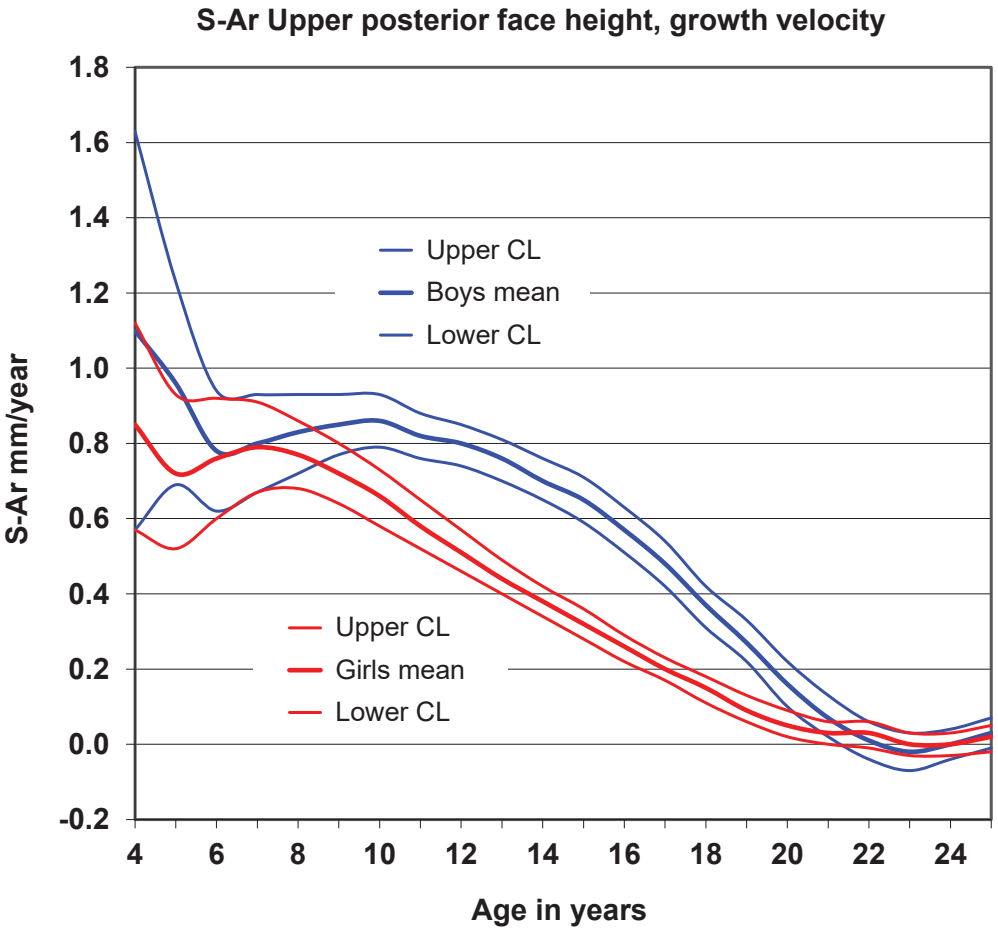

Pgn-Tgo Corpus length, growth velocity
Pgn-Tgo mm/year
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

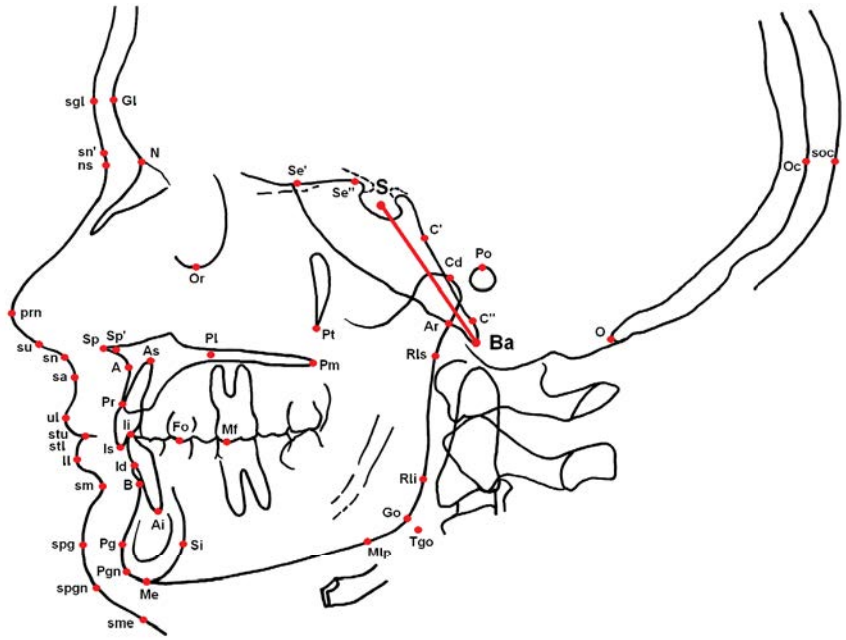


S-Ar (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	25.4	26.6	27.8	1.66	1.67		7	24.3	25.3	26.2	1.28
5	18	26.0	26.9	27.8	1.90	1.63		19	24.8	25.8	26.8	2.24
6	35	27.0	27.7	28.4	2.01	2.58	p<0.05	27	25.6	26.4	27.1	2.00
7	43	27.8	28.4	29.1	2.09	3.99	p<0.001	39	25.9	26.6	27.2	2.08
8	48	28.6	29.2	29.8	2.12	4.09	p<0.001	49	26.8	27.4	28.0	2.20
9	49	29.3	29.9	30.6	2.23	4.13	p<0.001	53	27.6	28.1	28.7	2.15
10	50	30.2	30.8	31.4	2.29	4.44	p<0.001	54	28.3	28.9	29.4	2.13
11	50	31.0	31.7	32.3	2.35	4.83	p<0.001	55	29.0	29.6	30.1	2.13
12	50	31.8	32.5	33.1	2.37	5.35	p<0.001	55	29.5	30.1	30.7	2.17
13	50	32.6	33.2	33.9	2.37	5.96	p<0.001	55	30.0	30.6	31.2	2.20
14	50	33.3	34.0	34.6	2.37	6.59	p<0.001	55	30.4	31.0	31.6	2.24
15	50	33.9	34.6	35.3	2.37	7.20	p<0.001	55	30.7	31.3	31.9	2.27
16	50	34.6	35.2	35.9	2.35	7.90	p<0.001	55	31.0	31.6	32.2	2.30
17	50	35.1	35.7	36.4	2.36	8.48	p<0.001	55	31.2	31.9	32.5	2.32
18	49	35.5	36.1	36.8	2.38	8.88	p<0.001	55	31.4	32.0	32.6	2.32
19	49	35.8	36.5	37.1	2.39	9.32	p<0.001	55	31.5	32.1	32.7	2.32
20	46	35.8	36.5	37.2	2.44	9.08	p<0.001	55	31.6	32.2	32.8	2.32
21	46	35.8	36.6	37.3	2.51	8.92	p<0.001	54	31.6	32.2	32.9	2.35
22	46	35.8	36.5	37.2	2.53	8.77	p<0.001	53	31.6	32.2	32.8	2.35
23	41	35.7	36.5	37.3	2.59	7.46	p<0.001	42	31.8	32.5	33.2	2.31
24	35	35.5	36.4	37.4	2.79	6.71	p<0.001	41	31.8	32.5	33.2	2.31
25	30	35.7	36.6	37.6	2.68	6.50	p<0.001	35	31.7	32.5	33.3	2.41

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.57	1.10	1.63	0.71	0.83		7	0.57	0.85	1.12	0.37
5	18	0.69	0.96	1.23	0.58	1.42		19	0.52	0.72	0.93	0.46
6	35	0.62	0.78	0.94	0.48	0.22		27	0.60	0.76	0.92	0.43
7	43	0.67	0.80	0.93	0.44	0.10		39	0.67	0.79	0.91	0.38
8	48	0.72	0.83	0.93	0.37	0.85		49	0.68	0.77	0.86	0.32
9	49	0.77	0.85	0.93	0.29	2.33	p<0.05	53	0.64	0.72	0.80	0.29
10	50	0.79	0.86	0.93	0.25	3.96	p<0.001	54	0.58	0.66	0.73	0.27
11	50	0.76	0.82	0.88	0.21	5.26	p<0.001	55	0.52	0.58	0.65	0.24
12	50	0.74	0.80	0.85	0.20	7.09	p<0.001	55	0.46	0.51	0.57	0.21
13	50	0.70	0.76	0.81	0.21	8.27	p<0.001	55	0.40	0.44	0.49	0.18
14	50	0.65	0.70	0.76	0.20	9.02	p<0.001	55	0.34	0.38	0.42	0.16
15	50	0.59	0.65	0.71	0.21	9.58	p<0.001	55	0.28	0.32	0.36	0.15
16	50	0.51	0.57	0.63	0.22	9.07	p<0.001	55	0.22	0.26	0.29	0.13
17	50	0.42	0.48	0.54	0.22	8.02	p<0.001	55	0.17	0.20	0.23	0.13
18	49	0.31	0.37	0.42	0.20	6.91	p<0.001	55	0.11	0.15	0.18	0.12
19	49	0.22	0.27	0.33	0.20	5.58	p<0.001	55	0.06	0.09	0.13	0.13
20	46	0.10	0.16	0.22	0.20	3.09	p<0.01	55	0.02	0.05	0.09	0.13
21	46	0.02	0.07	0.13	0.18	1.32		54	0.00	0.03	0.06	0.12
22	46	-0.04	0.01	0.07	0.18	-0.43		53	-0.01	0.03	0.06	0.12
23	41	-0.07	-0.02	0.03	0.17	-0.66		42	-0.03	-0.00	0.03	0.10
24	35	-0.04	-0.00	0.04	0.11	0.15		41	-0.03	-0.00	0.03	0.10
25	30	-0.01	0.03	0.07	0.12	0.56		35	-0.02	0.02	0.05	0.09

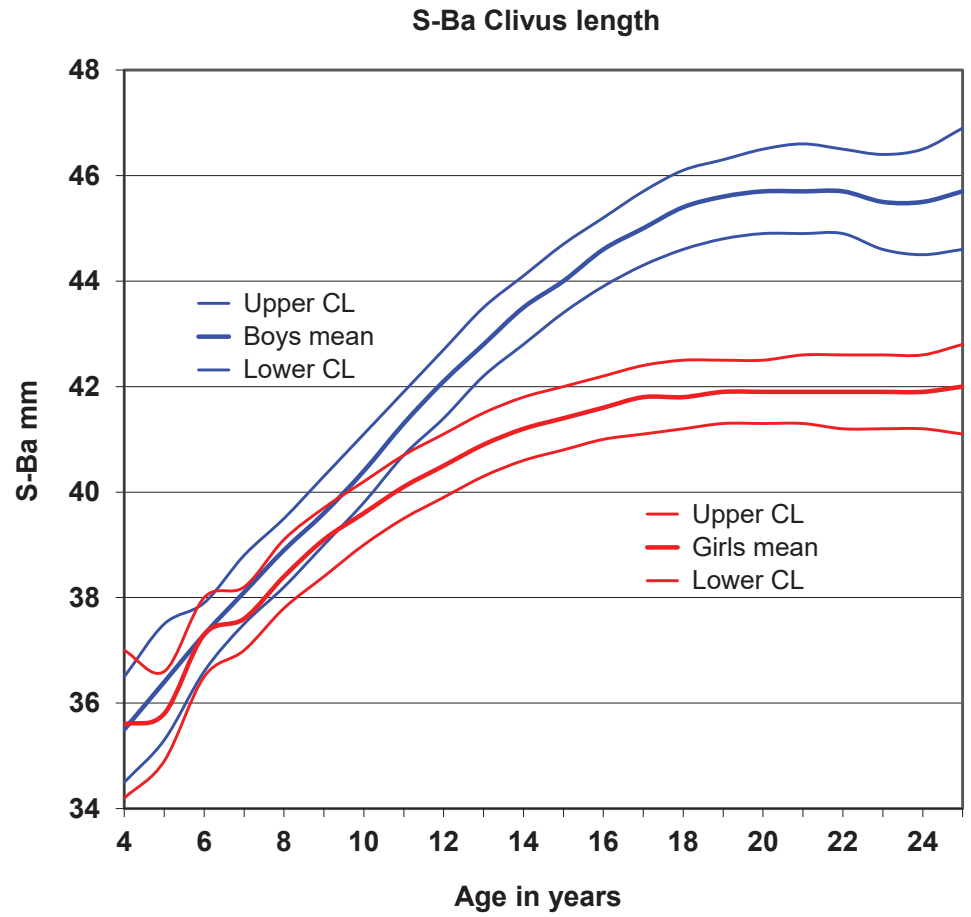

S-Ar Upper posterior face height
S-Ar mm
38
36
34
32
30
28
26
24
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

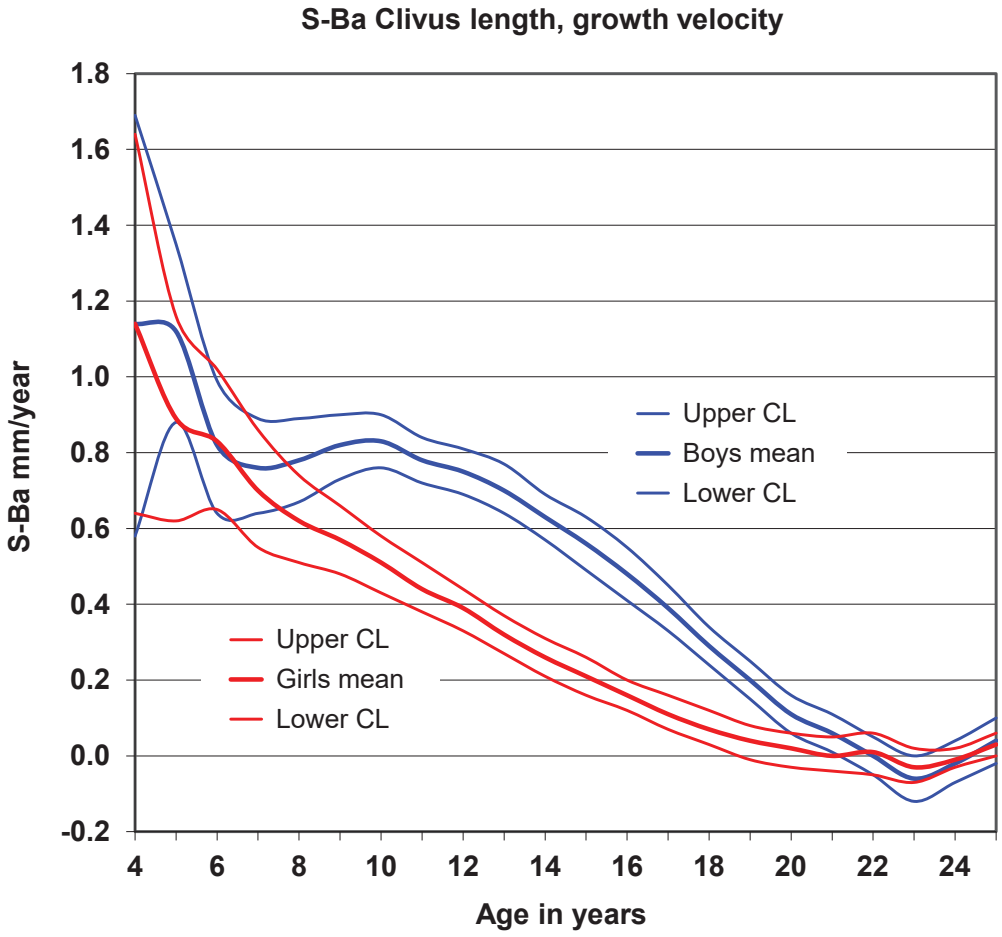

S-Ar Upper posterior face height, growth velocity
S-Ar mm/year
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

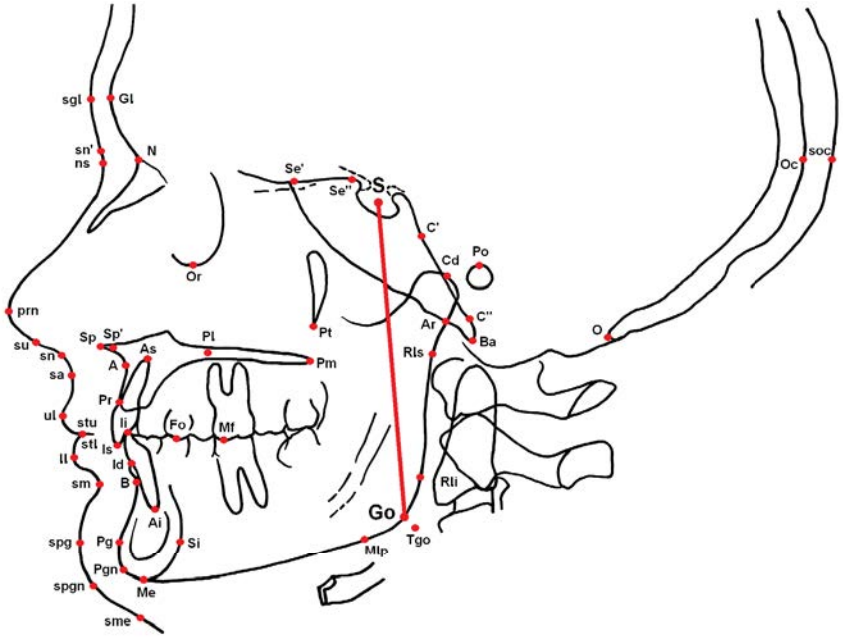


S-Ba (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	34.5	35.5	36.5	1.37	-0.12		7	34.2	35.6	37.0	1.88
5	18	35.3	36.4	37.5	2.33	0.93		19	34.9	35.8	36.6	1.86
6	35	36.6	37.3	38.0	2.01	0.03		27	36.5	37.3	38.0	1.92
7	43	37.5	38.1	38.8	2.11	1.19		39	37.0	37.6	38.2	2.01
8	48	38.2	38.9	39.5	2.23	0.97		49	37.8	38.4	39.1	2.35
9	49	39.0	39.6	40.2	2.27	1.20		53	38.4	39.1	39.7	2.30
10	50	39.8	40.4	41.0	2.28	1.83		54	39.0	39.6	40.2	2.26
11	50	40.6	41.3	41.9	2.29	2.64	p<0.01	55	39.5	40.1	40.7	2.20
12	50	41.4	42.1	42.7	2.31	3.43	p<0.001	55	39.9	40.5	41.1	2.22
13	50	42.2	42.8	43.5	2.32	4.31	p<0.001	55	40.3	40.9	41.5	2.24
14	50	42.8	43.5	44.1	2.37	5.11	p<0.001	55	40.6	41.2	41.8	2.25
15	50	43.4	44.1	44.7	2.42	5.75	p<0.001	55	40.8	41.4	42.0	2.25
16	50	43.9	44.6	45.3	2.49	6.40	p<0.001	55	41.0	41.6	42.2	2.27
17	50	44.3	45.0	45.7	2.54	6.95	p<0.001	55	41.1	41.8	42.4	2.29
18	49	44.7	45.4	46.1	2.60	7.36	p<0.001	55	41.2	41.8	42.5	2.32
19	49	44.9	45.6	46.4	2.66	7.64	p<0.001	55	41.3	41.9	42.5	2.35
20	46	44.9	45.7	46.5	2.79	7.43	p<0.001	55	41.3	41.9	42.5	2.40
21	46	45.0	45.8	46.6	2.84	7.21	p<0.001	54	41.3	41.9	42.6	2.51
22	46	45.0	45.8	46.6	2.79	7.11	p<0.001	53	41.2	41.9	42.6	2.56
23	41	44.7	45.6	46.5	2.92	6.28	p<0.001	42	41.2	41.9	42.6	2.34
24	35	44.5	45.5	46.6	3.12	5.72	p<0.001	41	41.2	41.9	42.6	2.41
25	30	44.6	45.8	46.9	3.18	5.41	p<0.001	35	41.1	42.0	42.8	2.50

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.58	1.14	1.69	0.75	-0.01		7	0.64	1.14	1.64	0.68
5	18	0.88	1.12	1.35	0.50	1.25		19	0.62	0.89	1.16	0.59
6	35	0.64	0.80	0.97	0.50	-0.21		27	0.65	0.83	1.02	0.49
7	43	0.63	0.76	0.88	0.41	0.53		39	0.55	0.70	0.86	0.49
8	48	0.67	0.77	0.88	0.37	1.90		49	0.51	0.62	0.74	0.41
9	49	0.73	0.81	0.90	0.29	3.95	p<0.001	53	0.48	0.57	0.66	0.33
10	50	0.76	0.83	0.90	0.25	6.20	p<0.001	54	0.43	0.51	0.58	0.28
11	50	0.73	0.79	0.85	0.22	7.61	p<0.001	55	0.38	0.44	0.51	0.24
12	50	0.70	0.76	0.81	0.21	9.04	p<0.001	55	0.33	0.39	0.44	0.20
13	50	0.65	0.71	0.77	0.21	10.00	p<0.001	55	0.27	0.32	0.37	0.19
14	50	0.58	0.64	0.70	0.22	9.67	p<0.001	55	0.21	0.26	0.31	0.18
15	50	0.50	0.57	0.63	0.23	8.91	p<0.001	55	0.16	0.21	0.26	0.18
16	50	0.43	0.49	0.56	0.23	8.52	p<0.001	55	0.12	0.16	0.20	0.16
17	50	0.35	0.40	0.45	0.19	8.19	p<0.001	55	0.07	0.11	0.16	0.17
18	49	0.25	0.30	0.35	0.18	6.63	p<0.001	55	0.03	0.07	0.12	0.16
19	49	0.15	0.20	0.25	0.18	4.81	p<0.001	55	-0.01	0.04	0.08	0.17
20	46	0.06	0.11	0.16	0.18	2.71	p<0.01	55	-0.03	0.02	0.06	0.18
21	46	0.01	0.06	0.11	0.17	1.53		54	-0.04	0.00	0.05	0.16
22	46	-0.05	-0.01	0.04	0.17	-0.34		53	-0.05	0.01	0.06	0.19
23	41	-0.12	-0.07	-0.01	0.18	-1.20		42	-0.07	-0.03	0.02	0.14
24	35	-0.08	-0.03	0.02	0.15	-0.86		41	-0.03	-0.01	0.02	0.09
25	30	-0.03	0.01	0.06	0.11	-0.56		35	0.00	0.03	0.06	0.08

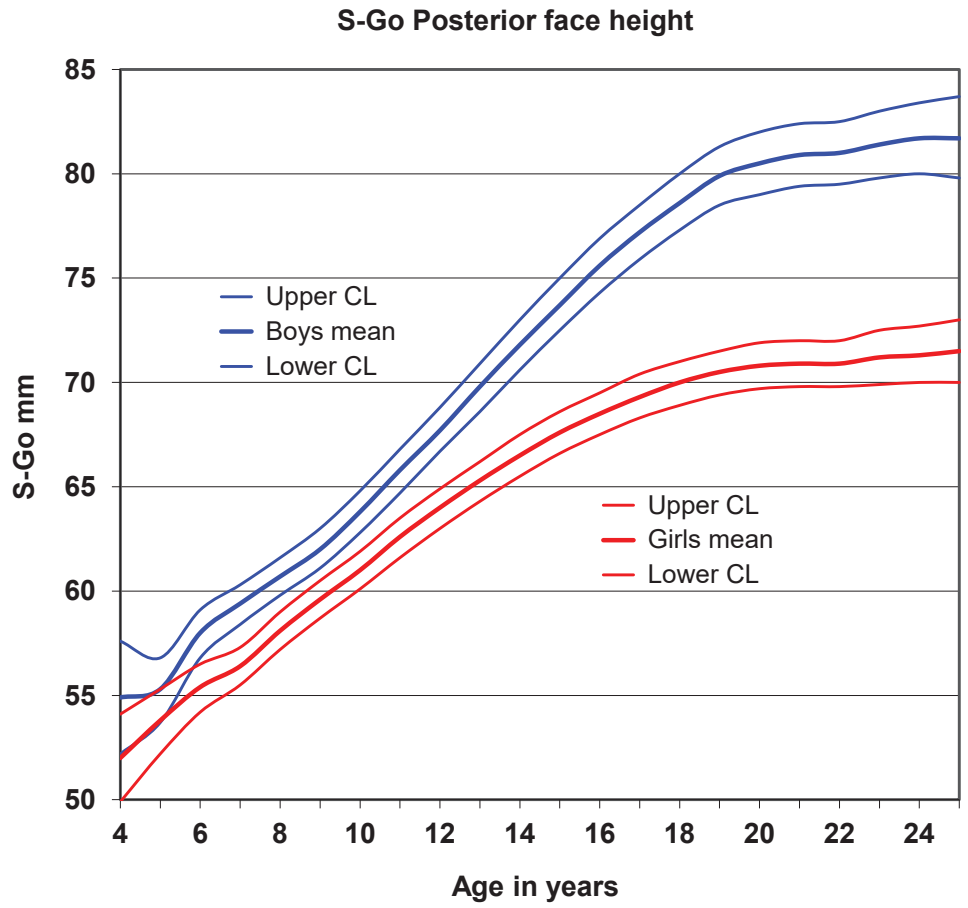

S-Ba Clivus length
S-Ba mm
48
46
44
42
40
38
36
34
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

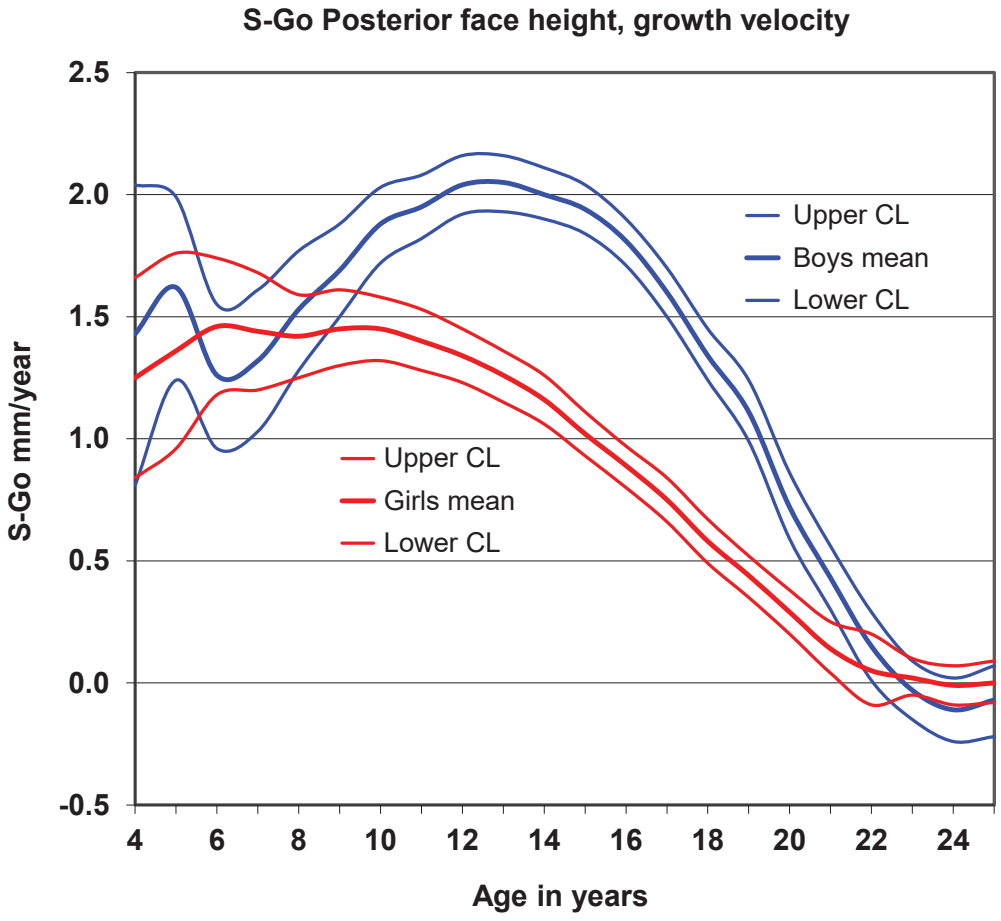

S-Ba Clivus length, growth velocity
S-Ba mm/year
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

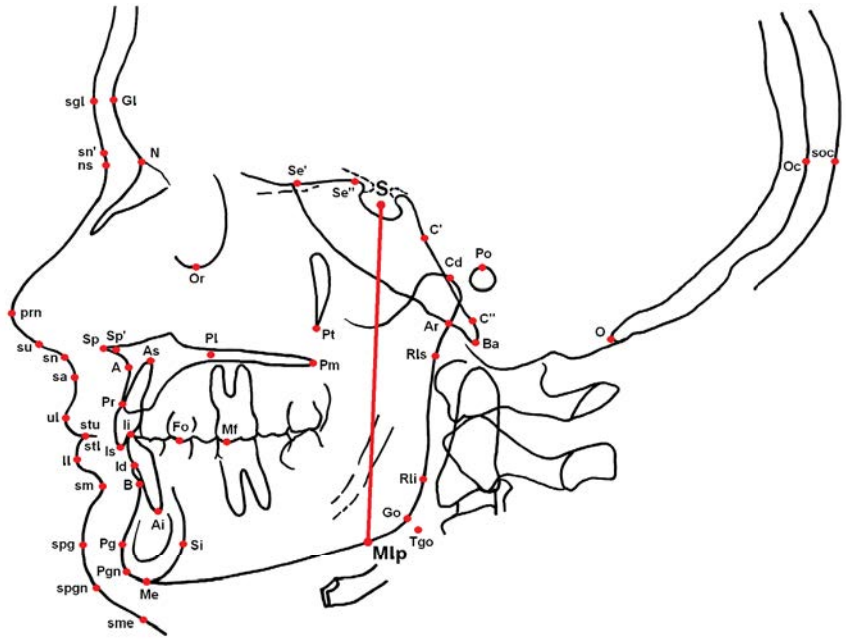


S-Go (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	52.2	54.9	57.6	3.65	1.70		7	49.9	52.0	54.1	2.84
5	18	53.7	55.3	56.8	3.38	1.34		19	52.2	53.8	55.3	3.44
6	35	56.8	57.9	59.1	3.43	3.07	p<0.01	27	54.2	55.4	56.5	3.01
7	43	58.4	59.4	60.3	3.29	4.26	p<0.001	39	55.5	56.4	57.3	2.87
8	48	59.8	60.7	61.6	3.11	4.04	p<0.001	49	57.2	58.1	59.0	3.29
9	49	61.2	62.1	63.0	3.27	3.84	p<0.001	53	58.7	59.6	60.5	3.28
10	50	62.9	63.8	64.8	3.51	4.24	p<0.001	54	60.1	61.0	61.9	3.29
11	50	64.8	65.8	66.8	3.67	4.61	p<0.001	55	61.6	62.6	63.5	3.48
12	50	66.7	67.8	68.8	3.89	5.18	p<0.001	55	63.0	64.0	64.9	3.59
13	50	68.6	69.8	70.9	4.10	5.91	p<0.001	55	64.3	65.3	66.2	3.69
14	50	70.6	71.7	72.9	4.33	6.66	p<0.001	55	65.5	66.5	67.5	3.78
15	50	72.4	73.7	74.9	4.51	7.48	p<0.001	55	66.6	67.6	68.6	3.84
16	50	74.2	75.5	76.8	4.64	8.39	p<0.001	55	67.5	68.5	69.5	3.92
17	50	75.8	77.2	78.5	4.77	9.16	p<0.001	55	68.3	69.3	70.4	3.99
18	49	77.2	78.6	79.9	4.86	9.88	p<0.001	55	68.9	70.0	71.0	4.00
19	49	78.4	79.8	81.2	4.95	10.60	p<0.001	55	69.4	70.5	71.5	4.06
20	46	78.9	80.4	81.9	5.13	10.48	p<0.001	55	69.7	70.8	71.9	4.07
21	46	79.3	80.8	82.3	5.23	10.62	p<0.001	54	69.8	70.9	72.0	4.10
22	46	79.4	80.9	82.4	5.17	10.74	p<0.001	53	69.8	70.9	72.0	4.08
23	41	79.7	81.3	82.9	5.19	9.64	p<0.001	42	69.9	71.2	72.5	4.30
24	35	79.9	81.6	83.3	5.18	9.38	p<0.001	41	70.0	71.3	72.7	4.34
25	30	79.7	81.7	83.6	5.49	8.13	p<0.001	35	70.0	71.5	73.0	4.59

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.81	1.43	2.04	0.83	0.46		7	0.84	1.25	1.66	0.56
5	18	1.24	1.62	1.99	0.80	0.91		19	0.96	1.36	1.76	0.89
6	35	0.98	1.28	1.58	0.91	-0.82		27	1.18	1.46	1.74	0.74
7	43	1.05	1.34	1.63	0.98	-0.52		39	1.20	1.44	1.68	0.75
8	48	1.29	1.54	1.78	0.86	0.78		49	1.25	1.42	1.59	0.60
9	49	1.51	1.70	1.89	0.68	1.95		53	1.30	1.45	1.61	0.58
10	50	1.72	1.87	2.02	0.55	4.19	p<0.001	54	1.32	1.45	1.58	0.49
11	50	1.81	1.94	2.07	0.47	5.97	p<0.001	55	1.28	1.40	1.53	0.46
12	50	1.91	2.02	2.14	0.42	8.42	p<0.001	55	1.23	1.34	1.45	0.41
13	50	1.92	2.03	2.14	0.40	9.99	p<0.001	55	1.15	1.26	1.36	0.39
14	50	1.88	1.99	2.09	0.37	11.40	p<0.001	55	1.06	1.16	1.26	0.38
15	50	1.83	1.92	2.02	0.36	13.43	p<0.001	55	0.93	1.02	1.11	0.33
16	50	1.69	1.79	1.88	0.35	13.64	p<0.001	55	0.80	0.89	0.97	0.33
17	50	1.49	1.59	1.69	0.36	12.48	p<0.001	55	0.66	0.75	0.84	0.33
18	49	1.23	1.34	1.44	0.38	10.83	p<0.001	55	0.49	0.58	0.67	0.33
19	49	0.98	1.11	1.23	0.45	8.64	p<0.001	55	0.35	0.44	0.52	0.34
20	46	0.59	0.72	0.85	0.46	5.38	p<0.001	55	0.20	0.29	0.38	0.33
21	46	0.31	0.44	0.57	0.45	3.51	p<0.001	54	0.04	0.14	0.25	0.39
22	46	0.02	0.16	0.29	0.47	1.02		53	-0.09	0.05	0.20	0.54
23	41	-0.12	-0.01	0.10	0.36	-0.52		42	-0.05	0.02	0.10	0.25
24	35	-0.19	-0.07	0.04	0.34	-0.95		41	-0.09	-0.01	0.07	0.25
25	30	-0.12	-0.02	0.09	0.29	-0.28		35	-0.08	0.00	0.09	0.25

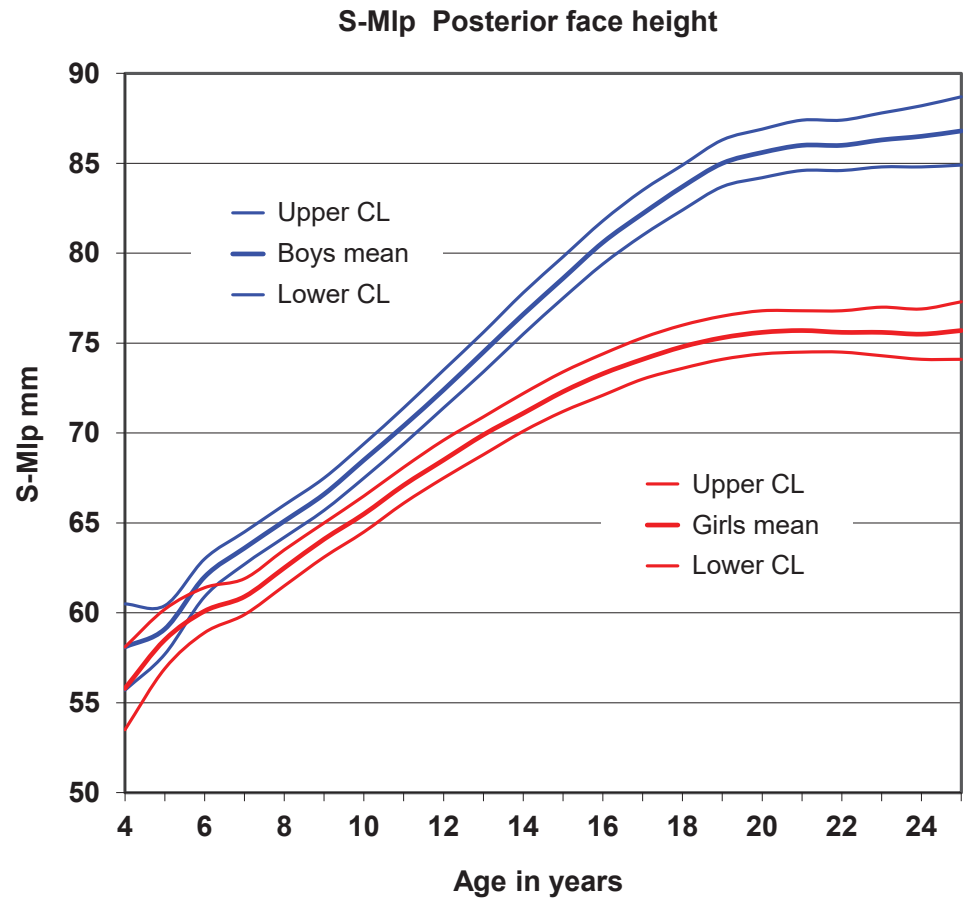

S-Go Posterior face height
S-Go mm
85
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

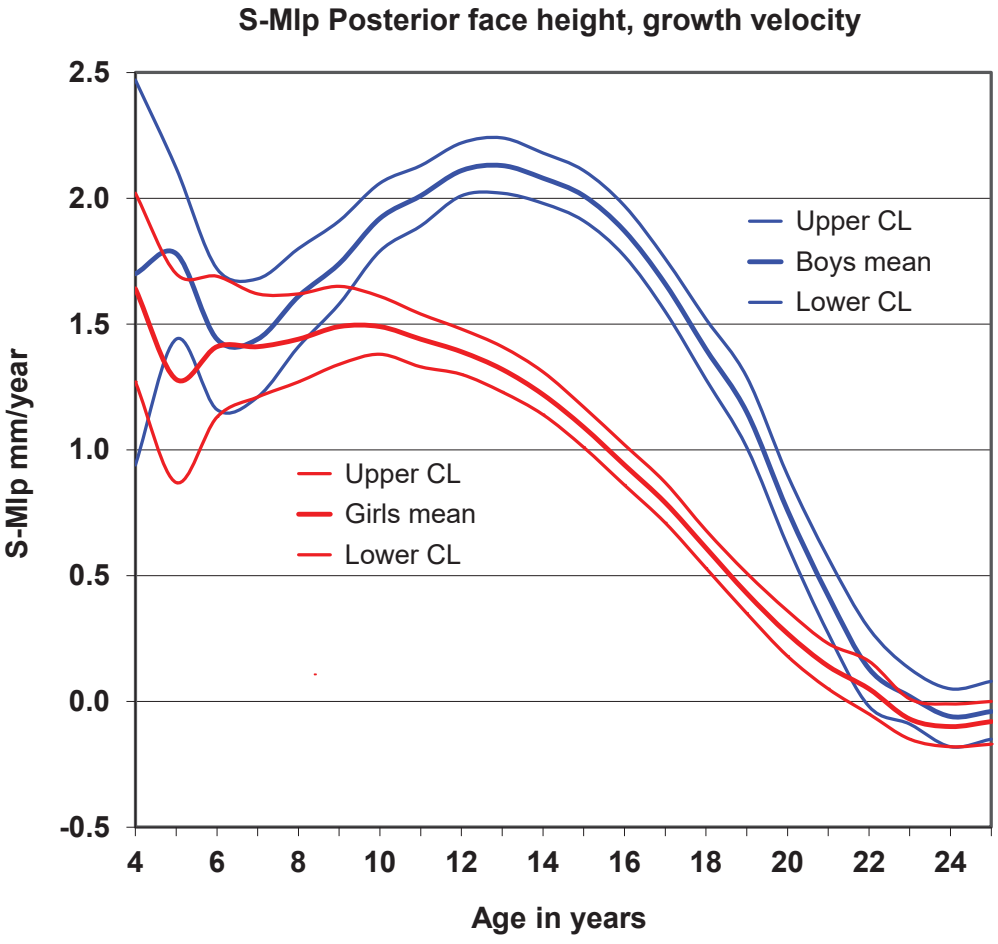

S-Go Posterior face height, growth velocity
S-Go mm/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

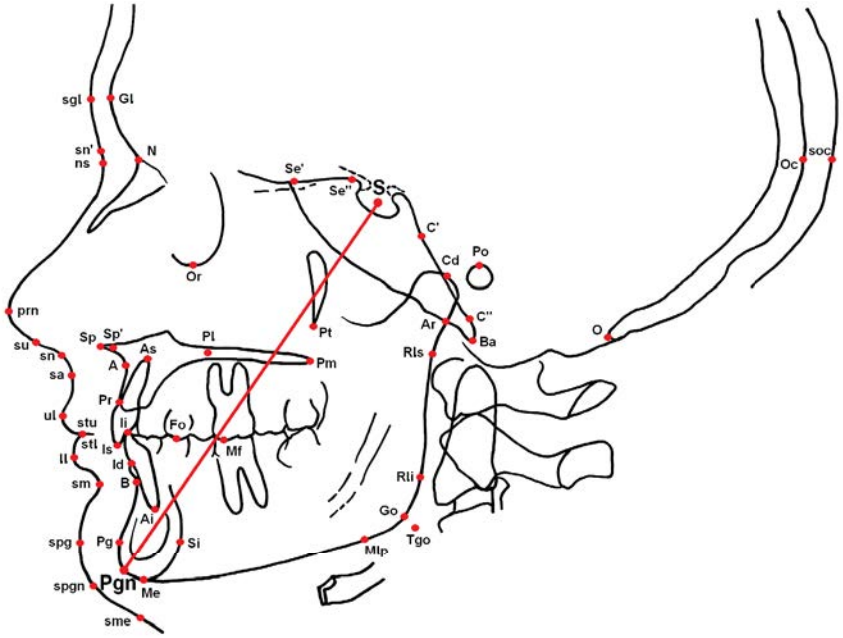


S-Mlp (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	55.7	58.1	60.5	3.26	1.35		7	53.5	55.8	58.1	3.08
5	18	57.7	59.1	60.4	2.93	0.49		19	56.9	58.5	60.2	3.70
6	35	60.9	62.0	63.0	3.11	2.25	p<0.05	27	58.9	60.1	61.4	3.30
7	43	62.7	63.6	64.5	3.03	3.97	p<0.001	39	59.9	60.9	61.9	3.17
8	48	64.2	65.1	66.0	3.15	3.81	p<0.001	49	61.5	62.5	63.5	3.52
9	49	65.7	66.6	67.5	3.22	3.79	p<0.001	53	63.1	64.1	65.0	3.54
10	50	67.5	68.5	69.4	3.48	4.20	p<0.001	54	64.5	65.5	66.5	3.67
11	50	69.4	70.4	71.4	3.65	4.49	p<0.001	55	66.1	67.1	68.1	3.83
12	50	71.4	72.4	73.5	3.82	5.18	p<0.001	55	67.5	68.5	69.6	3.94
13	50	73.4	74.5	75.6	3.96	6.00	p<0.001	55	68.8	69.9	70.9	4.02
14	50	75.5	76.6	77.8	4.11	6.85	p<0.001	55	70.1	71.1	72.2	4.11
15	50	77.5	78.6	79.8	4.24	7.71	p<0.001	55	71.2	72.3	73.4	4.20
16	50	79.4	80.6	81.8	4.35	8.67	p<0.001	55	72.1	73.3	74.4	4.29
17	50	81.0	82.3	83.5	4.43	9.46	p<0.001	55	73.0	74.1	75.3	4.38
18	49	82.4	83.7	85.0	4.54	10.14	p<0.001	55	73.6	74.8	76.0	4.39
19	49	83.7	85.0	86.3	4.66	10.87	p<0.001	55	74.1	75.3	76.5	4.42
20	46	84.2	85.6	86.9	4.73	10.91	p<0.001	55	74.4	75.6	76.8	4.44
21	46	84.7	86.0	87.4	4.79	11.26	p<0.001	54	74.5	75.7	76.8	4.42
22	46	84.6	86.0	87.4	4.84	11.19	p<0.001	53	74.5	75.6	76.8	4.37
23	41	84.8	86.3	87.8	4.93	10.38	p<0.001	42	74.3	75.6	77.0	4.43
24	35	84.8	86.5	88.2	5.08	9.96	p<0.001	41	74.1	75.5	76.9	4.53
25	30	84.9	86.8	88.7	5.35	8.88	p<0.001	35	74.1	75.7	77.3	4.71

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.94	1.70	2.47	1.03	0.14		7	1.27	1.64	2.02	0.51
5	18	1.44	1.78	2.12	0.73	1.82		19	0.87	1.28	1.70	0.91
6	35	1.16	1.44	1.71	0.83	0.13		27	1.13	1.41	1.69	0.73
7	43	1.21	1.44	1.67	0.78	0.15		39	1.21	1.41	1.62	0.66
8	48	1.41	1.60	1.80	0.69	1.20		49	1.27	1.44	1.62	0.61
9	49	1.58	1.74	1.90	0.57	2.20	p<0.05	53	1.34	1.49	1.65	0.57
10	50	1.79	1.92	2.06	0.47	4.87	p<0.001	54	1.38	1.49	1.61	0.43
11	50	1.90	2.01	2.13	0.43	7.30	p<0.001	55	1.33	1.44	1.54	0.38
12	50	2.01	2.12	2.22	0.38	10.20	p<0.001	55	1.30	1.39	1.48	0.35
13	50	2.03	2.14	2.24	0.39	11.40	p<0.001	55	1.23	1.32	1.41	0.34
14	50	1.99	2.08	2.18	0.35	13.06	p<0.001	55	1.14	1.22	1.31	0.32
15	50	1.92	2.02	2.12	0.36	14.43	p<0.001	55	1.01	1.09	1.17	0.30
16	50	1.77	1.87	1.97	0.36	14.71	p<0.001	55	0.86	0.94	1.02	0.29
17	50	1.56	1.66	1.76	0.36	13.67	p<0.001	55	0.71	0.79	0.87	0.29
18	49	1.28	1.40	1.52	0.42	11.49	p<0.001	55	0.53	0.61	0.68	0.28
19	49	1.01	1.15	1.29	0.51	8.86	p<0.001	55	0.35	0.43	0.51	0.30
20	46	0.62	0.76	0.90	0.48	5.86	p<0.001	55	0.18	0.27	0.36	0.34
21	46	0.27	0.42	0.57	0.52	3.21	p<0.01	54	0.05	0.14	0.23	0.33
22	46	-0.03	0.13	0.28	0.54	0.82		53	-0.05	0.05	0.16	0.39
23	41	-0.09	0.02	0.12	0.35	1.32		42	-0.15	-0.07	0.01	0.27
24	35	-0.18	-0.07	0.04	0.33	0.38		41	-0.18	-0.10	-0.01	0.28
25	30	-0.16	-0.05	0.06	0.30	0.48		35	-0.17	-0.08	0.00	0.26


S-Mlp Posterior face height
S-Mlp mm
90
85
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


S-Mlp Posterior face height, growth velocity
S-Mlp mm/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

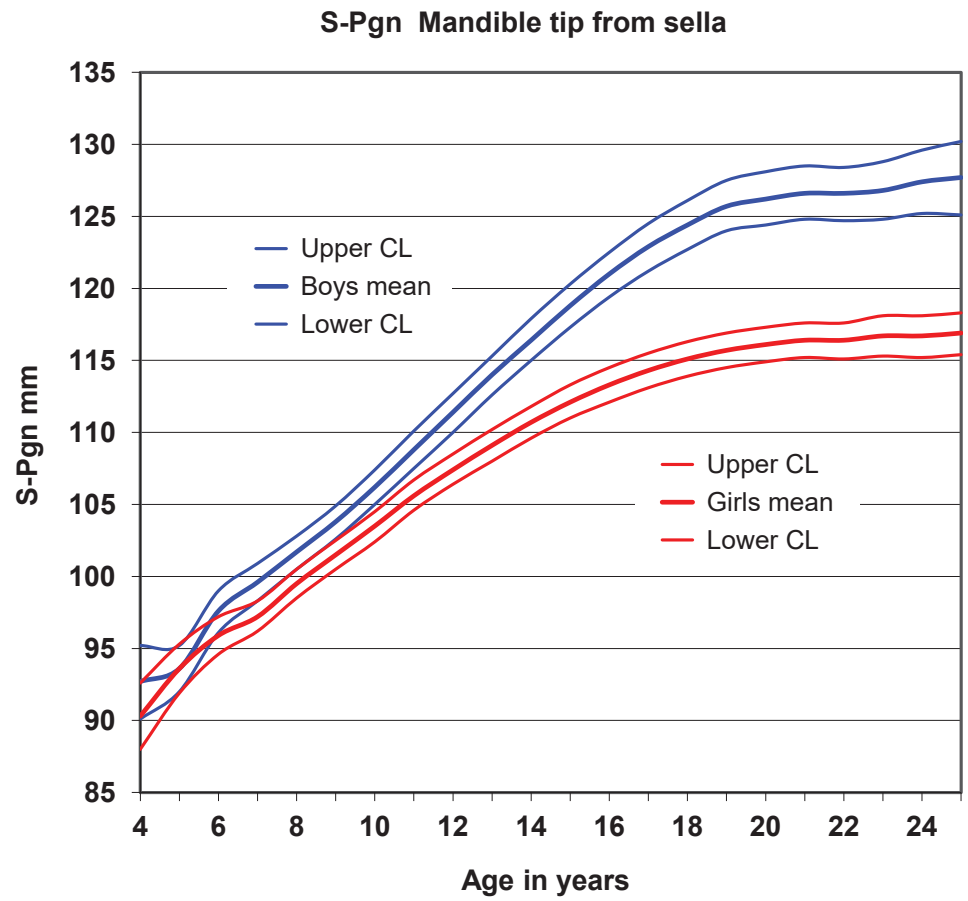


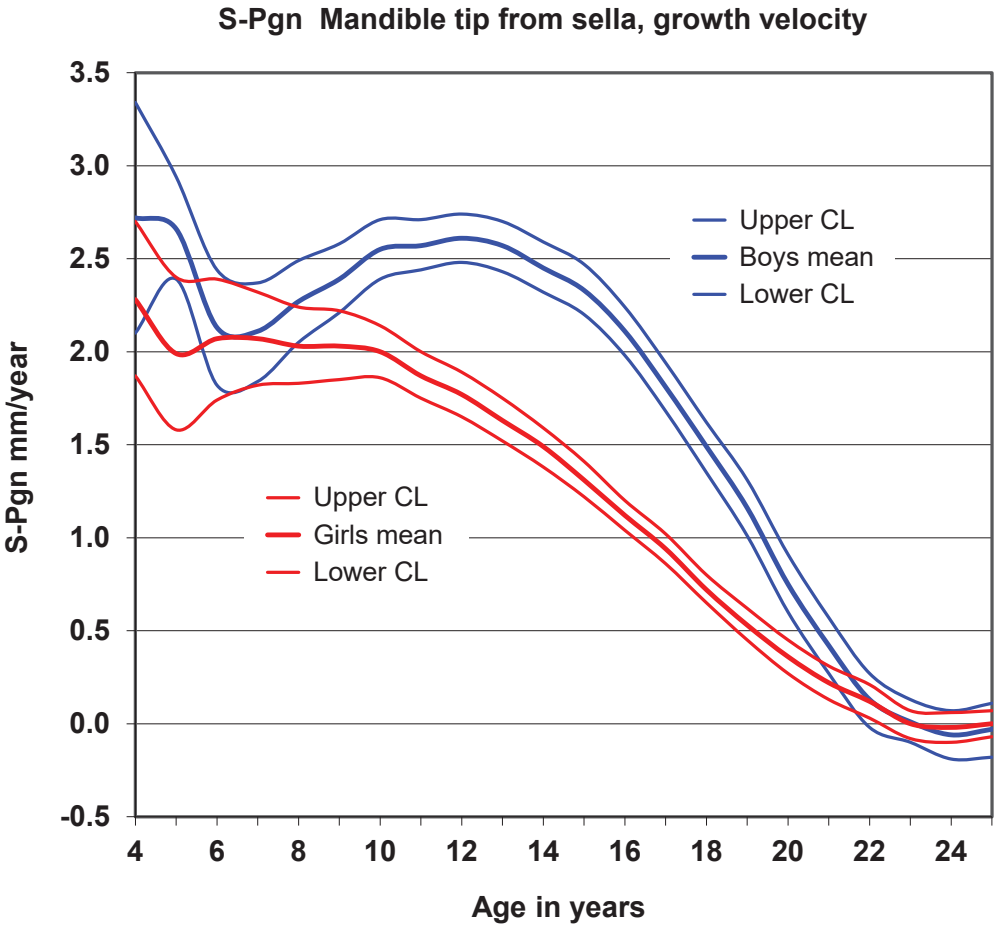
S-Pgn (mm)

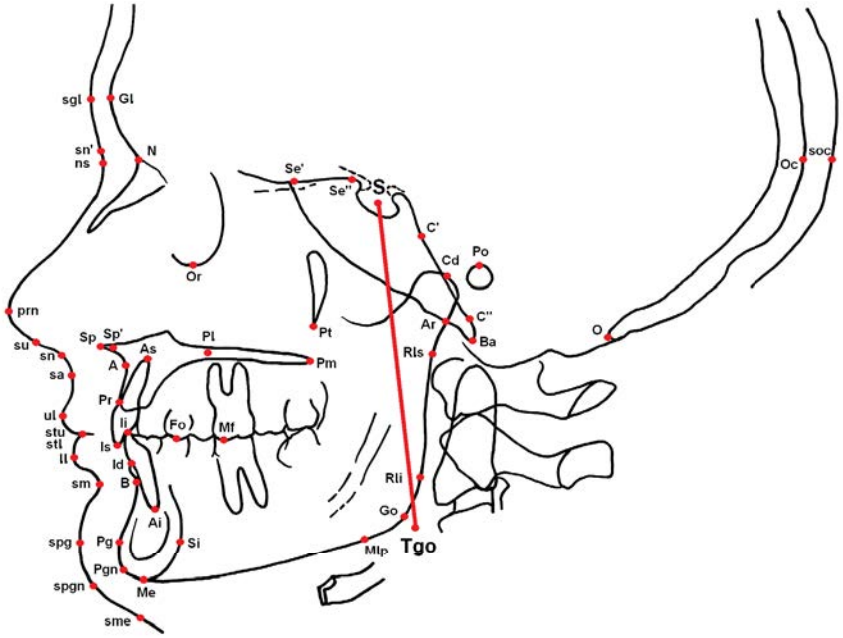
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	90.1	92.7	95.2	3.45	1.36		7	88.0	90.3	92.6	3.10
5	18	92.0	93.6	95.2	3.46	0.02		19	91.9	93.6	95.3	3.76
6	35	96.1	97.6	99.0	4.43	1.58		27	94.6	95.9	97.2	3.46
7	43	98.3	99.6	100.9	4.23	2.75	p<0.01	39	96.2	97.2	98.3	3.41
8	48	100.5	101.7	102.8	4.08	2.78	p<0.01	49	98.5	99.5	100.5	3.67
9	49	102.6	103.7	104.9	4.15	2.87	p<0.01	53	100.5	101.5	102.5	3.71
10	50	105.0	106.2	107.4	4.33	3.45	p<0.001	54	102.4	103.5	104.5	3.79
11	50	107.5	108.8	110.1	4.64	3.79	p<0.001	55	104.6	105.6	106.7	3.98
12	50	110.0	111.4	112.7	4.84	4.52	p<0.001	55	106.4	107.4	108.5	4.06
13	50	112.6	114.0	115.4	5.04	5.36	p<0.001	55	108.0	109.1	110.2	4.14
14	50	115.0	116.4	117.9	5.25	6.19	p<0.001	55	109.6	110.7	111.8	4.24
15	50	117.3	118.8	120.3	5.43	6.98	p<0.001	55	111.0	112.1	113.3	4.34
16	50	119.4	121.0	122.5	5.64	7.81	p<0.001	55	112.1	113.3	114.5	4.43
17	50	121.2	122.9	124.5	5.84	8.44	p<0.001	55	113.1	114.3	115.5	4.52
18	49	122.7	124.4	126.1	6.00	8.96	p<0.001	55	113.9	115.1	116.3	4.55
19	49	124.0	125.7	127.5	6.21	9.43	p<0.001	55	114.5	115.7	116.9	4.57
20	46	124.4	126.3	128.1	6.35	9.29	p<0.001	55	114.9	116.1	117.3	4.56
21	46	124.8	126.7	128.5	6.49	9.26	p<0.001	54	115.2	116.4	117.6	4.55
22	46	124.7	126.6	128.4	6.41	9.29	p<0.001	53	115.1	116.4	117.6	4.49
23	41	124.8	126.8	128.8	6.48	8.25	p<0.001	42	115.3	116.7	118.1	4.58
24	35	125.2	127.4	129.6	6.72	8.16	p<0.001	41	115.2	116.7	118.1	4.68
25	30	125.2	127.7	130.2	7.02	7.52	p<0.001	35	115.4	116.9	118.3	4.46

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.10	2.72	3.34	0.84	1.15		7	1.87	2.28	2.70	0.56
5	18	2.39	2.66	2.94	0.59	2.64	p<0.05	19	1.58	1.99	2.40	0.91
6	35	1.82	2.13	2.44	0.94	0.27		27	1.74	2.07	2.39	0.86
7	43	1.84	2.10	2.37	0.89	0.17		39	1.82	2.07	2.32	0.80
8	48	2.05	2.27	2.49	0.79	1.55		49	1.83	2.03	2.24	0.73
9	49	2.20	2.39	2.58	0.67	2.69	p<0.01	53	1.85	2.03	2.22	0.68
10	50	2.39	2.55	2.71	0.57	5.13	p<0.001	54	1.86	2.00	2.14	0.53
11	50	2.44	2.58	2.71	0.49	7.43	p<0.001	55	1.75	1.87	2.00	0.48
12	50	2.48	2.62	2.75	0.47	9.42	p<0.001	55	1.65	1.77	1.89	0.45
13	50	2.44	2.57	2.70	0.49	10.58	p<0.001	55	1.52	1.63	1.75	0.42
14	50	2.33	2.46	2.59	0.47	11.35	p<0.001	55	1.38	1.49	1.59	0.40
15	50	2.20	2.33	2.47	0.49	12.23	p<0.001	55	1.22	1.31	1.41	0.36
16	50	1.98	2.11	2.24	0.48	12.62	p<0.001	55	1.04	1.12	1.20	0.32
17	50	1.68	1.81	1.94	0.46	11.61	p<0.001	55	0.86	0.94	1.02	0.30
18	49	1.36	1.49	1.62	0.47	10.21	p<0.001	55	0.65	0.72	0.80	0.28
19	49	1.02	1.17	1.32	0.54	7.40	p<0.001	55	0.45	0.53	0.62	0.32
20	46	0.60	0.75	0.91	0.54	4.38	p<0.001	55	0.27	0.36	0.45	0.35
21	46	0.27	0.42	0.57	0.51	2.31	p<0.05	54	0.13	0.22	0.31	0.34
22	46	-0.02	0.13	0.27	0.50	0.07		53	0.03	0.12	0.21	0.34
23	41	-0.11	0.01	0.12	0.38	0.19		42	-0.08	-0.00	0.07	0.23
24	35	-0.19	-0.06	0.07	0.39	-0.56		41	-0.10	-0.02	0.06	0.25
25	30	-0.19	-0.04	0.11	0.41	-0.47		35	-0.07	-0.00	0.07	0.20

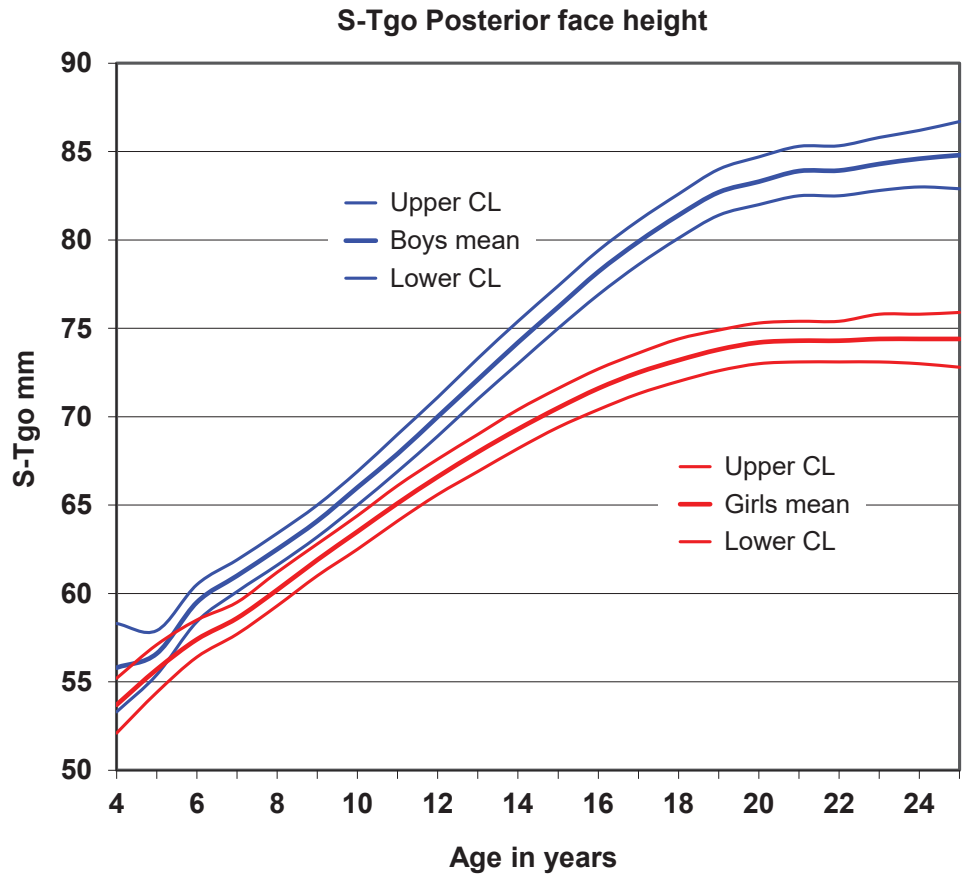

S-Pgn Mandible tip from sella
S-Pgn mm
135
130
125
120
115
110
105
100
95
90
85
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

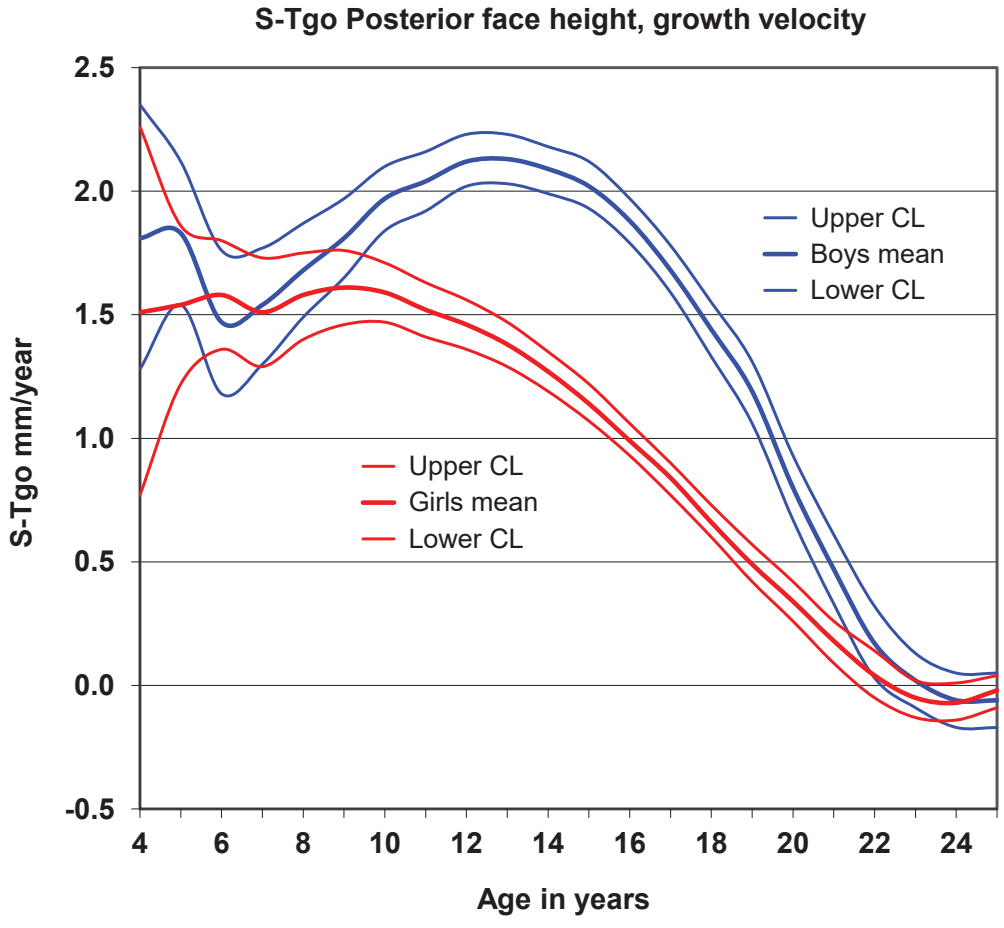

S-Pgn Mandible tip from sella, growth velocity
S-Pgn mm/year
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

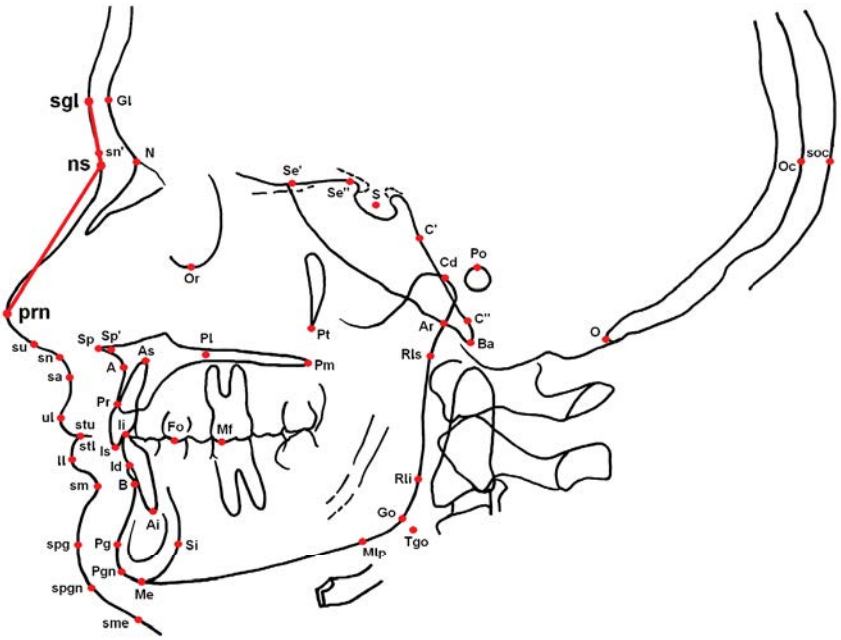


S-Tgo (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	53.3	55.8	58.3	3.33	1.45		7	52.1	53.7	55.2	2.12
5	18	55.4	56.6	57.9	2.73	0.97		19	54.4	55.7	57.1	3.01
6	35	58.4	59.5	60.5	3.19	2.58	p<0.05	27	56.4	57.4	58.5	2.87
7	43	60.1	61.0	61.9	2.98	3.62	p<0.001	39	57.7	58.6	59.5	2.97
8	48	61.6	62.5	63.4	3.17	3.45	p<0.001	49	59.3	60.2	61.2	3.37
9	49	63.2	64.1	65.0	3.30	3.33	p<0.01	53	61.0	61.9	62.8	3.41
10	50	65.0	66.0	66.9	3.59	3.57	p<0.001	54	62.5	63.5	64.4	3.55
11	50	66.9	67.9	69.0	3.76	3.93	p<0.001	55	64.1	65.1	66.1	3.71
12	50	68.9	70.0	71.1	3.94	4.49	p<0.001	55	65.6	66.6	67.6	3.88
13	50	71.0	72.1	73.3	4.09	5.22	p<0.001	55	66.9	68.0	69.0	4.01
14	50	73.0	74.2	75.4	4.25	5.98	p<0.001	55	68.2	69.3	70.4	4.13
15	50	75.0	76.2	77.4	4.37	6.77	p<0.001	55	69.4	70.5	71.6	4.23
16	50	76.9	78.2	79.4	4.45	7.70	p<0.001	55	70.4	71.6	72.7	4.31
17	50	78.6	79.9	81.1	4.51	8.52	p<0.001	55	71.3	72.5	73.6	4.38
18	49	80.1	81.4	82.6	4.59	9.28	p<0.001	55	72.0	73.2	74.4	4.37
19	49	81.4	82.7	84.0	4.69	10.04	p<0.001	55	72.6	73.8	74.9	4.38
20	46	82.0	83.3	84.7	4.78	10.07	p<0.001	55	73.0	74.2	75.3	4.38
21	46	82.5	83.9	85.3	4.85	10.41	p<0.001	54	73.1	74.3	75.4	4.36
22	46	82.5	83.9	85.3	4.87	10.47	p<0.001	53	73.1	74.3	75.4	4.34
23	41	82.8	84.3	85.8	4.87	9.68	p<0.001	42	73.1	74.4	75.8	4.39
24	35	83.0	84.6	86.2	4.95	9.43	p<0.001	41	73.0	74.4	75.8	4.48
25	30	82.9	84.8	86.7	5.31	8.37	p<0.001	35	72.8	74.4	75.9	4.69

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	1.28	1.81	2.35	0.73	0.64		7	0.77	1.51	2.26	1.00
5	18	1.54	1.83	2.12	0.63	1.30		19	1.22	1.54	1.86	0.71
6	35	1.18	1.47	1.76	0.88	-0.60		27	1.36	1.58	1.80	0.58
7	43	1.30	1.54	1.77	0.79	0.18		39	1.29	1.51	1.73	0.72
8	48	1.49	1.68	1.87	0.69	0.78		49	1.40	1.58	1.75	0.63
9	49	1.65	1.81	1.97	0.57	1.81		53	1.46	1.61	1.76	0.54
10	50	1.84	1.97	2.10	0.47	4.21	p<0.001	54	1.47	1.59	1.71	0.45
11	50	1.92	2.04	2.16	0.42	6.33	p<0.001	55	1.41	1.52	1.63	0.42
12	50	2.02	2.12	2.23	0.38	8.92	p<0.001	55	1.36	1.46	1.56	0.38
13	50	2.03	2.13	2.23	0.37	10.90	p<0.001	55	1.29	1.38	1.47	0.34
14	50	1.99	2.09	2.18	0.33	12.99	p<0.001	55	1.19	1.27	1.35	0.31
15	50	1.93	2.02	2.12	0.34	14.40	p<0.001	55	1.07	1.14	1.22	0.28
16	50	1.79	1.88	1.97	0.34	15.27	p<0.001	55	0.93	0.99	1.06	0.25
17	50	1.59	1.68	1.78	0.34	14.71	p<0.001	55	0.77	0.84	0.90	0.24
18	49	1.33	1.44	1.55	0.38	12.57	p<0.001	55	0.60	0.66	0.73	0.24
19	49	1.06	1.19	1.31	0.45	9.60	p<0.001	55	0.42	0.49	0.57	0.27
20	46	0.67	0.80	0.93	0.45	6.03	p<0.001	55	0.26	0.34	0.42	0.31
21	46	0.33	0.47	0.61	0.47	3.69	p<0.001	54	0.09	0.18	0.26	0.32
22	46	0.03	0.17	0.32	0.51	1.51		53	-0.05	0.04	0.14	0.34
23	41	-0.09	0.02	0.13	0.36	1.07		42	-0.13	-0.05	0.02	0.24
24	35	-0.17	-0.06	0.05	0.33	0.06		41	-0.14	-0.07	0.01	0.24
25	30	-0.17	-0.06	0.05	0.31	-0.64		35	-0.09	-0.02	0.04	0.19


S-Tgo Posterior face height
S-Tgo mm
90
85
80
75
70
65
60
55
50
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


S-Tgo Posterior face height, growth velocity
S-Tgo mm/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

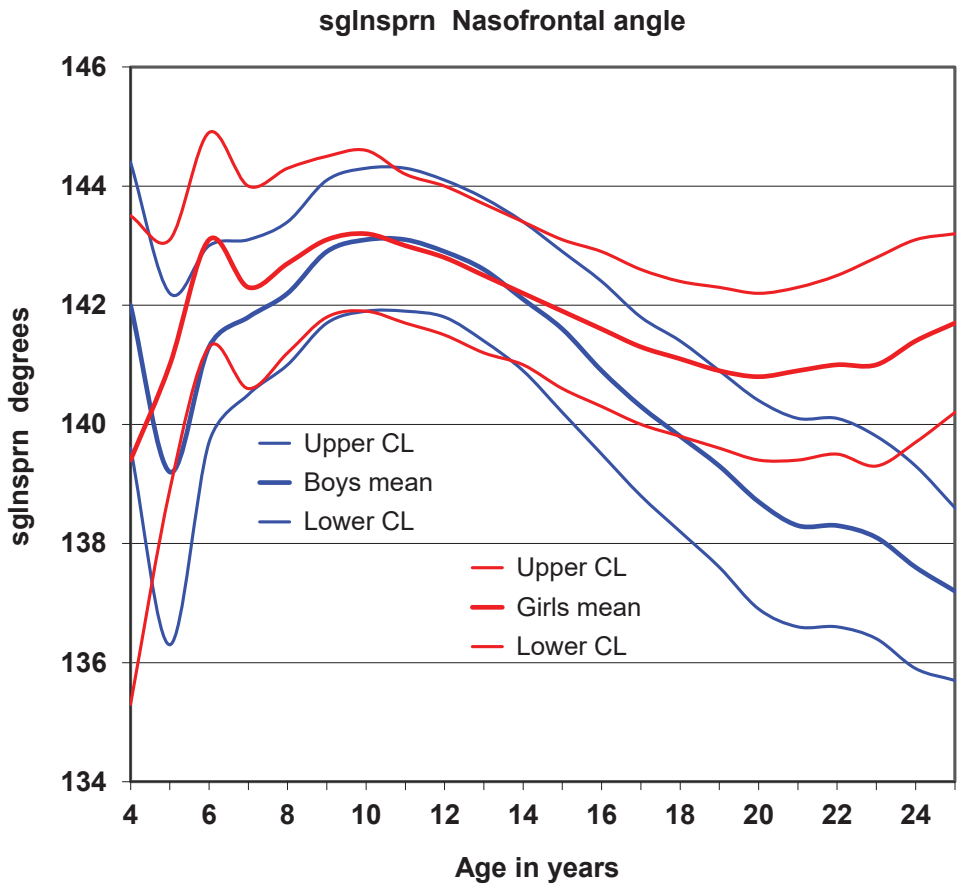


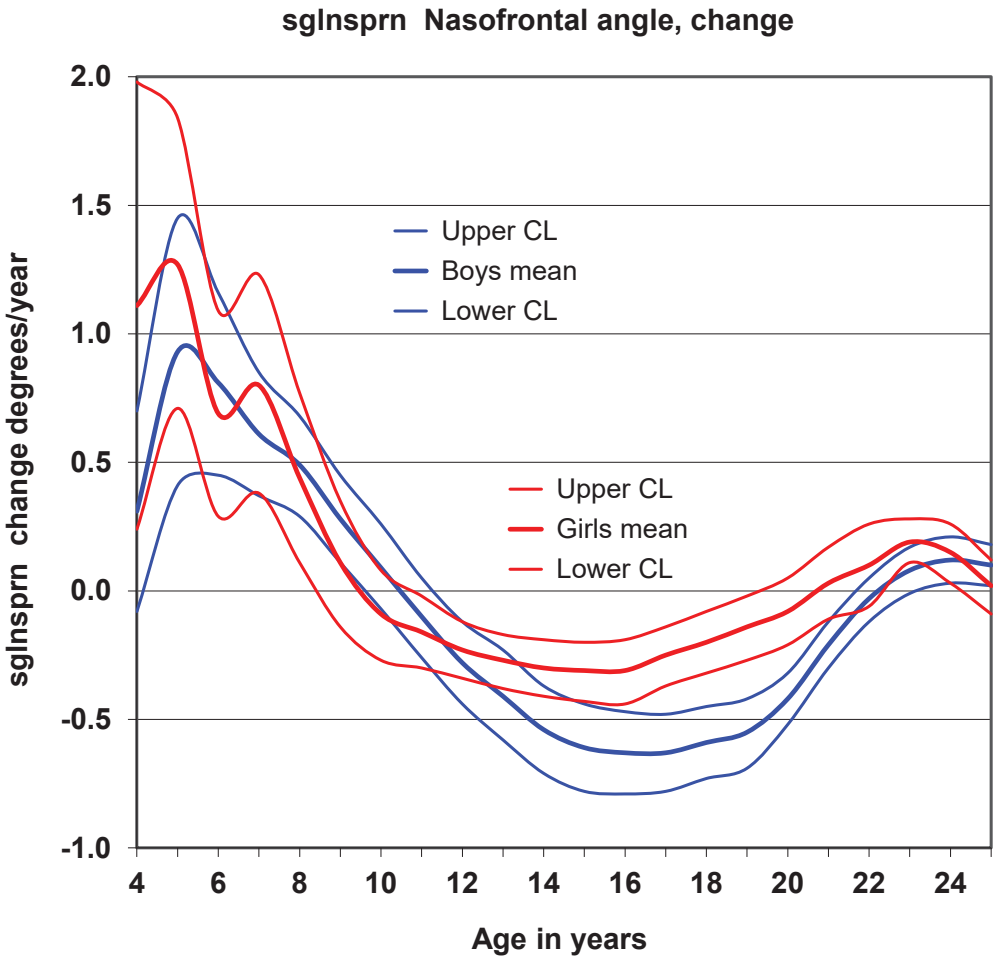
sglnsprn (degrees)

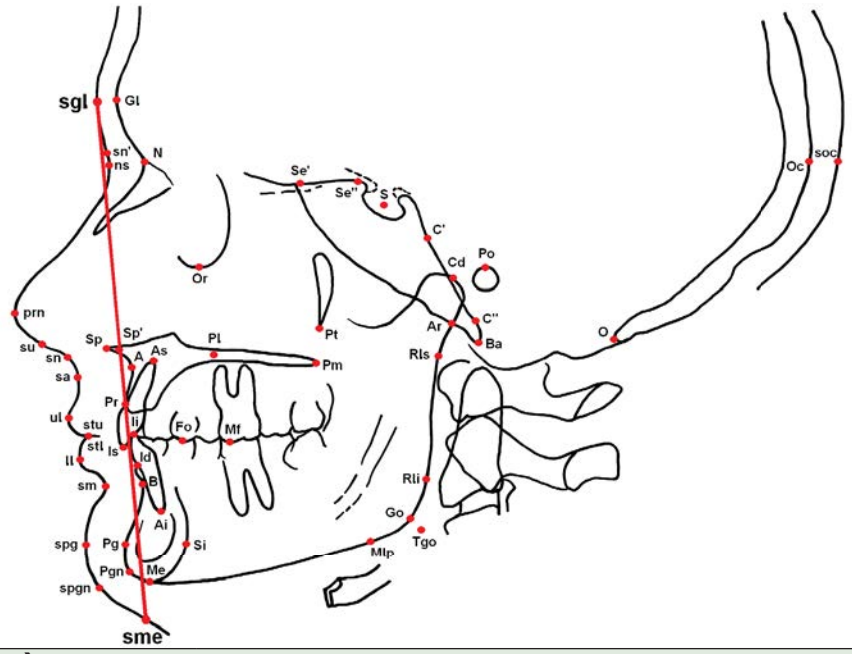
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	139.7	142.1	144.5	3.19	-1.15		6	135.2	139.4	143.6	5.22
5	18	136.3	139.2	142.2	6.37	0.98		18	138.9	141.0	143.1	4.57
6	35	139.7	141.3	143.0	5.08	1.37		26	141.3	143.1	144.9	4.73
7	43	140.5	141.8	143.1	4.44	0.48		39	140.6	142.3	144.0	5.28
8	48	141.0	142.2	143.4	4.24	0.49		49	141.2	142.7	144.3	5.50
9	49	141.7	142.9	144.1	4.38	0.26		53	141.8	143.1	144.5	5.09
10	50	141.9	143.1	144.2	4.29	0.19		54	141.9	143.2	144.6	4.99
11	50	141.9	143.1	144.3	4.19	-0.14		55	141.7	143.0	144.2	4.77
12	50	141.7	142.9	144.1	4.21	-0.18		55	141.5	142.8	144.0	4.70
13	50	141.4	142.6	143.8	4.35	-0.16		55	141.2	142.5	143.7	4.68
14	50	140.9	142.1	143.4	4.57	0.05		55	141.0	142.2	143.4	4.66
15	50	140.2	141.6	142.9	4.82	0.32		55	140.6	141.9	143.1	4.68
16	50	139.5	141.0	142.4	5.11	0.66		55	140.3	141.6	142.9	4.76
17	50	138.9	140.4	141.9	5.39	0.94		55	140.0	141.3	142.6	4.85
18	49	138.3	139.9	141.5	5.69	1.16		55	139.8	141.1	142.4	4.98
19	49	137.6	139.3	141.0	6.01	1.50		55	139.6	140.9	142.3	5.13
20	46	137.0	138.7	140.4	6.02	1.89		55	139.4	140.8	142.2	5.26
21	46	136.6	138.4	140.1	6.05	2.20	p<0.05	54	139.4	140.9	142.3	5.40
22	46	136.6	138.4	140.2	6.15	2.25	p<0.05	53	139.5	141.0	142.5	5.58
23	41	136.5	138.2	139.9	5.53	2.31	p<0.05	42	139.3	141.0	142.8	5.82
24	35	135.9	137.6	139.3	5.13	3.03	p<0.01	41	139.7	141.4	143.1	5.64
25	30	135.7	137.2	138.6	4.02	4.19	p<0.001	35	140.2	141.7	143.2	4.56

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.08	0.31	0.70	0.53	1.71		6	0.22	1.11	2.00	1.11
5	18	0.41	0.93	1.45	1.13	0.88		18	0.71	1.27	1.84	1.22
6	35	0.43	0.79	1.15	1.08	-0.37		26	0.29	0.69	1.09	1.04
7	43	0.36	0.60	0.84	0.81	0.83		39	0.38	0.80	1.23	1.35
8	48	0.28	0.48	0.68	0.70	-0.21		49	0.11	0.44	0.77	1.18
9	49	0.11	0.28	0.45	0.61	-1.11		53	-0.14	0.11	0.35	0.91
10	50	-0.07	0.10	0.26	0.59	-1.52		54	-0.27	-0.09	0.08	0.67
11	50	-0.25	-0.10	0.05	0.55	-0.55		55	-0.30	-0.16	-0.02	0.54
12	50	-0.44	-0.27	-0.11	0.59	0.41		55	-0.34	-0.23	-0.12	0.43
13	50	-0.57	-0.40	-0.23	0.62	1.26		55	-0.38	-0.27	-0.17	0.40
14	50	-0.70	-0.53	-0.36	0.61	2.29	p<0.05	55	-0.41	-0.30	-0.19	0.41
15	50	-0.77	-0.60	-0.43	0.62	2.81	p<0.01	55	-0.43	-0.31	-0.20	0.43
16	50	-0.79	-0.62	-0.46	0.59	3.03	p<0.01	55	-0.44	-0.31	-0.19	0.46
17	50	-0.77	-0.62	-0.47	0.55	3.77	p<0.001	55	-0.37	-0.25	-0.14	0.43
18	49	-0.73	-0.59	-0.44	0.52	3.99	p<0.001	55	-0.32	-0.20	-0.08	0.47
19	49	-0.69	-0.55	-0.41	0.49	4.32	p<0.001	55	-0.27	-0.14	-0.02	0.48
20	46	-0.52	-0.42	-0.31	0.35	3.93	p<0.001	55	-0.21	-0.08	0.05	0.49
21	46	-0.30	-0.21	-0.12	0.31	2.77	p<0.01	54	-0.11	0.03	0.17	0.51
22	46	-0.12	-0.03	0.05	0.28	1.39		53	-0.06	0.10	0.26	0.59
23	41	-0.02	0.07	0.16	0.29	1.90		42	0.11	0.19	0.28	0.29
24	35	0.01	0.11	0.20	0.28	0.51		41	0.03	0.15	0.26	0.38
25	30	-0.02	0.07	0.17	0.26	-0.81		35	-0.09	0.02	0.12	0.31


sglnsprn Nasofrontal angle
sglnsprn degrees
146
144
142
140
138
136
134
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


sglnsprn Nasofrontal angle, change
sglnsprn change degrees/year
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

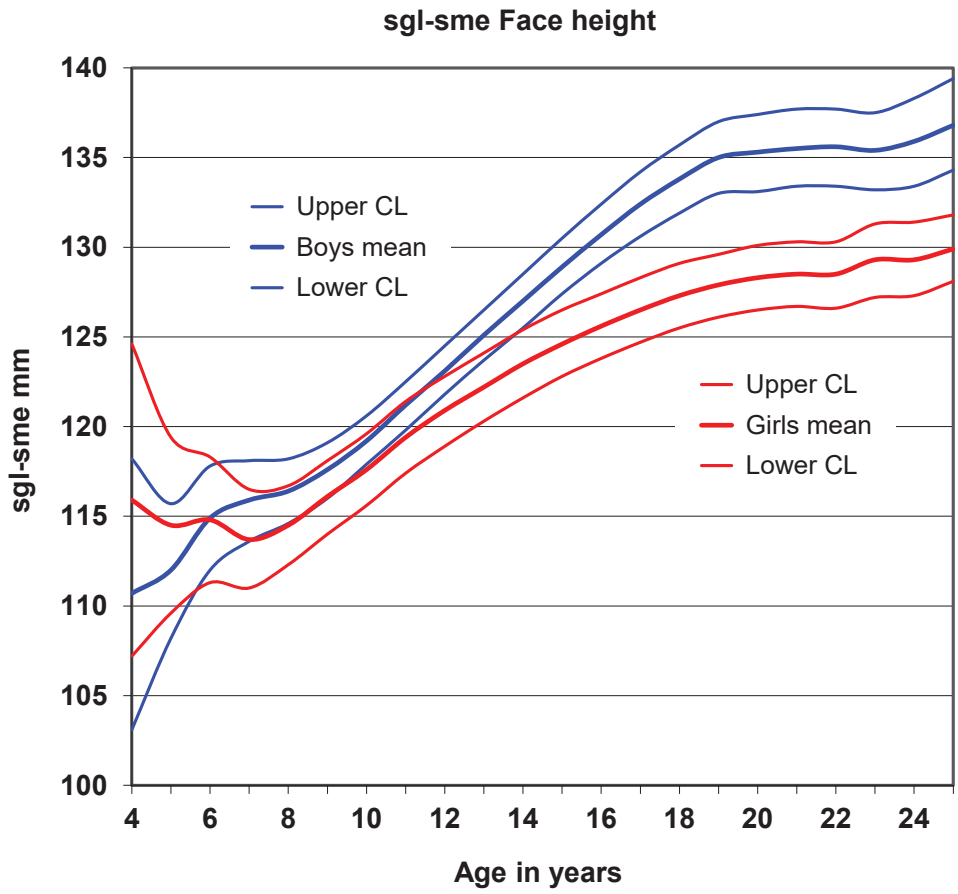


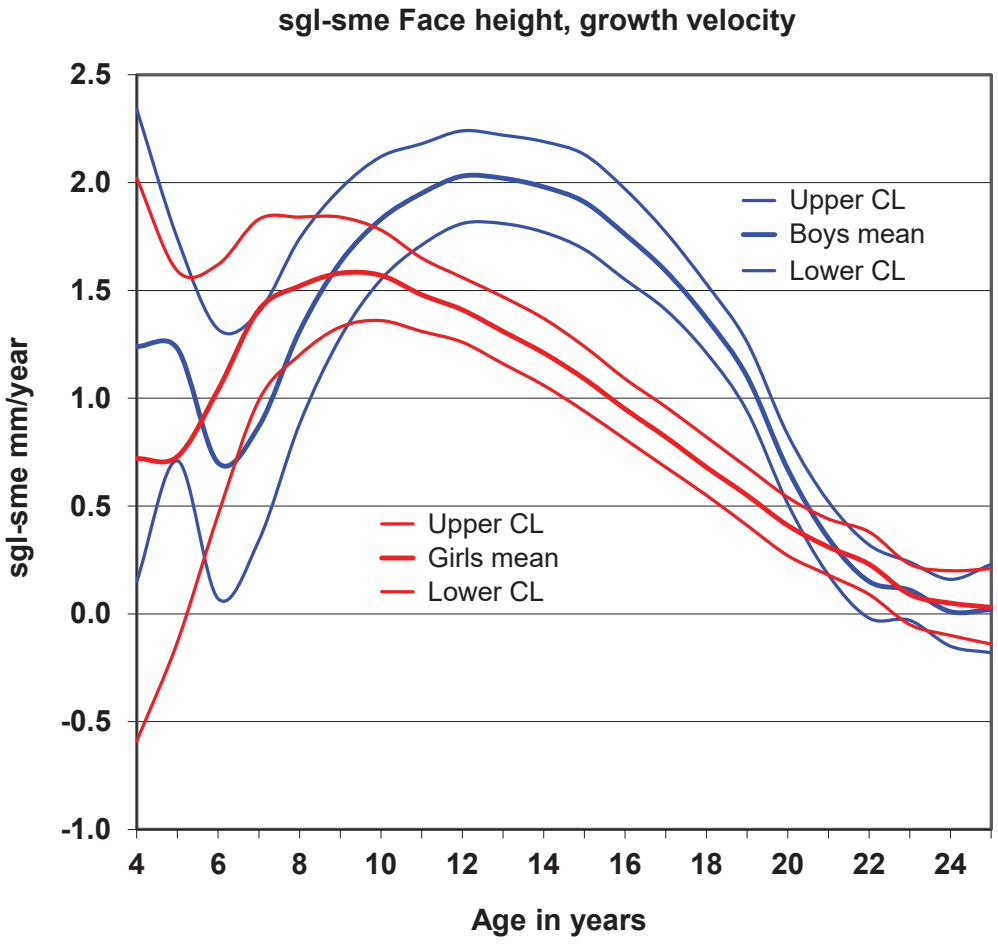
sgl-sme (mm)

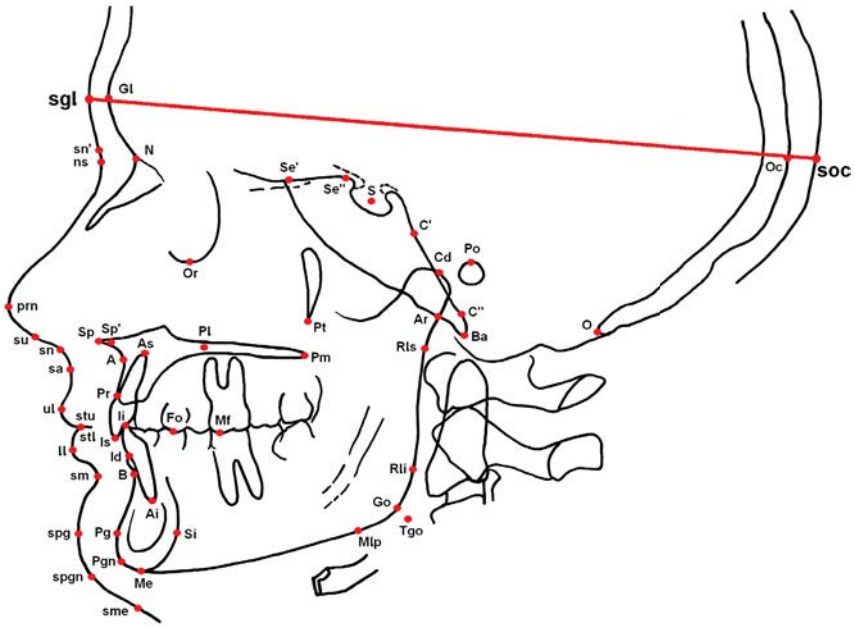
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	103.1	110.7	118.2	10.21	-0.88		7	107.2	115.9	124.6	11.76
5	18	108.2	112.0	115.7	8.06	-0.80		18	109.6	114.5	119.4	10.64
6	33	112.0	114.9	117.8	8.41	0.07		26	111.3	114.8	118.3	9.12
7	41	113.6	115.9	118.1	7.31	1.19		39	111.0	113.7	116.5	8.70
8	46	114.6	116.4	118.2	6.26	1.27		49	112.3	114.5	116.7	7.89
9	48	116.0	117.5	119.1	5.39	1.10		53	114.0	116.1	118.1	7.58
10	50	117.9	119.2	120.6	4.87	1.31		54	115.6	117.6	119.6	7.45
11	50	119.8	121.1	122.5	4.83	1.40		55	117.4	119.4	121.4	7.50
12	50	121.7	123.1	124.5	4.92	1.82		55	118.9	120.9	122.8	7.39
13	50	123.7	125.1	126.5	5.13	2.32	p<0.05	55	120.3	122.2	124.1	7.29
14	50	125.6	127.0	128.5	5.33	2.86	p<0.01	55	121.6	123.5	125.4	7.15
15	50	127.4	129.0	130.5	5.60	3.49	p<0.001	55	122.8	124.6	126.5	7.03
16	50	129.1	130.8	132.4	5.95	4.09	p<0.001	55	123.8	125.6	127.4	6.96
17	49	130.7	132.5	134.3	6.41	4.58	p<0.001	55	124.7	126.5	128.3	6.90
18	48	131.9	133.8	135.8	6.76	4.92	p<0.001	55	125.5	127.3	129.1	6.81
19	48	133.1	135.1	137.1	7.06	5.30	p<0.001	55	126.1	127.9	129.6	6.78
20	44	133.2	135.4	137.5	7.15	5.03	p<0.001	55	126.5	128.3	130.1	6.79
21	44	133.5	135.6	137.7	7.17	5.00	p<0.001	54	126.7	128.5	130.3	6.87
22	44	133.5	135.7	137.8	7.22	5.02	p<0.001	53	126.6	128.5	130.3	6.84
23	39	133.3	135.5	137.6	6.86	4.11	p<0.001	42	127.2	129.3	131.3	6.75
24	33	133.5	136.0	138.4	7.12	4.10	p<0.001	41	127.3	129.3	131.4	6.75
25	28	134.3	136.9	139.4	6.89	4.43	p<0.001	35	128.1	129.9	131.8	5.56

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.15	1.24	2.34	1.48	0.61		7	-0.59	0.72	2.02	1.76
5	18	0.71	1.23	1.74	1.12	0.97		18	-0.13	0.73	1.59	1.87
6	33	0.05	0.67	1.29	1.82	-0.83		26	0.46	1.04	1.62	1.50
7	41	0.33	0.86	1.38	1.72	-1.60		39	0.99	1.41	1.83	1.34
8	46	0.87	1.30	1.72	1.48	-0.82		49	1.20	1.52	1.84	1.14
9	48	1.28	1.62	1.97	1.22	0.18		53	1.33	1.58	1.84	0.95
10	50	1.55	1.84	2.12	1.02	1.52		54	1.36	1.57	1.78	0.79
11	50	1.72	1.95	2.19	0.85	3.23	p<0.01	55	1.31	1.48	1.65	0.64
12	50	1.82	2.04	2.25	0.77	4.76	p<0.001	55	1.26	1.41	1.56	0.58
13	50	1.83	2.03	2.23	0.74	5.55	p<0.001	55	1.16	1.31	1.47	0.58
14	50	1.79	1.99	2.20	0.74	6.07	p<0.001	55	1.06	1.21	1.37	0.58
15	50	1.71	1.92	2.14	0.77	6.34	p<0.001	55	0.94	1.09	1.24	0.57
16	50	1.57	1.77	1.98	0.74	6.59	p<0.001	55	0.81	0.95	1.09	0.52
17	49	1.43	1.61	1.78	0.62	6.96	p<0.001	55	0.68	0.82	0.96	0.53
18	48	1.22	1.38	1.54	0.56	6.53	p<0.001	55	0.55	0.68	0.82	0.51
19	48	0.95	1.11	1.26	0.56	5.40	p<0.001	55	0.41	0.55	0.68	0.50
20	44	0.51	0.67	0.83	0.53	2.51	p<0.05	55	0.27	0.41	0.54	0.51
21	44	0.18	0.35	0.52	0.57	0.37		54	0.18	0.31	0.44	0.48
22	44	-0.03	0.14	0.31	0.58	-0.80		53	0.09	0.23	0.38	0.53
23	39	-0.04	0.09	0.22	0.42	0.02		42	-0.05	0.09	0.23	0.47
24	33	-0.17	-0.02	0.13	0.44	-0.67		41	-0.10	0.05	0.20	0.49
25	28	-0.22	-0.03	0.16	0.51	-0.46		35	-0.14	0.03	0.21	0.53

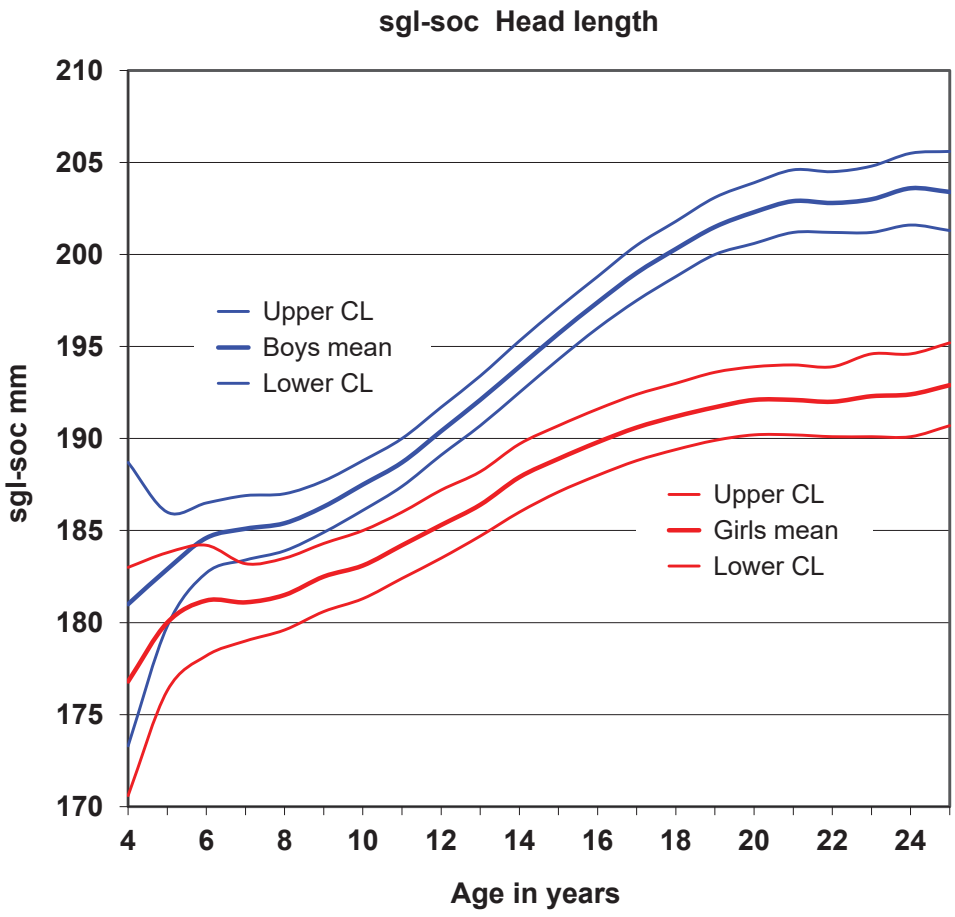

sgl-sme Face height
sgl-sme mm
140
135
130
125
120
115
110
105
100
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

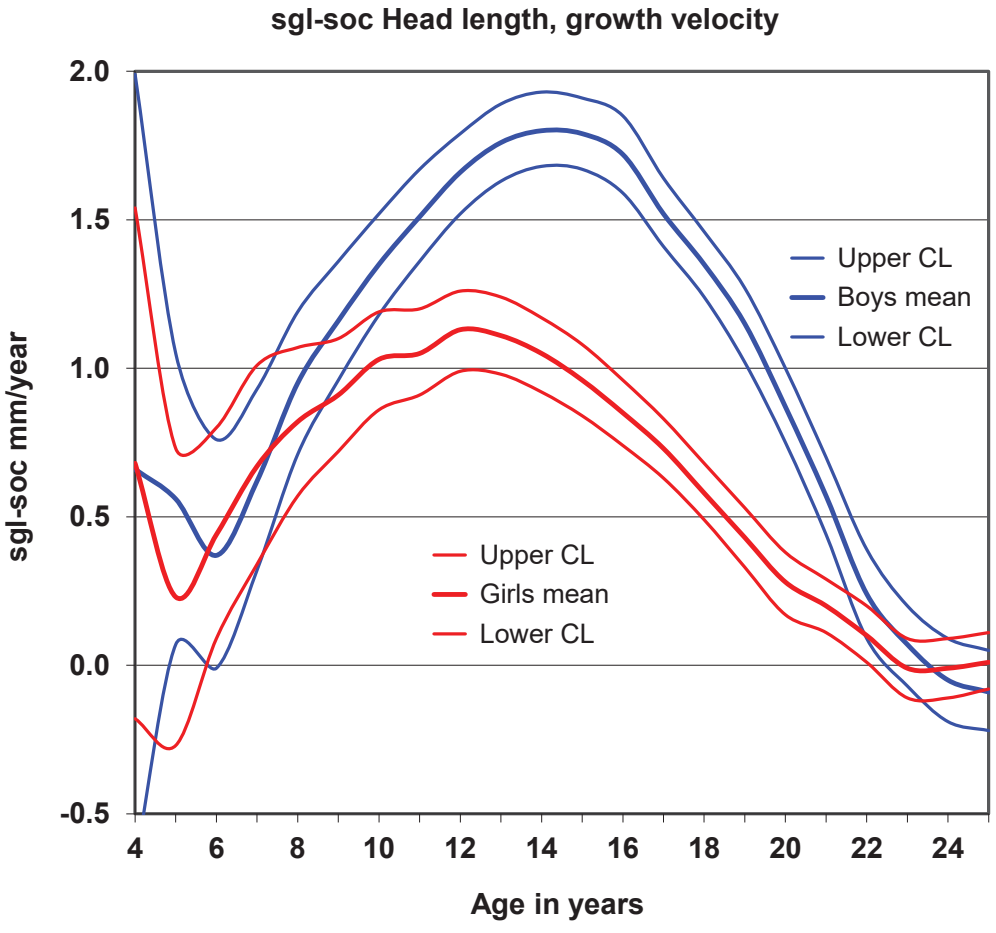

sgl-sme Face height, growth velocity
sgl-sme mm/year
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

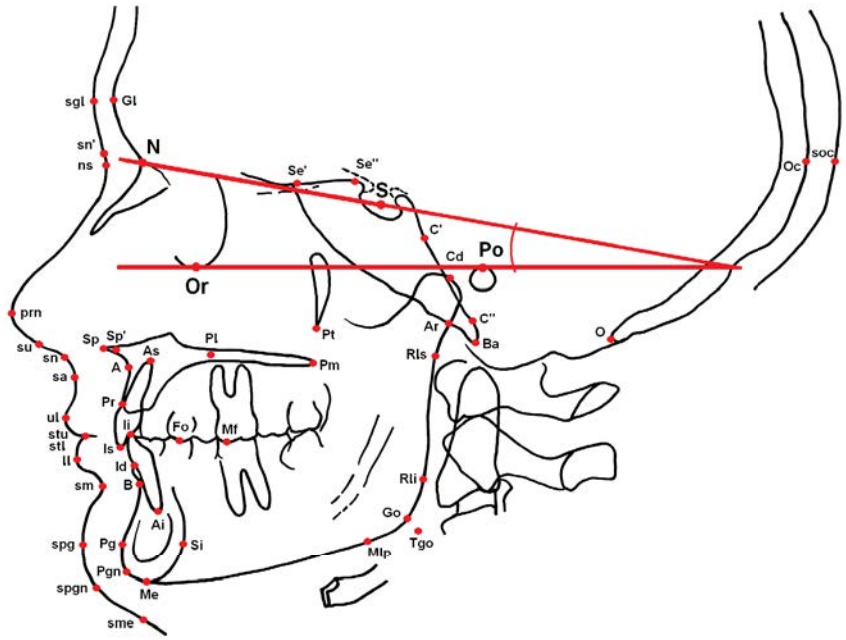


sgl-soc (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	3	173.3	181.0	188.7	6.79	0.80		6	170.6	176.8	183.0	7.74
5	13	179.8	182.9	186.0	5.71	1.14		15	176.3	180.0	183.8	7.39
6	29	182.7	184.6	186.5	5.29	1.98		21	178.2	181.2	184.2	7.00
7	38	183.4	185.1	186.9	5.57	2.88	p<0.01	35	179.0	181.1	183.2	6.44
8	44	183.9	185.4	187.0	5.25	3.06	p<0.01	46	179.6	181.5	183.5	6.76
9	48	184.9	186.3	187.7	4.96	3.17	p<0.01	50	180.6	182.5	184.3	6.72
10	49	186.1	187.5	188.8	4.74	3.74	p<0.001	52	181.3	183.1	185.0	6.71
11	49	187.4	188.7	190.0	4.66	3.91	p<0.001	53	182.4	184.2	186.0	6.73
12	50	189.1	190.4	191.7	4.75	4.38	p<0.001	53	183.5	185.3	187.2	6.69
13	50	190.7	192.1	193.4	4.87	4.91	p<0.001	54	184.7	186.4	188.2	6.63
14	50	192.5	193.9	195.3	4.96	5.11	p<0.001	55	186.0	187.9	189.7	6.88
15	50	194.3	195.7	197.1	5.07	5.71	p<0.001	55	187.1	188.9	190.7	6.87
16	50	196.0	197.4	198.8	5.19	6.40	p<0.001	55	188.0	189.8	191.6	6.85
17	49	197.5	199.0	200.5	5.34	6.94	p<0.001	55	188.8	190.6	192.4	6.84
18	48	198.8	200.3	201.8	5.42	7.36	p<0.001	55	189.4	191.2	193.0	6.86
19	48	200.0	201.6	203.1	5.54	7.87	p<0.001	55	189.9	191.7	193.6	6.92
20	45	200.6	202.3	204.0	5.73	7.84	p<0.001	55	190.2	192.1	193.9	7.01
21	45	201.2	202.9	204.6	5.89	8.13	p<0.001	54	190.2	192.1	194.0	7.06
22	44	201.2	202.8	204.5	5.64	8.21	p<0.001	53	190.1	192.0	193.9	7.05
23	40	201.2	203.0	204.8	5.80	7.14	p<0.001	42	190.1	192.3	194.6	7.54
24	35	201.6	203.6	205.5	5.76	7.33	p<0.001	40	190.1	192.4	194.6	7.25
25	29	201.3	203.4	205.6	6.00	6.52	p<0.001	33	190.7	192.9	195.2	6.60

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	3	-0.67	0.66	1.99	1.18	-0.02		6	-0.18	0.68	1.54	1.08
5	13	0.07	0.56	1.05	0.91	0.93		15	-0.27	0.23	0.73	0.98
6	29	-0.01	0.38	0.76	1.07	-0.24		21	0.09	0.44	0.80	0.83
7	38	0.32	0.62	0.93	0.96	-0.21		35	0.34	0.67	1.01	1.01
8	44	0.71	0.95	1.19	0.81	0.75		46	0.57	0.82	1.07	0.86
9	48	0.96	1.16	1.36	0.72	1.74		50	0.72	0.91	1.10	0.68
10	49	1.18	1.35	1.52	0.61	2.64	p<0.01	52	0.86	1.03	1.19	0.62
11	49	1.36	1.51	1.67	0.57	4.24	p<0.001	53	0.91	1.05	1.20	0.54
12	50	1.52	1.66	1.79	0.50	5.44	p<0.001	53	0.99	1.13	1.26	0.49
13	50	1.63	1.76	1.89	0.47	6.96	p<0.001	54	0.98	1.11	1.24	0.48
14	50	1.68	1.80	1.93	0.44	8.40	p<0.001	55	0.92	1.05	1.17	0.48
15	50	1.67	1.79	1.92	0.45	9.45	p<0.001	55	0.84	0.96	1.08	0.45
16	50	1.59	1.72	1.85	0.47	10.02	p<0.001	55	0.74	0.85	0.96	0.42
17	49	1.41	1.52	1.64	0.41	10.12	p<0.001	55	0.63	0.73	0.83	0.38
18	48	1.24	1.35	1.46	0.40	10.08	p<0.001	55	0.49	0.58	0.68	0.37
19	48	1.02	1.15	1.27	0.45	8.83	p<0.001	55	0.33	0.43	0.53	0.38
20	45	0.75	0.87	1.00	0.43	7.24	p<0.001	55	0.17	0.28	0.38	0.40
21	45	0.44	0.57	0.70	0.45	4.71	p<0.001	54	0.11	0.20	0.29	0.33
22	44	0.09	0.24	0.39	0.51	1.49		53	0.01	0.10	0.20	0.36
23	40	-0.07	0.07	0.20	0.43	0.94		42	-0.11	-0.01	0.09	0.34
24	35	-0.19	-0.05	0.09	0.42	-0.46		40	-0.11	-0.01	0.09	0.32
25	29	-0.22	-0.09	0.04	0.37	-1.28		33	-0.08	0.01	0.11	0.27


sgl-soc Head length
sgl-soc mm
210
205
200
195
190
185
180
175
170
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


sgl-soc Head length, growth velocity
sgl-soc mm/year
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

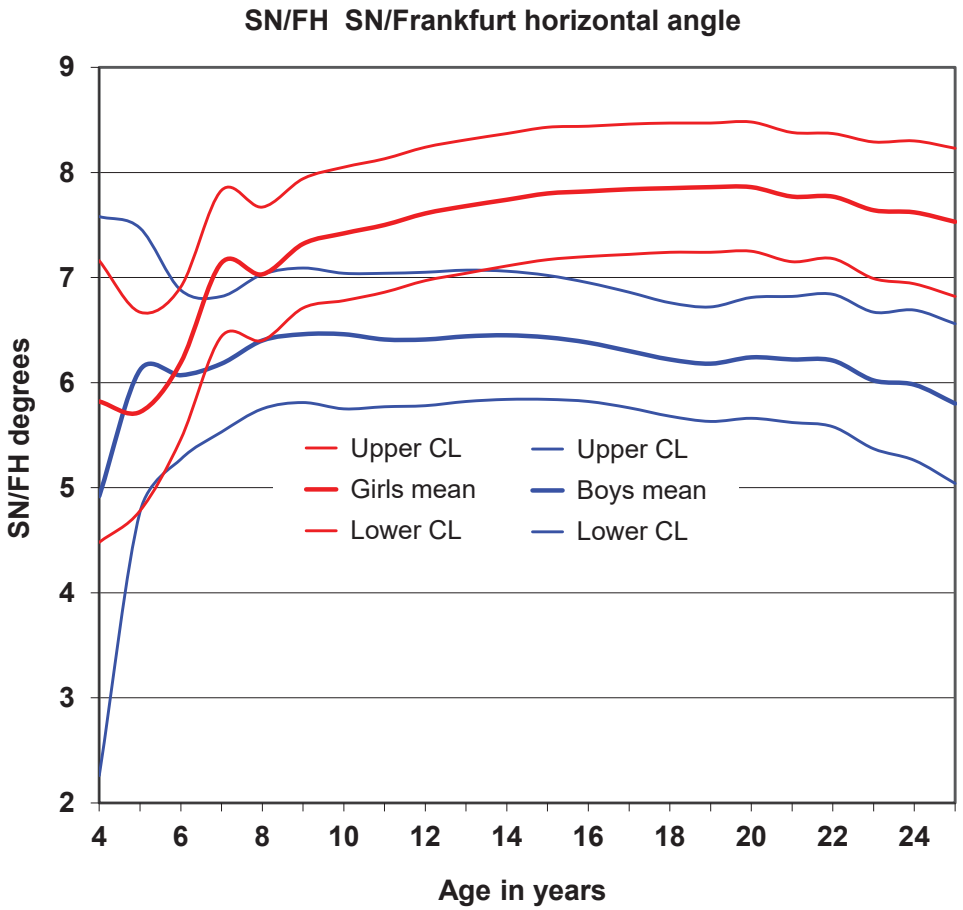


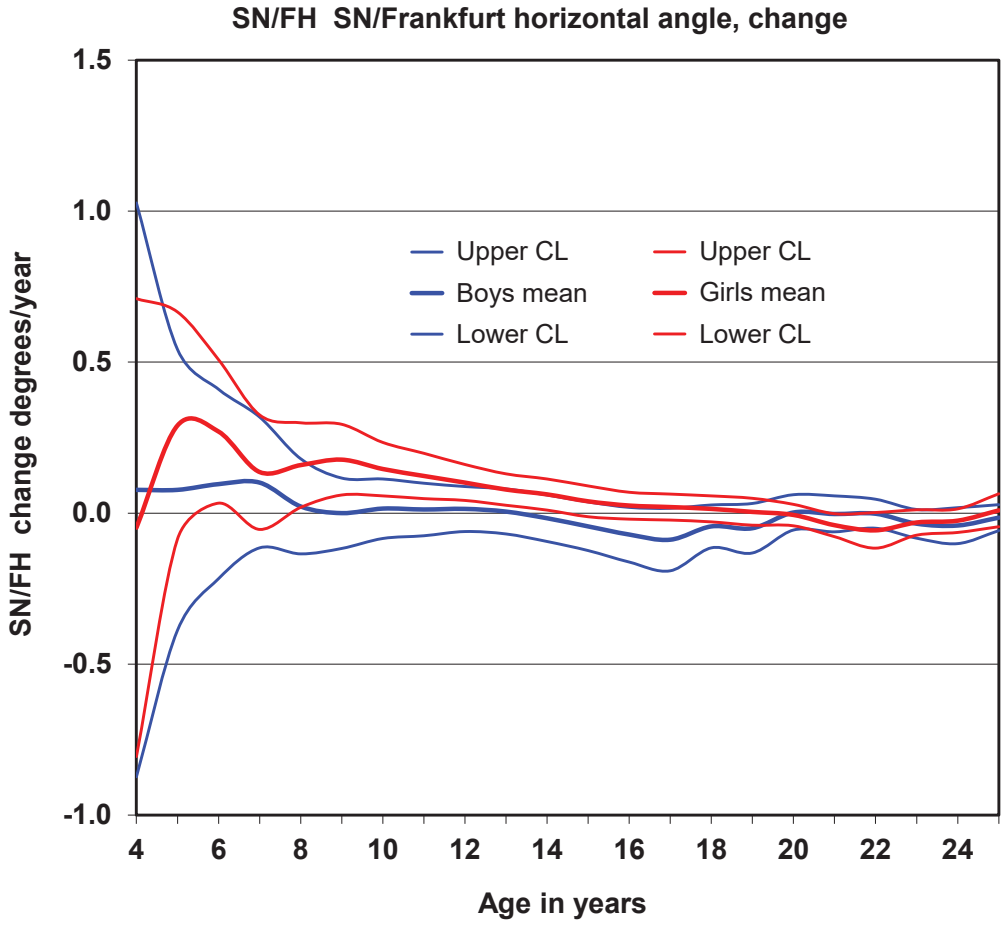
SN/FH (degrees)

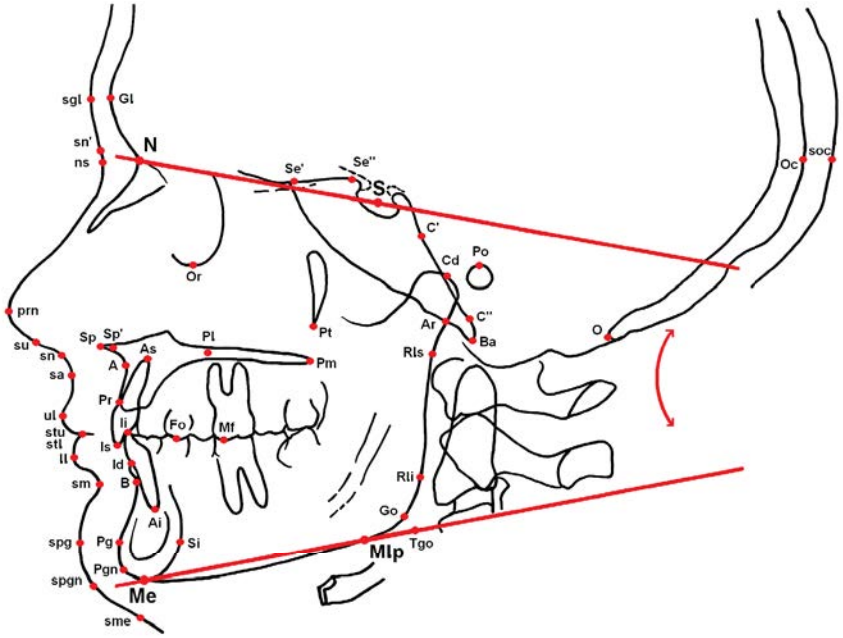
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.26	4.92	7.58	3.59	0.59		7	4.48	5.82	7.16	1.81
5	18	4.77	6.12	7.47	2.92	-0.48		19	4.78	5.72	6.67	2.10
6	35	5.27	6.07	6.87	2.42	0.20		27	5.46	6.19	6.91	1.93
7	43	5.53	6.18	6.82	2.16	1.99		39	6.44	7.14	7.83	2.21
8	48	5.75	6.38	7.00	2.22	1.44		49	6.40	7.03	7.67	2.27
9	49	5.80	6.45	7.09	2.31	1.92		53	6.71	7.32	7.94	2.29
10	50	5.75	6.40	7.04	2.32	2.21	p<0.05	54	6.78	7.42	8.05	2.38
11	50	5.78	6.42	7.06	2.31	2.34	p<0.05	55	6.86	7.50	8.13	2.40
12	50	5.79	6.43	7.08	2.33	2.54	p<0.05	55	6.97	7.61	8.24	2.40
13	50	5.82	6.47	7.11	2.32	2.62	p<0.05	55	7.04	7.68	8.31	2.40
14	50	5.84	6.47	7.10	2.27	2.79	p<0.01	55	7.11	7.74	8.37	2.38
15	50	5.84	6.42	7.00	2.09	3.14	p<0.01	55	7.17	7.80	8.43	2.39
16	50	5.81	6.35	6.89	1.95	3.47	p<0.001	55	7.20	7.82	8.44	2.35
17	50	5.74	6.25	6.75	1.83	3.86	p<0.001	55	7.22	7.84	8.46	2.34
18	49	5.64	6.13	6.62	1.75	4.21	p<0.001	55	7.24	7.85	8.47	2.34
19	49	5.55	6.05	6.55	1.77	4.42	p<0.001	55	7.24	7.86	8.47	2.32
20	46	5.44	6.00	6.56	1.93	4.33	p<0.001	55	7.25	7.86	8.48	2.33
21	46	5.42	6.00	6.57	1.99	4.08	p<0.001	54	7.15	7.77	8.38	2.30
22	46	5.46	6.04	6.62	2.02	4.06	p<0.001	53	7.18	7.77	8.37	2.21
23	41	5.37	6.02	6.67	2.12	3.47	p<0.001	42	6.99	7.64	8.29	2.15
24	35	5.26	5.98	6.69	2.16	3.24	p<0.01	41	6.94	7.62	8.30	2.23
25	30	5.04	5.80	6.56	2.12	3.27	p<0.01	35	6.82	7.53	8.23	2.12

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.87	0.08	1.03	1.28	-0.20		7	-0.81	-0.05	0.71	1.02
5	18	-0.39	0.08	0.54	1.01	0.70		19	-0.09	0.29	0.67	0.84
6	35	-0.22	0.10	0.41	0.94	0.82		27	0.03	0.27	0.51	0.63
7	43	-0.11	0.10	0.32	0.72	0.23		39	-0.05	0.14	0.32	0.60
8	48	-0.13	0.03	0.18	0.56	1.25		49	0.02	0.16	0.30	0.50
9	49	-0.11	0.01	0.13	0.44	1.92		53	0.06	0.18	0.29	0.44
10	50	-0.08	0.03	0.14	0.40	1.62		54	0.06	0.15	0.23	0.33
11	50	-0.07	0.02	0.11	0.34	1.71		55	0.05	0.12	0.20	0.28
12	50	-0.06	0.02	0.10	0.29	1.62		55	0.04	0.10	0.16	0.23
13	50	-0.07	0.01	0.08	0.27	1.53		55	0.03	0.08	0.13	0.20
14	50	-0.10	-0.02	0.05	0.27	1.80		55	0.01	0.06	0.11	0.20
15	50	-0.15	-0.06	0.03	0.31	1.97		55	-0.01	0.04	0.09	0.19
16	50	-0.19	-0.09	0.01	0.36	2.15	p<0.05	55	-0.02	0.02	0.07	0.17
17	50	-0.23	-0.11	0.00	0.43	2.18	p<0.05	55	-0.02	0.02	0.06	0.16
18	49	-0.18	-0.08	0.02	0.36	1.72		55	-0.03	0.01	0.06	0.16
19	49	-0.20	-0.09	0.03	0.41	1.55		55	-0.04	0.00	0.05	0.17
20	46	-0.10	-0.03	0.05	0.27	0.47		55	-0.04	-0.01	0.03	0.13
21	46	-0.06	0.03	0.12	0.30	-1.53		54	-0.08	-0.04	-0.00	0.14
22	46	-0.09	0.08	0.24	0.57	-1.60		53	-0.12	-0.06	0.00	0.22
23	41	-0.09	-0.04	0.01	0.16	0.20		42	-0.07	-0.03	0.01	0.14
24	35	-0.10	-0.04	0.02	0.18	0.45		41	-0.06	-0.03	0.01	0.13
25	30	-0.06	-0.01	0.03	0.12	0.65		35	-0.05	0.01	0.06	0.17

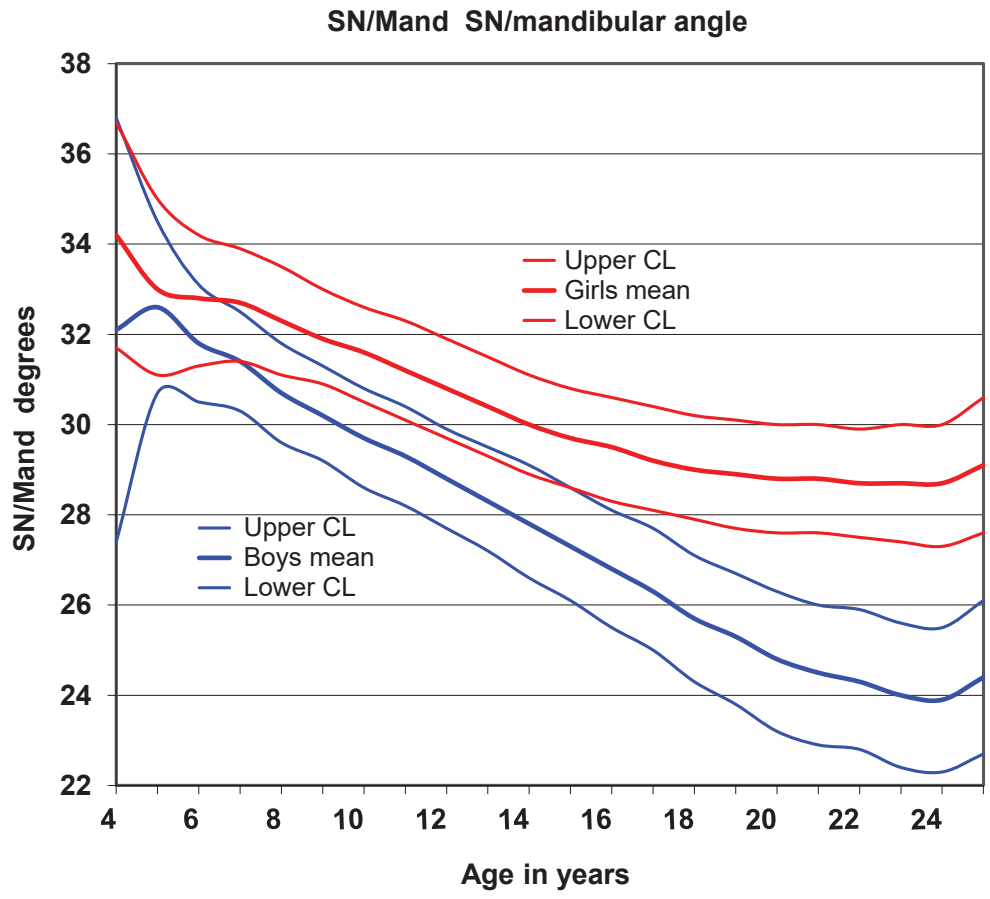

SN/FH SN/Frankfurt horizontal angle
SN/FH degrees
9
8
7
6
5
4
3
2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

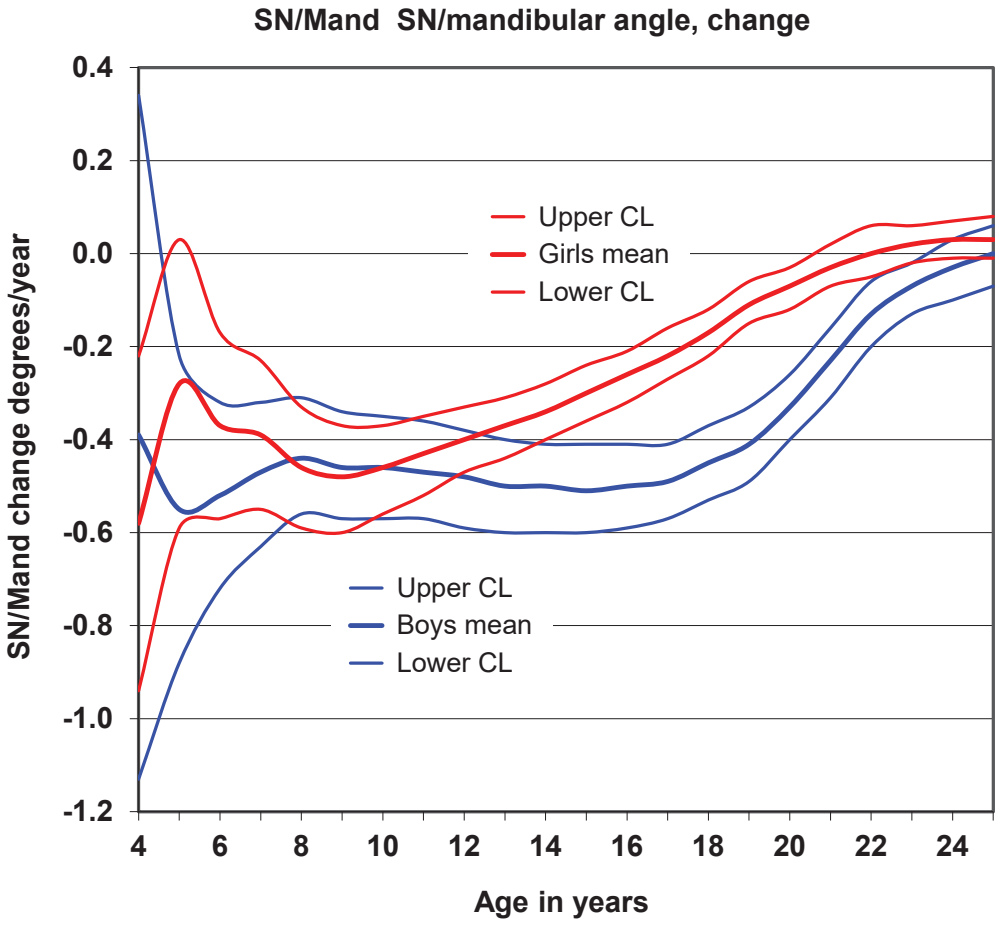

SN/FH SN/Frankfurt horizontal angle, change
SN/FH change degrees/year
1.5
1.0
0.5
0.0
-0.5
-1.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

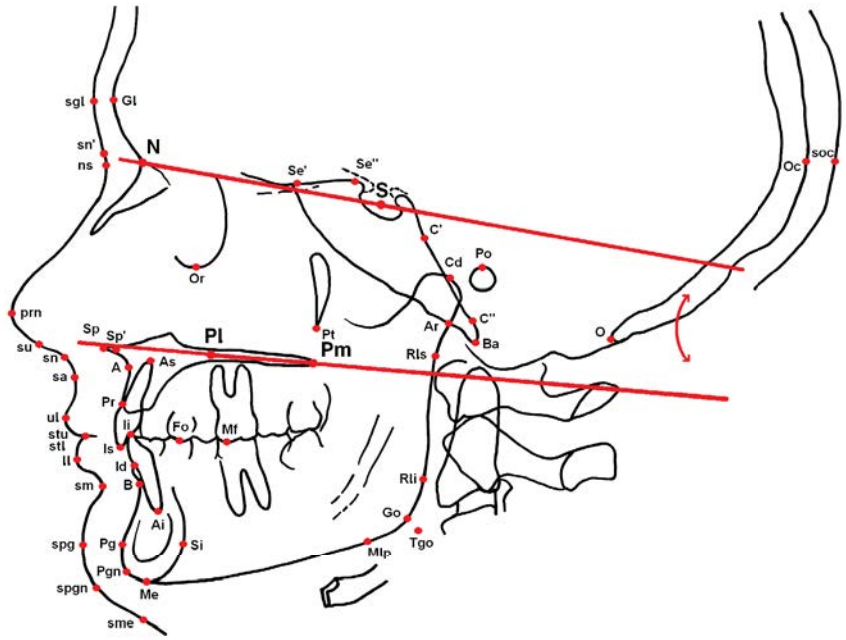


SN/Mand (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	27.4	32.1	36.8	6.37	0.78		7	31.7	34.2	36.7	3.40
5	18	30.7	32.6	34.5	4.09	0.31		19	31.1	33.0	35.0	4.39
6	35	30.5	31.8	33.1	3.90	1.02		27	31.3	32.8	34.2	3.82
7	43	30.3	31.4	32.5	3.60	1.52		39	31.4	32.7	33.9	4.06
8	48	29.6	30.7	31.8	3.75	2.00	p<0.05	49	31.1	32.3	33.5	4.17
9	49	29.2	30.3	31.3	3.75	2.20	p<0.05	53	30.9	31.9	33.0	3.98
10	50	28.6	29.7	30.8	3.84	2.42	p<0.05	54	30.5	31.6	32.6	3.98
11	50	28.2	29.3	30.4	3.97	2.46	p<0.05	55	30.1	31.2	32.3	4.07
12	50	27.7	28.8	29.9	4.12	2.47	p<0.05	55	29.7	30.8	31.9	4.10
13	50	27.2	28.3	29.5	4.26	2.53	p<0.05	55	29.3	30.4	31.5	4.13
14	50	26.6	27.8	29.1	4.43	2.65	p<0.01	55	28.9	30.0	31.1	4.17
15	50	26.0	27.3	28.6	4.62	2.79	p<0.01	55	28.6	29.7	30.8	4.21
16	50	25.5	26.8	28.1	4.77	3.01	p<0.01	55	28.3	29.5	30.6	4.27
17	50	25.0	26.3	27.7	4.91	3.21	p<0.01	55	28.1	29.2	30.4	4.33
18	49	24.3	25.7	27.1	4.98	3.63	p<0.001	55	27.9	29.0	30.2	4.38
19	49	23.8	25.2	26.7	5.11	3.92	p<0.001	55	27.7	28.9	30.1	4.43
20	46	23.2	24.8	26.3	5.32	4.16	p<0.001	55	27.6	28.8	30.0	4.47
21	46	22.9	24.5	26.0	5.35	4.44	p<0.001	54	27.6	28.8	30.0	4.52
22	46	22.8	24.3	25.8	5.32	4.46	p<0.001	53	27.5	28.7	29.9	4.47
23	41	22.4	24.0	25.5	5.16	4.58	p<0.001	42	27.4	28.7	30.0	4.31
24	35	22.3	23.9	25.5	4.78	4.55	p<0.001	41	27.3	28.7	30.0	4.41
25	30	22.7	24.4	26.1	4.81	4.09	p<0.001	35	27.6	29.1	30.6	4.47

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.13	-0.39	0.34	0.99	-0.45		7	-0.94	-0.58	-0.22	0.49
5	18	-0.88	-0.55	-0.22	0.72	1.17		19	-0.59	-0.28	0.03	0.68
6	35	-0.71	-0.51	-0.31	0.60	0.96		27	-0.57	-0.37	-0.17	0.53
7	43	-0.62	-0.47	-0.32	0.52	0.68		39	-0.55	-0.39	-0.23	0.51
8	48	-0.56	-0.44	-0.31	0.43	-0.24		49	-0.59	-0.46	-0.33	0.47
9	49	-0.57	-0.46	-0.34	0.40	-0.31		53	-0.60	-0.48	-0.37	0.43
10	50	-0.57	-0.46	-0.35	0.40	-0.08		54	-0.56	-0.46	-0.37	0.37
11	50	-0.57	-0.47	-0.36	0.38	0.52		55	-0.52	-0.43	-0.35	0.31
12	50	-0.59	-0.49	-0.39	0.37	1.39		55	-0.47	-0.40	-0.33	0.26
13	50	-0.60	-0.50	-0.41	0.35	2.22	p<0.05	55	-0.44	-0.37	-0.31	0.24
14	50	-0.60	-0.51	-0.41	0.34	2.99	p<0.01	55	-0.40	-0.34	-0.28	0.23
15	50	-0.60	-0.51	-0.42	0.33	3.93	p<0.001	55	-0.36	-0.30	-0.24	0.22
16	50	-0.59	-0.51	-0.42	0.31	4.77	p<0.001	55	-0.32	-0.26	-0.21	0.21
17	50	-0.57	-0.49	-0.41	0.28	5.74	p<0.001	55	-0.27	-0.22	-0.16	0.20
18	49	-0.53	-0.45	-0.37	0.28	6.05	p<0.001	55	-0.22	-0.17	-0.12	0.19
19	49	-0.49	-0.41	-0.34	0.28	6.80	p<0.001	55	-0.15	-0.11	-0.06	0.17
20	46	-0.40	-0.33	-0.26	0.24	6.37	p<0.001	55	-0.12	-0.07	-0.03	0.16
21	46	-0.31	-0.23	-0.16	0.25	4.78	p<0.001	54	-0.07	-0.03	0.02	0.17
22	46	-0.20	-0.13	-0.06	0.24	3.03	p<0.01	53	-0.05	0.00	0.06	0.20
23	41	-0.13	-0.07	-0.01	0.19	2.39	p<0.05	42	-0.02	0.02	0.06	0.13
24	35	-0.08	-0.02	0.04	0.19	1.33		41	-0.01	0.03	0.07	0.13
25	30	-0.04	0.01	0.07	0.16	0.62		35	-0.01	0.03	0.08	0.13

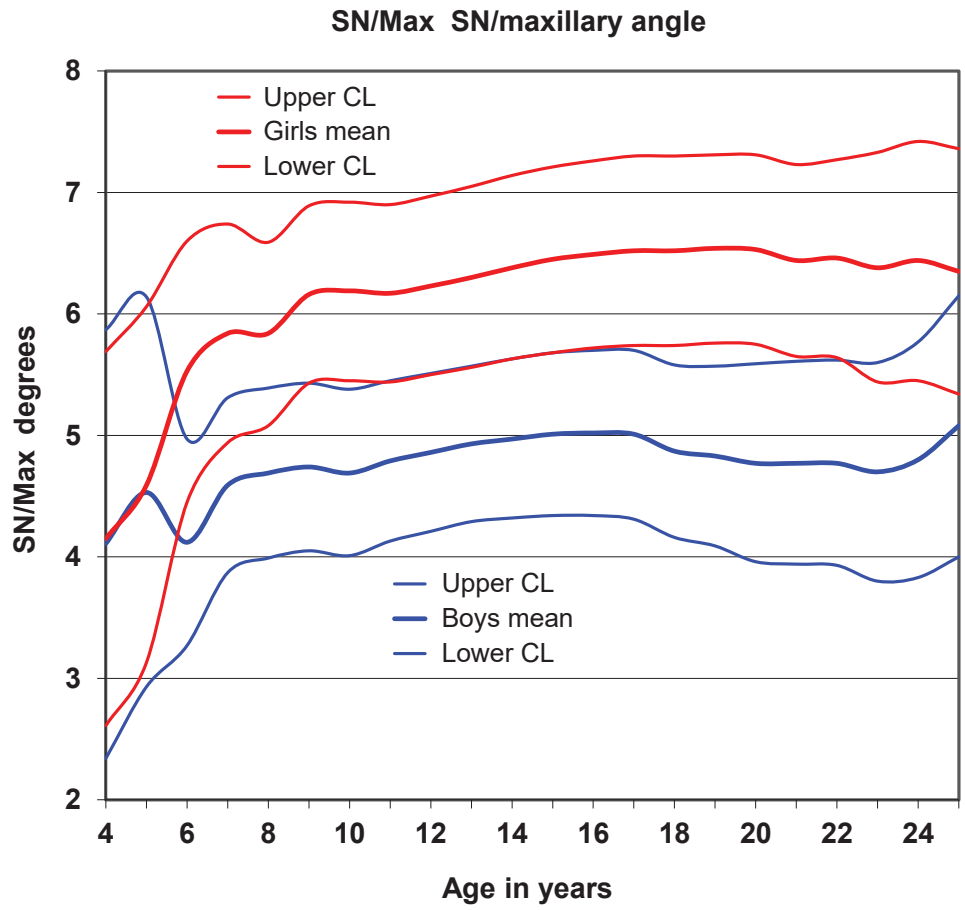

SN/Mand SN/mandibular angle
SN/Mand degrees
38
36
34
32
30
28
26
24
22
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

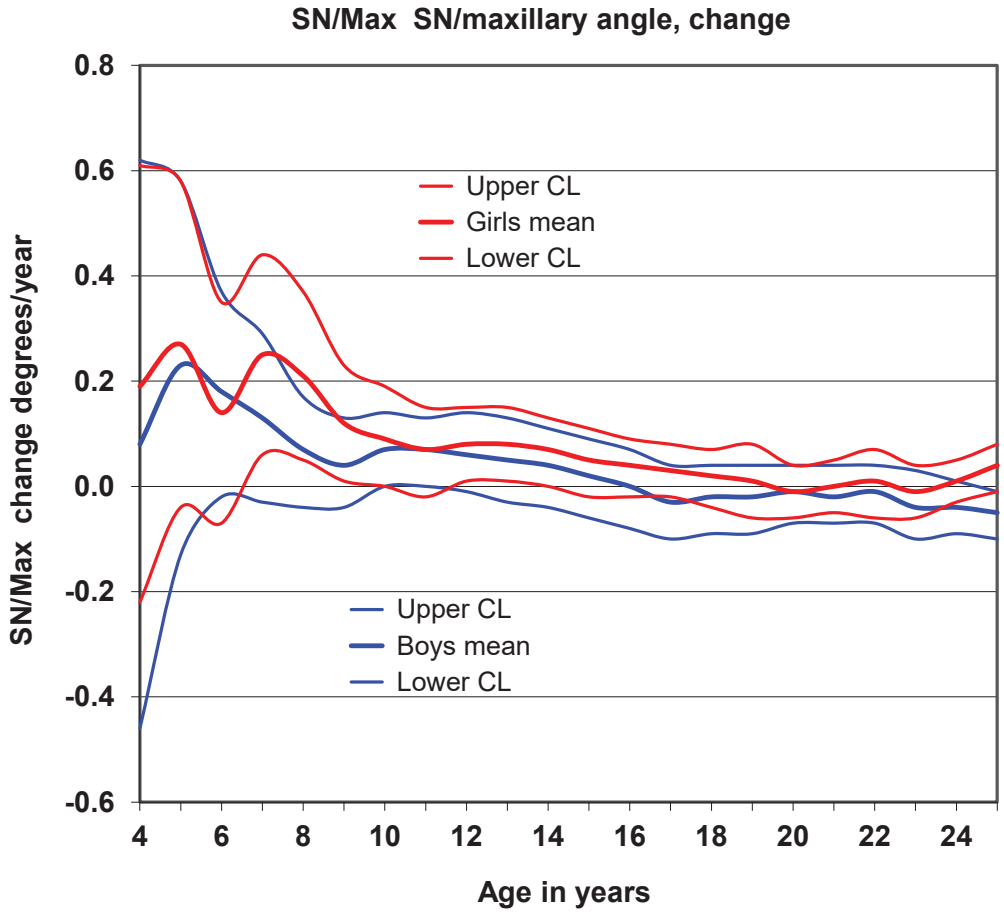

SN/Mand SN/mandibular angle, change
SN/Mand change degrees/year
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

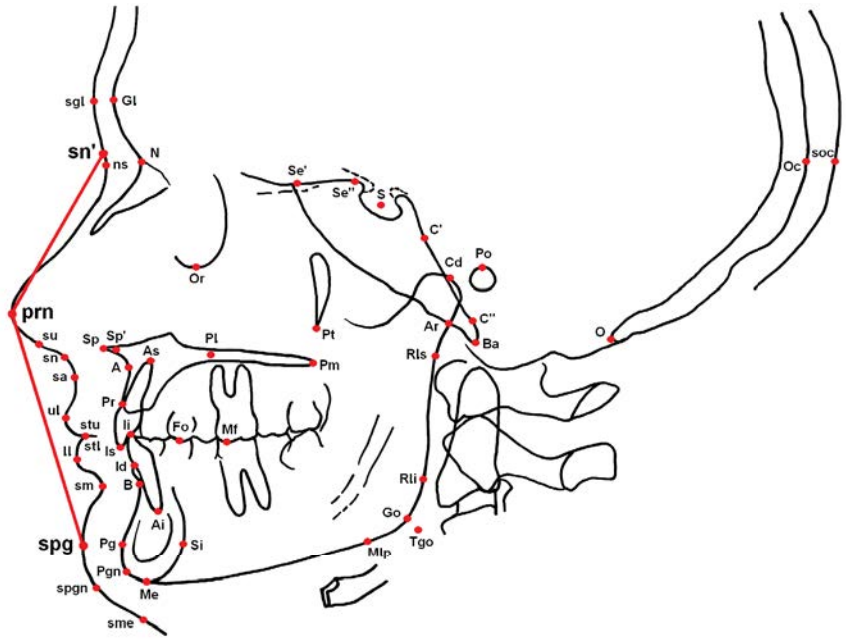


SN/Max (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	2.34	4.11	5.87	2.38	0.04		7	2.61	4.15	5.69	2.08
5	18	2.93	4.53	6.14	3.47	0.06		19	3.13	4.59	6.06	3.25
6	35	3.27	4.12	4.97	2.58	2.04	p<0.05	27	4.45	5.53	6.60	2.84
7	43	3.87	4.59	5.31	2.41	2.15	p<0.05	39	4.94	5.84	6.74	2.87
8	48	3.99	4.69	5.39	2.46	2.19	p<0.05	49	5.08	5.84	6.59	2.69
9	49	4.05	4.74	5.43	2.47	2.77	p<0.01	53	5.43	6.16	6.89	2.70
10	50	4.01	4.69	5.38	2.47	2.91	p<0.01	54	5.45	6.19	6.92	2.76
11	50	4.13	4.79	5.45	2.38	2.73	p<0.01	55	5.44	6.17	6.90	2.77
12	50	4.21	4.86	5.51	2.34	2.73	p<0.01	55	5.50	6.23	6.97	2.78
13	50	4.29	4.93	5.57	2.31	2.71	p<0.01	55	5.56	6.30	7.05	2.81
14	50	4.32	4.98	5.63	2.37	2.73	p<0.01	55	5.63	6.38	7.14	2.86
15	50	4.35	5.01	5.68	2.40	2.75	p<0.01	55	5.68	6.45	7.21	2.89
16	50	4.34	5.02	5.70	2.46	2.76	p<0.01	55	5.72	6.49	7.26	2.93
17	50	4.31	5.01	5.70	2.51	2.81	p<0.01	55	5.74	6.52	7.30	2.95
18	49	4.16	4.87	5.58	2.53	3.05	p<0.01	55	5.74	6.52	7.30	2.95
19	49	4.09	4.83	5.57	2.64	3.10	p<0.01	55	5.76	6.54	7.31	2.93
20	46	3.96	4.78	5.59	2.81	3.03	p<0.01	55	5.75	6.53	7.31	2.95
21	46	3.94	4.78	5.61	2.89	2.83	p<0.01	54	5.65	6.44	7.23	2.96
22	46	3.93	4.77	5.62	2.93	2.81	p<0.01	53	5.64	6.46	7.27	3.01
23	41	3.80	4.70	5.60	2.94	2.52	p<0.05	42	5.44	6.38	7.33	3.14
24	35	3.84	4.81	5.77	2.92	2.30	p<0.05	41	5.45	6.44	7.42	3.22
25	30	4.01	5.08	6.15	3.00	1.69		35	5.34	6.35	7.36	3.05

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.46	0.08	0.62	0.73	0.32		7	-0.22	0.19	0.61	0.56
5	18	-0.13	0.23	0.58	0.77	0.18		19	-0.04	0.27	0.58	0.68
6	35	-0.02	0.18	0.37	0.59	-0.26		27	-0.07	0.14	0.35	0.56
7	43	-0.03	0.13	0.29	0.54	0.94		39	0.06	0.25	0.44	0.61
8	48	-0.04	0.07	0.17	0.38	1.48		49	0.05	0.21	0.37	0.56
9	49	-0.04	0.04	0.13	0.31	1.02		53	0.01	0.12	0.23	0.41
10	50	-0.00	0.07	0.14	0.25	0.41		54	-0.00	0.09	0.19	0.36
11	50	0.00	0.07	0.13	0.24	0.02		55	-0.02	0.07	0.15	0.32
12	50	-0.01	0.07	0.14	0.25	0.26		55	0.01	0.08	0.15	0.28
13	50	-0.03	0.05	0.13	0.27	0.56		55	0.01	0.08	0.15	0.26
14	50	-0.04	0.04	0.11	0.28	0.56		55	-0.00	0.07	0.13	0.26
15	50	-0.06	0.02	0.09	0.28	0.59		55	-0.02	0.05	0.11	0.25
16	50	-0.08	-0.00	0.07	0.27	0.81		55	-0.02	0.04	0.09	0.20
17	50	-0.10	-0.03	0.04	0.25	1.28		55	-0.02	0.03	0.08	0.20
18	49	-0.09	-0.02	0.04	0.23	0.93		55	-0.04	0.02	0.07	0.20
19	49	-0.09	-0.02	0.04	0.24	0.71		55	-0.06	0.01	0.08	0.25
20	46	-0.07	-0.01	0.04	0.19	0.06		55	-0.06	-0.01	0.04	0.20
21	46	-0.07	-0.02	0.04	0.18	0.45		54	-0.05	-0.00	0.05	0.17
22	46	-0.07	-0.01	0.04	0.20	0.40		53	-0.06	0.01	0.07	0.25
23	41	-0.10	-0.04	0.02	0.20	0.60		42	-0.06	-0.01	0.04	0.17
24	35	-0.09	-0.04	0.01	0.15	1.58		41	-0.03	0.01	0.05	0.13
25	30	-0.10	-0.05	-0.01	0.12	2.84	p<0.01	35	-0.01	0.04	0.08	0.14

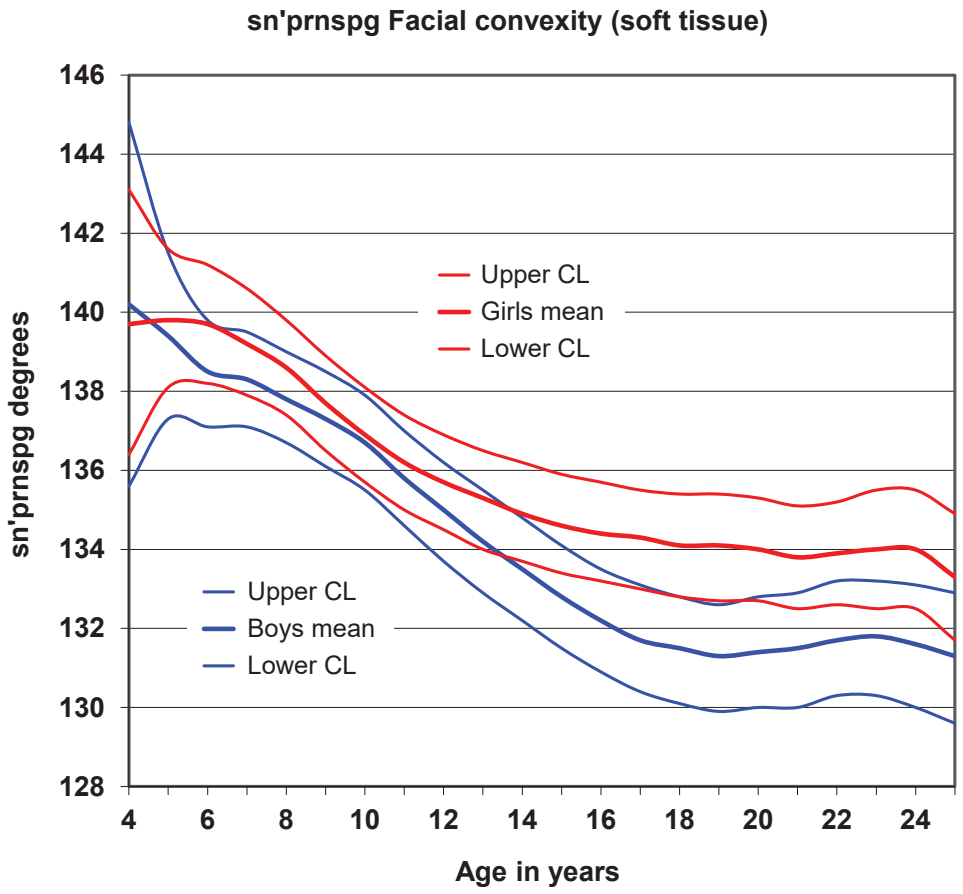

SN/Max SN/maxillary angle
SN/Max degrees
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
8
7
6
5
4
3
2
4
6
8
10
12
14
16
18
20
22
24

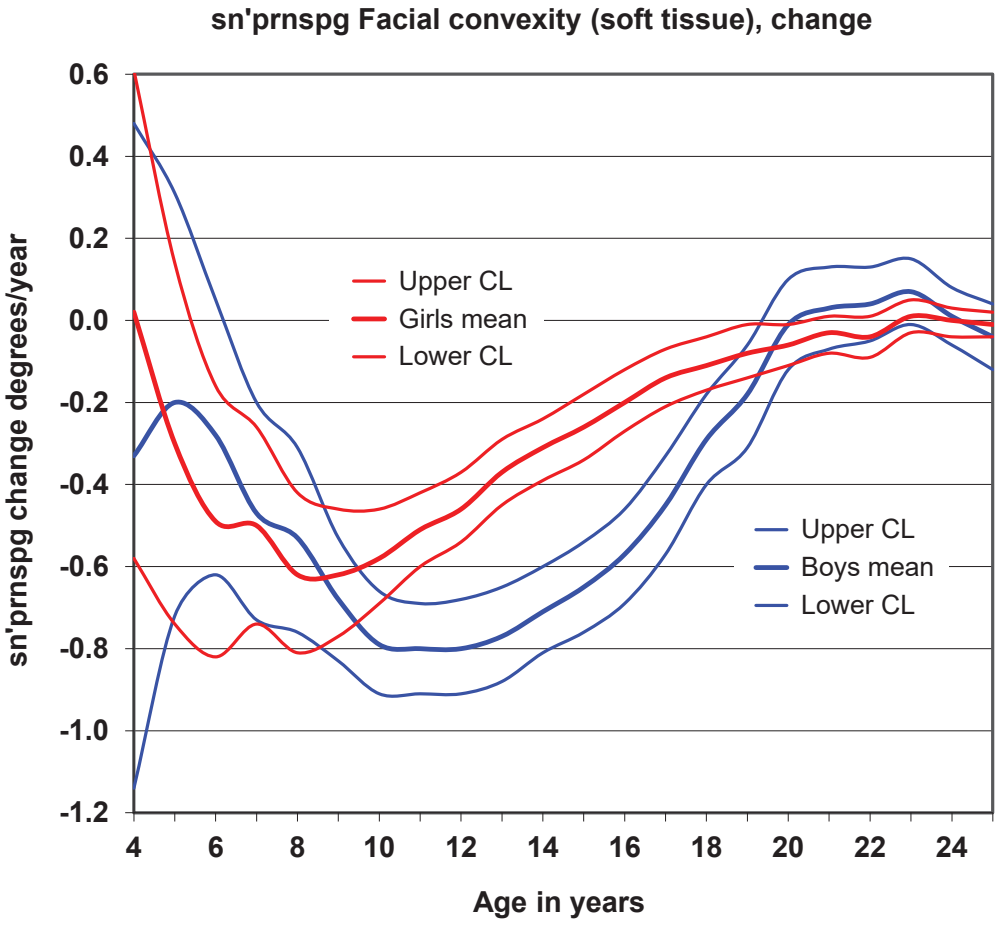

SN/Max SN/maxillary angle, change
SN/Max change degrees/year
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24

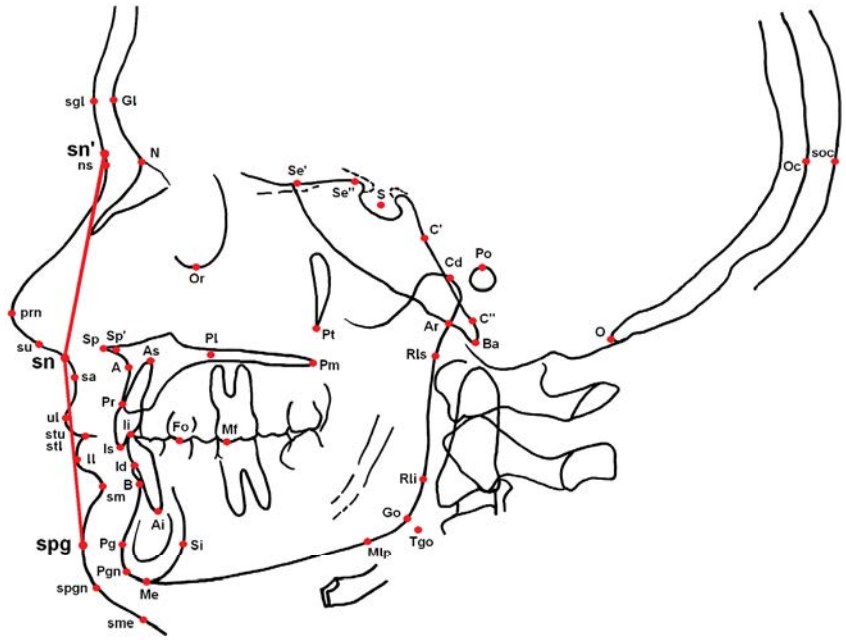


sn'prnspg (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	135.6	140.2	144.8	6.26	-0.15		6	136.4	139.7	143.1	4.15
5	18	137.3	139.4	141.5	4.55	0.33		18	138.1	139.8	141.6	3.81
6	35	137.1	138.5	139.8	4.06	1.21		26	138.2	139.7	141.2	3.89
7	43	137.1	138.3	139.5	4.07	1.01		39	137.9	139.2	140.6	4.29
8	48	136.7	137.8	139.0	4.05	0.96		49	137.4	138.6	139.8	4.28
9	49	136.1	137.3	138.5	4.18	0.46		53	136.5	137.7	138.9	4.38
10	50	135.5	136.7	137.9	4.34	0.26		54	135.7	136.9	138.1	4.51
11	50	134.6	135.8	137.0	4.40	0.44		55	135.0	136.2	137.4	4.66
12	50	133.7	135.0	136.2	4.54	0.82		55	134.5	135.7	136.9	4.66
13	50	132.9	134.2	135.5	4.66	1.20		55	134.0	135.3	136.5	4.69
14	50	132.2	133.5	134.8	4.69	1.61		55	133.7	134.9	136.2	4.73
15	50	131.5	132.8	134.1	4.72	1.98		55	133.4	134.6	135.9	4.77
16	50	130.9	132.2	133.5	4.75	2.36	p<0.05	55	133.2	134.4	135.7	4.80
17	50	130.4	131.7	133.1	4.77	2.69	p<0.01	55	133.0	134.3	135.5	4.84
18	49	130.1	131.5	132.8	4.85	2.78	p<0.01	55	132.8	134.1	135.4	4.90
19	49	129.9	131.2	132.6	4.88	2.89	p<0.01	55	132.7	134.1	135.4	4.98
20	46	129.9	131.4	132.8	4.97	2.62	p<0.05	55	132.7	134.0	135.3	5.02
21	46	130.0	131.5	132.9	5.03	2.37	p<0.05	54	132.5	133.8	135.1	4.91
22	46	130.2	131.7	133.2	5.09	2.18	p<0.05	53	132.6	133.9	135.2	4.92
23	41	130.3	131.8	133.2	4.82	2.12	p<0.05	42	132.5	134.0	135.5	4.88
24	35	130.0	131.6	133.1	4.66	2.15	p<0.05	41	132.5	134.0	135.5	4.97
25	30	129.6	131.3	132.9	4.64	1.72		35	131.7	133.3	134.9	4.91

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.14	-0.33	0.48	1.10	0.66		6	-0.58	0.02	0.61	0.74
5	18	-0.72	-0.20	0.31	1.11	-0.28		18	-0.74	-0.30	0.14	0.96
6	35	-0.62	-0.28	0.06	1.02	-0.85		26	-0.82	-0.49	-0.16	0.86
7	43	-0.73	-0.46	-0.20	0.89	-0.17		39	-0.74	-0.50	-0.26	0.76
8	48	-0.75	-0.53	-0.31	0.78	-0.56		49	-0.81	-0.62	-0.42	0.70
9	49	-0.83	-0.68	-0.53	0.54	0.59		53	-0.77	-0.62	-0.46	0.58
10	50	-0.91	-0.79	-0.66	0.45	2.45	p<0.05	54	-0.69	-0.58	-0.46	0.43
11	50	-0.91	-0.80	-0.69	0.40	3.95	p<0.001	55	-0.60	-0.51	-0.42	0.34
12	50	-0.91	-0.80	-0.69	0.41	4.94	p<0.001	55	-0.54	-0.46	-0.37	0.30
13	50	-0.88	-0.77	-0.65	0.41	5.74	p<0.001	55	-0.45	-0.37	-0.29	0.30
14	50	-0.81	-0.71	-0.60	0.38	5.97	p<0.001	55	-0.39	-0.31	-0.24	0.29
15	50	-0.77	-0.66	-0.55	0.40	5.80	p<0.001	55	-0.34	-0.26	-0.18	0.30
16	50	-0.69	-0.58	-0.46	0.42	5.41	p<0.001	55	-0.27	-0.20	-0.12	0.29
17	50	-0.57	-0.45	-0.33	0.44	4.48	p<0.001	55	-0.21	-0.14	-0.07	0.26
18	49	-0.40	-0.29	-0.18	0.40	2.86	p<0.01	55	-0.17	-0.11	-0.04	0.24
19	49	-0.31	-0.19	-0.06	0.44	1.61		55	-0.14	-0.08	-0.01	0.23
20	46	-0.12	-0.01	0.10	0.39	-0.77		55	-0.11	-0.06	-0.01	0.20
21	46	-0.07	0.03	0.13	0.35	-1.21		54	-0.08	-0.03	0.01	0.17
22	46	-0.05	0.04	0.13	0.31	-1.48		53	-0.09	-0.04	0.01	0.20
23	41	-0.01	0.07	0.15	0.25	-1.36		42	-0.03	0.01	0.05	0.14
24	35	-0.06	0.02	0.09	0.22	-0.43		41	-0.04	-0.00	0.03	0.11
25	30	-0.11	-0.03	0.05	0.22	0.54		35	-0.04	-0.01	0.02	0.10


sn'prnspg Facial convexity (soft tissue)
sn'prnspg degrees
146
144
142
140
138
136
134
132
130
128
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


sn'prnspg Facial convexity (soft tissue), change
sn'prnspg change degrees/year
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

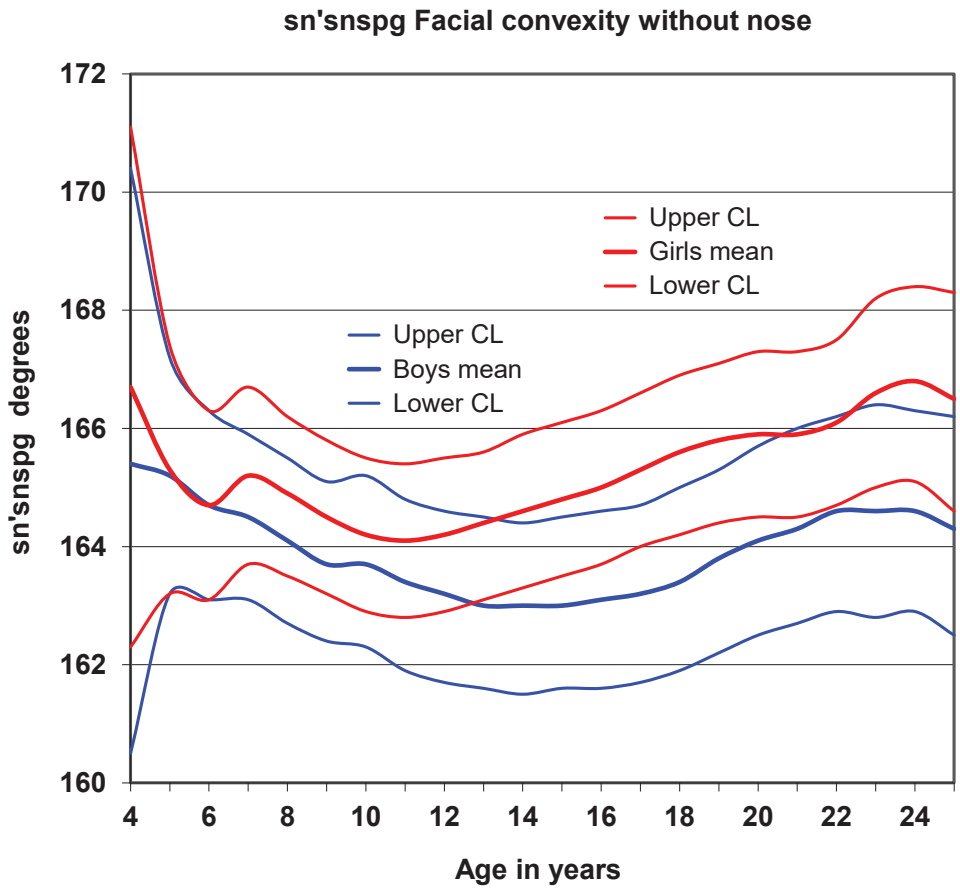


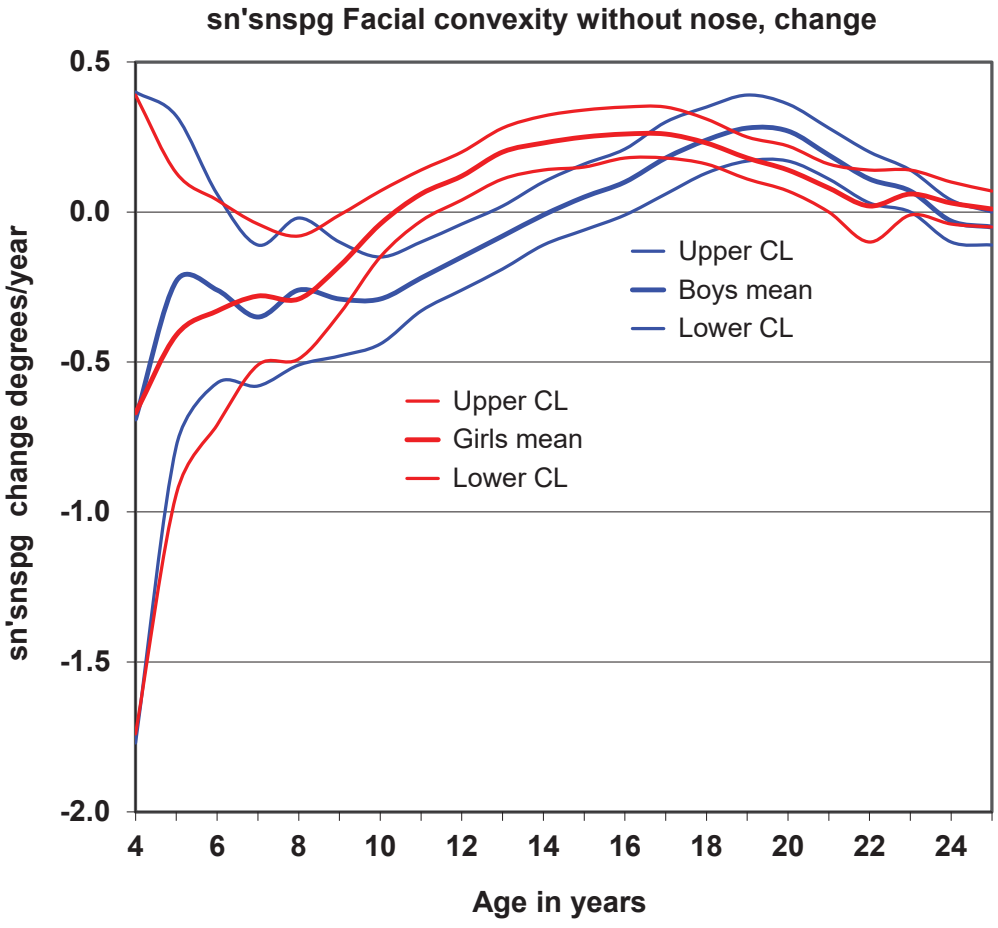
sn'snspg (degrees)

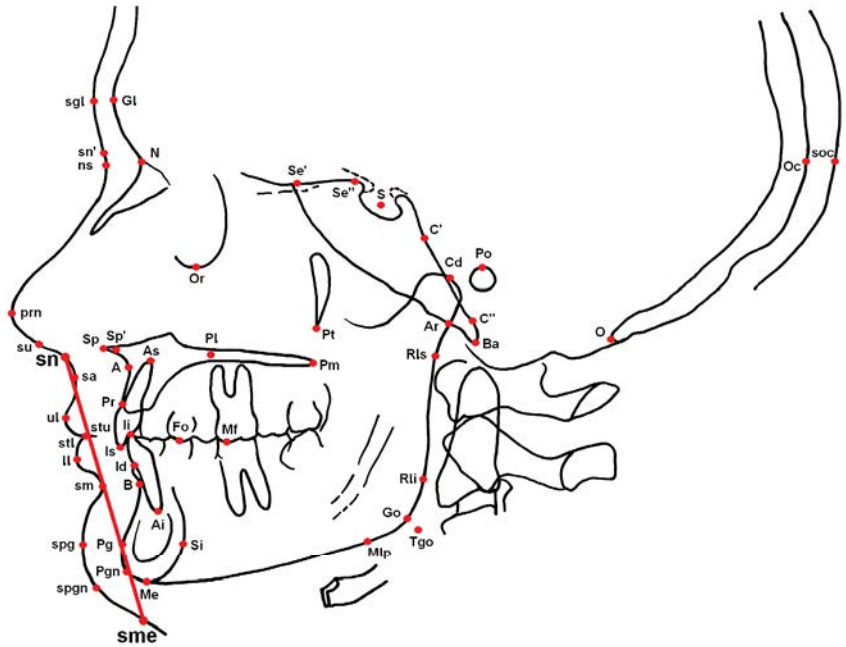
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	160.5	165.4	170.4	6.63	0.38		7	162.3	166.7	171.1	5.92
5	18	163.2	165.2	167.2	4.32	0.10		19	163.2	165.3	167.4	4.61
6	35	163.1	164.7	166.3	4.85	0.03		27	163.1	164.7	166.3	4.23
7	43	163.1	164.5	165.9	4.65	0.64		39	163.7	165.2	166.7	4.85
8	48	162.7	164.1	165.5	4.87	0.77		49	163.5	164.9	166.2	4.83
9	49	162.4	163.7	165.1	4.81	0.83		53	163.2	164.5	165.8	4.80
10	50	162.3	163.7	165.2	5.26	0.44		54	162.9	164.2	165.5	4.90
11	50	161.9	163.4	164.8	5.17	0.74		55	162.8	164.1	165.4	4.92
12	50	161.7	163.2	164.6	5.21	1.07		55	162.9	164.2	165.5	4.87
13	50	161.6	163.0	164.5	5.27	1.33		55	163.1	164.4	165.6	4.86
14	50	161.5	163.0	164.4	5.25	1.62		55	163.3	164.6	165.9	4.85
15	50	161.6	163.0	164.5	5.26	1.81		55	163.5	164.8	166.1	4.85
16	50	161.6	163.1	164.6	5.29	1.94		55	163.7	165.0	166.3	4.90
17	50	161.8	163.2	164.7	5.36	2.05	p<0.05	55	164.0	165.3	166.6	4.95
18	49	161.9	163.5	165.0	5.52	2.02	p<0.05	55	164.2	165.6	166.9	5.04
19	49	162.2	163.8	165.4	5.66	1.87		55	164.4	165.8	167.1	5.13
20	46	162.5	164.1	165.7	5.54	1.71		55	164.5	165.9	167.3	5.26
21	46	162.7	164.4	166.0	5.66	1.42		54	164.5	165.9	167.3	5.31
22	46	162.9	164.6	166.2	5.64	1.41		53	164.7	166.1	167.5	5.17
23	41	162.8	164.6	166.4	5.79	1.66		42	165.0	166.6	168.2	5.18
24	35	163.0	164.6	166.3	5.12	1.76		41	165.1	166.8	168.4	5.26
25	30	162.5	164.3	166.2	5.14	1.60		35	164.6	166.5	168.3	5.58

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.77	-0.69	0.40	1.47	0.02		7	-1.74	-0.67	0.39	1.44
5	18	-0.78	-0.23	0.32	1.19	-0.45		19	-0.94	-0.41	0.13	1.19
6	35	-0.58	-0.26	0.05	0.95	-0.28		27	-0.71	-0.33	0.04	1.00
7	43	-0.58	-0.35	-0.12	0.78	0.43		39	-0.51	-0.28	-0.04	0.76
8	48	-0.51	-0.27	-0.02	0.87	-0.13		49	-0.49	-0.29	-0.08	0.72
9	49	-0.48	-0.29	-0.10	0.67	0.91		53	-0.34	-0.18	-0.01	0.61
10	50	-0.43	-0.29	-0.15	0.52	2.73	p<0.01	54	-0.15	-0.04	0.07	0.42
11	50	-0.33	-0.21	-0.09	0.43	3.67	p<0.001	55	-0.03	0.06	0.14	0.32
12	50	-0.26	-0.15	-0.04	0.40	3.82	p<0.001	55	0.04	0.12	0.20	0.30
13	50	-0.19	-0.08	0.03	0.39	3.97	p<0.001	55	0.11	0.20	0.28	0.33
14	50	-0.11	-0.00	0.11	0.39	3.26	p<0.01	55	0.14	0.23	0.32	0.34
15	50	-0.06	0.05	0.16	0.40	2.69	p<0.01	55	0.15	0.25	0.34	0.34
16	50	-0.01	0.10	0.21	0.41	2.26	p<0.05	55	0.18	0.26	0.35	0.33
17	50	0.07	0.18	0.30	0.42	1.10		55	0.18	0.26	0.35	0.32
18	49	0.13	0.24	0.35	0.40	-0.14		55	0.16	0.23	0.31	0.29
19	49	0.17	0.28	0.39	0.40	-1.47		55	0.11	0.18	0.25	0.27
20	46	0.17	0.27	0.36	0.33	-2.04	p<0.05	55	0.07	0.14	0.22	0.28
21	46	0.11	0.19	0.28	0.30	-1.88		54	0.00	0.08	0.16	0.30
22	46	0.03	0.11	0.20	0.30	-1.18		53	-0.10	0.02	0.14	0.44
23	41	-0.00	0.07	0.14	0.23	-0.04		42	-0.01	0.06	0.14	0.25
24	35	-0.11	-0.04	0.04	0.22	1.24		41	-0.04	0.03	0.10	0.22
25	30	-0.12	-0.06	-0.01	0.15	1.74		35	-0.05	0.01	0.07	0.18

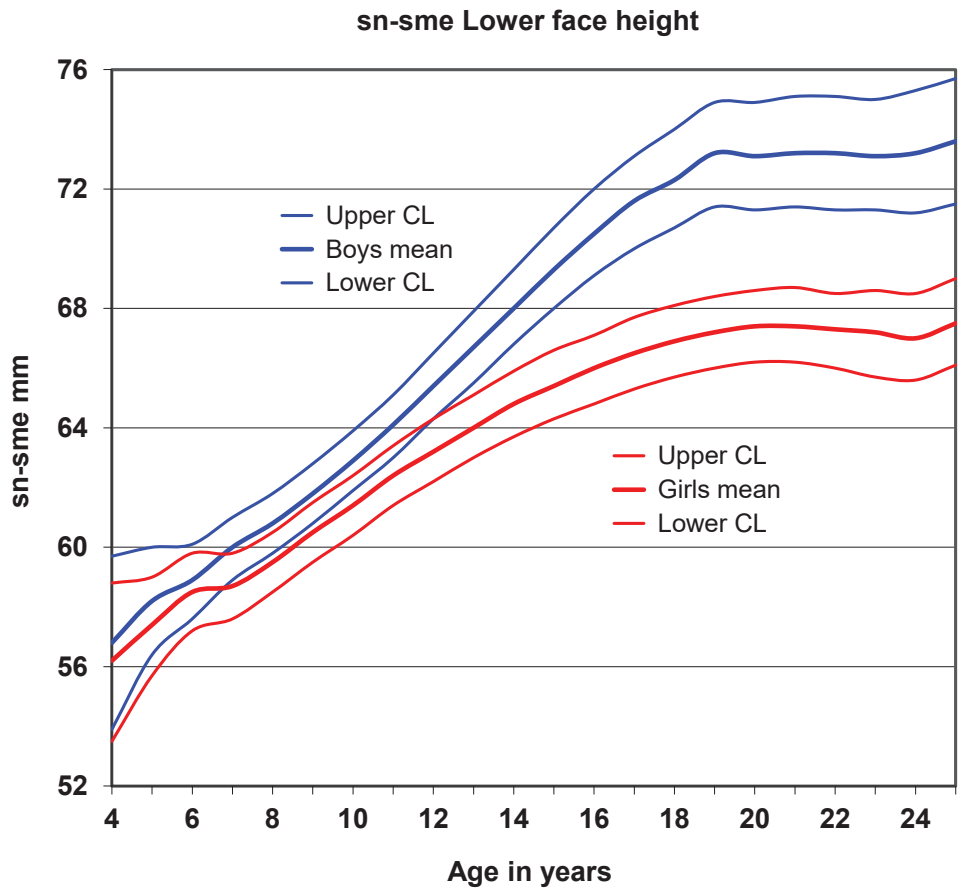

sn'snspg Facial convexity without nose
sn'snspg degrees
172
170
168
166
164
162
160
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

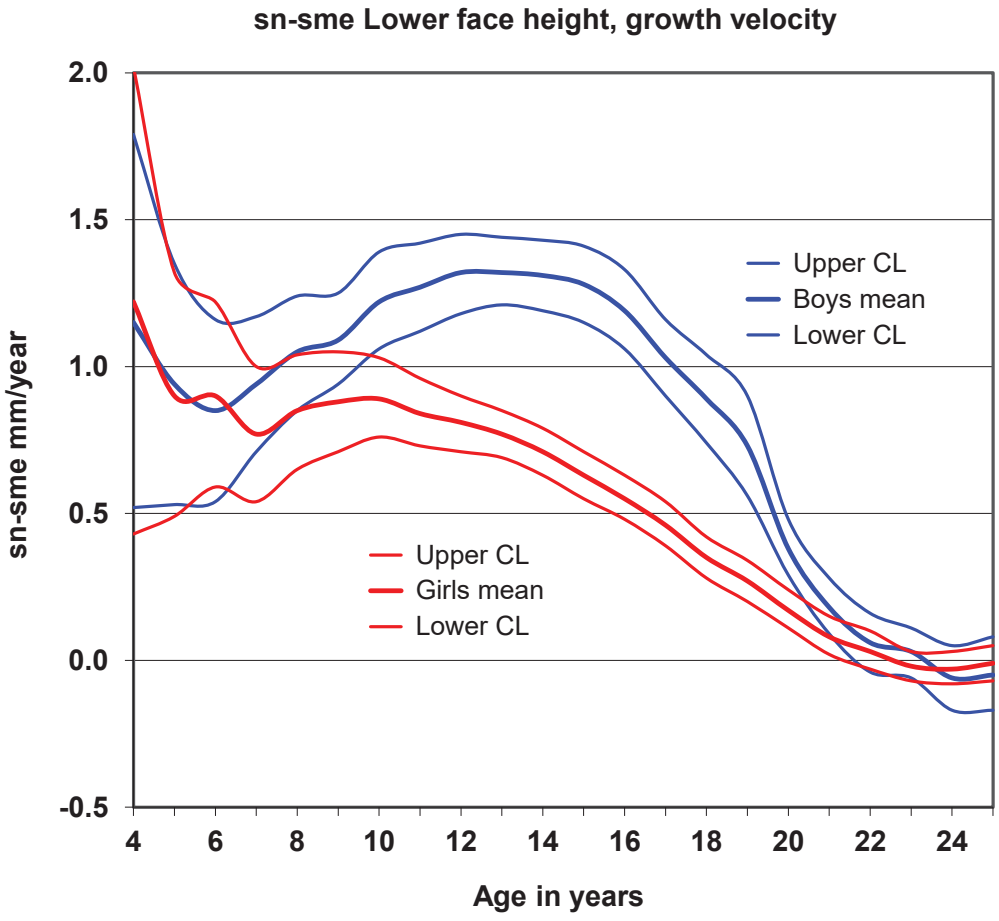

sn'snspg Facial convexity without nose, change
sn'snspg change degrees/year
0.5
0.0
-0.5
-1.0
-1.5
-2.0
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

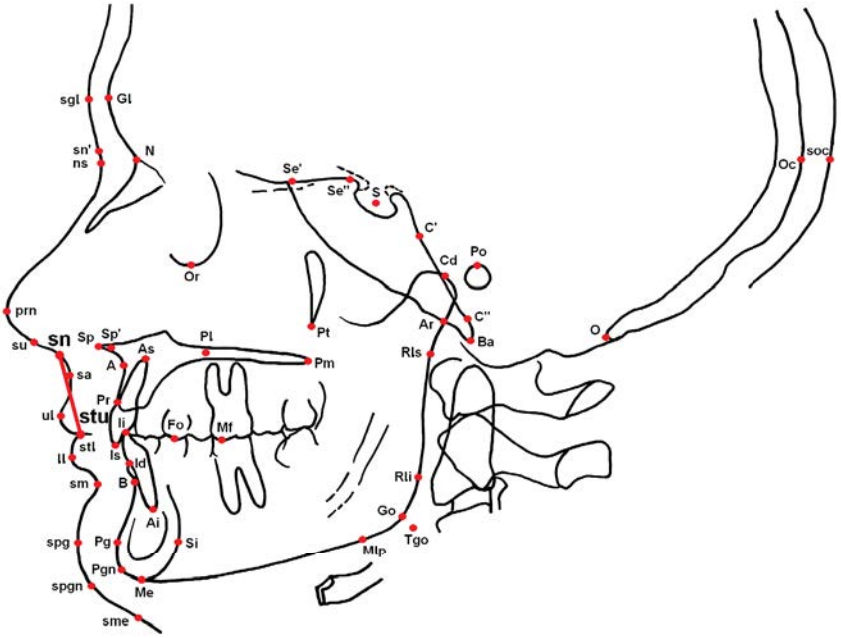


sn-sme (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	53.9	56.8	59.7	3.86	0.32		7	53.5	56.2	58.8	3.58
5	18	56.4	58.2	60.0	3.96	0.66		18	55.7	57.4	59.0	3.49
6	33	57.6	58.9	60.1	3.66	0.37		26	57.2	58.5	59.8	3.38
7	41	58.9	60.0	61.0	3.47	1.61		39	57.6	58.7	59.8	3.54
8	46	59.8	60.8	61.8	3.59	1.73		49	58.5	59.5	60.5	3.54
9	48	60.8	61.8	62.8	3.47	1.80		53	59.5	60.5	61.5	3.63
10	50	61.9	62.9	63.9	3.52	2.05	p<0.05	54	60.4	61.4	62.4	3.72
11	50	63.0	64.1	65.1	3.73	2.30	p<0.05	55	61.4	62.4	63.4	3.81
12	50	64.3	65.4	66.5	4.01	2.76	p<0.01	55	62.2	63.2	64.3	3.94
13	50	65.5	66.7	67.9	4.29	3.26	p<0.01	55	63.0	64.0	65.1	4.05
14	50	66.8	68.0	69.3	4.55	3.84	p<0.001	55	63.7	64.8	65.9	4.17
15	50	68.0	69.3	70.7	4.84	4.38	p<0.001	55	64.3	65.4	66.6	4.27
16	50	69.1	70.5	72.0	5.14	4.91	p<0.001	55	64.8	66.0	67.1	4.37
17	49	70.1	71.6	73.1	5.52	5.24	p<0.001	55	65.3	66.5	67.7	4.43
18	48	70.7	72.4	74.0	5.73	5.42	p<0.001	55	65.7	66.9	68.1	4.46
19	48	71.4	73.2	74.9	6.06	5.72	p<0.001	55	66.0	67.2	68.4	4.50
20	44	71.3	73.1	74.9	6.15	5.32	p<0.001	55	66.2	67.4	68.6	4.53
21	44	71.4	73.2	75.1	6.28	5.28	p<0.001	54	66.2	67.4	68.7	4.64
22	44	71.3	73.2	75.1	6.36	5.29	p<0.001	53	66.0	67.3	68.5	4.64
23	39	71.3	73.1	75.0	5.86	5.04	p<0.001	42	65.7	67.2	68.6	4.77
24	33	71.2	73.2	75.3	5.97	4.98	p<0.001	41	65.6	67.0	68.5	4.79
25	28	71.5	73.6	75.7	5.67	4.87	p<0.001	35	66.1	67.5	69.0	4.28

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.52	1.15	1.79	0.86	-0.13		7	0.43	1.22	2.02	1.07
5	18	0.53	0.94	1.35	0.89	0.11		18	0.49	0.90	1.32	0.89
6	33	0.54	0.84	1.15	0.90	-0.27		26	0.59	0.90	1.22	0.82
7	41	0.71	0.94	1.16	0.74	1.00		39	0.54	0.77	1.00	0.73
8	46	0.85	1.04	1.24	0.68	1.39		49	0.65	0.85	1.04	0.71
9	48	0.94	1.09	1.25	0.54	1.78		53	0.71	0.88	1.05	0.64
10	50	1.06	1.22	1.39	0.60	3.06	p<0.01	54	0.76	0.89	1.03	0.51
11	50	1.12	1.27	1.42	0.55	4.50	p<0.001	55	0.73	0.84	0.96	0.42
12	50	1.18	1.32	1.46	0.49	6.13	p<0.001	55	0.71	0.81	0.90	0.36
13	50	1.21	1.32	1.44	0.42	7.69	p<0.001	55	0.69	0.77	0.85	0.31
14	50	1.19	1.31	1.44	0.44	8.24	p<0.001	55	0.63	0.71	0.79	0.30
15	50	1.15	1.28	1.41	0.47	8.55	p<0.001	55	0.55	0.63	0.71	0.29
16	50	1.06	1.19	1.33	0.50	8.27	p<0.001	55	0.48	0.55	0.63	0.28
17	49	0.90	1.03	1.17	0.48	7.51	p<0.001	55	0.39	0.46	0.54	0.27
18	48	0.74	0.89	1.04	0.53	6.65	p<0.001	55	0.28	0.35	0.42	0.26
19	48	0.56	0.73	0.90	0.61	5.04	p<0.001	55	0.20	0.27	0.34	0.28
20	44	0.29	0.38	0.48	0.32	3.60	p<0.001	55	0.11	0.17	0.24	0.26
21	44	0.08	0.18	0.28	0.34	1.74		54	0.02	0.08	0.15	0.24
22	44	-0.04	0.06	0.16	0.33	0.53		53	-0.03	0.03	0.10	0.24
23	39	-0.06	0.02	0.11	0.27	0.90		42	-0.07	-0.02	0.03	0.17
24	33	-0.17	-0.06	0.05	0.32	-0.63		41	-0.08	-0.03	0.03	0.17
25	28	-0.18	-0.05	0.07	0.34	-0.61		35	-0.07	-0.01	0.05	0.18

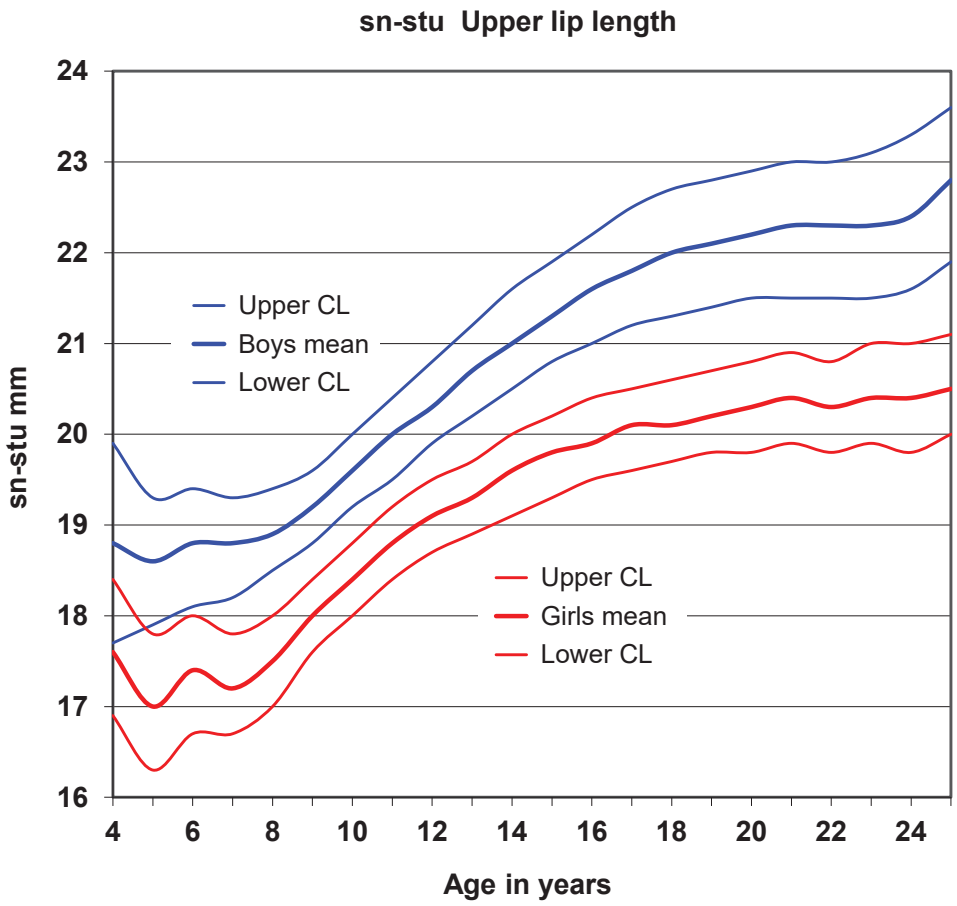

sn-sme Lower face height
sn-sme mm
76
72
68
64
60
56
52
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

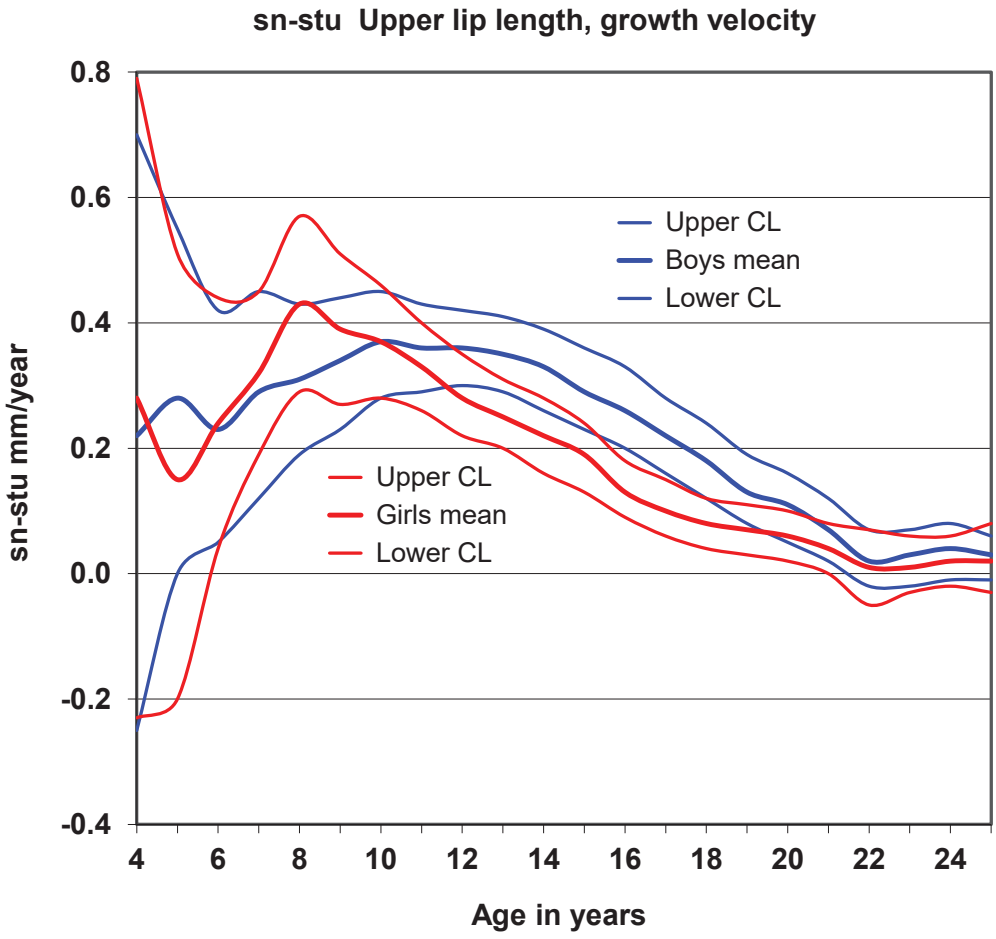

sn-sme Lower face height, growth velocity
sn-sme mm/year
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL



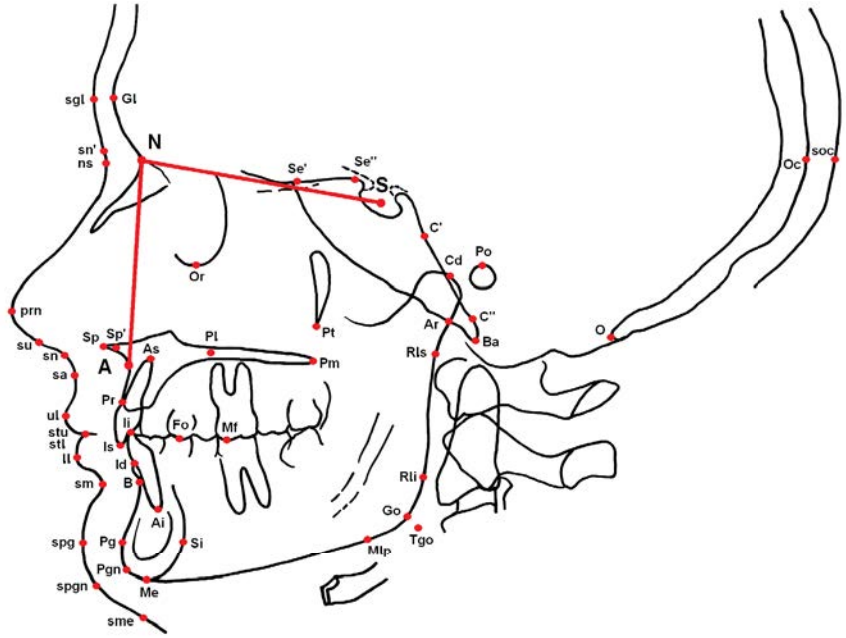
sn-stu (mm)	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	17.7	18.8	19.9	1.43	1.76		7	16.9	17.6	18.4	1.00
5	18	17.9	18.6	19.3	1.52	2.96	p<0.01	19	16.3	17.0	17.8	1.61
6	35	18.1	18.8	19.4	1.93	3.05	p<0.01	27	16.7	17.4	18.0	1.61
7	43	18.2	18.8	19.3	1.86	3.86	p<0.001	39	16.7	17.2	17.8	1.74
8	48	18.5	18.9	19.4	1.59	4.25	p<0.001	49	17.0	17.5	18.0	1.75
9	49	18.8	19.2	19.6	1.45	4.14	p<0.001	53	17.6	18.0	18.4	1.52
10	50	19.2	19.6	20.0	1.48	4.21	p<0.001	54	18.0	18.4	18.8	1.41
11	50	19.5	20.0	20.4	1.59	3.99	p<0.001	55	18.4	18.8	19.2	1.52
12	50	19.9	20.3	20.8	1.72	4.04	p<0.001	55	18.7	19.1	19.5	1.52
13	50	20.2	20.7	21.2	1.86	4.14	p<0.001	55	18.9	19.3	19.7	1.54
14	50	20.5	21.0	21.6	1.99	4.25	p<0.001	55	19.1	19.6	20.0	1.57
15	50	20.8	21.3	21.9	2.13	4.30	p<0.001	55	19.3	19.8	20.2	1.61
16	50	21.0	21.6	22.2	2.26	4.38	p<0.001	55	19.5	19.9	20.4	1.65
17	50	21.2	21.8	22.5	2.40	4.43	p<0.001	55	19.6	20.1	20.5	1.71
18	49	21.3	22.0	22.7	2.48	4.38	p<0.001	55	19.7	20.1	20.6	1.75
19	49	21.4	22.1	22.8	2.57	4.38	p<0.001	55	19.8	20.2	20.7	1.77
20	46	21.5	22.2	22.9	2.58	4.37	p<0.001	55	19.8	20.3	20.8	1.80
21	46	21.5	22.3	23.0	2.62	4.24	p<0.001	54	19.9	20.4	20.9	1.86
22	46	21.5	22.3	23.0	2.67	4.29	p<0.001	53	19.8	20.3	20.8	1.82
23	41	21.5	22.3	23.1	2.61	3.84	p<0.001	42	19.9	20.4	21.0	1.84
24	35	21.6	22.4	23.3	2.59	4.02	p<0.001	41	19.8	20.4	21.0	1.83
25	30	21.9	22.8	23.6	2.27	4.50	p<0.001	35	20.0	20.5	21.1	1.71

Change per year	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.25	0.22	0.70	0.64	-0.16		7	-0.23	0.28	0.79	0.68
5	18	0.00	0.28	0.55	0.59	0.53		19	-0.20	0.15	0.51	0.79
6	35	0.05	0.23	0.42	0.56	-0.05		27	0.04	0.24	0.44	0.53
7	43	0.12	0.29	0.45	0.54	-0.33		39	0.19	0.32	0.45	0.41
8	48	0.19	0.31	0.43	0.43	-1.20		49	0.29	0.43	0.57	0.51
9	49	0.23	0.34	0.44	0.38	-0.69		53	0.27	0.39	0.51	0.44
10	50	0.28	0.37	0.45	0.30	-0.08		54	0.28	0.37	0.46	0.33
11	50	0.29	0.36	0.43	0.25	0.70		55	0.26	0.33	0.40	0.27
12	50	0.30	0.36	0.42	0.22	1.70		55	0.22	0.28	0.35	0.24
13	50	0.29	0.35	0.41	0.23	2.17	p<0.05	55	0.20	0.25	0.31	0.22
14	50	0.27	0.33	0.39	0.23	2.51	p<0.05	55	0.16	0.22	0.28	0.22
15	50	0.23	0.29	0.36	0.24	2.49	p<0.05	55	0.13	0.19	0.24	0.20
16	50	0.20	0.26	0.33	0.24	3.25	p<0.01	55	0.09	0.13	0.18	0.17
17	50	0.16	0.22	0.28	0.22	3.16	p<0.01	55	0.06	0.10	0.15	0.15
18	49	0.12	0.18	0.24	0.22	2.78	p<0.01	55	0.04	0.08	0.12	0.15
19	49	0.08	0.13	0.19	0.20	1.85		55	0.03	0.07	0.11	0.14
20	46	0.05	0.11	0.16	0.18	1.31		55	0.02	0.06	0.10	0.16
21	46	0.02	0.07	0.12	0.18	0.83		54	0.00	0.04	0.08	0.16
22	46	-0.02	0.02	0.07	0.15	0.34		53	-0.05	0.01	0.07	0.23
23	41	-0.02	0.03	0.07	0.15	0.44		42	-0.03	0.01	0.06	0.15
24	35	-0.01	0.04	0.08	0.13	0.45		41	-0.02	0.02	0.06	0.13
25	30	-0.01	0.03	0.06	0.10	0.09		35	-0.03	0.02	0.08	0.15


sn-stu Upper lip length
sn-stu mm
24
23
22
21
20
19
18
17
16
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

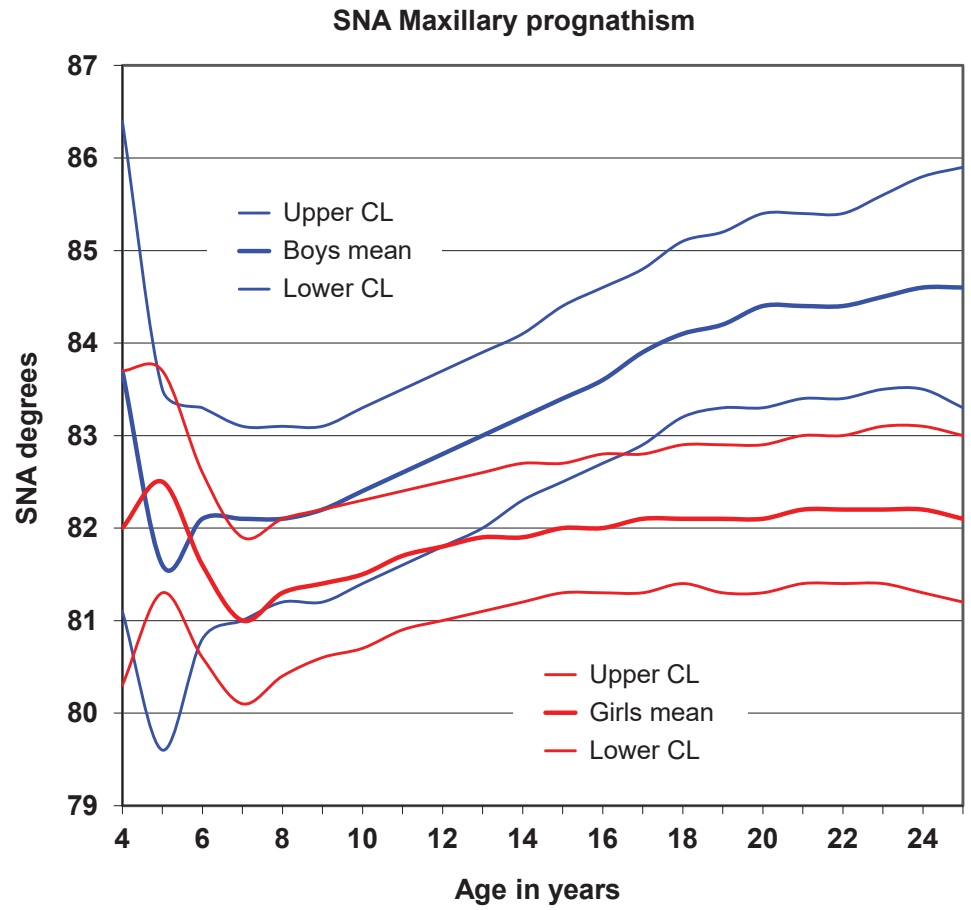

sn-stu Upper lip length, growth velocity
sn-stu mm/year
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

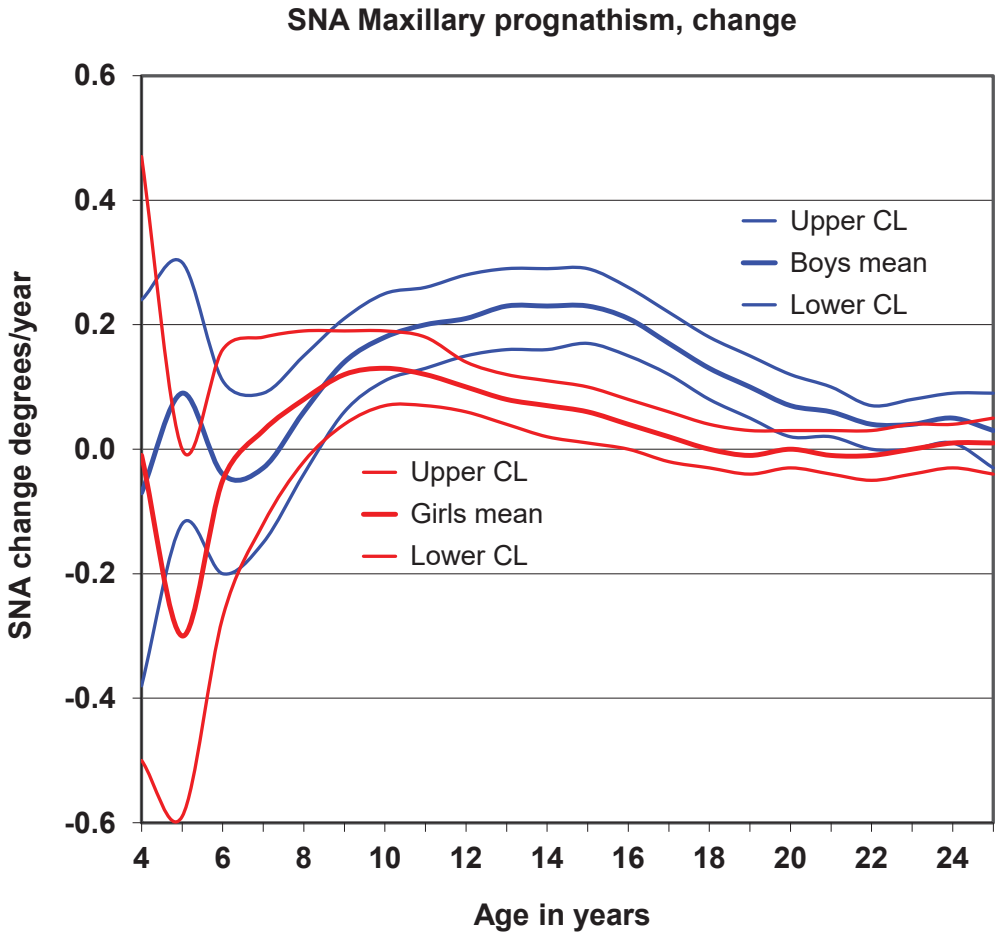
SNA

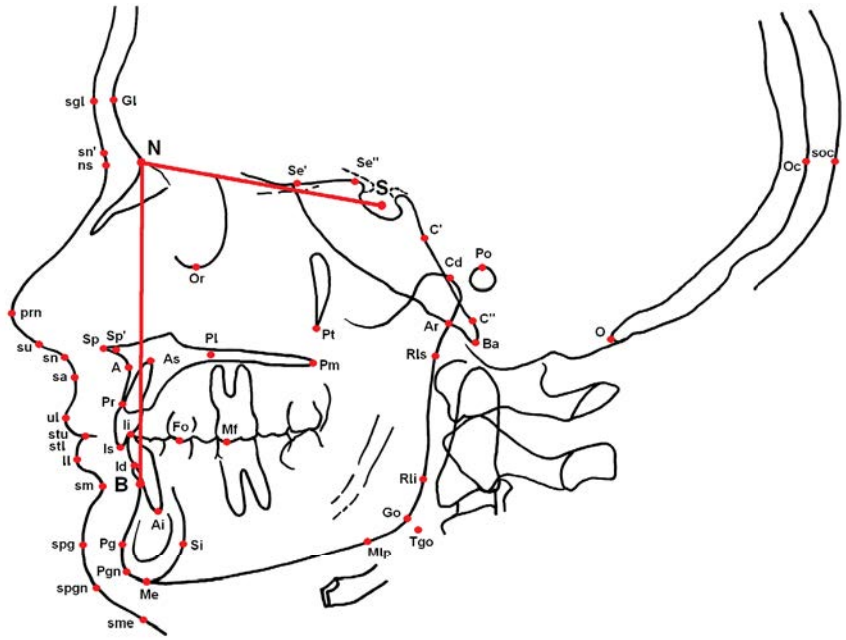


SNA (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	81.1	83.7	86.4	3.56	1.08		7	80.3	82.0	83.7	2.29
5	18	79.6	81.6	83.5	4.32	-0.80		19	81.3	82.5	83.7	2.61
6	35	80.8	82.1	83.3	3.75	0.55		27	80.6	81.6	82.6	2.70
7	43	81.0	82.1	83.1	3.57	1.50		39	80.1	81.0	81.9	2.84
8	48	81.2	82.1	83.1	3.42	1.34		49	80.4	81.3	82.1	3.02
9	49	81.2	82.2	83.1	3.39	1.31		53	80.6	81.4	82.2	2.89
10	50	81.4	82.3	83.3	3.35	1.38		54	80.7	81.5	82.3	2.84
11	50	81.6	82.6	83.5	3.33	1.51		55	80.9	81.7	82.4	2.81
12	50	81.8	82.8	83.7	3.34	1.67		55	81.0	81.8	82.5	2.78
13	50	82.0	83.0	83.9	3.38	1.86		55	81.1	81.9	82.6	2.76
14	50	82.3	83.2	84.1	3.40	2.10	p<0.05	55	81.2	81.9	82.7	2.77
15	50	82.5	83.4	84.4	3.44	2.34	p<0.05	55	81.3	82.0	82.7	2.78
16	50	82.7	83.7	84.6	3.47	2.62	p<0.05	55	81.3	82.0	82.8	2.80
17	50	82.9	83.9	84.8	3.50	2.84	p<0.01	55	81.3	82.1	82.8	2.84
18	49	83.2	84.1	85.1	3.39	3.29	p<0.01	55	81.4	82.1	82.9	2.88
19	49	83.3	84.2	85.2	3.41	3.44	p<0.001	55	81.3	82.1	82.9	2.90
20	46	83.3	84.4	85.4	3.53	3.54	p<0.001	55	81.3	82.1	82.9	2.90
21	46	83.4	84.4	85.4	3.52	3.50	p<0.001	54	81.4	82.2	83.0	2.86
22	46	83.4	84.4	85.5	3.53	3.38	p<0.01	53	81.4	82.2	83.0	2.95
23	41	83.5	84.5	85.6	3.52	3.33	p<0.01	42	81.4	82.2	83.1	2.80
24	35	83.5	84.6	85.8	3.44	3.34	p<0.01	41	81.3	82.2	83.1	2.90
25	30	83.3	84.6	85.9	3.65	3.12	p<0.01	35	81.2	82.1	83.0	2.74

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.38	-0.07	0.24	0.42	-0.19		7	-0.50	-0.01	0.47	0.65
5	18	-0.12	0.09	0.30	0.46	2.09	p<0.05	19	-0.59	-0.30	-0.00	0.66
6	35	-0.20	-0.05	0.10	0.46	0.07		27	-0.27	-0.05	0.16	0.56
7	43	-0.15	-0.03	0.09	0.40	-0.62		39	-0.12	0.03	0.18	0.48
8	48	-0.04	0.06	0.15	0.33	-0.38		49	-0.02	0.08	0.19	0.37
9	49	0.06	0.14	0.21	0.26	0.38		53	0.04	0.12	0.19	0.28
10	50	0.12	0.18	0.25	0.25	1.12		54	0.07	0.13	0.19	0.23
11	50	0.14	0.20	0.27	0.23	1.82		55	0.07	0.12	0.18	0.19
12	50	0.15	0.22	0.28	0.24	2.89	p<0.01	55	0.06	0.10	0.14	0.16
13	50	0.16	0.23	0.30	0.24	3.69	p<0.001	55	0.04	0.08	0.12	0.17
14	50	0.17	0.23	0.29	0.23	4.13	p<0.001	55	0.02	0.07	0.11	0.17
15	50	0.17	0.23	0.29	0.22	4.53	p<0.001	55	0.01	0.06	0.10	0.17
16	50	0.15	0.21	0.26	0.20	4.76	p<0.001	55	0.00	0.04	0.08	0.16
17	50	0.12	0.17	0.22	0.18	4.66	p<0.001	55	-0.02	0.02	0.06	0.15
18	49	0.08	0.13	0.18	0.17	4.23	p<0.001	55	-0.03	0.00	0.04	0.13
19	49	0.05	0.10	0.15	0.17	3.63	p<0.001	55	-0.04	-0.01	0.03	0.12
20	46	0.02	0.07	0.12	0.16	2.55	p<0.05	55	-0.03	-0.00	0.03	0.12
21	46	0.03	0.06	0.10	0.13	2.76	p<0.01	54	-0.04	-0.01	0.03	0.12
22	46	-0.00	0.03	0.07	0.13	1.47		53	-0.05	-0.01	0.03	0.16
23	41	-0.01	0.03	0.08	0.14	1.07		42	-0.04	0.00	0.04	0.13
24	35	-0.00	0.04	0.08	0.13	1.23		41	-0.03	0.01	0.04	0.11
25	30	-0.03	0.02	0.07	0.15	0.36		35	-0.04	0.01	0.05	0.14

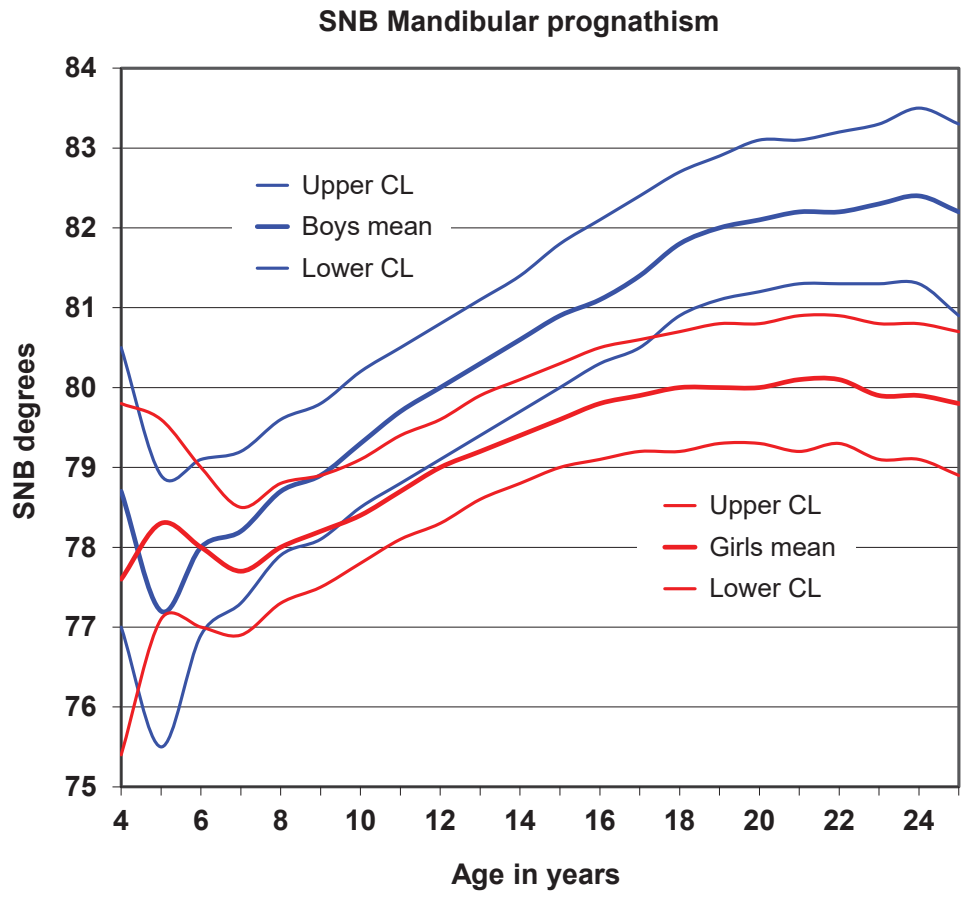

SNA Maxillary prognathism
SNA degrees
87
86
85
84
83
82
81
80
79
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

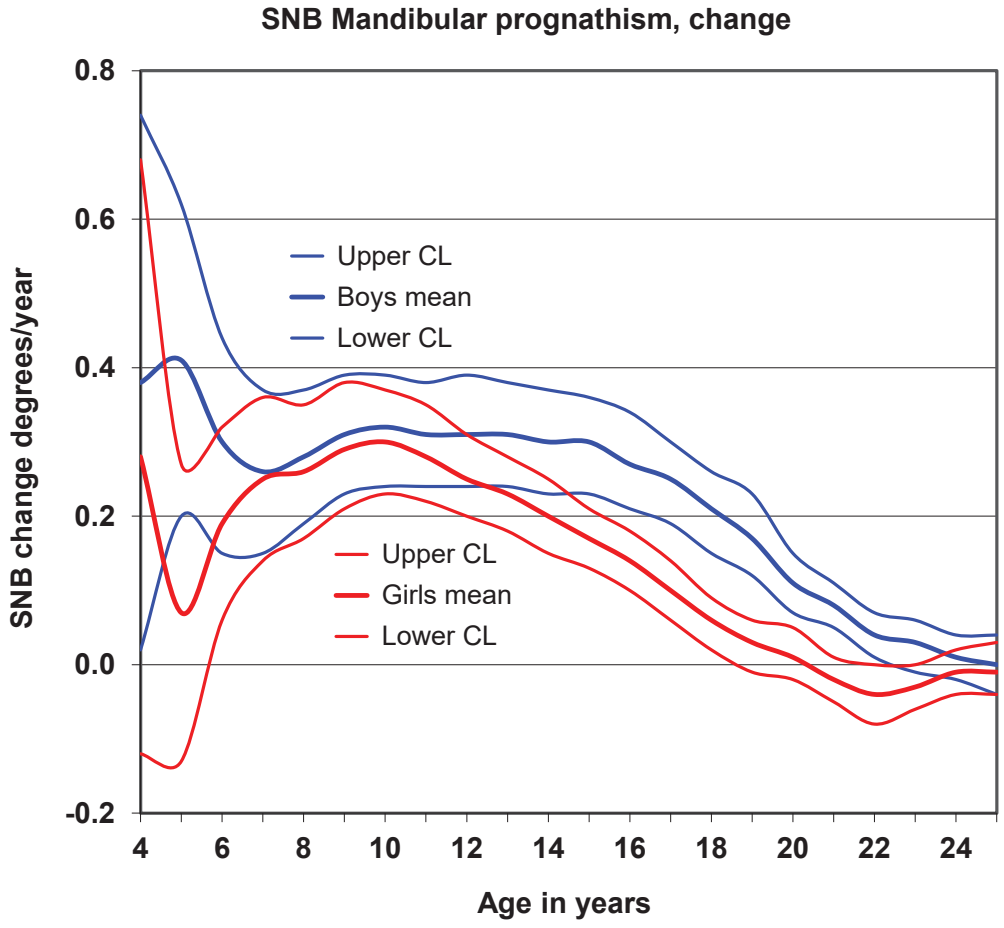

SNA Maxillary prognathism, change
SNA change degrees/year
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

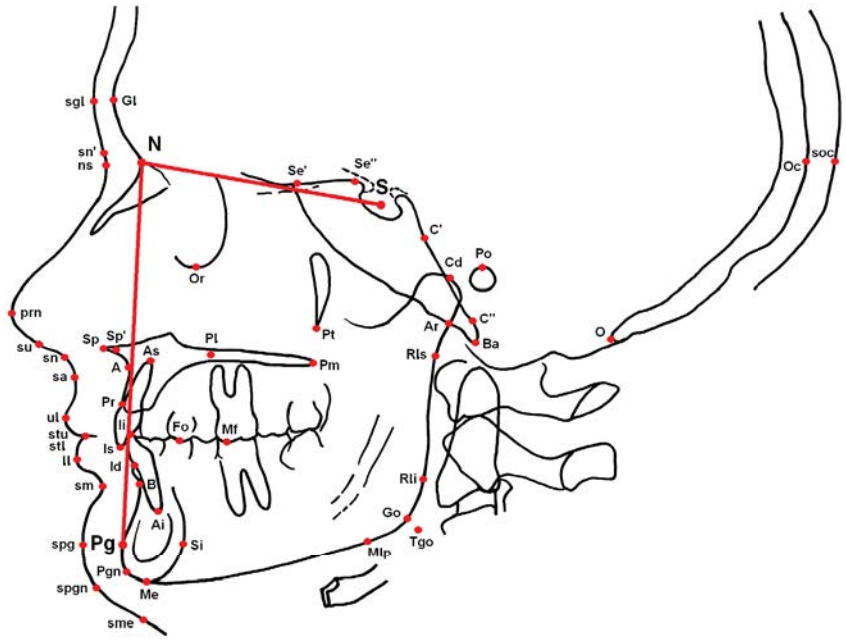


SNB (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	77.0	78.7	80.5	2.38	0.81		7	75.4	77.6	79.8	2.95
5	18	75.5	77.2	78.9	3.66	-1.04		19	77.1	78.3	79.6	2.83
6	35	76.9	78.0	79.1	3.35	0.02		27	77.0	78.0	79.0	2.72
7	43	77.3	78.2	79.2	3.09	0.89		39	76.9	77.7	78.5	2.54
8	48	77.9	78.7	79.6	3.06	1.19		49	77.3	78.0	78.8	2.67
9	49	78.1	79.0	79.8	3.05	1.40		53	77.5	78.2	78.9	2.55
10	50	78.5	79.3	80.2	3.06	1.67		54	77.8	78.4	79.1	2.48
11	50	78.8	79.7	80.5	3.07	1.77		55	78.1	78.7	79.3	2.44
12	50	79.1	80.0	80.8	3.09	1.80		55	78.3	79.0	79.6	2.44
13	50	79.4	80.3	81.1	3.12	1.90		55	78.6	79.2	79.9	2.48
14	50	79.7	80.6	81.4	3.14	2.04	p<0.05	55	78.8	79.4	80.1	2.53
15	50	80.0	80.9	81.7	3.17	2.18	p<0.05	55	78.9	79.6	80.3	2.58
16	50	80.3	81.1	82.0	3.21	2.41	p<0.05	55	79.1	79.8	80.5	2.64
17	50	80.5	81.4	82.3	3.24	2.61	p<0.05	55	79.2	79.9	80.6	2.71
18	49	80.9	81.8	82.7	3.12	3.14	p<0.01	55	79.2	80.0	80.7	2.77
19	49	81.1	82.0	82.9	3.16	3.39	p<0.001	55	79.3	80.0	80.7	2.78
20	46	81.2	82.1	83.1	3.23	3.51	p<0.001	55	79.3	80.0	80.8	2.80
21	46	81.3	82.2	83.1	3.22	3.57	p<0.001	54	79.3	80.1	80.8	2.80
22	46	81.3	82.2	83.2	3.21	3.54	p<0.001	53	79.3	80.1	80.9	2.81
23	41	81.3	82.3	83.3	3.23	3.57	p<0.001	42	79.1	79.9	80.8	2.83
24	35	81.3	82.4	83.5	3.21	3.53	p<0.001	41	79.1	79.9	80.8	2.87
25	30	80.9	82.1	83.2	3.24	3.20	p<0.01	35	78.8	79.7	80.6	2.73

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.02	0.38	0.74	0.49	0.36		7	-0.12	0.28	0.68	0.54
5	18	0.20	0.41	0.62	0.46	2.30	p<0.05	19	-0.13	0.07	0.27	0.45
6	35	0.15	0.30	0.44	0.45	1.04		27	0.06	0.19	0.32	0.35
7	43	0.15	0.26	0.37	0.37	0.18		39	0.14	0.25	0.36	0.35
8	48	0.19	0.28	0.37	0.32	0.36		49	0.17	0.26	0.35	0.31
9	49	0.23	0.31	0.39	0.29	0.30		53	0.21	0.29	0.38	0.30
10	50	0.24	0.32	0.39	0.28	0.28		54	0.23	0.30	0.37	0.27
11	50	0.24	0.31	0.39	0.26	0.57		55	0.22	0.28	0.35	0.24
12	50	0.24	0.31	0.39	0.26	1.29		55	0.20	0.25	0.31	0.21
13	50	0.24	0.31	0.38	0.26	1.89		55	0.18	0.23	0.28	0.19
14	50	0.23	0.30	0.37	0.25	2.43	p<0.05	55	0.15	0.20	0.25	0.18
15	50	0.23	0.30	0.36	0.24	3.19	p<0.01	55	0.13	0.17	0.21	0.16
16	50	0.21	0.28	0.34	0.23	3.75	p<0.001	55	0.10	0.14	0.18	0.15
17	50	0.19	0.25	0.30	0.21	4.22	p<0.001	55	0.06	0.10	0.14	0.15
18	49	0.15	0.21	0.26	0.19	4.60	p<0.001	55	0.02	0.06	0.09	0.14
19	49	0.12	0.17	0.23	0.19	4.62	p<0.001	55	-0.01	0.03	0.06	0.14
20	46	0.07	0.11	0.15	0.14	3.66	p<0.001	55	-0.02	0.01	0.05	0.13
21	46	0.05	0.08	0.11	0.12	4.27	p<0.001	54	-0.05	-0.02	0.01	0.12
22	46	0.01	0.04	0.07	0.11	2.94	p<0.01	53	-0.08	-0.04	0.00	0.15
23	41	-0.01	0.03	0.06	0.11	2.25	p<0.05	42	-0.06	-0.03	0.00	0.10
24	35	-0.02	0.01	0.04	0.10	1.05		41	-0.04	-0.01	0.02	0.10
25	30	-0.04	-0.00	0.04	0.11	0.24		35	-0.04	-0.01	0.03	0.10

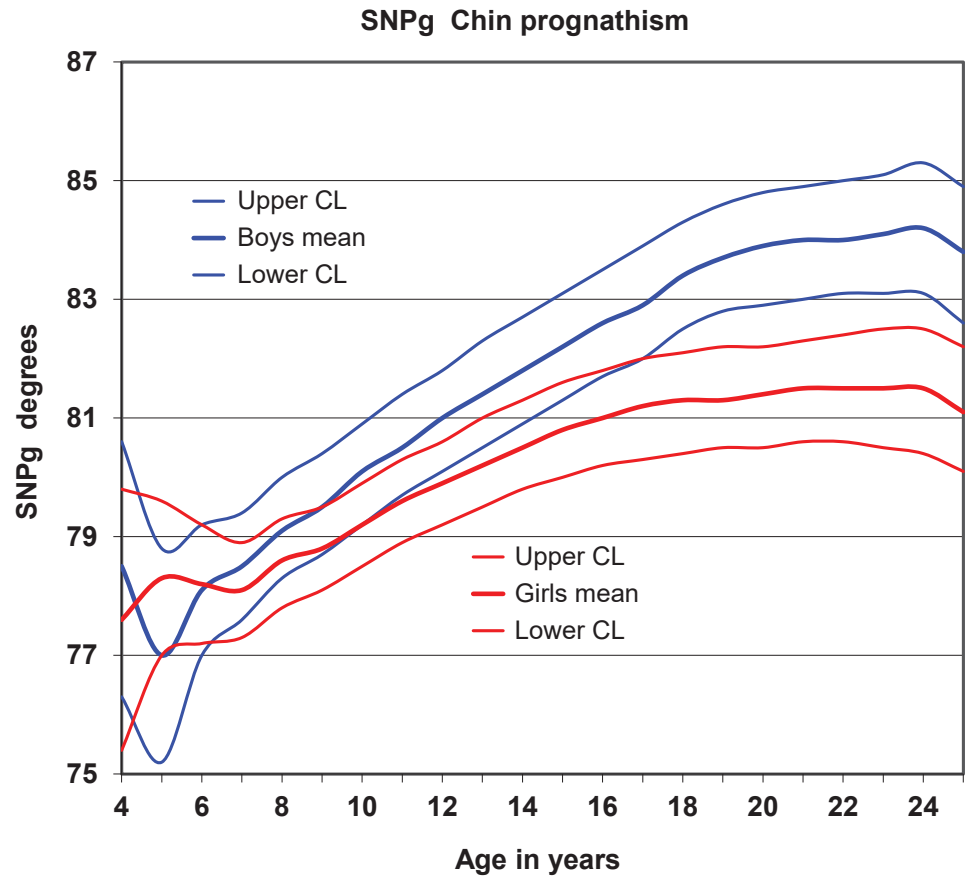

SNB Mandibular prognathism
SNB degrees
84
83
82
81
80
79
78
77
76
75
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

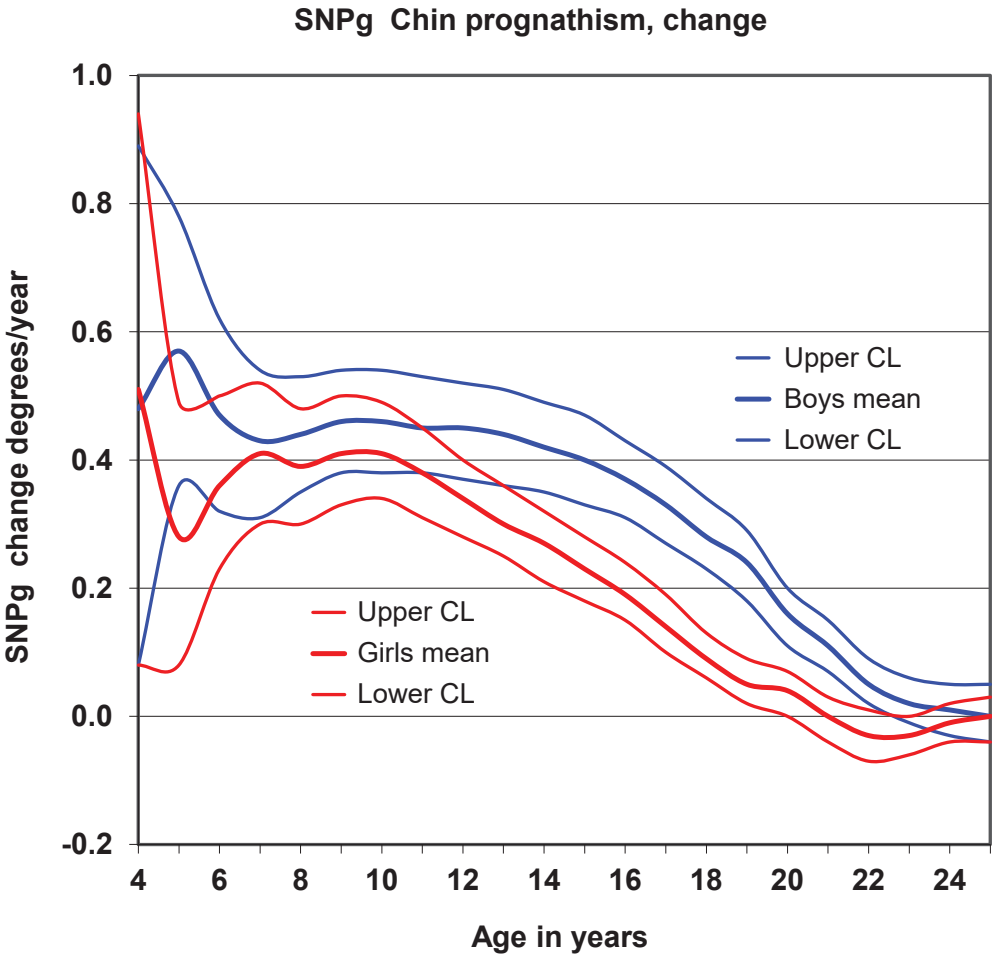

SNB Mandibular prognathism, change
SNB change degrees/year
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

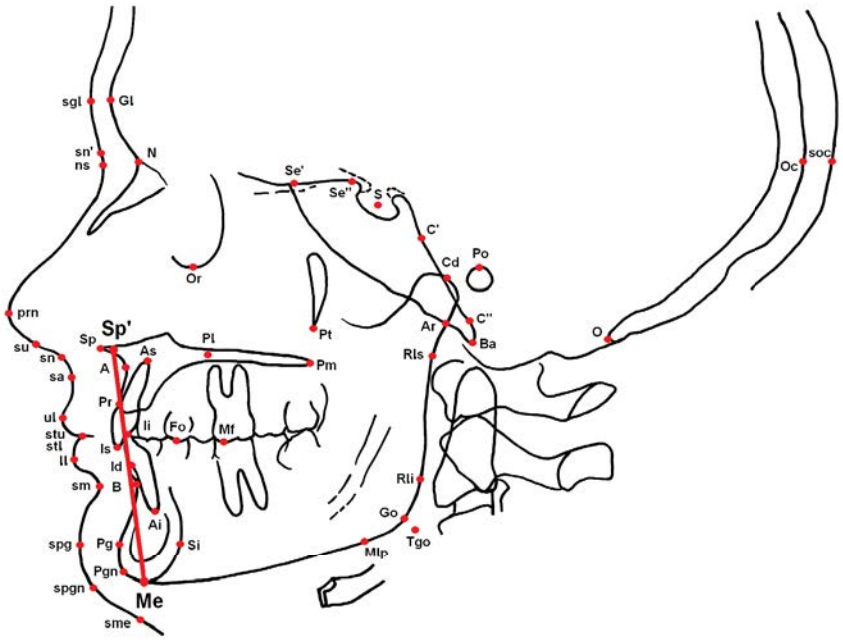


SNPg (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	76.3	78.5	80.6	2.93	0.53		7	75.4	77.6	79.8	3.02
5	18	75.2	77.0	78.8	3.83	-1.14		19	77.0	78.3	79.6	2.89
6	35	77.0	78.1	79.2	3.39	-0.10		27	77.2	78.2	79.2	2.72
7	43	77.6	78.5	79.4	3.05	0.59		39	77.3	78.1	78.9	2.57
8	48	78.3	79.1	80.0	3.04	0.95		49	77.8	78.6	79.3	2.73
9	49	78.7	79.5	80.4	3.03	1.26		53	78.1	78.8	79.5	2.65
10	50	79.2	80.1	80.9	3.06	1.60		54	78.5	79.2	79.9	2.65
11	50	79.7	80.5	81.4	3.08	1.71		55	78.9	79.6	80.3	2.65
12	50	80.1	81.0	81.8	3.12	1.81		55	79.2	79.9	80.6	2.71
13	50	80.5	81.4	82.3	3.16	1.96		55	79.5	80.2	81.0	2.78
14	50	80.9	81.8	82.7	3.21	2.15	p<0.05	55	79.8	80.5	81.3	2.87
15	50	81.3	82.2	83.1	3.26	2.35	p<0.05	55	80.0	80.8	81.6	2.95
16	50	81.7	82.6	83.5	3.32	2.60	p<0.05	55	80.2	81.0	81.8	3.03
17	50	82.0	83.0	83.9	3.37	2.82	p<0.01	55	80.3	81.2	82.0	3.11
18	49	82.5	83.4	84.3	3.25	3.37	p<0.01	55	80.4	81.3	82.1	3.19
19	49	82.8	83.7	84.6	3.29	3.65	p<0.001	55	80.5	81.3	82.2	3.21
20	46	82.9	83.9	84.8	3.33	3.78	p<0.001	55	80.5	81.4	82.2	3.23
21	46	83.0	84.0	84.9	3.32	3.83	p<0.001	54	80.6	81.5	82.3	3.22
22	46	83.1	84.0	85.0	3.30	3.82	p<0.001	53	80.6	81.5	82.4	3.22
23	41	83.1	84.1	85.1	3.35	3.63	p<0.001	42	80.5	81.5	82.5	3.31
24	35	83.1	84.2	85.3	3.34	3.60	p<0.001	41	80.4	81.5	82.5	3.35
25	30	82.6	83.8	84.9	3.28	3.29	p<0.01	35	80.1	81.1	82.2	3.19

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.08	0.48	0.89	0.55	-0.08		7	0.08	0.51	0.94	0.58
5	18	0.36	0.57	0.78	0.45	1.92		19	0.08	0.28	0.49	0.46
6	35	0.32	0.47	0.62	0.45	1.01		27	0.23	0.36	0.50	0.36
7	43	0.31	0.43	0.54	0.38	0.26		39	0.30	0.41	0.52	0.35
8	48	0.35	0.44	0.53	0.32	0.75		49	0.30	0.39	0.48	0.32
9	49	0.38	0.46	0.54	0.29	0.84		53	0.33	0.41	0.50	0.31
10	50	0.38	0.46	0.54	0.29	0.87		54	0.34	0.41	0.49	0.29
11	50	0.38	0.45	0.53	0.27	1.39		55	0.31	0.38	0.45	0.26
12	50	0.37	0.45	0.52	0.27	2.18	p<0.05	55	0.28	0.34	0.40	0.23
13	50	0.36	0.44	0.51	0.27	2.85	p<0.01	55	0.25	0.30	0.36	0.21
14	50	0.35	0.42	0.49	0.25	3.42	p<0.001	55	0.21	0.27	0.32	0.20
15	50	0.33	0.40	0.47	0.24	4.14	p<0.001	55	0.18	0.23	0.28	0.18
16	50	0.31	0.37	0.43	0.23	4.67	p<0.001	55	0.15	0.19	0.24	0.17
17	50	0.28	0.33	0.39	0.21	5.19	p<0.001	55	0.10	0.14	0.19	0.16
18	49	0.23	0.28	0.34	0.20	5.60	p<0.001	55	0.06	0.09	0.13	0.14
19	49	0.18	0.24	0.29	0.19	5.51	p<0.001	55	0.02	0.05	0.09	0.14
20	46	0.11	0.16	0.20	0.16	4.33	p<0.001	55	0.00	0.04	0.07	0.13
21	46	0.07	0.11	0.15	0.13	4.40	p<0.001	54	-0.04	-0.00	0.03	0.12
22	46	0.02	0.05	0.09	0.12	2.83	p<0.01	53	-0.07	-0.03	0.01	0.15
23	41	-0.01	0.02	0.06	0.12	2.06	p<0.05	42	-0.06	-0.03	0.00	0.10
24	35	-0.03	0.01	0.04	0.11	0.89		41	-0.04	-0.01	0.02	0.10
25	30	-0.04	0.00	0.04	0.13	0.15		35	-0.04	-0.00	0.03	0.10

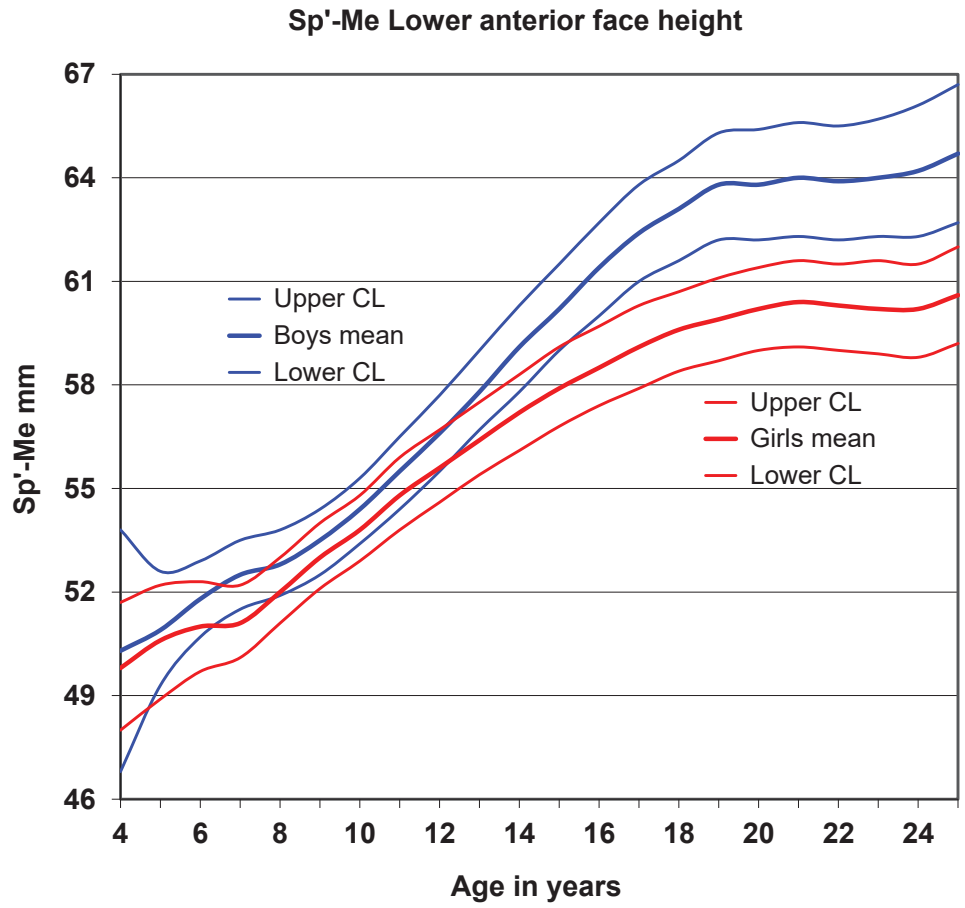

SNPg Chin prognathism
SNPg degrees
87
85
83
81
79
77
75
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

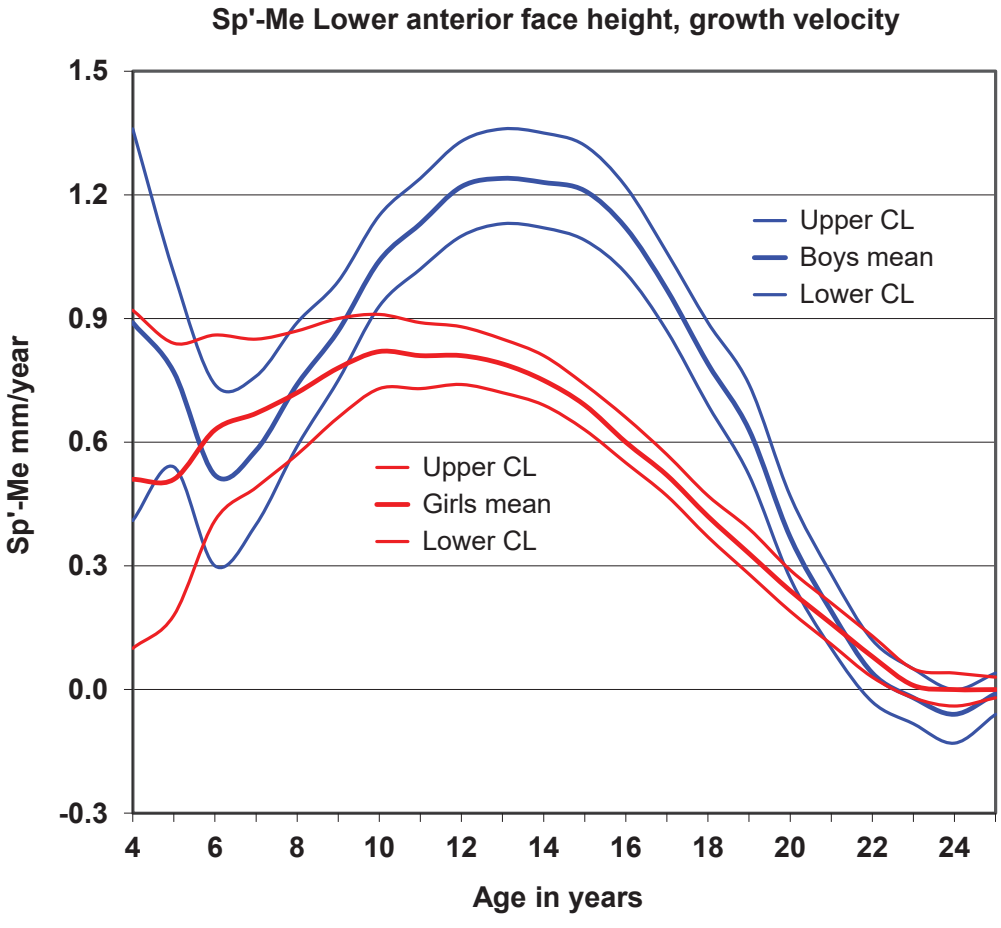

SNPg Chin prognathism, change
SNPg change degrees/year
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

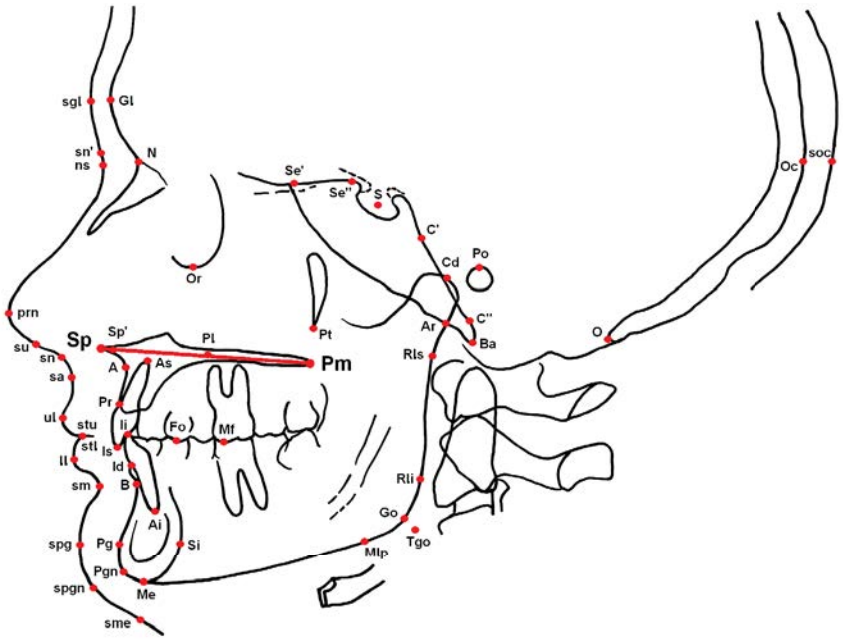


Sp'-Me (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	46.8	50.3	53.8	4.70	0.24		7	48.0	49.8	51.7	2.53
5	18	49.3	50.9	52.6	3.59	0.30		19	48.9	50.6	52.2	3.63
6	35	50.7	51.8	52.9	3.39	0.96		27	49.7	51.0	52.3	3.47
7	43	51.5	52.5	53.5	3.35	1.81		39	50.1	51.1	52.2	3.40
8	48	51.9	52.8	53.8	3.36	1.18		49	51.1	52.0	53.0	3.34
9	49	52.5	53.5	54.4	3.37	0.63		53	52.1	53.0	54.0	3.57
10	50	53.4	54.4	55.3	3.47	0.72		54	52.9	53.8	54.8	3.70
11	50	54.4	55.5	56.5	3.67	0.84		55	53.8	54.8	55.9	3.91
12	50	55.5	56.6	57.7	3.87	1.26		55	54.6	55.6	56.7	4.01
13	50	56.7	57.8	59.0	4.10	1.74		55	55.4	56.4	57.5	4.10
14	50	57.8	59.1	60.3	4.36	2.21	p<0.05	55	56.1	57.2	58.3	4.19
15	50	59.0	60.2	61.5	4.61	2.67	p<0.01	55	56.8	57.9	59.1	4.27
16	50	60.0	61.4	62.7	4.89	3.14	p<0.01	55	57.4	58.5	59.7	4.36
17	50	61.0	62.4	63.8	5.15	3.50	p<0.001	55	57.9	59.1	60.3	4.43
18	49	61.6	63.1	64.5	5.29	3.64	p<0.001	55	58.4	59.6	60.7	4.47
19	49	62.2	63.8	65.3	5.52	3.89	p<0.001	55	58.7	59.9	61.1	4.52
20	46	62.2	63.8	65.4	5.57	3.56	p<0.001	55	59.0	60.2	61.4	4.56
21	46	62.3	64.0	65.6	5.70	3.49	p<0.001	54	59.1	60.4	61.6	4.63
22	46	62.2	63.9	65.5	5.71	3.47	p<0.001	53	59.0	60.3	61.5	4.58
23	41	62.3	64.0	65.7	5.48	3.43	p<0.001	42	58.9	60.2	61.6	4.52
24	35	62.3	64.2	66.1	5.69	3.43	p<0.001	41	58.8	60.2	61.5	4.55
25	30	62.7	64.7	66.7	5.63	3.36	p<0.01	35	59.2	60.6	62.0	4.21

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.41	0.89	1.36	0.64	1.17		7	0.10	0.51	0.92	0.56
5	18	0.54	0.77	1.01	0.51	1.24		19	0.18	0.51	0.84	0.73
6	35	0.30	0.52	0.74	0.67	-0.69		27	0.41	0.63	0.86	0.60
7	43	0.40	0.58	0.76	0.61	-0.65		39	0.49	0.67	0.85	0.57
8	48	0.59	0.74	0.89	0.53	0.14		49	0.57	0.72	0.87	0.53
9	49	0.75	0.87	0.99	0.44	0.99		53	0.66	0.78	0.90	0.46
10	50	0.93	1.04	1.15	0.41	3.03	p<0.01	54	0.73	0.82	0.91	0.35
11	50	1.02	1.13	1.24	0.40	4.75	p<0.001	55	0.73	0.81	0.89	0.29
12	50	1.10	1.22	1.33	0.42	6.06	p<0.001	55	0.74	0.81	0.88	0.26
13	50	1.13	1.24	1.36	0.42	6.85	p<0.001	55	0.72	0.79	0.85	0.25
14	50	1.12	1.23	1.35	0.41	7.44	p<0.001	55	0.69	0.75	0.81	0.24
15	50	1.09	1.20	1.32	0.40	8.26	p<0.001	55	0.63	0.69	0.74	0.22
16	50	1.01	1.12	1.22	0.38	8.75	p<0.001	55	0.55	0.60	0.66	0.21
17	50	0.87	0.97	1.06	0.35	8.17	p<0.001	55	0.47	0.52	0.57	0.19
18	49	0.69	0.79	0.89	0.35	6.91	p<0.001	55	0.37	0.42	0.47	0.18
19	49	0.52	0.63	0.74	0.38	5.04	p<0.001	55	0.28	0.33	0.39	0.19
20	46	0.27	0.37	0.47	0.34	2.33	p<0.05	55	0.19	0.24	0.29	0.20
21	46	0.10	0.19	0.28	0.30	0.60		54	0.11	0.16	0.21	0.19
22	46	-0.03	0.04	0.12	0.26	-0.93		53	0.03	0.08	0.13	0.18
23	41	-0.08	-0.02	0.05	0.21	-0.90		42	-0.02	0.01	0.05	0.12
24	35	-0.12	-0.06	0.00	0.19	-1.63		41	-0.04	-0.00	0.04	0.12
25	30	-0.06	-0.01	0.04	0.14	-0.53		35	-0.02	0.00	0.03	0.09

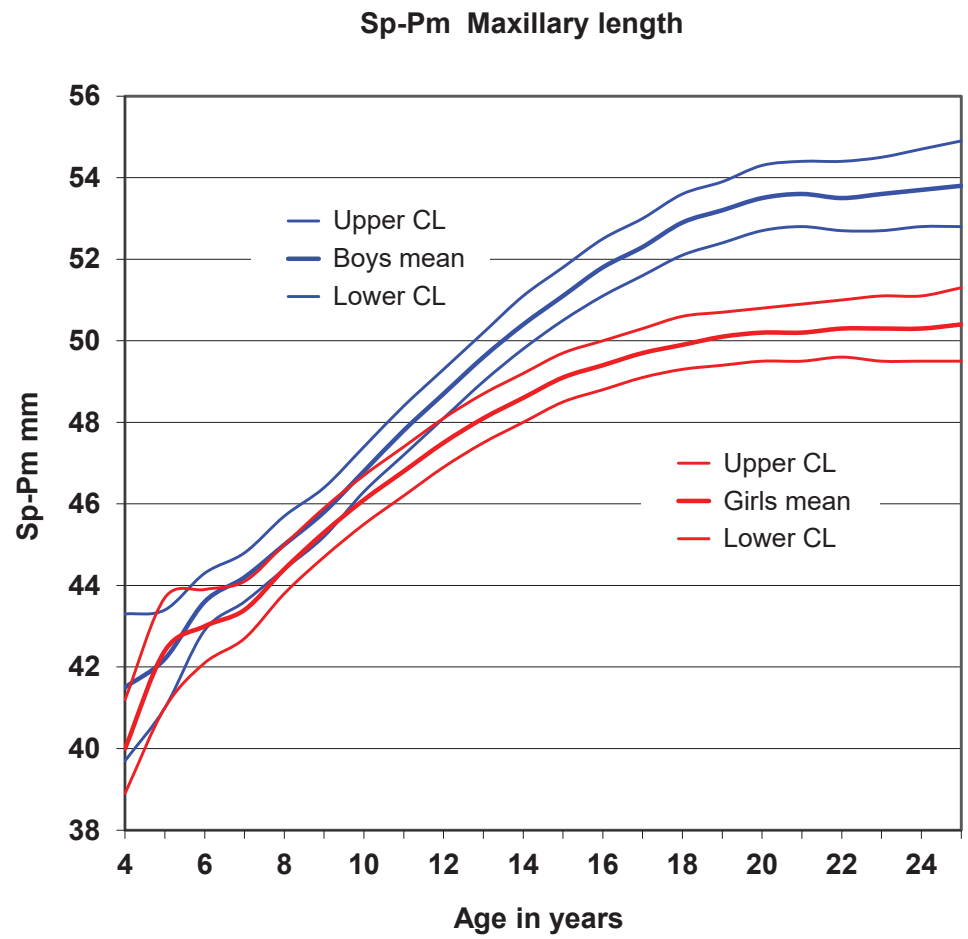

Sp'-Me Lower anterior face height
Sp'-Me mm
67
64
61
58
55
52
49
46
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

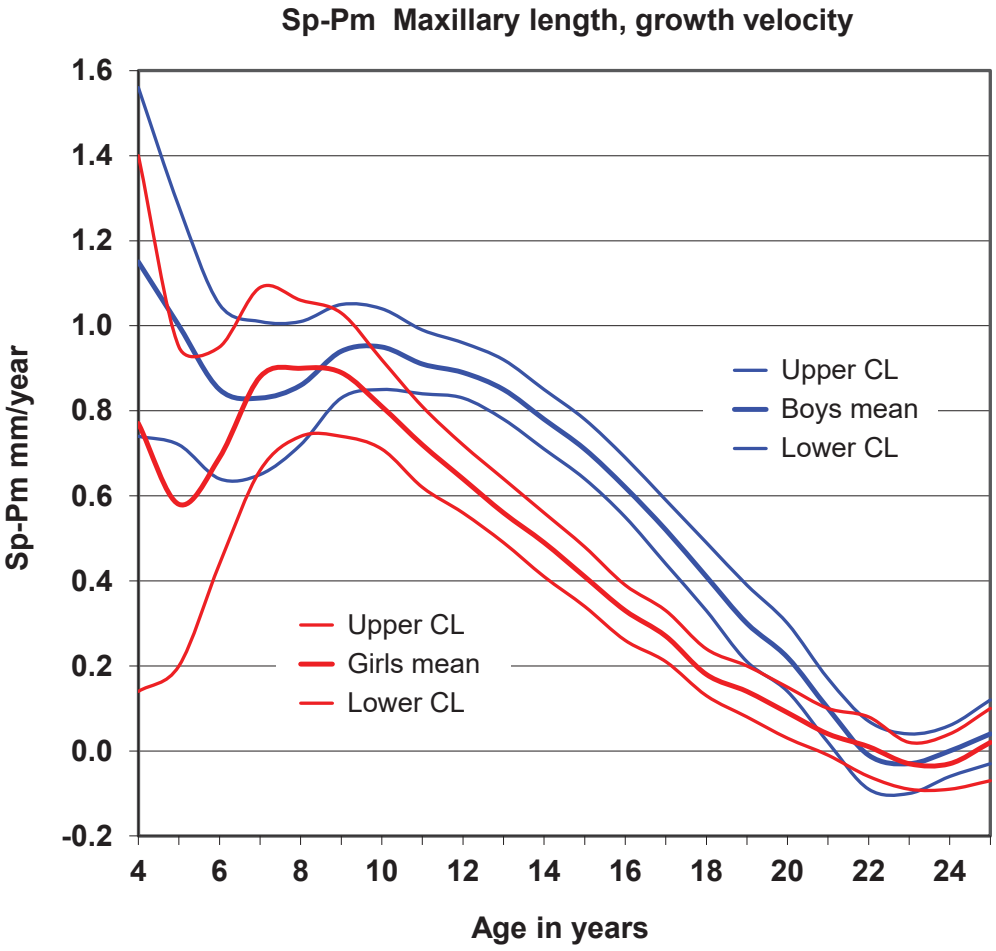

Sp'-Me Lower anterior face height, growth velocity
Sp'-Me mm/year
1.5
1.2
0.9
0.6
0.3
0.0
-0.3
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

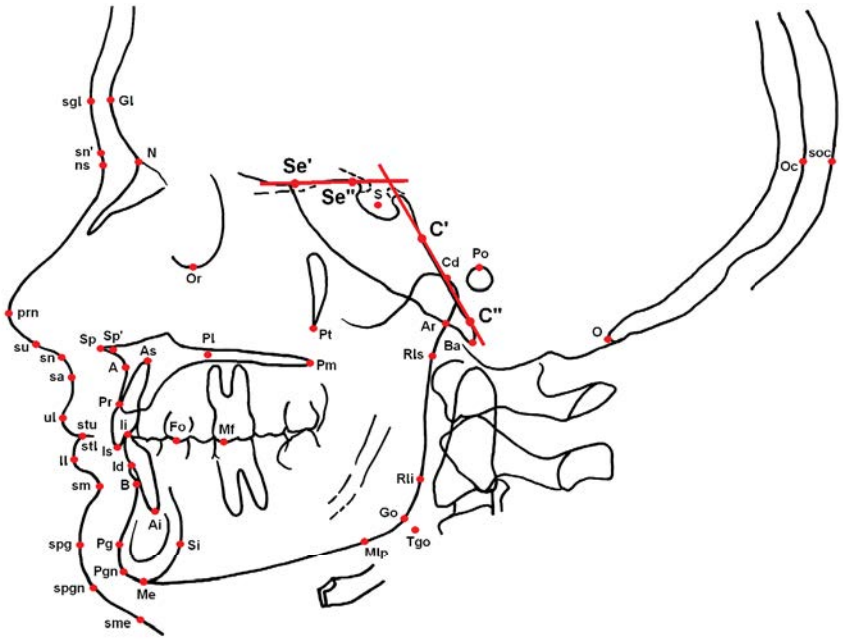


Sp-Pm (mm)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	39.7	41.5	43.3	2.44	1.31		7	38.9	40.0	41.2	1.59
5	18	41.0	42.2	43.4	2.57	-0.16		19	41.0	42.4	43.7	3.03
6	35	42.9	43.6	44.3	2.11	0.99		27	42.1	43.0	43.9	2.47
7	43	43.6	44.2	44.8	2.00	1.60		39	42.7	43.4	44.1	2.24
8	48	44.4	45.0	45.7	2.25	1.47		49	43.8	44.4	45.0	2.10
9	49	45.2	45.8	46.4	2.18	1.28		53	44.7	45.3	45.9	2.11
10	50	46.3	46.8	47.4	2.11	1.73		54	45.5	46.1	46.7	2.15
11	50	47.2	47.8	48.4	2.15	2.43	p<0.05	55	46.2	46.8	47.4	2.14
12	50	48.1	48.7	49.3	2.18	2.89	p<0.01	55	46.9	47.5	48.1	2.19
13	50	49.0	49.6	50.2	2.24	3.49	p<0.001	55	47.5	48.1	48.7	2.21
14	50	49.8	50.4	51.1	2.33	4.04	p<0.001	55	48.0	48.6	49.2	2.25
15	50	50.5	51.1	51.8	2.41	4.48	p<0.001	55	48.5	49.1	49.7	2.31
16	50	51.1	51.8	52.5	2.50	5.04	p<0.001	55	48.8	49.4	50.0	2.35
17	50	51.6	52.3	53.1	2.57	5.44	p<0.001	55	49.1	49.7	50.3	2.41
18	49	52.2	52.9	53.6	2.58	5.98	p<0.001	55	49.3	49.9	50.6	2.47
19	49	52.5	53.2	53.9	2.65	6.20	p<0.001	55	49.4	50.1	50.7	2.48
20	46	52.7	53.5	54.3	2.76	6.34	p<0.001	55	49.5	50.2	50.8	2.48
21	46	52.8	53.6	54.4	2.81	6.41	p<0.001	54	49.5	50.2	50.9	2.53
22	46	52.7	53.6	54.4	2.85	5.97	p<0.001	53	49.6	50.3	51.0	2.54
23	41	52.7	53.6	54.5	2.91	5.47	p<0.001	42	49.5	50.3	51.1	2.57
24	35	52.8	53.7	54.7	2.84	5.55	p<0.001	41	49.5	50.3	51.1	2.59
25	30	52.8	53.8	54.9	2.98	4.90	p<0.001	35	49.5	50.4	51.3	2.72

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.74	1.15	1.56	0.55	0.99		7	0.14	0.77	1.40	0.85
5	18	0.72	1.00	1.28	0.60	1.75		19	0.20	0.58	0.95	0.84
6	35	0.64	0.84	1.05	0.61	0.93		27	0.44	0.69	0.95	0.68
7	43	0.65	0.83	1.01	0.60	-0.34		39	0.66	0.88	1.09	0.69
8	48	0.72	0.86	1.00	0.51	-0.34		49	0.74	0.90	1.06	0.57
9	49	0.82	0.93	1.04	0.39	0.51		53	0.74	0.89	1.03	0.53
10	50	0.85	0.95	1.04	0.33	1.85		54	0.71	0.81	0.92	0.40
11	50	0.84	0.91	0.99	0.28	3.22	p<0.01	55	0.62	0.72	0.81	0.35
12	50	0.83	0.90	0.96	0.25	4.86	p<0.001	55	0.56	0.64	0.72	0.30
13	50	0.78	0.85	0.92	0.25	5.58	p<0.001	55	0.49	0.56	0.64	0.28
14	50	0.71	0.78	0.85	0.25	5.68	p<0.001	55	0.41	0.49	0.56	0.28
15	50	0.64	0.71	0.78	0.25	5.93	p<0.001	55	0.34	0.41	0.48	0.27
16	50	0.55	0.62	0.69	0.25	6.15	p<0.001	55	0.26	0.33	0.39	0.24
17	50	0.45	0.52	0.59	0.25	5.34	p<0.001	55	0.21	0.27	0.33	0.23
18	49	0.33	0.41	0.49	0.28	4.57	p<0.001	55	0.13	0.18	0.24	0.23
19	49	0.22	0.30	0.39	0.31	3.04	p<0.01	55	0.08	0.14	0.20	0.22
20	46	0.14	0.22	0.30	0.27	2.66	p<0.01	55	0.03	0.09	0.15	0.22
21	46	0.02	0.10	0.17	0.25	1.14		54	-0.01	0.04	0.10	0.22
22	46	-0.09	-0.01	0.07	0.27	-0.31		53	-0.06	0.01	0.08	0.25
23	41	-0.10	-0.03	0.03	0.22	-0.05		42	-0.09	-0.03	0.02	0.19
24	35	-0.07	-0.01	0.06	0.19	0.51		41	-0.09	-0.03	0.04	0.21
25	30	-0.04	0.04	0.11	0.21	0.34		35	-0.07	0.02	0.10	0.26


Sp-Pm Maxillary length
Sp-Pm mm
56
54
52
50
48
46
44
42
40
38
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Sp-Pm Maxillary length, growth velocity
Sp-Pm mm/year
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL



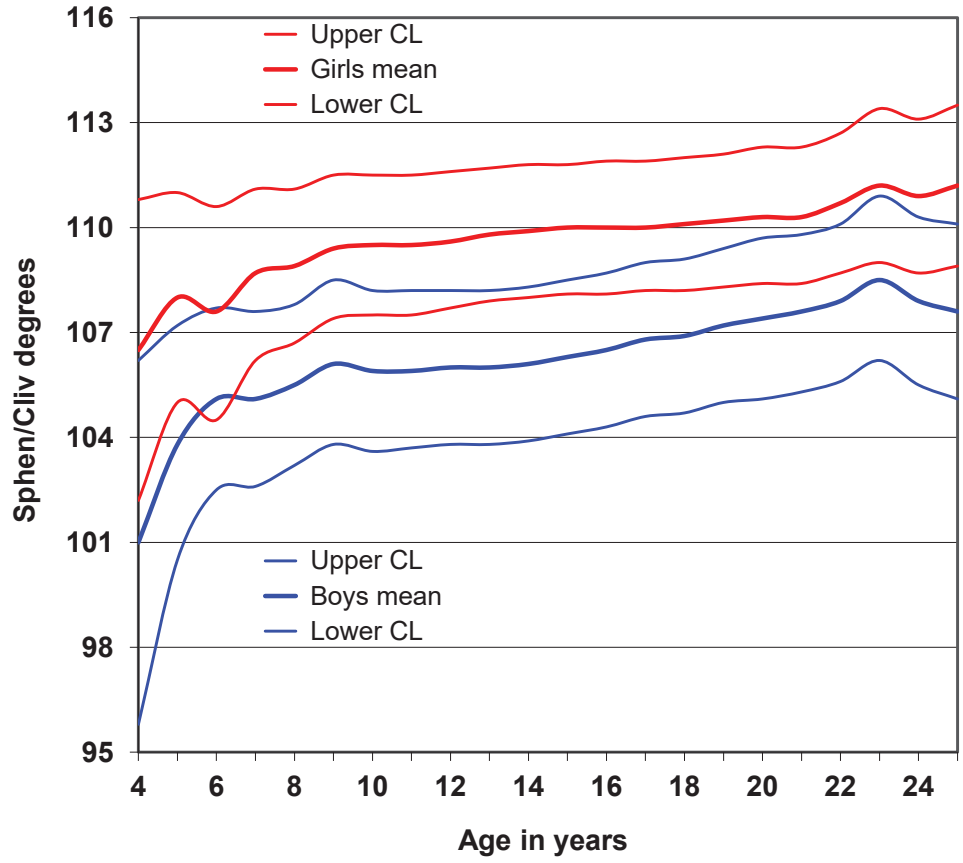
Sphen/Cliv (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	95.8	101.0	106.2	7.05	1.60		7	102.2	106.5	110.8	5.78
5	18	100.5	103.8	107.2	7.26	1.80		19	105.0	108.0	111.0	6.68
6	35	102.5	105.1	107.7	7.97	1.19		27	104.5	107.6	110.6	8.13
7	43	102.6	105.1	107.6	8.30	2.02	p<0.05	39	106.2	108.7	111.1	7.76
8	48	103.2	105.5	107.8	8.08	2.10	p<0.05	49	106.7	108.9	111.1	7.98
9	49	103.7	106.1	108.5	8.49	2.07	p<0.05	53	107.4	109.4	111.5	7.61
10	50	103.6	105.9	108.2	8.30	2.28	p<0.05	54	107.5	109.5	111.5	7.54
11	50	103.7	105.9	108.2	8.15	2.34	p<0.05	55	107.5	109.5	111.5	7.46
12	50	103.8	106.0	108.2	8.05	2.44	p<0.05	55	107.7	109.6	111.6	7.32
13	50	103.8	106.0	108.2	8.01	2.56	p<0.05	55	107.9	109.8	111.7	7.23
14	50	103.9	106.1	108.3	7.92	2.55	p<0.05	55	108.0	109.9	111.8	7.17
15	50	104.1	106.3	108.5	7.87	2.49	p<0.05	55	108.1	110.0	111.8	7.12
16	50	104.3	106.5	108.7	7.91	2.37	p<0.05	55	108.1	110.0	111.9	7.10
17	50	104.6	106.8	109.0	7.91	2.21	p<0.05	55	108.2	110.0	111.9	7.10
18	49	104.7	106.9	109.1	7.82	2.17	p<0.05	55	108.2	110.1	112.0	7.16
19	49	105.0	107.2	109.4	7.88	2.01	p<0.05	55	108.3	110.2	112.1	7.24
20	46	105.1	107.4	109.7	7.91	1.93		55	108.4	110.3	112.3	7.27
21	46	105.3	107.6	109.8	7.85	1.81		54	108.4	110.3	112.3	7.29
22	46	105.6	107.9	110.1	7.79	1.82		53	108.7	110.7	112.7	7.38
23	41	106.2	108.6	110.9	7.60	1.62		42	109.0	111.2	113.4	7.25
24	35	105.6	108.0	110.4	7.22	1.77		41	108.7	110.9	113.1	7.15
25	30	105.1	107.6	110.1	7.04	2.05	p<0.05	35	108.9	111.2	113.5	6.99

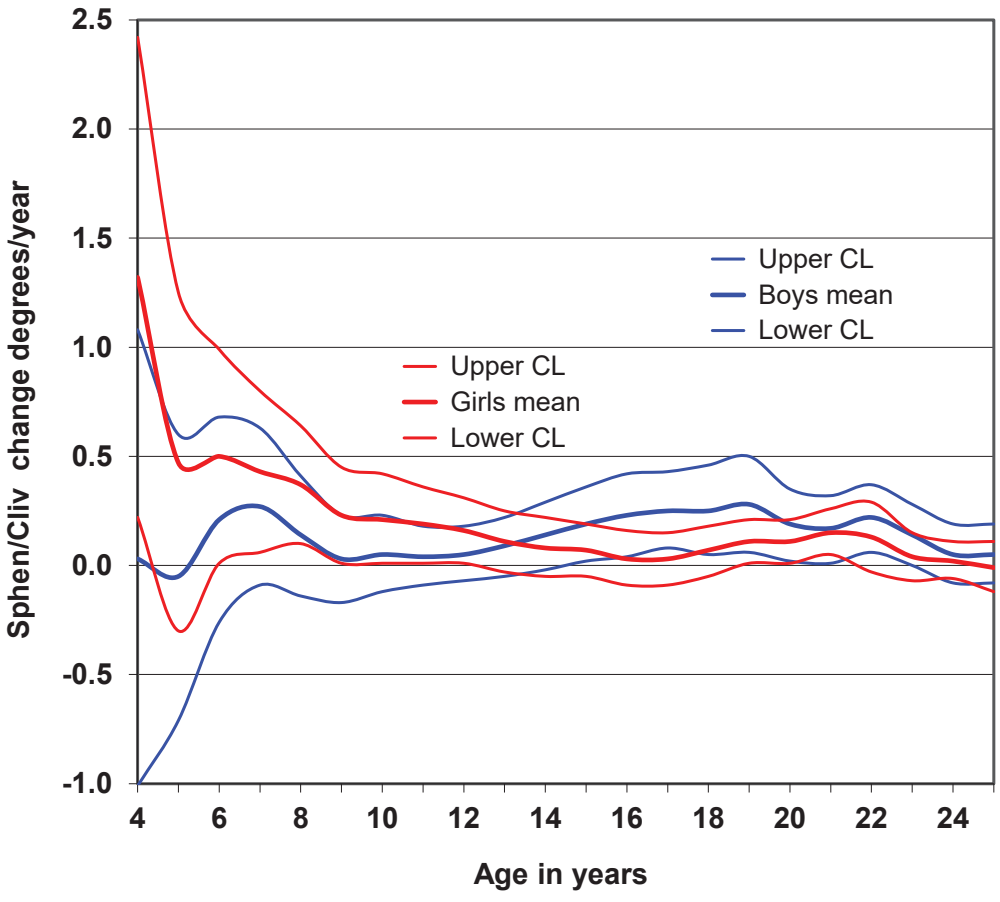
Change per year

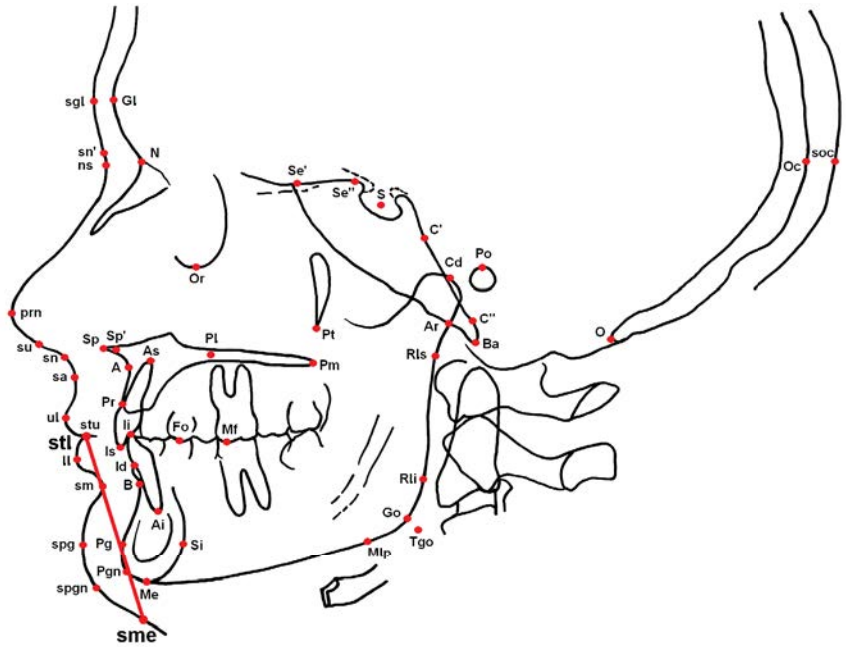
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.01	0.03	1.08	1.41	1.67		7	0.22	1.32	2.42	1.48
5	18	-0.71	-0.05	0.60	1.41	1.02		19	-0.30	0.47	1.25	1.72
6	35	-0.26	0.20	0.67	1.41	0.85		27	0.01	0.50	0.99	1.30
7	43	-0.09	0.27	0.63	1.21	0.61		39	0.06	0.43	0.80	1.18
8	48	-0.14	0.13	0.41	0.98	1.19		49	0.10	0.37	0.64	0.97
9	49	-0.17	0.03	0.23	0.72	1.30		53	0.01	0.23	0.45	0.81
10	50	-0.12	0.05	0.23	0.63	1.18		54	0.01	0.21	0.42	0.76
11	50	-0.09	0.04	0.18	0.49	1.24		55	0.01	0.19	0.36	0.67
12	50	-0.07	0.06	0.18	0.45	0.99		55	0.01	0.16	0.31	0.57
13	50	-0.04	0.09	0.22	0.47	0.21		55	-0.03	0.11	0.25	0.53
14	50	-0.01	0.14	0.30	0.55	-0.57		55	-0.05	0.08	0.22	0.51
15	50	0.02	0.19	0.36	0.61	-1.16		55	-0.05	0.07	0.19	0.47
16	50	0.05	0.24	0.42	0.67	-1.82		55	-0.09	0.03	0.16	0.46
17	50	0.08	0.26	0.43	0.62	-2.15	p<0.05	55	-0.09	0.03	0.15	0.45
18	49	0.05	0.26	0.46	0.73	-1.62		55	-0.05	0.07	0.18	0.44
19	49	0.07	0.28	0.50	0.78	-1.50		55	0.01	0.11	0.21	0.38
20	46	0.02	0.19	0.35	0.58	-0.82		55	0.01	0.11	0.21	0.38
21	46	0.01	0.17	0.32	0.54	-0.13		54	0.05	0.15	0.26	0.39
22	46	0.06	0.22	0.37	0.54	-0.75		53	-0.03	0.13	0.29	0.58
23	41	-0.00	0.14	0.28	0.46	-1.10		42	-0.07	0.04	0.15	0.36
24	35	-0.09	0.04	0.18	0.40	-0.24		41	-0.06	0.02	0.11	0.27
25	30	-0.09	0.04	0.17	0.36	-0.51		35	-0.12	-0.01	0.11	0.34

Sphen/Cliv Sphenoidal/Clivus plane angle



Sphen/Cliv Sphenoidal/Clivus plane angle, change



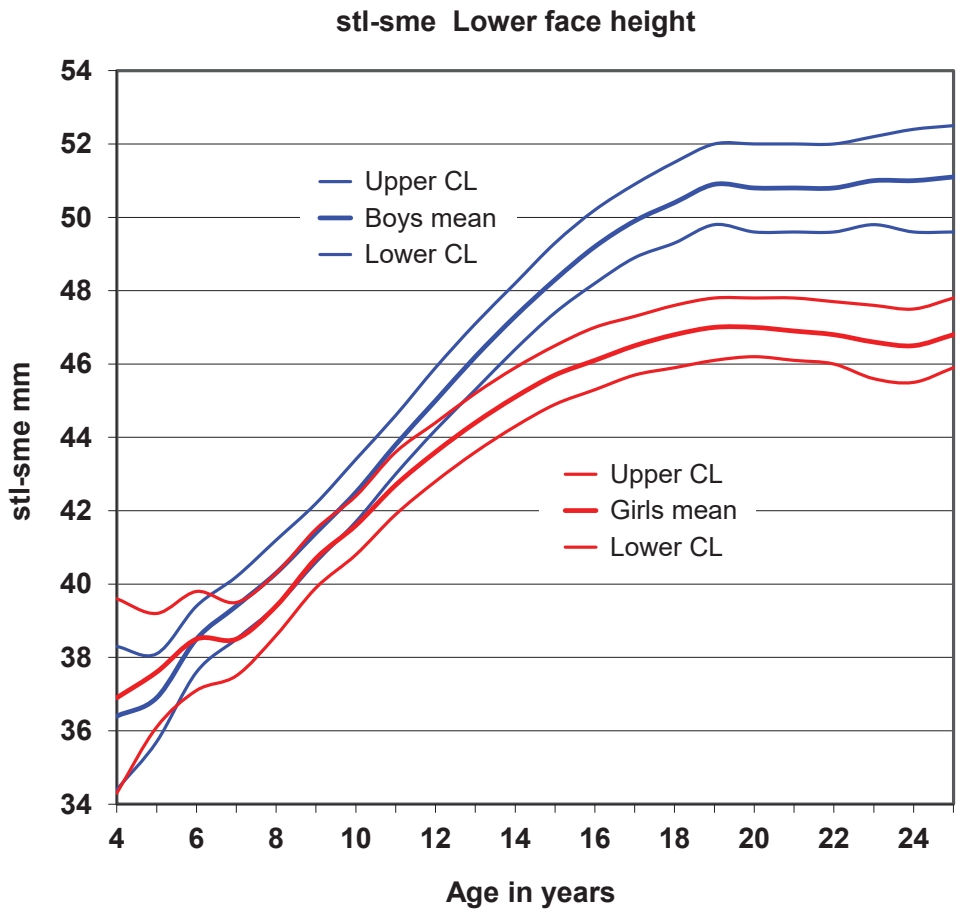


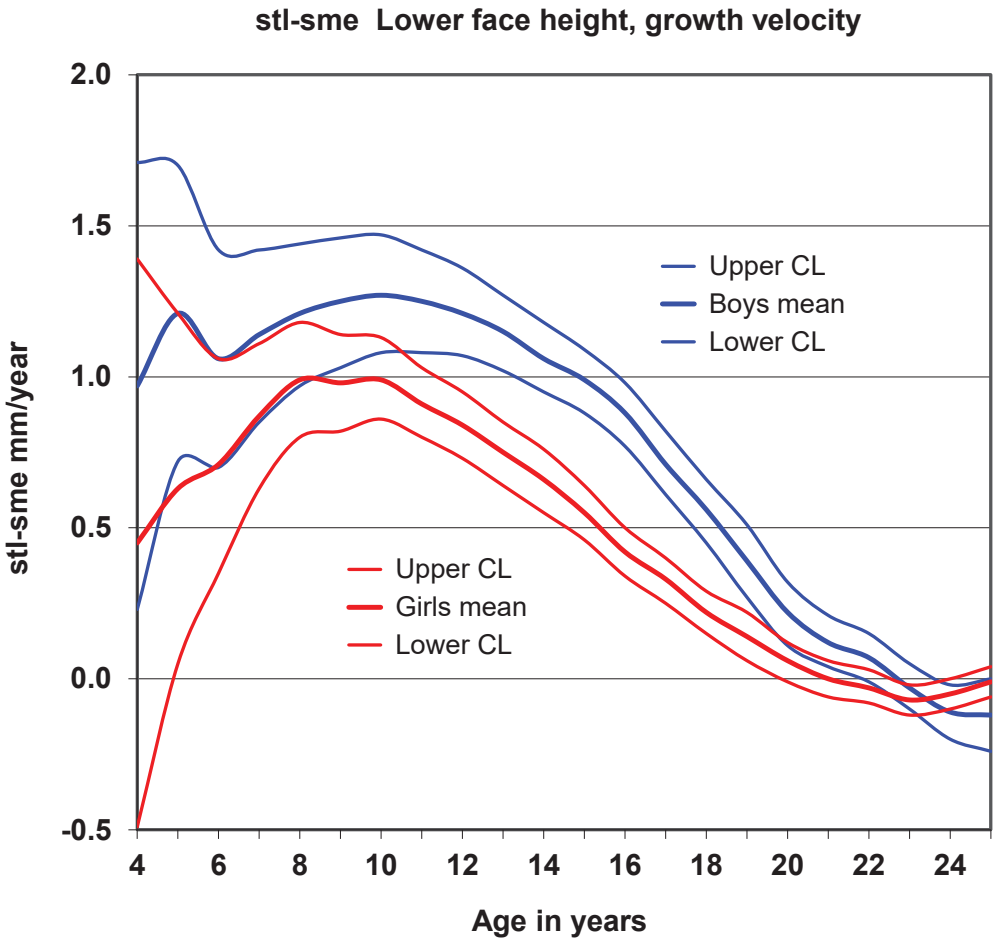
stl-sme (mm)

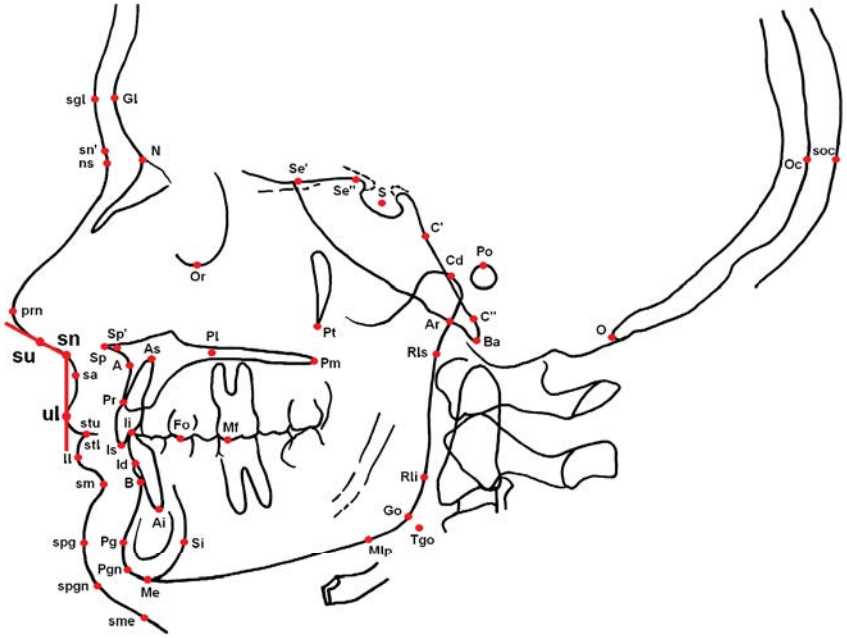
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	34.4	36.4	38.3	2.59	-0.33		7	34.3	36.9	39.6	3.56
5	18	35.7	36.9	38.1	2.61	-0.74		18	36.1	37.6	39.2	3.41
6	33	37.6	38.5	39.4	2.69	0.03		26	37.1	38.5	39.8	3.55
7	41	38.5	39.4	40.2	2.74	1.30		39	37.5	38.5	39.5	3.18
8	46	39.4	40.3	41.2	3.08	1.42		49	38.6	39.4	40.3	3.06
9	48	40.6	41.4	42.2	2.92	1.19		53	39.9	40.7	41.5	3.05
10	50	41.7	42.5	43.4	2.97	1.63		54	40.8	41.6	42.4	3.03
11	50	43.0	43.8	44.6	2.93	1.77		55	41.9	42.7	43.6	3.21
12	50	44.2	45.0	45.9	3.03	2.37	p<0.05	55	42.8	43.6	44.4	3.16
13	50	45.3	46.2	47.1	3.16	2.94	p<0.01	55	43.6	44.4	45.2	3.13
14	50	46.4	47.3	48.2	3.30	3.51	p<0.001	55	44.3	45.1	45.9	3.11
15	50	47.4	48.3	49.3	3.44	4.10	p<0.001	55	44.9	45.7	46.5	3.11
16	50	48.2	49.2	50.2	3.56	4.69	p<0.001	55	45.3	46.1	47.0	3.11
17	49	48.9	49.9	51.0	3.68	5.08	p<0.001	55	45.7	46.5	47.3	3.15
18	48	49.4	50.4	51.5	3.76	5.35	p<0.001	55	45.9	46.8	47.6	3.15
19	48	49.8	50.9	52.0	3.84	5.71	p<0.001	55	46.1	47.0	47.8	3.13
20	44	49.6	50.8	52.0	3.94	5.32	p<0.001	55	46.2	47.0	47.8	3.12
21	44	49.6	50.8	52.0	4.07	5.38	p<0.001	54	46.1	46.9	47.8	3.13
22	44	49.6	50.8	52.1	4.11	5.43	p<0.001	53	46.0	46.8	47.7	3.19
23	39	49.8	51.0	52.2	3.86	5.57	p<0.001	42	45.6	46.6	47.6	3.25
24	33	49.6	51.0	52.4	4.03	5.27	p<0.001	41	45.5	46.5	47.5	3.29
25	28	49.6	51.1	52.5	3.96	4.84	p<0.001	35	45.9	46.8	47.8	2.95

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	0.23	0.97	1.71	1.00	0.85		7	-0.49	0.45	1.39	1.27
5	18	0.72	1.21	1.70	1.06	1.51		18	0.05	0.63	1.21	1.25
6	33	0.69	1.06	1.42	1.06	1.34		26	0.35	0.71	1.06	0.92
7	41	0.85	1.13	1.42	0.94	1.37		39	0.63	0.87	1.11	0.76
8	46	0.97	1.20	1.44	0.82	1.37		49	0.80	0.99	1.18	0.68
9	48	1.03	1.25	1.46	0.75	2.01	p<0.05	53	0.82	0.98	1.14	0.59
10	50	1.08	1.27	1.47	0.69	2.39	p<0.05	54	0.86	0.99	1.13	0.50
11	50	1.08	1.25	1.42	0.60	3.28	p<0.01	55	0.80	0.91	1.03	0.45
12	50	1.07	1.21	1.36	0.52	4.07	p<0.001	55	0.73	0.84	0.95	0.42
13	50	1.02	1.15	1.27	0.45	4.80	p<0.001	55	0.64	0.75	0.85	0.40
14	50	0.95	1.07	1.18	0.41	5.23	p<0.001	55	0.55	0.66	0.76	0.39
15	50	0.88	0.99	1.09	0.37	6.19	p<0.001	55	0.46	0.55	0.64	0.35
16	50	0.78	0.88	0.98	0.37	7.03	p<0.001	55	0.34	0.42	0.50	0.30
17	49	0.61	0.72	0.82	0.37	6.17	p<0.001	55	0.25	0.33	0.40	0.28
18	48	0.45	0.56	0.66	0.37	5.48	p<0.001	55	0.15	0.22	0.29	0.25
19	48	0.28	0.39	0.51	0.42	3.56	p<0.001	55	0.06	0.14	0.22	0.30
20	44	0.11	0.22	0.32	0.36	2.60	p<0.05	55	-0.01	0.06	0.12	0.26
21	44	0.04	0.12	0.21	0.28	2.36	p<0.05	54	-0.06	0.00	0.06	0.22
22	44	-0.01	0.07	0.15	0.27	1.92		53	-0.08	-0.03	0.03	0.21
23	39	-0.10	-0.03	0.04	0.22	0.99		42	-0.12	-0.07	-0.02	0.17
24	33	-0.21	-0.12	-0.03	0.26	-1.32		41	-0.10	-0.05	0.00	0.17
25	28	-0.24	-0.13	-0.01	0.31	-1.97		35	-0.06	-0.01	0.04	0.16

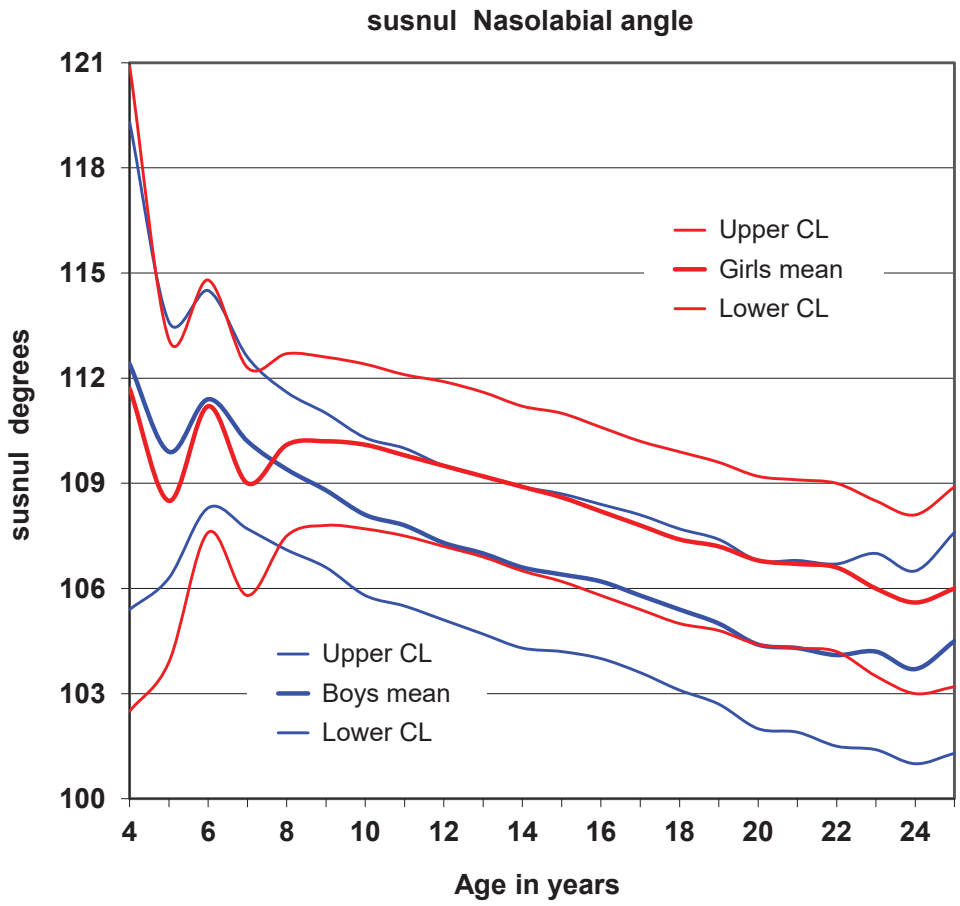

stl-sme Lower face height
54
52
50
48
46
44
42
40
38
36
34
stl-sme mm
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years

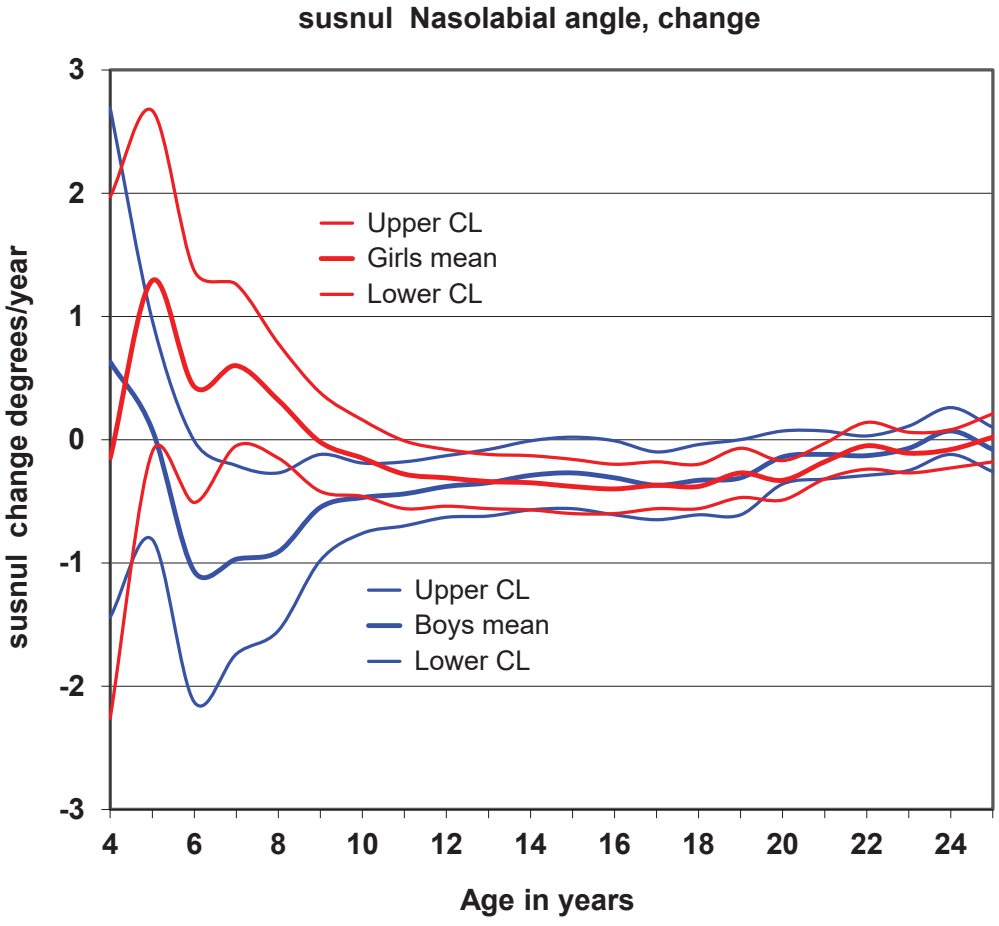

stl-sme Lower face height, growth velocity
2.0
1.5
1.0
0.5
0.0
-0.5
stl-sme mm/year
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL
4
6
8
10
12
14
16
18
20
22
24
Age in years



susnul (degrees)												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	105.4	112.4	119.3	9.35	-0.12		7	102.5	111.7	120.9	12.41
5	18	106.3	109.9	113.6	7.92	-0.47		19	103.9	108.5	113.1	10.18
6	35	108.3	111.4	114.4	9.21	-0.06		27	107.6	111.2	114.8	9.57
7	43	107.7	110.2	112.6	8.25	-0.54		39	105.8	109.0	112.3	10.28
8	48	107.1	109.4	111.7	7.99	0.40		49	107.5	110.1	112.7	9.21
9	49	106.6	108.8	111.1	7.97	0.82		53	107.8	110.2	112.6	8.98
10	50	105.9	108.1	110.3	8.02	1.19		54	107.7	110.1	112.4	8.85
11	50	105.6	107.8	110.0	8.05	1.22		55	107.5	109.8	112.1	8.78
12	50	105.1	107.3	109.6	8.04	1.32		55	107.2	109.5	111.9	8.88
13	50	104.7	106.9	109.2	8.20	1.36		55	106.9	109.2	111.6	8.95
14	50	104.3	106.6	108.9	8.20	1.34		55	106.5	108.9	111.2	9.02
15	50	104.2	106.4	108.6	8.03	1.30		55	106.2	108.6	111.0	9.07
16	50	103.9	106.1	108.3	7.95	1.24		55	105.8	108.2	110.6	9.15
17	50	103.5	105.7	108.0	8.12	1.22		55	105.4	107.8	110.2	9.22
18	49	103.0	105.3	107.6	8.28	1.23		55	105.0	107.4	109.9	9.24
19	49	102.6	104.9	107.3	8.51	1.30		55	104.8	107.2	109.6	9.08
20	46	101.8	104.2	106.7	8.42	1.47		55	104.4	106.8	109.2	9.08
21	46	101.7	104.2	106.7	8.65	1.41		54	104.3	106.7	109.1	9.06
22	46	101.4	104.0	106.6	9.04	1.47		53	104.2	106.6	109.0	8.95
23	41	101.2	104.1	106.9	9.25	1.00		42	103.5	106.0	108.5	8.38
24	35	100.8	103.6	106.5	8.57	1.00		41	103.0	105.6	108.1	8.28
25	30	101.2	104.4	107.6	8.99	0.76		35	103.2	106.0	108.9	8.65

Change per year												
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.44	0.63	2.69	2.79	-0.51		7	-2.26	-0.15	1.97	2.85
5	18	-0.81	0.08	0.97	1.92	1.42		19	-0.10	1.29	2.67	3.07
6	35	-2.10	-1.04	0.02	3.21	1.97		27	-0.51	0.43	1.37	2.49
7	43	-1.72	-0.95	-0.18	2.57	2.98	p<0.01	39	-0.05	0.60	1.26	2.09
8	48	-1.53	-0.89	-0.26	2.26	3.02	p<0.01	49	-0.15	0.32	0.78	1.65
9	49	-0.97	-0.54	-0.12	1.52	1.77		53	-0.42	-0.02	0.38	1.48
10	50	-0.76	-0.48	-0.19	1.03	1.50		54	-0.46	-0.15	0.16	1.18
11	50	-0.71	-0.45	-0.19	0.94	0.87		55	-0.56	-0.28	-0.01	1.04
12	50	-0.66	-0.40	-0.14	0.94	0.50		55	-0.54	-0.31	-0.08	0.88
13	50	-0.65	-0.37	-0.09	1.02	0.18		55	-0.56	-0.34	-0.12	0.83
14	50	-0.61	-0.32	-0.02	1.06	-0.17		55	-0.57	-0.35	-0.13	0.83
15	50	-0.59	-0.29	0.01	1.08	-0.47		55	-0.60	-0.38	-0.16	0.83
16	50	-0.64	-0.33	-0.03	1.11	-0.36		55	-0.60	-0.40	-0.20	0.74
17	50	-0.69	-0.40	-0.11	1.05	0.15		55	-0.56	-0.37	-0.18	0.70
18	49	-0.63	-0.34	-0.05	1.04	-0.23		55	-0.56	-0.38	-0.20	0.68
19	49	-0.62	-0.31	-0.01	1.09	0.25		55	-0.47	-0.27	-0.07	0.76
20	46	-0.36	-0.15	0.07	0.75	-1.32		55	-0.49	-0.33	-0.17	0.61
21	46	-0.31	-0.12	0.07	0.66	-0.46		54	-0.32	-0.18	-0.03	0.55
22	46	-0.28	-0.12	0.04	0.54	0.56		53	-0.24	-0.05	0.14	0.70
23	41	-0.22	-0.05	0.12	0.56	-0.49		42	-0.27	-0.11	0.06	0.54
24	35	-0.07	0.11	0.30	0.57	-1.55		41	-0.23	-0.08	0.08	0.50
25	30	-0.23	-0.01	0.21	0.61	0.19		35	-0.18	0.02	0.21	0.59


susnul Nasolabial angle
susnul degrees
121
118
115
112
109
106
103
100
4
6
8
10
12
14
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL


susnul Nasolabial angle, change
susnul change degrees/year
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-2
-3
4
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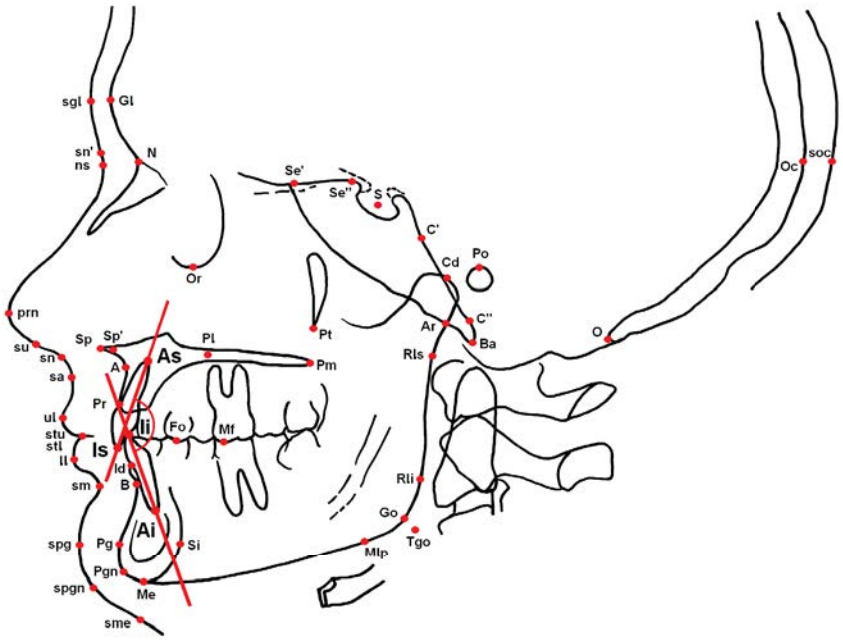
16
18
20
22
24
Age in years
Upper CL
Girls mean
Lower CL
Upper CL
Boys mean
Lower CL

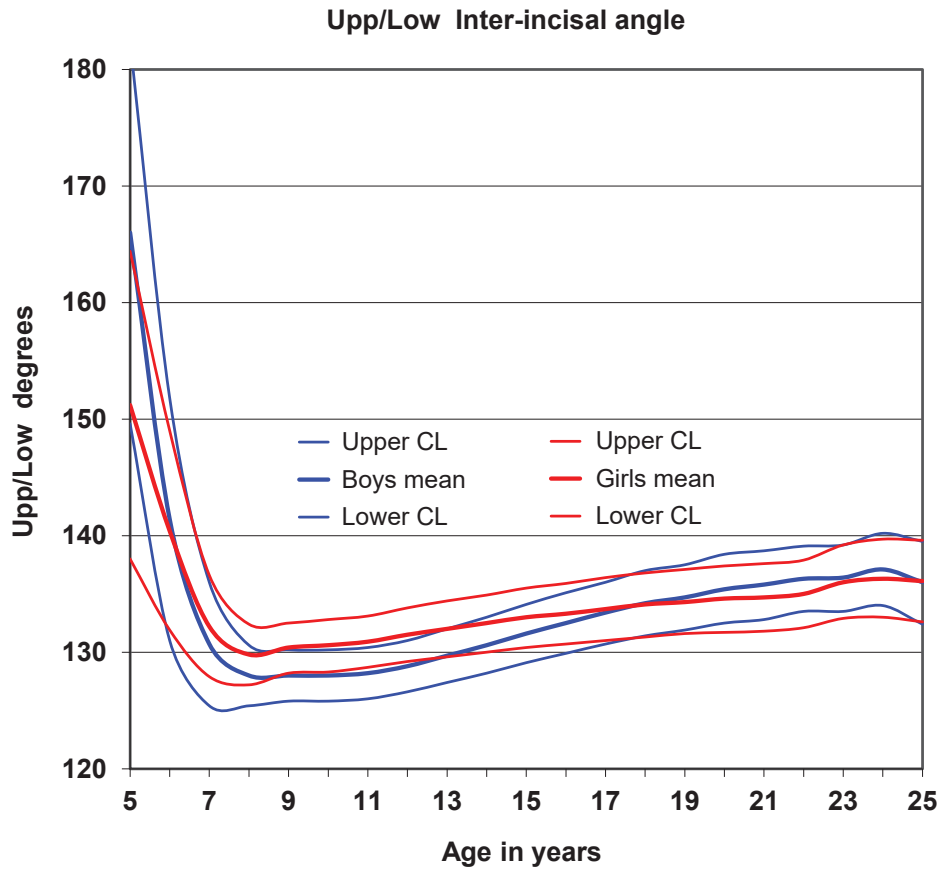


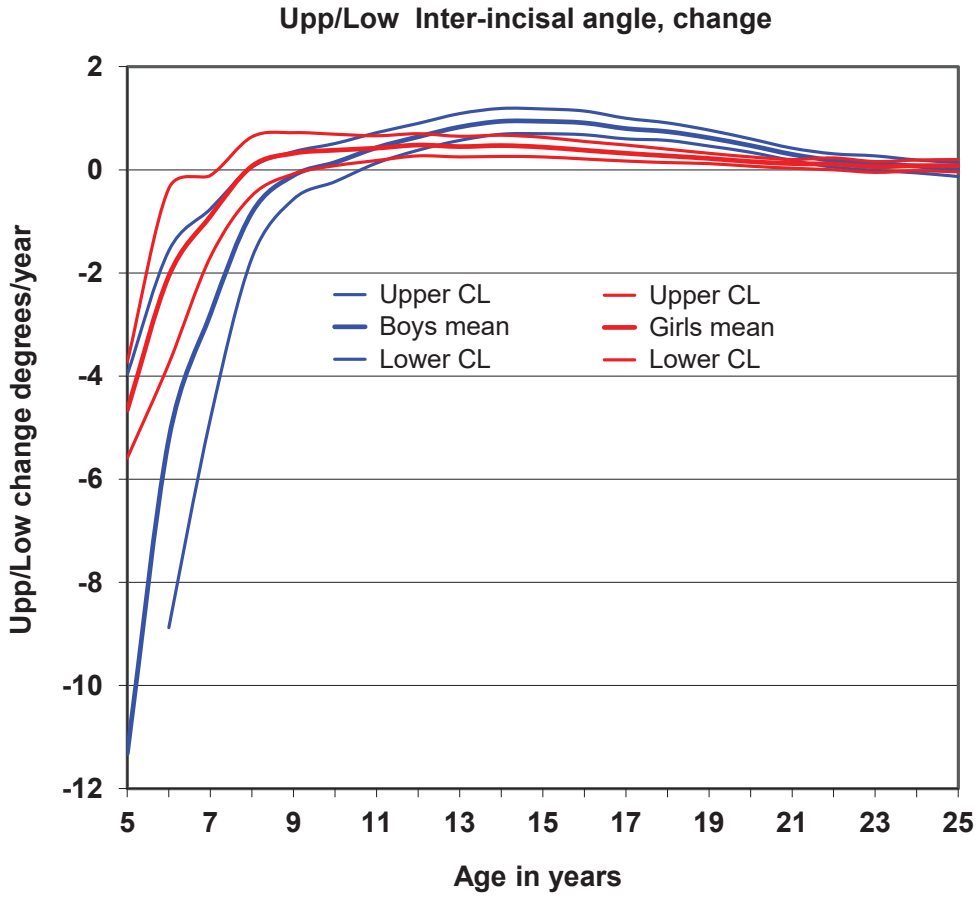
Upp/Low (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	149.6	166.0	182.4	16.75	1.30		3	138.0	151.2	164.4	11.63
6	9	131.0	141.4	151.8	15.96	0.14		7	131.9	140.4	149.0	11.56
7	17	125.4	130.7	136.0	11.15	-0.49		19	127.9	132.4	137.0	10.06
8	32	125.4	128.0	130.6	7.53	-0.99		37	127.3	129.9	132.6	8.25
9	46	125.8	128.0	130.2	7.58	-1.48		48	128.2	130.3	132.5	7.70
10	48	125.8	128.0	130.2	7.78	-1.59		50	128.3	130.6	132.8	8.04
11	48	126.0	128.2	130.4	7.81	-1.66		53	128.7	130.9	133.1	8.31
12	48	126.5	128.8	131.0	7.93	-1.65		54	129.2	131.5	133.8	8.59
13	49	127.4	129.7	132.0	8.21	-1.36		54	129.6	132.0	134.4	8.98
14	49	128.2	130.6	133.0	8.59	-1.09		55	130.1	132.5	134.9	9.25
15	49	129.1	131.6	134.1	8.97	-0.76		55	130.4	133.0	135.5	9.56
16	49	129.9	132.5	135.1	9.29	-0.45		55	130.8	133.4	136.0	9.85
17	49	130.7	133.4	136.0	9.54	-0.19		55	131.0	133.7	136.4	10.12
18	48	131.4	134.2	136.9	9.87	0.04		55	131.3	134.1	136.8	10.34
19	49	131.8	134.7	137.5	10.05	0.15		55	131.6	134.3	137.1	10.52
20	46	132.4	135.4	138.3	10.23	0.40		55	131.7	134.6	137.4	10.66
21	46	132.8	135.7	138.7	10.28	0.50		54	131.8	134.7	137.6	10.83
22	45	133.4	136.3	139.1	9.74	0.61		53	132.1	135.0	137.9	10.87
23	40	133.5	136.4	139.2	9.23	0.15		40	132.9	136.0	139.2	10.29
24	35	134.0	137.1	140.2	9.45	0.33		38	133.0	136.3	139.7	10.58
25	28	132.4	135.9	139.5	9.52	-0.05		34	132.6	136.1	139.6	10.42

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	-18.68	-11.32	-3.97	7.50	1.50		3	-5.59	-4.66	-3.73	0.82
6	9	-8.88	-5.22	-1.57	5.60	1.40		7	-3.76	-2.06	-0.36	2.30
7	17	-4.83	-2.80	-0.76	4.29	1.86		19	-1.60	-0.79	0.01	1.79
8	32	-1.71	-0.83	0.05	2.54	1.84		37	-0.44	0.13	0.71	1.78
9	46	-0.57	-0.11	0.35	1.58	1.54		48	-0.03	0.36	0.75	1.39
10	48	-0.23	0.14	0.50	1.30	1.10		50	0.10	0.40	0.71	1.09
11	48	0.13	0.42	0.72	1.04	0.08		53	0.20	0.44	0.68	0.89
12	48	0.38	0.64	0.90	0.92	-0.86		54	0.28	0.49	0.70	0.79
13	49	0.57	0.83	1.09	0.92	-2.29	p<0.05	54	0.25	0.45	0.65	0.75
14	49	0.68	0.94	1.19	0.90	-2.88	p<0.01	55	0.26	0.46	0.67	0.77
15	49	0.70	0.94	1.18	0.86	-3.27	p<0.01	55	0.25	0.44	0.62	0.70
16	49	0.67	0.90	1.13	0.83	-3.67	p<0.001	55	0.20	0.37	0.54	0.65
17	49	0.59	0.80	1.00	0.73	-3.68	p<0.001	55	0.17	0.32	0.48	0.58
18	48	0.56	0.74	0.91	0.61	-4.31	p<0.001	55	0.14	0.27	0.40	0.49
19	49	0.46	0.62	0.77	0.55	-4.29	p<0.001	55	0.12	0.22	0.32	0.39
20	46	0.34	0.47	0.60	0.45	-3.90	p<0.001	55	0.07	0.16	0.25	0.35
21	46	0.18	0.30	0.42	0.41	-2.54	p<0.05	54	0.03	0.12	0.20	0.32
22	45	0.05	0.18	0.31	0.45	-0.79		53	0.00	0.11	0.23	0.42
23	40	-0.01	0.13	0.27	0.45	-0.89		40	-0.05	0.06	0.16	0.33
24	35	-0.05	0.07	0.20	0.38	0.12		38	-0.02	0.08	0.19	0.33
25	28	-0.11	0.02	0.15	0.36	0.69		34	-0.04	0.08	0.20	0.37


Upp/Low Inter-incisal angle
Upp/Low degrees
180
170
160
150
140
130
120
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Upp/Low Inter-incisal angle, change
Upp/Low change degrees/year
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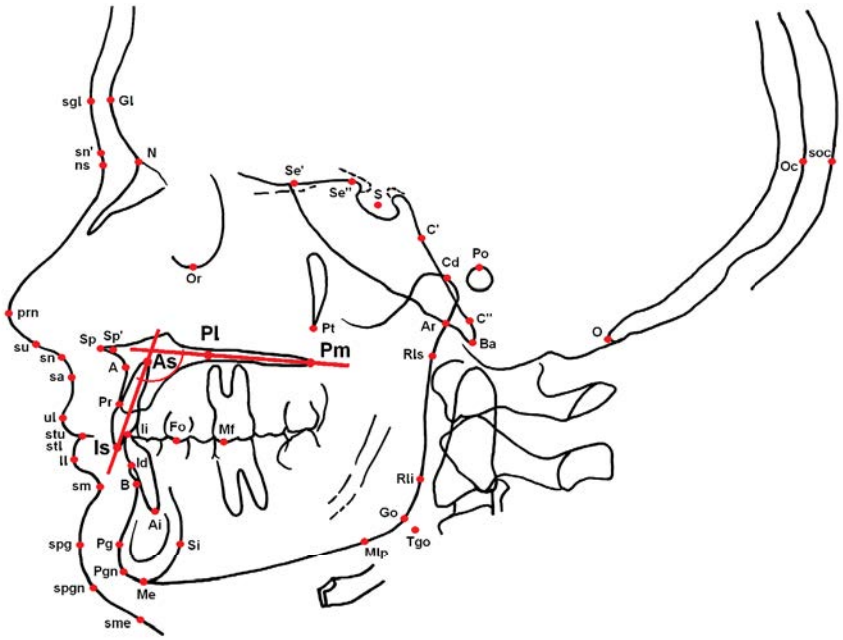
0
-2
-4
-6
-8
-10
-12
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

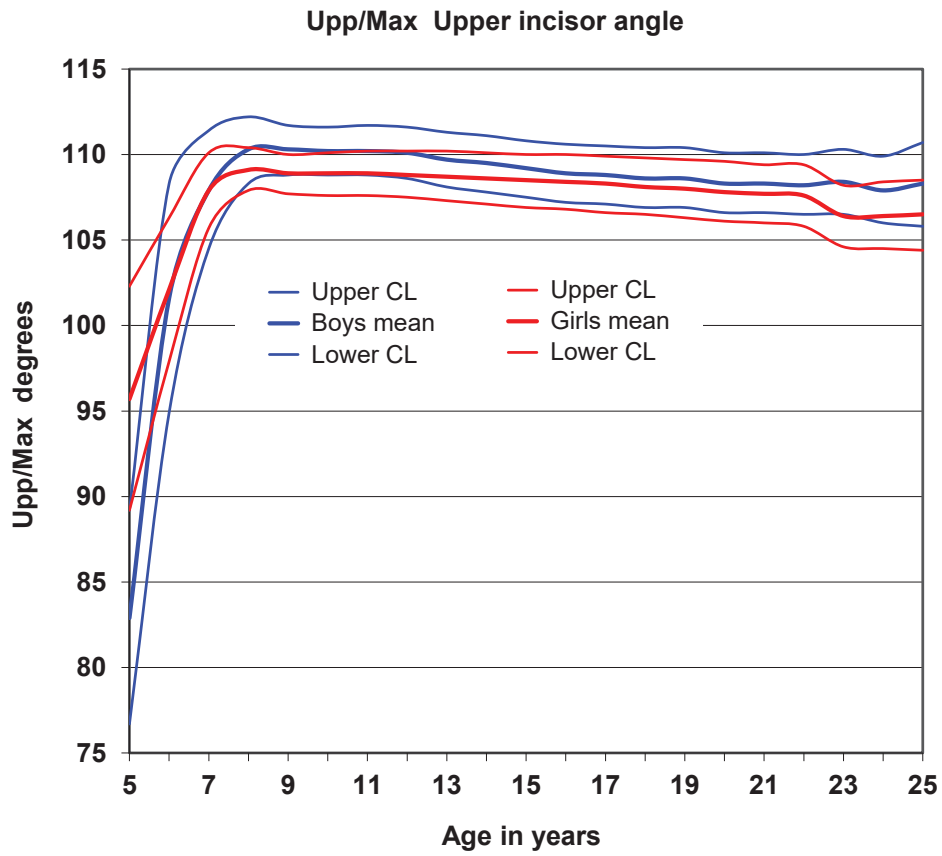


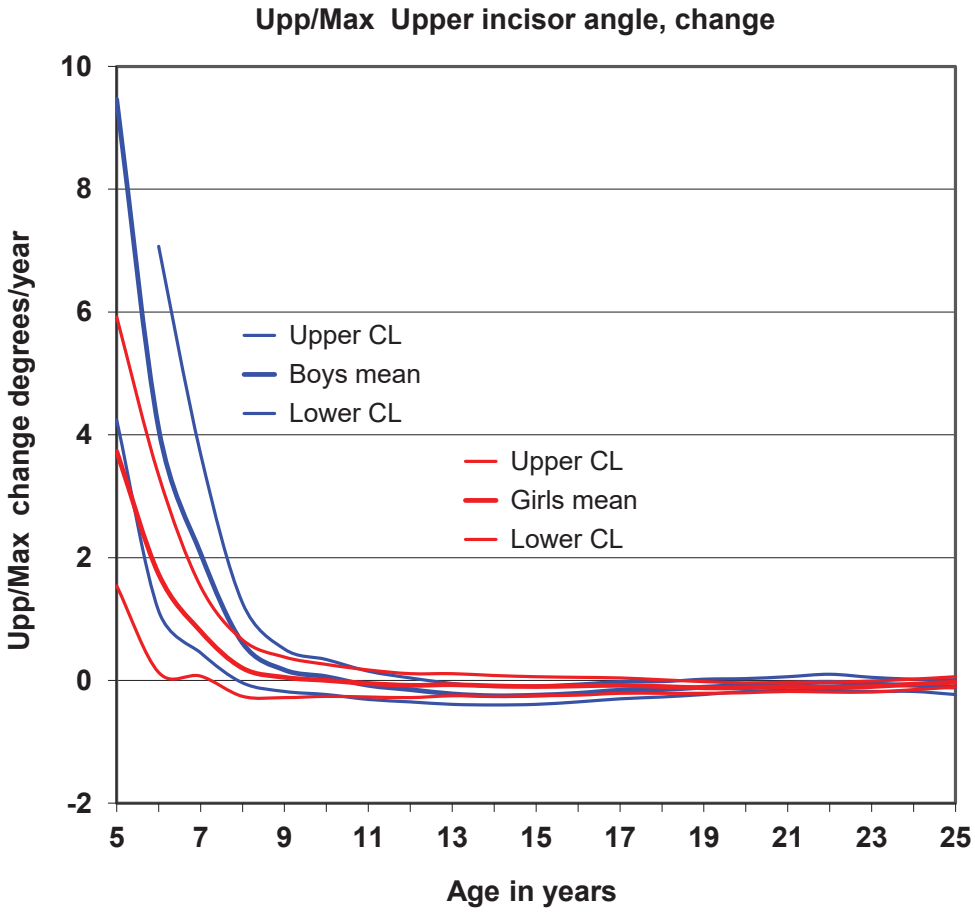
Upp/Max (degrees)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	76.7	82.9	89.2	6.35	-2.73	p<0.05	3	89.2	95.7	102.3	5.82
6	9	94.9	101.6	108.3	10.25	-0.11		7	97.9	102.1	106.3	5.66
7	17	104.5	107.9	111.4	7.23	0.03		19	105.6	107.9	110.2	5.12
8	32	108.3	110.3	112.2	5.61	1.02		37	107.8	109.1	110.4	4.01
9	46	108.8	110.3	111.7	4.94	1.47		48	107.7	108.9	110.1	4.24
10	48	108.8	110.2	111.6	4.90	1.41		50	107.6	108.9	110.1	4.48
11	48	108.8	110.2	111.7	5.11	1.32		53	107.6	108.9	110.2	4.83
12	48	108.6	110.1	111.6	5.33	1.21		54	107.5	108.8	110.2	5.11
13	49	108.1	109.7	111.3	5.69	0.91		54	107.3	108.7	110.1	5.39
14	49	107.8	109.5	111.1	5.91	0.78		55	107.1	108.6	110.1	5.60
15	49	107.5	109.2	110.8	5.98	0.60		55	106.9	108.5	110.0	5.83
16	49	107.2	108.9	110.6	6.06	0.47		55	106.8	108.4	110.0	6.05
17	49	107.1	108.8	110.5	6.09	0.39		55	106.6	108.3	109.9	6.22
18	48	106.9	108.6	110.4	6.17	0.39		55	106.5	108.1	109.8	6.35
19	49	106.9	108.6	110.4	6.17	0.51		55	106.3	108.0	109.7	6.45
20	46	106.6	108.3	110.1	6.19	0.39		55	106.1	107.8	109.6	6.47
21	46	106.6	108.3	110.1	6.13	0.49		54	106.0	107.7	109.4	6.51
22	45	106.5	108.2	110.0	6.04	0.49		53	105.8	107.6	109.4	6.59
23	40	106.5	108.4	110.3	6.01	1.49		40	104.6	106.4	108.2	5.84
24	35	105.9	107.9	109.9	6.00	1.06		38	104.5	106.4	108.4	5.99
25	28	105.8	108.3	110.7	6.62	1.12		34	104.4	106.5	108.5	6.18

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	4.24	9.46	14.67	5.32	1.75		3	1.54	3.73	5.92	1.94
6	9	1.13	4.10	7.07	4.54	1.26		7	0.13	1.73	3.34	2.17
7	17	0.45	2.07	3.69	3.41	1.53		19	-0.03	0.72	1.47	1.67
8	32	-0.04	0.61	1.26	1.88	1.15		37	-0.31	0.15	0.61	1.43
9	46	-0.18	0.16	0.51	1.20	0.61		48	-0.31	0.02	0.34	1.15
10	48	-0.23	0.05	0.34	1.02	0.35		50	-0.27	-0.02	0.24	0.93
11	48	-0.31	-0.08	0.15	0.81	-0.15		53	-0.28	-0.06	0.16	0.82
12	48	-0.35	-0.15	0.04	0.68	-0.45		54	-0.28	-0.09	0.10	0.71
13	49	-0.39	-0.22	-0.05	0.62	-1.18		54	-0.25	-0.07	0.11	0.66
14	49	-0.40	-0.25	-0.10	0.54	-1.40		55	-0.25	-0.09	0.08	0.64
15	49	-0.39	-0.24	-0.09	0.54	-1.31		55	-0.25	-0.09	0.06	0.60
16	49	-0.35	-0.21	-0.06	0.52	-1.13		55	-0.23	-0.09	0.06	0.54
17	49	-0.30	-0.16	-0.02	0.49	-0.80		55	-0.21	-0.08	0.04	0.48
18	48	-0.27	-0.15	-0.02	0.45	-0.52		55	-0.21	-0.10	0.01	0.42
19	49	-0.23	-0.11	0.02	0.45	0.12		55	-0.21	-0.12	-0.02	0.35
20	46	-0.18	-0.08	0.03	0.37	0.71		55	-0.20	-0.12	-0.04	0.30
21	46	-0.16	-0.05	0.06	0.39	0.84		54	-0.18	-0.10	-0.03	0.28
22	45	-0.16	-0.03	0.10	0.46	1.05		53	-0.19	-0.11	-0.03	0.29
23	40	-0.18	-0.06	0.05	0.37	0.47		40	-0.19	-0.10	-0.01	0.29
24	35	-0.18	-0.08	0.02	0.30	-0.26		38	-0.15	-0.06	0.02	0.27
25	28	-0.23	-0.11	0.01	0.32	-1.13		34	-0.11	-0.03	0.06	0.25


Upp/Max Upper incisor angle
Upp/Max degrees
115
110
105
100
95
90
85
80
75
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Upp/Max Upper incisor angle, change
Upp/Max change degrees/year
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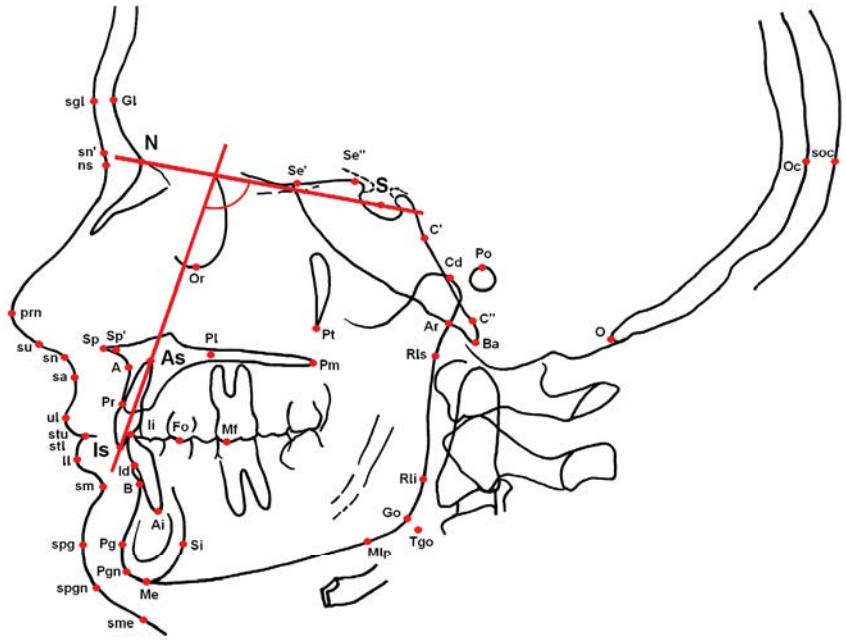
8
6
4
2
0
-2
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL

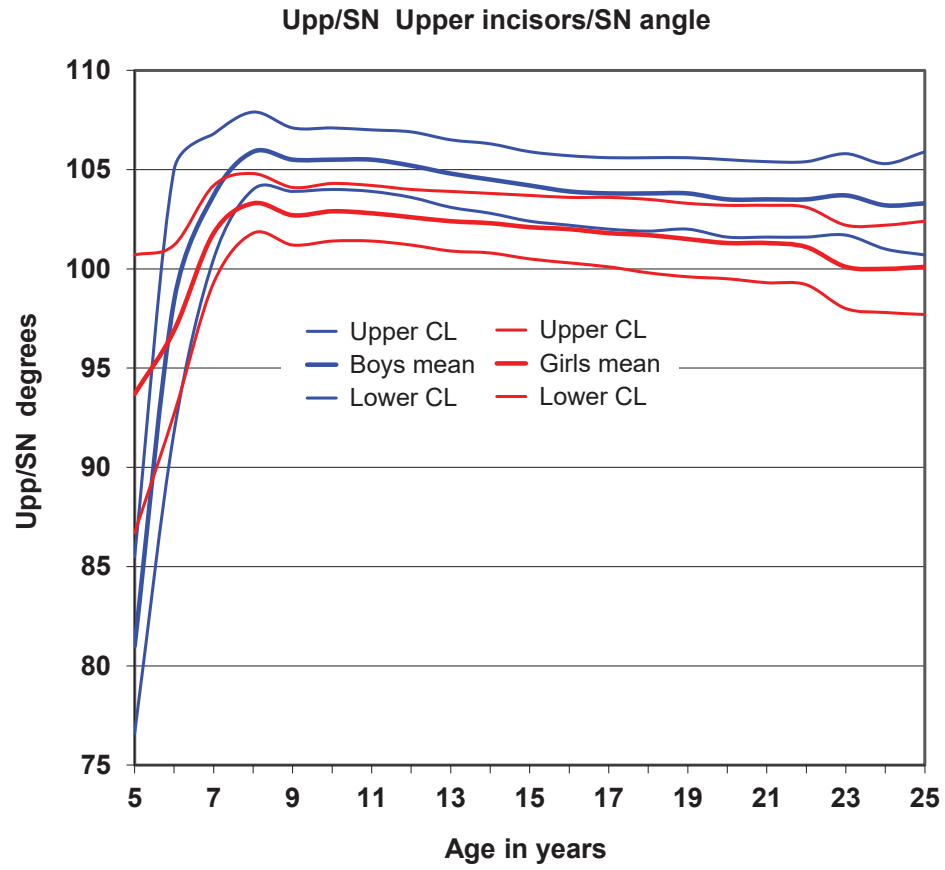


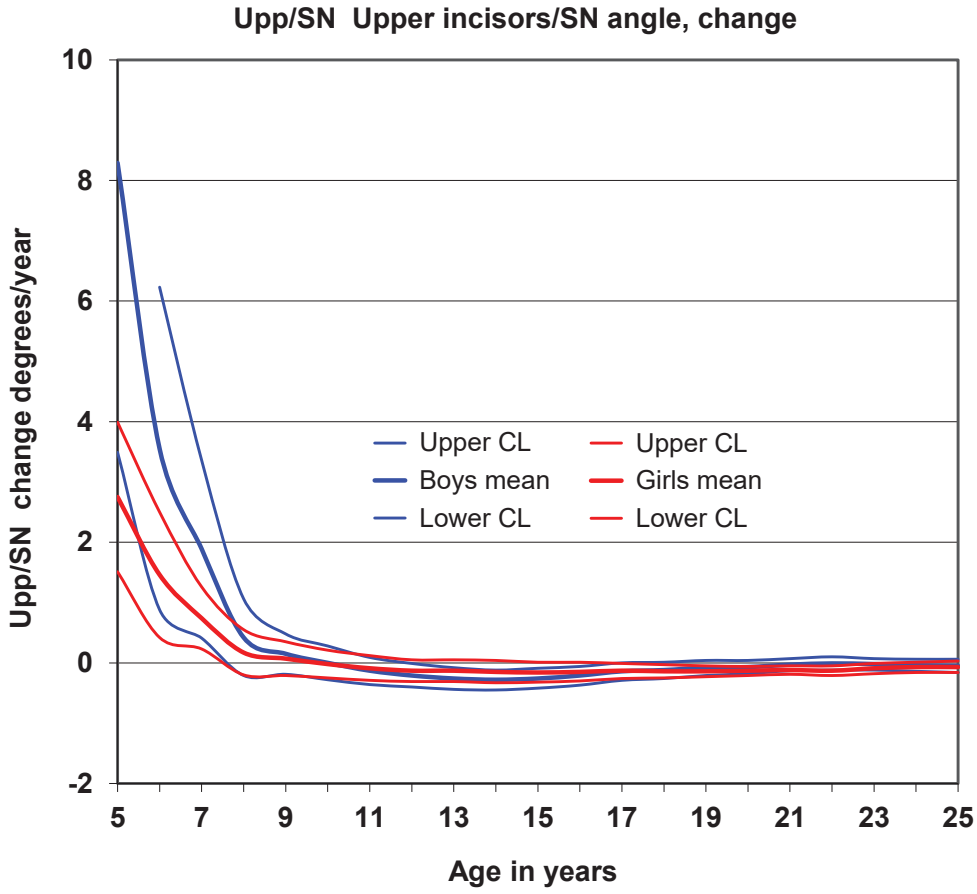
Upp/SN (degrees)

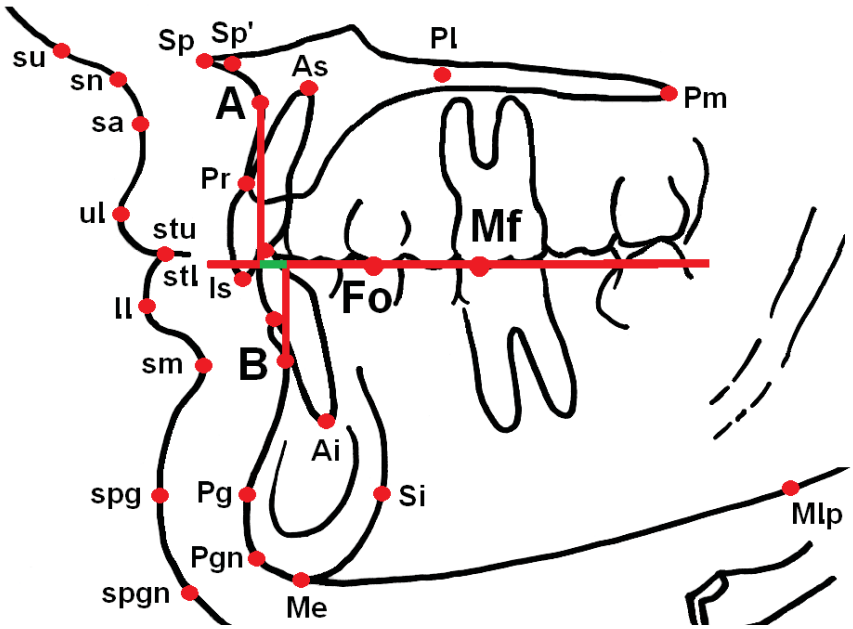
	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	76.6	81.0	85.5	4.54	-3.16	p<0.05	3	86.7	93.7	100.7	6.16
6	9	91.8	98.4	105.0	10.08	0.34		7	92.7	96.9	101.2	5.73
7	17	100.5	103.7	106.8	6.65	0.87		19	99.3	101.9	104.4	5.76
8	32	104.0	105.9	107.9	5.70	2.07	p<0.05	37	101.8	103.3	104.9	4.78
9	46	103.9	105.5	107.1	5.45	2.58	p<0.05	48	101.2	102.7	104.1	5.20
10	48	104.0	105.5	107.1	5.46	2.48	p<0.05	50	101.4	102.9	104.3	5.14
11	48	103.9	105.5	107.0	5.61	2.48	p<0.05	53	101.4	102.8	104.2	5.16
12	48	103.6	105.2	106.9	5.78	2.46	p<0.05	54	101.2	102.6	104.0	5.26
13	49	103.1	104.8	106.5	6.11	2.09	p<0.05	54	100.9	102.4	103.9	5.50
14	49	102.8	104.5	106.3	6.24	1.92		55	100.7	102.3	103.8	5.73
15	49	102.4	104.2	105.9	6.32	1.71		55	100.5	102.1	103.7	6.03
16	49	102.2	103.9	105.7	6.38	1.58		55	100.3	102.0	103.6	6.34
17	49	102.0	103.8	105.6	6.43	1.52		55	100.1	101.8	103.6	6.62
18	48	101.9	103.8	105.6	6.51	1.60		55	99.8	101.7	103.5	6.86
19	49	102.0	103.8	105.6	6.52	1.71		55	99.6	101.5	103.3	7.02
20	46	101.6	103.5	105.4	6.61	1.59		55	99.5	101.3	103.2	7.13
21	46	101.6	103.5	105.4	6.60	1.61		54	99.3	101.3	103.2	7.25
22	45	101.6	103.5	105.4	6.53	1.65		53	99.2	101.1	103.1	7.31
23	40	101.7	103.7	105.8	6.63	2.43	p<0.05	40	98.0	100.1	102.2	6.80
24	35	101.0	103.1	105.3	6.45	1.98		38	97.8	100.0	102.2	7.04
25	28	100.7	103.3	105.9	7.08	1.83		34	97.7	100.1	102.4	6.92

Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
5	4	3.49	8.29	13.09	4.90	1.88		3	1.51	2.75	3.99	1.10
6	9	0.88	3.55	6.23	4.10	1.29		7	0.42	1.46	2.50	1.41
7	17	0.41	1.89	3.36	3.09	1.61		19	0.15	0.66	1.17	1.14
8	32	-0.21	0.42	1.06	1.83	0.83		37	-0.25	0.12	0.50	1.16
9	46	-0.19	0.14	0.48	1.16	0.47		48	-0.23	0.04	0.31	0.97
10	48	-0.28	-0.00	0.27	0.98	0.18		50	-0.27	-0.04	0.19	0.83
11	48	-0.36	-0.14	0.09	0.80	-0.24		53	-0.30	-0.10	0.10	0.74
12	48	-0.40	-0.21	-0.01	0.68	-0.53		54	-0.32	-0.14	0.05	0.68
13	49	-0.44	-0.26	-0.09	0.63	-1.02		54	-0.31	-0.13	0.05	0.68
14	49	-0.45	-0.29	-0.12	0.58	-1.09		55	-0.33	-0.15	0.04	0.69
15	49	-0.42	-0.26	-0.10	0.58	-0.88		55	-0.32	-0.15	0.02	0.64
16	49	-0.37	-0.21	-0.06	0.55	-0.65		55	-0.29	-0.14	0.01	0.57
17	49	-0.29	-0.15	0.00	0.52	-0.11		55	-0.26	-0.13	-0.01	0.49
18	48	-0.26	-0.13	0.01	0.48	0.17		55	-0.25	-0.14	-0.03	0.40
19	49	-0.21	-0.08	0.04	0.45	0.73		55	-0.23	-0.14	-0.05	0.33
20	46	-0.18	-0.07	0.04	0.38	0.98		55	-0.21	-0.13	-0.06	0.29
21	46	-0.13	-0.03	0.07	0.34	1.55		54	-0.19	-0.12	-0.05	0.26
22	45	-0.12	-0.01	0.10	0.37	1.80		53	-0.21	-0.13	-0.05	0.30
23	40	-0.11	-0.02	0.07	0.30	1.09		40	-0.18	-0.09	-0.01	0.28
24	35	-0.13	-0.04	0.06	0.30	0.54		38	-0.16	-0.07	0.01	0.27
25	28	-0.16	-0.05	0.06	0.30	0.24		34	-0.16	-0.07	0.03	0.27


Upp/SN Upper incisors/SN angle
Upp/SN degrees
110
105
100
95
90
85
80
75
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL


Upp/SN Upper incisors/SN angle, change
Upp/SN change degrees/year
10
8
6
4
2
0
-2
5
7
9
11
13
15
17
19
21
23
25
Age in years
Upper CL
Boys mean
Lower CL
Upper CL
Girls mean
Lower CL



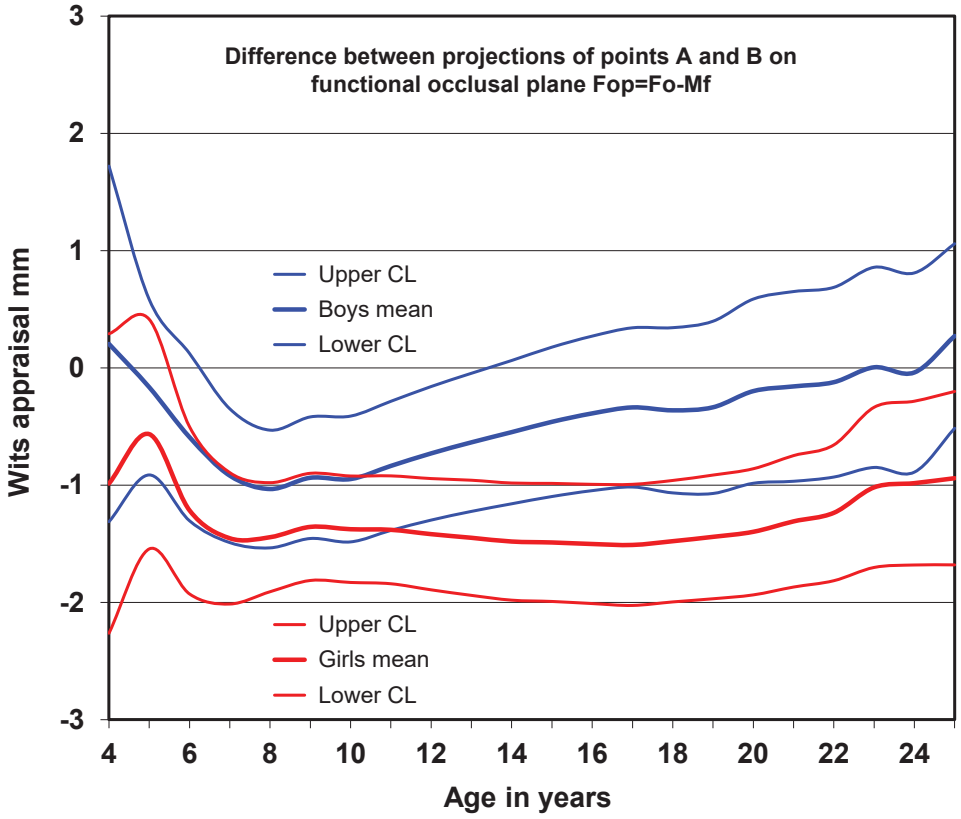
Wits appraisal (mm)

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-1.31	0.20	1.72	2.05	1.18		7	-2.26	-0.99	0.29	1.72
5	18	-0.91	-0.17	0.58	1.62	0.63		19	-1.54	-0.57	0.41	2.18
6	35	-1.30	-0.59	0.12	2.15	1.19		27	-1.93	-1.21	-0.50	1.89
7	43	-1.49	-0.92	-0.35	1.91	1.30		39	-2.01	-1.45	-0.89	1.78
8	48	-1.53	-1.03	-0.53	1.77	1.18		49	-1.91	-1.44	-0.98	1.66
9	49	-1.46	-0.94	-0.42	1.85	1.19		53	-1.81	-1.36	-0.90	1.70
10	50	-1.48	-0.95	-0.41	1.93	1.20		54	-1.83	-1.38	-0.92	1.70
11	50	-1.39	-0.84	-0.29	1.99	1.50		55	-1.84	-1.38	-0.92	1.74
12	50	-1.30	-0.73	-0.16	2.06	1.84		55	-1.89	-1.42	-0.94	1.80
13	50	-1.22	-0.64	-0.05	2.13	2.09	p<0.05	55	-1.94	-1.45	-0.96	1.86
14	50	-1.16	-0.55	0.06	2.20	2.34	p<0.05	55	-1.98	-1.48	-0.98	1.89
15	50	-1.10	-0.46	0.18	2.30	2.51	p<0.05	55	-1.99	-1.49	-0.99	1.91
16	50	-1.05	-0.39	0.27	2.38	2.65	p<0.01	55	-2.01	-1.50	-0.99	1.92
17	50	-1.02	-0.34	0.34	2.45	2.72	p<0.01	55	-2.03	-1.51	-0.99	1.95
18	49	-1.07	-0.36	0.34	2.52	2.54	p<0.05	55	-2.00	-1.48	-0.96	1.96
19	49	-1.07	-0.34	0.40	2.62	2.43	p<0.05	55	-1.97	-1.44	-0.91	1.99
20	46	-0.98	-0.20	0.59	2.72	2.53	p<0.05	55	-1.94	-1.40	-0.86	2.04
21	46	-0.97	-0.16	0.65	2.80	2.34	p<0.05	54	-1.87	-1.31	-0.75	2.10
22	46	-0.93	-0.12	0.69	2.80	2.24	p<0.05	53	-1.82	-1.24	-0.66	2.15
23	41	-0.85	0.00	0.86	2.79	1.84		42	-1.70	-1.02	-0.34	2.26
24	35	-0.89	-0.04	0.81	2.56	1.70		41	-1.68	-0.98	-0.28	2.28
25	30	-0.51	0.27	1.06	2.20	2.20	p<0.05	35	-1.68	-0.94	-0.20	2.23

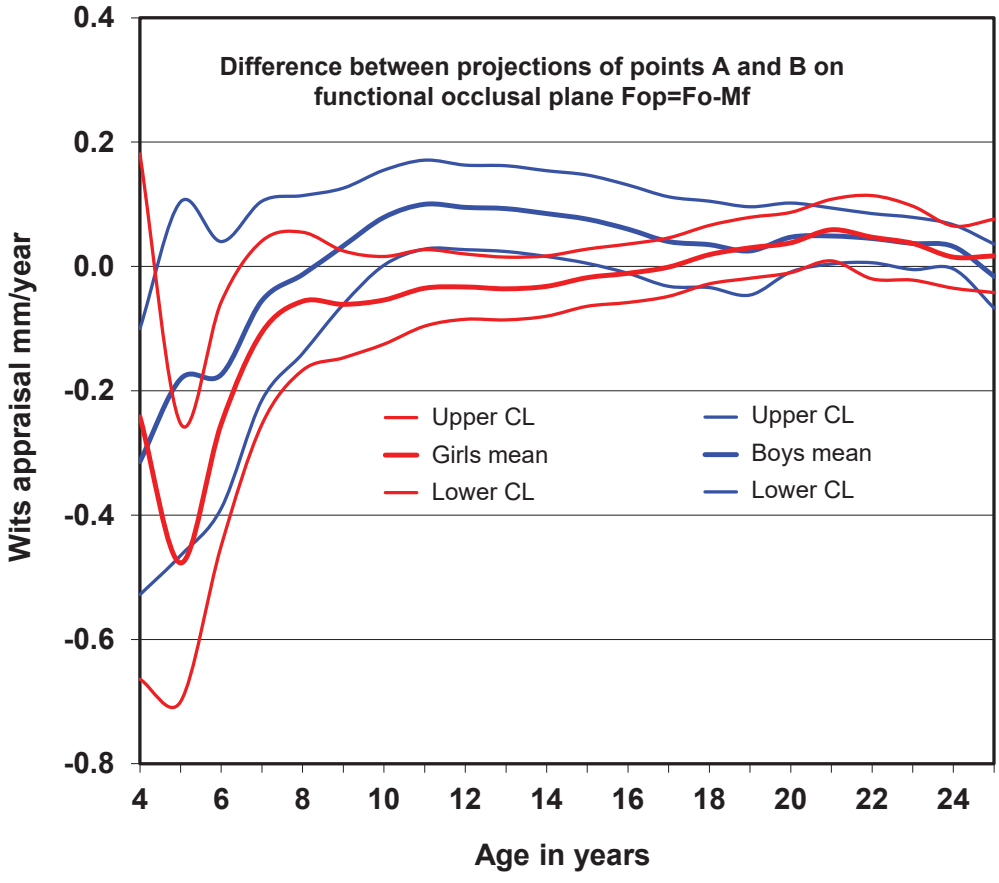
Change per year

	Boys							Girls				
Age	N	LowCL	Mean	UpCL	SD	T-test	B vs G	N	LowCL	Mean	UpCL	SD
4	7	-0.53	-0.31	-0.10	0.29	-0.30		7	-0.66	-0.24	0.18	0.57
5	18	-0.47	-0.18	0.10	0.62	1.61		19	-0.70	-0.48	-0.25	0.50
6	35	-0.39	-0.17	0.04	0.65	0.52		27	-0.45	-0.25	-0.06	0.52
7	43	-0.22	-0.06	0.10	0.54	0.46		39	-0.25	-0.11	0.04	0.47
8	48	-0.14	-0.01	0.11	0.45	0.50		49	-0.17	-0.06	0.05	0.40
9	49	-0.06	0.03	0.13	0.33	1.45		53	-0.15	-0.06	0.03	0.32
10	50	0.00	0.08	0.16	0.28	2.52	p<0.05	54	-0.12	-0.05	0.02	0.26
11	50	0.03	0.10	0.17	0.26	2.82	p<0.01	55	-0.10	-0.03	0.03	0.23
12	50	0.03	0.09	0.16	0.24	2.95	p<0.01	55	-0.09	-0.03	0.02	0.20
13	50	0.02	0.09	0.16	0.25	2.99	p<0.01	55	-0.09	-0.04	0.01	0.19
14	50	0.02	0.08	0.15	0.25	2.75	p<0.01	55	-0.08	-0.03	0.02	0.18
15	50	0.00	0.08	0.15	0.26	2.21	p<0.05	55	-0.06	-0.02	0.03	0.17
16	50	-0.01	0.06	0.13	0.26	1.67		55	-0.06	-0.01	0.04	0.18
17	50	-0.03	0.04	0.11	0.26	0.95		55	-0.05	-0.00	0.05	0.18
18	49	-0.03	0.04	0.10	0.25	0.38		55	-0.03	0.02	0.07	0.18
19	49	-0.05	0.02	0.10	0.25	-0.11		55	-0.02	0.03	0.08	0.19
20	46	-0.01	0.05	0.10	0.19	0.22		55	-0.01	0.04	0.09	0.18
21	46	0.00	0.05	0.09	0.16	-0.28		54	0.01	0.06	0.11	0.19
22	46	0.01	0.05	0.08	0.14	-0.04		53	-0.02	0.05	0.11	0.25
23	41	-0.00	0.04	0.08	0.14	-0.01		42	-0.02	0.04	0.10	0.20
24	35	-0.00	0.03	0.07	0.11	0.53		41	-0.03	0.01	0.06	0.16
25	30	-0.07	-0.02	0.04	0.14	-0.80		35	-0.04	0.02	0.08	0.18

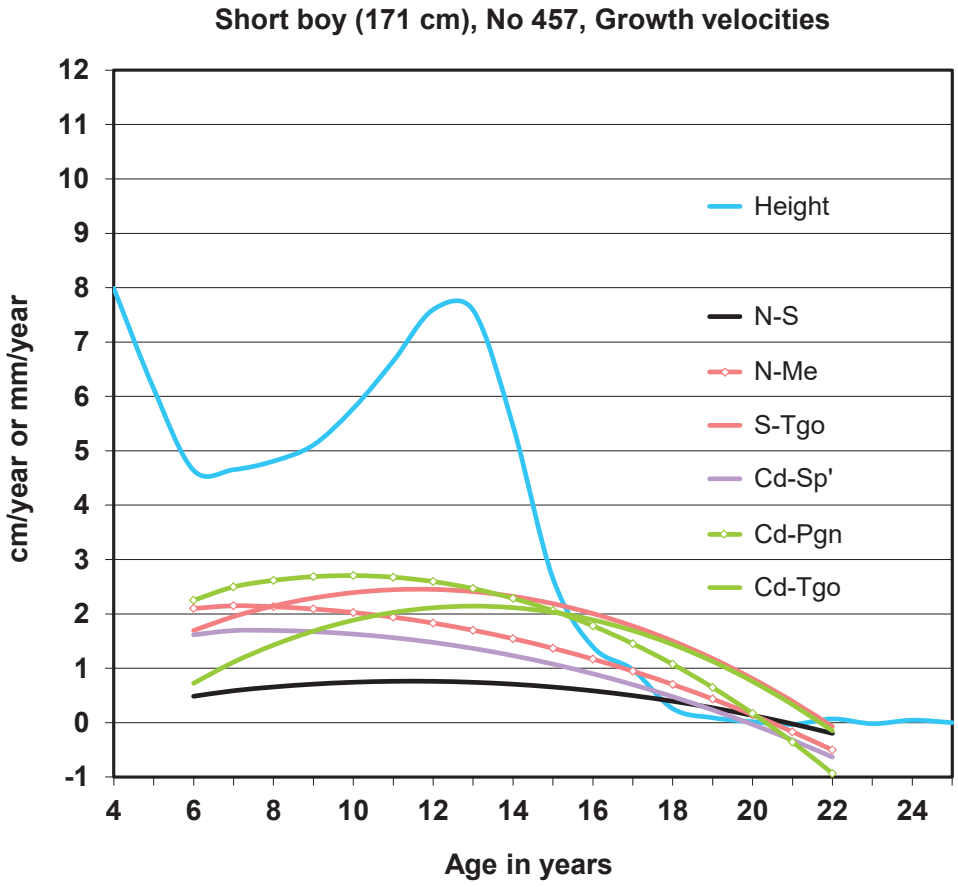
Wits appraisal



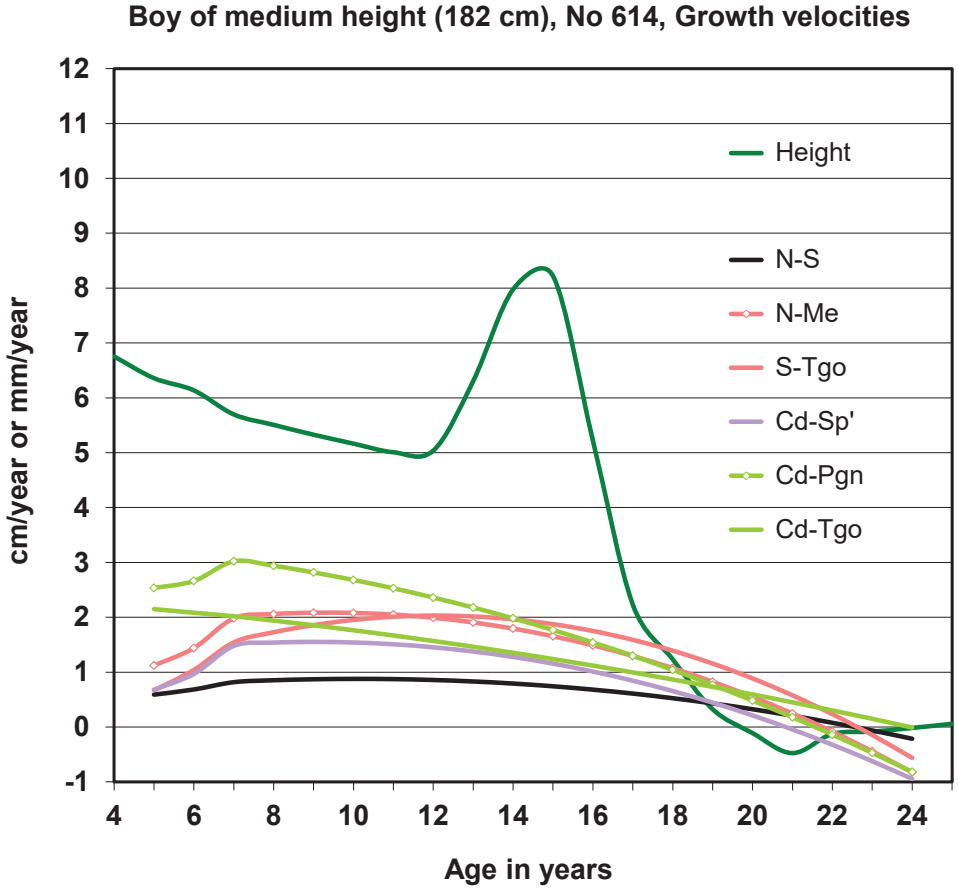
Wits appraisal, change

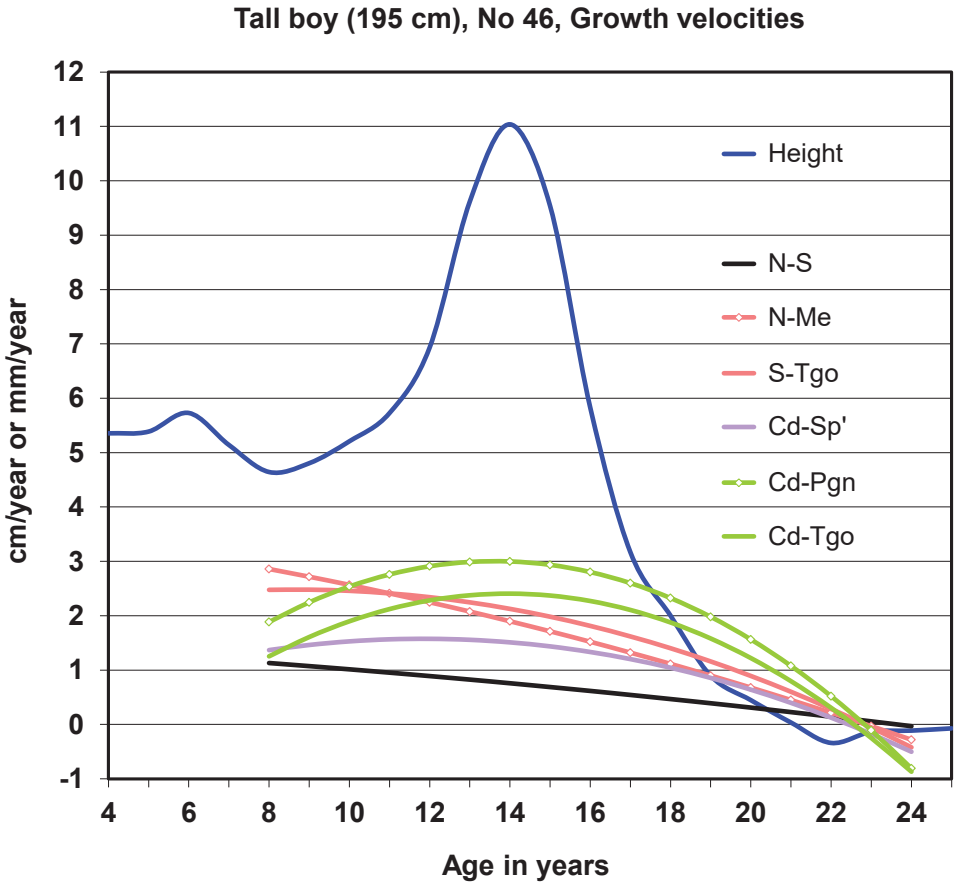


Short Boy

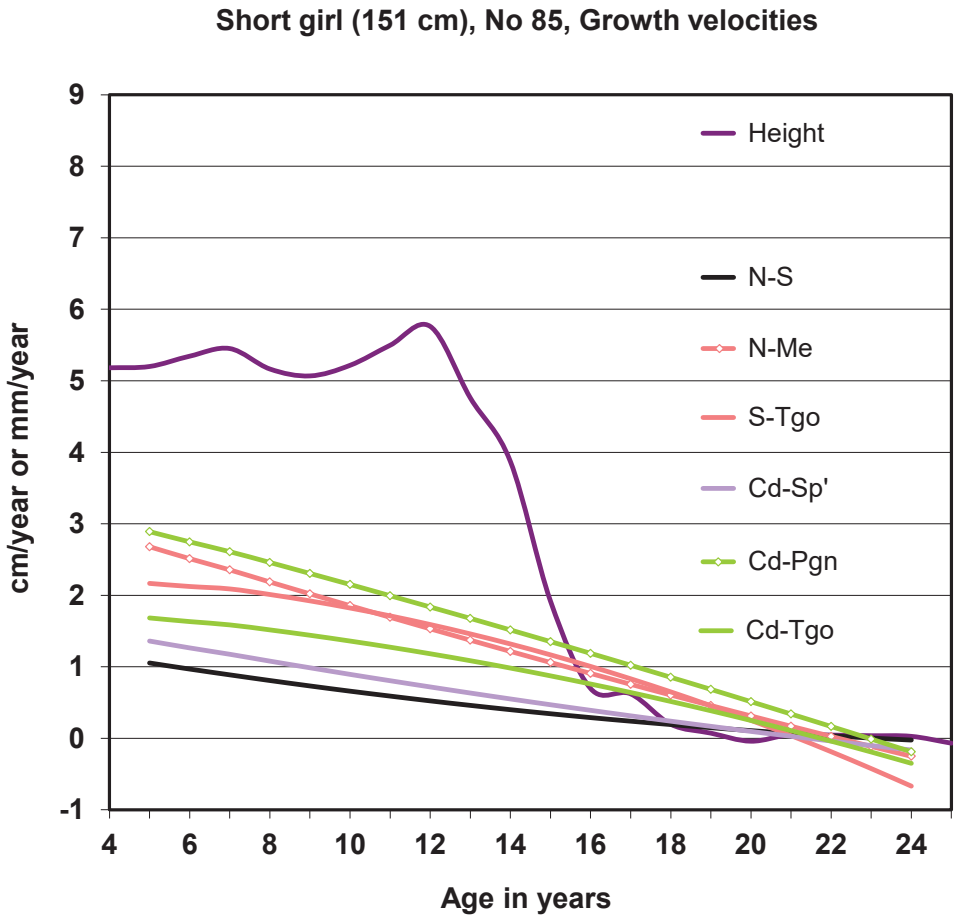


Medium Boy

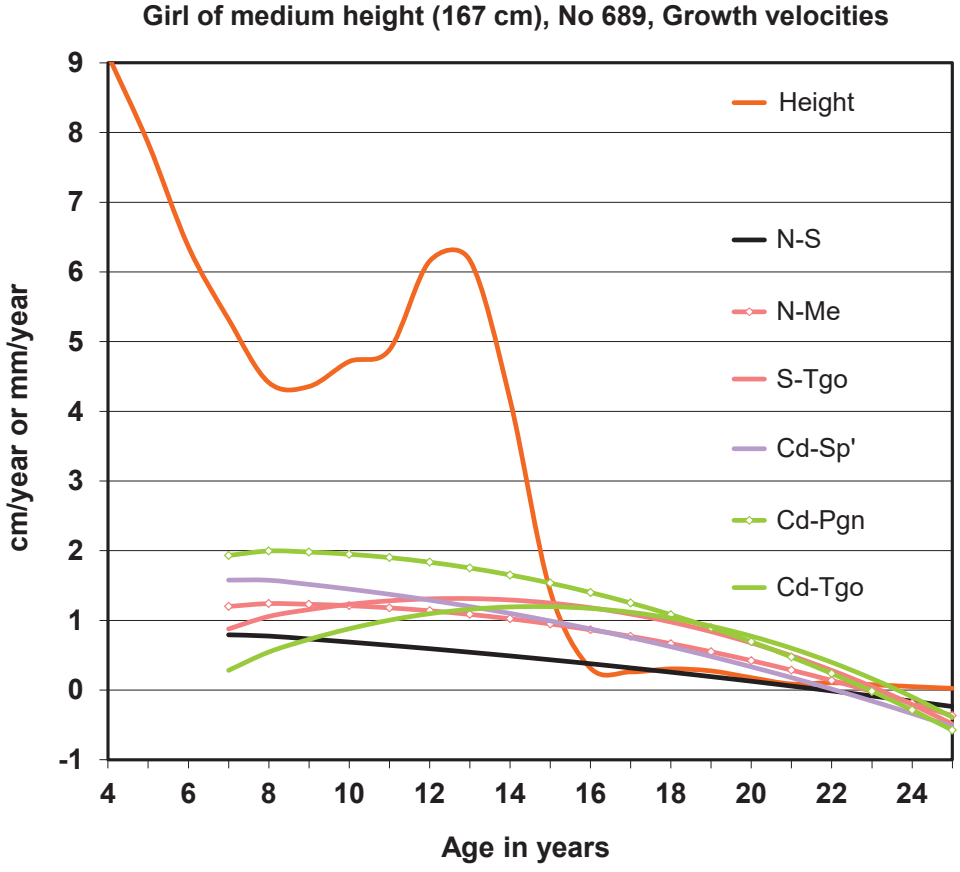


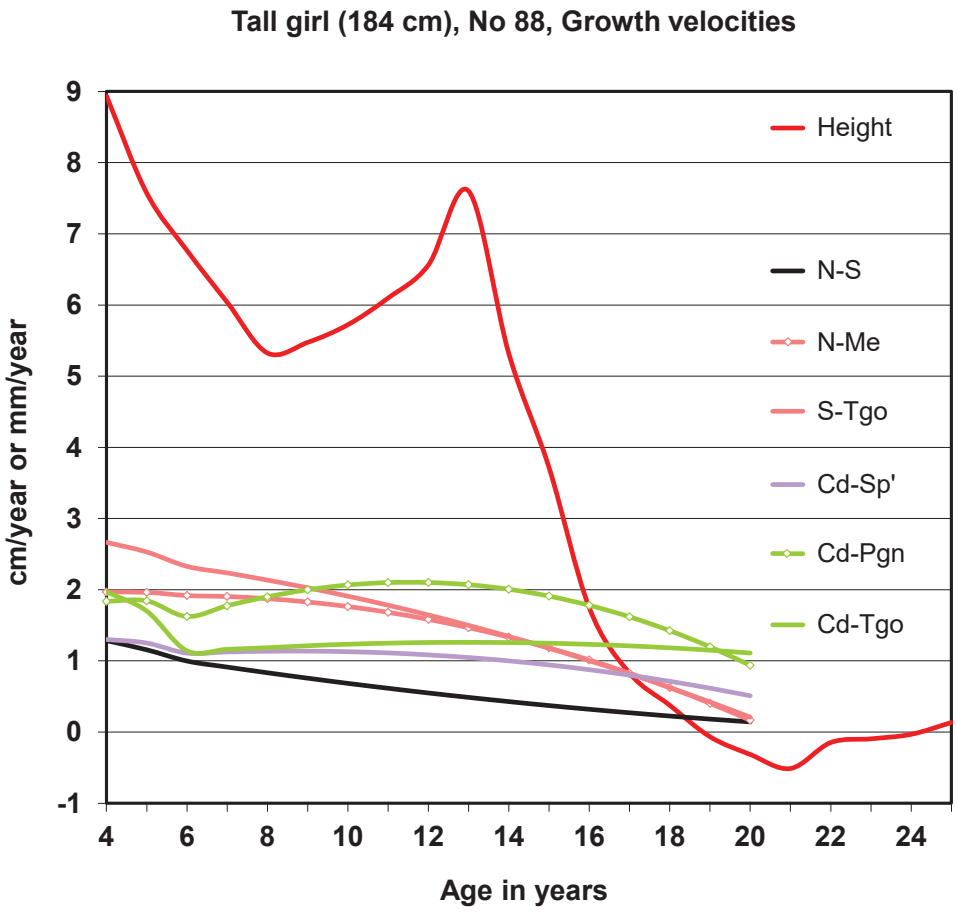

Tall boy (195 cm), No 46, Growth velocities
cm/year or mm/year
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Height
N-S
N-Me
S-Tgo
Cd-Sp'
Cd-Pgn
Cd-Tgo

Short Girl



Medium Girl




Tall girl (184 cm), No 88, Growth velocities
cm/year or mm/year
9
8
7
6
5
4
3
2
1
0
-1
4
6
8
10
12
14
16
18
20
22
24
Age in years
Height
N-S
N-Me
S-Tgo
Cd-Sp'
Cd-Pgn
Cd-Tgo