STATEMENTS OFTEN MADE TO DISCREDIT EARLY TREATMENT PHILOSPHY AND THE RESEARCH REFERENCES THAT TEND TO SUPPORT TREATMENT PROCEDURES IN THE 5-7 YEAR OLD.

1. One cannot predict malocclusions at such early ages.

A.) Crowding is predictable from early ages

1. Sanin, C., and Savara, B.S., Factors That Affect the Alignment of the Mandibular Incisors: A Longitudinal Study, *Am. J. Ortho.*, 64: 248-249, 1973.
   82% of straight incisors at 8 years of age were straight at 14 , while 89% of crowded incisors at 8 years were crowded at 14.

2. Heckman, U., A Longitudinal Study of Dental Development in 82 Children from Birth to 12 Years of Age, *Trans.Europ. Ortho. Soc.,* 49th Congr., 259-265, 1973. Crowding did not improve from 6 to 12 years of age.

3. Barrow, G.V. and White, J.R., Developmental Changes of the Maxillary and Mandibular Dental Arches, *Angle Orthod.*, 22:41-46, 1952.
   If no spaces in deciduous dentition - 69% had permanent crowding. 37% had increase in mandibular crowding 6 to 14 years of age. 24% had increase in maxillary crowding 6 to 14 years of age.

4. Schwartz, M. from Lewis, S.J. and Lehman, I.A., A Quantitative Study of the Relation Between Certain Factors in the Development of the Dental Arch and the Occlusion of the Teeth, *Int. J. Orthod., Oral Surg. and Radiog.,* 18:1015-1037, 1932. Rotations of permanent incisors can be seen radiographically at 2 years of age and won't usually erupt straight.

- **The following 5 studies (#5-9) substantiate arch enlargement as a result of incisors erupting without rotations or displacement.**

5. Lewis, S.J. and Lehman, I.A., A Quantitative Study of the Relation Betwen Certain Factors in the Development of the Dental Arch and the Occlusion of the Teeth, *Int. J. Orthod., Oral Surg. and Radiog.*, 18: 1015-1037, 1932.
   Eruption of lower permanent incisors have (38%) less arch enlargement when these teeth erupt crowded as when they erupt straight.

6. Lewis, S.J. and Lehman, I.A., Observations on Growth Changes of the Teeth and Dental Arches, *Dent. Cosmos*, 71: 480-499, 1929. Incisal crowded cases have 2.13 mm. canine-to-canine enlargement while uncrowded cases have 3.44 mm. expansion.

7. Korkhaus, G. and Neumann, F., Das Kieferwachstum wahrend des Schneidezahnwechsels und die orthodontische Fruhdehnung, *Fortschr. Ortho.*, 1: 32-62, 1931.
   Deciduous incisors that have interproximal spacing have 20% less arch enlargement than deciduous teeth without spaces.

8. Baume, L.J., Physiological Tooth Migration and its Significance for the Development of Occlusion. I. The biogenetic course of the deciduous dentition. II. The biogenesis of accessional dentition. III. The biogenesis of the successional dentition. IV. The biogenesis of overbite, *J. Dent. Res.*, 29: 123-132, 331-337, 338-348, 440-447, 1950.
   If permanent incisor does not erupt into arch, there is no increase in arch dimension. If lower incisors come directly into arch without rotations, the arch dimension can be increased as much as 5 mm. (upper,

6.5 mm.). Mean enlargement was 2.3 mm. Spaced deciduous incisors result in 10% less arch enlargement as the permanent incisors erupt than deciduous incisors without spaces.

9. Lewis, S.J., Some Aspects of Dental Arch Growth, *J. Am. Dent. Assoc.*, 23: 277-294, 1936.
In a case with a missing lower permanent lateral, there was no change in deciduous arch size, while upper arch in same case with all incisors present had normal upper arch enlargement.

- **Crowded adult dentitions have narrower arches (lower canine-to-canine is 3 mm. smaller) than well-aligned arches (tooth sizes being the same), (#10- #12). This supports premise that when teeth erupt rotated they develop narrower arches and conversely.**

10. Mills, L.F., Arch Width, Arch Length and Tooth Size in Young Adult Males, *Angle Ortho.*, 34: 124-129, 1964

11. Howes, A.E., Arch Width in the Premolar Region - Still the Major Problem in Orthodontics, *Am. J. Ortho.*, 43: 5-31, 1957.

12. Howe, R.P., McNamara, J.A., Jr. and O'Connor, K.A., An Examination of Dental Crowding and its Relationship to Tooth Size and Arch Dimension, *Am. J. Ortho.*, 83: 363-373, 1983.

- **The prediction of crowding and spacing between the deciduous and permanent dentitions (#13 - 18)**

13. Leighton, B.C., 1969.

Crowded deciduous incisors	100% chance of permanent incisal crowding
No spaces deciduous incisors	67% chance of permanent incisal crowding
Less than 3 mm. spaces deciduous incisors	50% chance of permanent incisal crowding
3 - 6 mm. spaces deciduous incisors	20% chance of permanent incisal crowding
Over 6 mm. spaces deciduous incisors	0% chance of permanent incisal crowding

14. Barrow, G.V. and White, J.R., 22:41 - 46, 1952. If no spaces of deciduous lower incisors - 69% got crowding of permanent incisors.

15. Neumann, D., Weitere Untersuchungen uber die Gibissentwicklung an Hand von Reihenuntersuchungen bei Kindern in 10 Lebensjahr, *Deutsch Zahn.-Mund-und Kieferhelk*, 22: 157-165, 1955.
If no spaces between deciduous upper incisors - 77.8% got crowding of permanent incisors.

16. Baume, L.J., 1950. If no spaces between lower deciduous incisors - 43% got crowding of permanent incisors.

17. Sillman, J.H., Clinical Considerations of Occlusion, *Am. J. Ortho.*, 42: 658-682, 1956.
75% of poor occlusions in permanent dentitions had poor deciduous dentitions. 89% of good occlusions in permanent dentitions had good deciduous dentitions.

18. Moorrees, C.F.A., *The dentition of the growing child,* Harvard University Press, Cambridge, Mass., 1959.
Can predict adult crowding from available space at 5 years of age.

- **Studies Substantiating Arch Enlargement as a Result of Incisors Erupting without Rotations (#19 - #23):**

19. Korkhaus, G. and Neumann, F., 1931.
20. Baume, L.J., 1950.
21. Howes, A.E., 1957.
22. Mills, L.F., 1964.
23. Howe, R.P., McNamara, Jr., J.A., and O'Connor, K.A., 1983.

- **Deciduous Crowding Incidence (#24 - 26):**

24. 10.6% Seipel, C.M., Variation in Tooth Position, *Svensk Tandlakare-Tidschr.*, Vol. 39, Suppl., 1946.
25. 14.0% Barrow, G.V. and White, J.R. 1952.
26. 3.7% Heckman, U., 1973.

- **Permanent Crowding Incidence (#27 - 32):**

27. 67% Sodermans, H., Uber den Ablauf der Gebissentwicklung bei Kompressionsanomalien, *Deutsche Zahn-Mund. und Kieferheilk.*, 6: 194-206, 422-439, 1939.
28. 61% Seipel, C.M. 1946.
29. 51% Barrow, G.V., and White, J.R., 1952.
30. 75.8% Cryer, B.S., Lower Arch Changes During the Early Teens, *Trans. Europ. Orthod. Soc.*, 41st Congr., 87-99, 1965.
31. 79.6% Haynes, S., The Prevalence of Malocclusion in English Children Aged 11 - 12 years, *Trans Europ. Ortho. Soc.*, 46th Congr., 89-98, 1970.
32. 28.0% Heckman, U., 1973.

- **Arch Enlargement During Incisor Eruption - Lower Arch Increases During the Eruption of Lower Permanent Incisors (#33 - #37):**

33. Lewis, S.J. and Lehman, I.A., 1929	N=31		3.06 mm.
34. Korkhaus, G. and Neumann, F., 1931	N=18		2.62 mm.
35. Baume, L.J., 1950	N=33		2.60 mm.
36. Speck, N.T. A Longitudinal Study of Developmental Changes in Human Lower Dental Arches, *Angle Orthod.*, 20: 215-225, 1950.	N=53		5.00 mm.
37. Moorrees, C.F.A., 1959	N=87-107		2.75 mm.
		mean	3.21 mm.

- **Upper Arch Increases During the Eruption of Upper Permanent Incisors (#38 - 42):**

38. Lewis, S.J. and Lehman, I.A., 1929	N=30		5.04 mm.
39. Korkhaus, G. and Neumann, F., 1931	N=14		4.44 mm.
41. Baume, L.J. 1950	N=33		2.76 mm.
42. Moorrees, C.F.A., 1959	N=87-117		2.57 mm.
		mean	3.70 mm.

- **Sequence of enlargement as eruption occurs.**

43. Moorrees, C.F.A., 1959

Mandible	47.5%	(1.64 mm.)	of the arch enlargement occurs as centrals erupt
	37%	(1.28 mm.)	of the arch enlargement occurs as laterals erupt
	15%	(0.52 mm.)	of the arch enlargement occurs 6 months after laterals erupt
Maxilla	73.3%	(2.57 mm.)	of the arch enlargement occurs as centrals erupt
	26.7%	(0.93 mm.)	of the arch enlargement occurs as laterals erupt

- **Maximum lower arch enlargement as the permanent incisors erupt:**

44. Lewis, S.J. and Lehman, I.A., 1932	N=21	5.5 mm.
45. Baume, L.J., 1950.	N=15	4.6 mm.

- **Maximum upper arch enlargement as the permanent incisors erupt:**

46. Lewis, S.J. and Lehman, I.A., 1932.	N=10	7.0 mm.
47. Baume, L.J., 1950	N=12	6.5 mm.

- **Incidence and severity of crowding in permanent dentition (#48 & #49).**

48. Lundstrom, A., The Significance of Early Loss of Deciduous Teeth in the Etiology of Malocclusion, *Am. J. Ortho.*, 41: 819-826, 1955. 82% of crowding in maxilla is 3 mm. or less and 90% of crowding in mandible is 3 mm. or less.

49. Cryer, B.S., 1965.
    77.2% of all crowding is in the anterior segment, while only 22.8% of crowding is in the posterior segment. 82% of mandibular permanent incisal crowding (in Class I occlusions) is 3 mm. or less. 8.5% have 4 mm. of crowding and 4.9% have 5 mm. or more.

- **Percentage of children with mandibular crowding (maxillary crowding in parenth. (#50 - #55):**

50. 52.6% (max. 32.2%) Huber, R.E., and Reynolds, J.W., A Dentofacial Study of Male Students at the University of Michigan, *Am. J. Ortho.*, 32: 1-21, 1946.
51. 51% (max. 24%) Barrow, G.V. and White, J.R., 1952.
52. 50% (max. 33%) Lundstrom, A., 1955.
53. 48.3% (max. 26.4%) Moore, G.R., Heredity as a Guide in Dental Orthopedics, *Am. J. Ortho.*, 30 549-554, 1944.
54. 69% Moorrees, C.F.A. and Reed, R.B., Biometrics of Crowding and Spacing of the Teeth in the Mandible, *Am. J., Phys. Anthrop.*, 12: 77-88, 1954.
55. 51% (max. 25%) Seipel, C.M., 1946.

- **Incidence of Malocclusions (#56 & #57):**

56. Lundergan, L.B. Preventative Dentistry and Preventative Orthodontics Through Public Dental Health Education, *Am. J Ortho.*, 41: 554-564, 1955.

5-6 yrs	17% malocclusion	9-10 yrs	53.9% malocclusion
6-7 yrs	17.5% malocclusion	12-13 yrs	55.7% malocclusion
7-8 yrs	31.2% malocclusion	14-15 yrs	65.5% malocclusion
8-9 yrs	49.7% malocclusion		

57. Cryer, B.S., 1965.
    73.1% of all Class I malocclusions had crowding.
    77.2% of all Class II malocclusions had crowding.
    83.9% of all Class III malocclusions had crowding.
    82% of all crowding is less than 3 mm. (N=1000)

58. Sinclair, P.M. and Little, R.M., Maturation of Untreated Normal Occlusions, *Am. J. Ortho*., 83: 114-123, 1983.
    Cases starting out normal (at 9-10) stayed straighter than those cases that started out crowded treated orthodontically (to 19-20 yrs). The treated group had increases in crowding at twice the rate of the untreated normals.
59. Sanin, C. and Savara, B.S., 1973.
    Untreated children with no crowding at 14 years of age had wider arches. Also showed that when permanent lower molars erupt distally and incisors labially, there is less tendency for crowded incisors.

B.) Overbite and overjet are predictable from early ages:

60. Methenitou, S., Shein,B., Remanathan,G. and Bergersen, E.O.; The prevention of overbite and overjet development in the 3 to 8 year old by nighttime guidance of incisal eruption: A study of 43 individuals, *J. Clin. Pediat. Dent.,* 14: 219-230, 1990.
    Showed a significant relation between overjet at 2½ years of age and overbite at 18 years of age in the same untreated individuals.

- **Overbite increases about 2 mm. from the primary to the mixed dentition (#61 - #64):**

61. 1.75 mm. N=51 Barrow, G.V. and White, J.R., 1952.
62. 1.64 mm. N=70-91 Moorrees, C.F.A., 1959.
63. 2.35 mm. N-38-81 Moyers, R.E., van der Linden, F.P.G.M., Riolo, M.L. and McNamara, J.A., Jr., Standards of Human Occlusal Development, Center for Human Growth & Development, Univ. of Michigan, Ann Arbor, 1976.
64. 1.75 mm. N=43 Methenitou, S., Shein, B., Ramanathan, G. and Bergersen, E.O., 1990.

- **Overbite remains constant from 8 years to adulthood (#65 - 73):**

65. Linder, J., *Bimetrische Untersuchunger des Normalgebisses in Verschiedenen Lebansaltern. Intermaxillare und Dentofaciale Beziehungen*, Inaug. Dissertation, Rheinischen Friedrich-Wilhelms-Universitat, Bonn, Germany, 1930.
66. Baurle, J.R., A Longitudinal Study of Incisor Overbite from Mixed Deciduous Dentition to Age Fifteen, M. S. Thesis, Univ. of Iowa, Iowa City, IA, 1949.
67. Baume, L.J. 1950.
68. Moorrees, C.F.A., *The Dentition of the Growing Child*, 1959.
69. Fleming, H.B., An Investigation of the Vertical Overbite During the Eruption of the Permanent Dentition, *Angle Ortho.*, 31: 53-62, 1961.
70. Frohlich, F.J. A Longitudinal Study of Untreated Class II Type Malocclusions, *Tr. Europ. Ortho. Soc.*, 37th Congr. 137-151, 1961.
71. Leighton, B.C., The Early Development of Normal Occlusion, *Tr. Europ. Ortho. Soc.*, 51st Congr., 67-77, 1975.
72. Moyers, R.E., et.al., Univ. of Michigan, Ann Arbor, Michigan, 1976.
73. Bergersen, E.O., A Longitudinal Study of Anterior Vertical Overbite from Eight to Twenty Years of Age, *Angle Ortho.*, 58:237-256, 1988.

- **Incidence and severity of overbite and overjet:**

74. Luffingham, J.K. and Campbell, H.M., The Need for Orthodontic Treatment, A Pilot Survey of 14 Year Old School Children in Paisley, Scotland, *Tr. Europ. Ortho. Soc.*, 50th Congr.: 259-267. 1974. 76% of overbites were 3 mm. or more, and 68% of overjets were 3 mm. or more.

- **Overjet Remains the Same From the Primary to Permanent Dentition (#75 - #77):**

75. Moorrees, C.F.A., *The Dentition of the Growing Child*, 1959.
76. Leighton, B.C., The Early Signs of Malocclusion, *Tr. Europ. Ortho. Soc.*, 45th Congr., 353-368, 1969.
77. Foster, T.D. and Grundy, M.C., Occlusal Changes from Primary to Permanent Dentition, *Brit. J. Ortho.*, 13: 187-193, 1986.

C.) The molar relations are predictable from early ages (#78 - 82):

78. Silver, E.I., Forsyth Orthodontic Survey of Untreated Cases, *Am. J. Ortho. and Oral Surg.*, 30: 635-659, 1944.
    80% of Class I occlusions did not improve from deciduous to permanent dentitions.
    76% of Class II occlusions increased severity from deciduous to permanent dentitions.
    89% of Class III occlusions increased severity from deciduous to permanent dentitions.

79. Leighton, B.C., 1969. The antero-posterior relation is constant from deciduous to permanent dentitions.

80. Foster, T.D. and Grundy, M.C., 1986. Antero-posterior relation is constant from deciduous to permanent dentitions.

81. Haynes, S., 1970.
    At 11-12 years of age, 73.1% had malocclusions.
    50.7% had Class I malocclusions.
    19.6% had Class II malocclusions.
    2.55% had Class III malocclusions.
    0.76% were unclassifiable.

82. Sillman, J.H., Development of Occlusions: A Serial Study from Birth to Seven Years, *J. Second Dist., Dent. Soc.*, 31: 153-163, 1945. At 20 months of age when the 1st deciduous molar (upper and lower) erupt, the prognosis of a malocclusion can be made and the outcome of the molar relation is predictable.

D.) The arch form and cross-bites are predictable from early ages (#84 - 85):

83. Leighton, B.C. 1975. Arch form stays the same from deciduous to permanent dentitions.

84. Moorrees, C.F.A., 1959. "V" shaped arches remained the same from 6-7 years to 16-18 years.

85. Benediktssen, E., Uber den Entwicklungsablauf des Gebisses bei der Progenie und Kreuzbisz, Inaugural Dissertation, Rheinischen Friedrich-Wilhelms-Universitat, Bonn, 1938. Cross-bites stayed the same 80% of the time.

2. Cases treated at early ages won't stay, they will relapse and make the cases more complicated at a later age. Research indicates that early treatment does retain better and is healthier on the dentition (#86 - 98):

86. Grosfeld, O., Longitudinal Observations of the Development of Occlusion in Children After Orthodontic Treatment in the Deciduous Dentition, *Tr. Europ. Ortho. Soc.,* 49th Congr., 251- 258, 1973.
    In treating with functional appliances before 6 years of age, 12.3% had relapse and 26.1% had other complications seen 4 years after completion of permanent dentition in 65 children.

87. Gallerno, R.L., *Mandibular Anterior Crowding: A Postretention Study*, M.S.D. Thesis, Univ. of Washington, Seattle, 1976.
    Treating at an early age reduces relapse of incisal crowding in 83 cases.

88. Little, R.M., Riedel, R.A. and Artun, J., An Evaluation of Changes in Mandibular Anterior Alignment From 10 to 20 Years Postretention, *Am. J. Ortho.*, 93:423-428, 1988.
    Showed that 90% of cases (N-31) treated with four premolar extractions (with standard fixed appliances) had relapse to end with unacceptable mandibular incisal alignment.

89. Little, R.M., Personal communication. Stated that when cases are started before the loss of deciduous molars by maintaining the original distal erupted position of the first permanent molars - these stay better long term than any other cases by far. Also in those untreated cases that start out with straight teeth at 8 years - these cases stay straighter long term than any other type cases.

90. Sinclair, P.M. and Little, R.M., Maturation of Untreated Normal Occlusions, *Am. J. Ortho*., 83: 114-123, 1983.
Cases starting out normal (at 9-10) stayed straighter than those cases that started out crowded treated orthodontically (to 19-20 yrs). The treated group had increases in crowding at twice the rate of the untreated normals.

91. Sanin, C. and Savara, B.S., 1973.
Untreated children with no crowding at 14 years of age had wider arches. Also showed that when permanent lower molars erupt distally and incisors labially, there is less tendency for crowded incisors..

92. Reitan, K., Tissue Behavior During Orthodontic Tooth Movement, *Am. J. Ortho.* 46: 881-900, 1960.
Early treatment before root are fully formed may prevent relapse due to formation of fibers after the teeth are straightened.

93. Reitan, K., Tissue Rearrangement During Retention of Orthodontically Rotated Teeth, *Angle,Ortho.*, 29: 105-113, 1959.,
Early treatment before root formed would solve relapse because of fiber development after straightening. Fibers around root rearrange first after 28 days, marginal fibers takes longer than 7.5 months.

94. Reitan, K., Initial Tissue Behavior During Special Root Resorption, *Angle Ortho.*, 44: 68-82, 1974.
Cementoid delays root resorption. Uncalcified predentin is not attacked by resorbing cells, therefore treatment before root is fully developed can prevent resorption.

95. Linge, B.O., and Linge, L., Apical Root Resorption in Upper Anterior Teeth, *Europ. J. Ortho.*, 5: 173-183, 1983. Treating at earlier ages with incomplete root formation reduces risk of root resorption. Functional appliances had half of the resorption that fixed appliances had. Especially risky are Class II elastics, edgewise fixed appliances and pre-treatment signs of resorption.

96. Stenvak, A., Pulp and Dentine Reactions to Experimental Tooth Intrusion, *Tr. Eruop. Ortho. Soc.*, 45th Congr., 449-464, 1969. Depressing mature teeth causes scar tissue to form and does not completely repair itself if root end is mature. Roots with open apical foramen did not experience damage and recuperated rapidly.

97. Linge, L. and Linge, B.O., Patient Characteristics and Treatment Variables Associated with Apical Root Resorption During Orthodontic Treatment, *Am. J. Ortho.*, 99: 35-43, 1991.
Activators don't cause root resorption. Risk of root resorption lessened whenever fixed phase is reduced with little use of Class II elastics and reduced use of fixed appliances and heavy wires.

98. Rosenberg, M.N., An Evaluation of the Incidence and Amount of Apical Root Resorption and Delaceration Occurring in Orthodontically Treated Teeth Having Incompletely Formed Roots at the Beginning of Begg treatment, *Am. J. Ortho.*, 61: 524-525, 1972. Teeth with incomplete root ends will develop normal roots when active orthodontics is done and will have less root resorption when compared to teeth with completely formed roots.

3. Most malocclusions at early ages will self-correct, making early intervention useless. Studies show that early malocclusions do not usually self-correct (#99 - 102):

99. Sanin, C., and Savara, B.S., Factors That Affect the Alignment of the Mandibular Incisors: A Longitudinal Study, *Am. J. Ortho.*, 64: 248-249, 1973.
82% of straight incisors at 8 years of age were straight at 14 , while 89% of crowded incisors at 8 years were crowded at 14.

100. Heckman, U., A Longitudinal Study of Dental Development in 82 Children from Birth to 12 Years of Age, *Trans.Europ. Ortho. Soc.*, 49th Congr., 259-265, 1973. Crowding did not improve from 6 to 12 years of age.

101. Barrow, G.V. and White, J.R., 1952.
If no spaces in deciduous dentition - 69% had permanent crowding. 37% had increase in mandibular crowding 6 to 14 years of age. 24% had increase in maxillary crowding 6 to 14 years of age.

102. Sillman, J.H., Clinical Considerations of Occlusion, *Am. J. Ortho.*, 42: 658-682, 1956.
75% of poor occlusions in permanent dentitions had poor deciduous dentitions. 89% of good occlusions in permanent dentitions had good deciduous dentitions.

- **Incidence of crowding increases from the deciduous to the permanent dentition (#103 - 113):**

103. Seipel, C.M., Variation in Tooth Position, *Svensk Tandlakare-Tidschr.*, Vol. 39, Suppl., 1946.
Indicated that deciduous crowding was present in 10.6% of cases.

104. Barrow, G.V. and White, J.R. 1952. Indicated deciduous crowding to be 14.0%.

105. Heckman, U., 1973. Indicated deciduous crowding to be 3.7%.

- **Permanent Crowding Incidence:**

106. Sodermans, H., Uber den Ablauf der Gebissentwicklung bei Kompressionsanomalien, *Deutsche Zahn-Mund. und Kieferheilk.*, 6: 194-206, 422-439, 1939. Indicated upper permanent crowding to be 67%.

107. Seipel, C.M. 1946. Indicated permanent lower crowding to be 61% while upper was 25%.

108. Barrow, G.V., and White, J.R., 1952. Indicated permanent mandibular crowding to be 51%, maxillary crowding is 24%.

109. Cryer, B.S., Lower Arch Changes During the Early Teens, *Trans. Europ. Orthod. Soc.*, 41st Congr., 87-99, 1965. Indicated permanent lower crowding to be 75.8%.

110. Haynes, S., The Prevalence of Malocclusion in English Children Aged 11 - 12 years, *Trans Europ. Ortho. Soc.*, 46th Congr., 89-98, 1970. Indicated permanent crowding to be 79.6% in Class I malocclusions.

111. Heckman, U., 1973. Indicated permanent crowding to be 28.0%.

112. Lundergan, L.B. Preventative Dentistry and Preventative Orthodontics Through Public Dental Health Education, *Am. J. Ortho.*, 41: 554-564, 1955.

5-6 yrs	17% malocclusion	9-10 yrs	53.9% malocclusion
6-7 yrs	17.5% malocclusion	12-13 yrs	55.7% malocclusion
7-8 yrs	31.2% malocclusion	14-15 yrs	65.5% malocclusion
8-9 yrs	49.7% malocclusion		

113. Methenitou, S., Shein, B., Remanathan, G. and Bergersen, E.O., The Prevention of Overbite and Overjet Development in the 3 to 8 Year Old by Nighttime Guidance of Incisal Eruption: A Study of 43 Individuals, *J. Clin. Pediat. Dent.*, 14: 219-230, 1990.

Showed a significant relation between overjet at 2½ years of age and overbite at 18 years of age in the same untreated individuals. Can prevent overbite from developing by retarding the overeruption of the maxillary permanent incisors.

. Overbite increases about 2mm from the primary of the mixed dentition (#114 - 117):

114. 1.75 mm. N=51 Barrow, G.V. and White, J.R., 1952.

115. 1.64 mm. N=70-91 Moorrees, C.F.A., 1959.

116. 2.35 mm. N-38-81 Moyers, R.E., van der Linden, F.P.G.M., Riolo, M.L. and McNamara, J.A., Jr., Standards of Human Occlusal Development, Center for Human Growth & Development, Univ. of Michigan, Ann Arbor, 1976.

117. 1.75 mm. N=43 Methenitou, S., Shein, B., Ramanathan, G. and Bergersen, E.O., 1990.

- **Overbite remains constant from 8 years to adulthood (#118 - 126):**

118. Linder, J., *Bimetrische Untersuchunger des Normalgebisses in Verschiedenen Lebansaltern. Intermaxillare und Dentofaciale Beziehungen*, Inaug. Dissertation, Rheinischen Friedrich-Wilhelms-Universitat, Bonn, Germany, 1930.

119. Baurle, J.R., A Longitudinal Study of Incisor Overbite from Mixed Deciduous Dentition to Age Fifteen, M. S. Thesis, Univ. of Iowa, Iowa City, IA, 1949.

120. Baume, L.J. 1950.

121. Moorrees, C.F.A., *The Dentition of the Growing Child*, 1959.

122. Fleming, H.B., An Investigation of the Vertical Overbite During the Eruption of the Permanent Dentition, *Angle Ortho.*, 31: 53-62, 1961.

123. Frohlich, F.J., A Longitudinal Study of Untreated Class II Type Malocclusions, *Tr. Europ. Ortho. Soc.*, 37th. Congr. 137-151, 1961.

124. Leighton, B.C., The Early Development of Normal Occlusion, *Tr. Europ. Ortho. Soc.*, 51st. Congr., 67-77, 1975.

125. Moyers, R.E., et.al., Univ. of Michigan, Ann Arbor, Michigan, 1976.

126. Bergersen, E.O., A Longitudinal Study of Anterior Vertical Overbite from Eight to Twenty Years of Age, *Angle Ortho.*, 58:237-256, 1988.

- **Overjet remains constant from the primary to the permanent dentition (#127 - 129):**

127. Moorrees, C.F.A., *The Dentition of the Growing Child*, 1959.

128. Leighton, B.C., The Early Signs of Malocclusion, *Tr. Europ. Ortho. Soc.*, 45th. Congr., 353-368, 1969.

129. Foster, T.D. and Grundy, M.C., Occlusal Changes from Primary to Permanent Dentition, *Brit. J. Ortho.*, 13: 187-193, 1986.

- **Molar Relations remain the same or get worse from the primary to the permanent dentition (#130-133):**

130. Silver, E.I., Forsyth Orthodontic Survey of Untreated Cases, *Am. J. Ortho. and Oral Surg.*, 30: 635-659, 1944.
80% of Class I occlusions did not improve from deciduous to permanent dentitions.

76% of Class II occlusions increased severity from deciduous to permanent dentitions.
89% of Class III occlusions increased severity from deciduous to permanent dentitions.

131. Leighton, B.C., 1969. Antero-posterior relation is constant from deciduous to permanent dentitions.

132. Foster, T.D. and Grundy, M.C., 1986. Antero-posterior relation is constant from deciduous to permanent dentitions.

133. Sillman, J.H., Development of Occlusions: A Serial Study from Birth to Seven Years, *J. Second Dist., Dent. Soc.*, 31: 153-163, 1945. At 20 months of age when the 1st deciduous molar (upper and lower) erupt, the prognosis of a malocclusion can be made and the outcome of the molar relation is predictable.

- **Incidence of TMJ symptoms usually increase with age (#134 - 141):**

134. 21.1% 3-5 yrs of age Bernal, M. and Tsantsouris, A., Signs and Symptoms of Temporomandibular Joint Dysfunction in 3 to 5 Year Old Children, *J. Pedo.*, 10: 127-140, 1986.

135. 56% 6-8 yrs of age Grosfeld, O. and Czarnecka, B., Musculo-articular Disorders of the Stomatognathic System in Schoolchildren Examined According to Clinical Criteria, *J. Oral Rehabil.*, 4: 193-200, 1977.

136. 33% 7 yrs of age Egermark-Eriksson, I., Carlsson, G.E. and Ingervall, B., Prevalence of Mandibular Dysfunction and Orofacial Parafunction in 7, 11 and 15 Year Old Swedish Children, *Europ. J. Ortho.*, 3:163-172, 1981.

137. 46% 11 yrs of age Egermark-Eriksson, I., Carlsson, G.E. and Ingervall, B., 1981.

138. 61% 15 yrs of age Egermark-Eriksson, I., Carlsson, G.E. and Ingervall, B., 1981.

139. 68% 13-15 yrs of age Grosfeld, O. and Czarnecka, B., 1977.

140. 56% 17 yrs of age Wenman, A. and Agerberg, G., Two Year Longitudinal Study of Signs of Mandibular Dysfunction in Adolescents, *Acta Odont. Scand.*, 44: 333-342, 1986.

141. 74% 15-18 yrs of age Nilner, M., Relationship Between Oral Parafunctions and Functional Disturbances in the Stomotognathic System Among 15 to 18 Year Olds, *Acta Odont. Scand.*, 41: 197-201, 1983.

- **Incidence of TMJ Clicking Sounds usually increase with age (#142-144):**

142. 5% 3-5 yrs of age Bernal, M. and Tsantsouris, A., 1986.

143. 10% 6-8 yrs of age Grosfeld, O. and Czarnecka, B., 1977.

144. 20% 13-15 yrs of age Grosfeld, O. and Czarnecka, B., 1977.

- **Importance of early detection of TMJ problems:**

145. Sanchez-Woodworth, R.E., Katzberg, R.W., Tallents, R.H. and Guay, J.A., Radiographic assessment of temporomandibular joint pain and dysfunction in the pediatric age group, *J. Dent. for Childr.*, 55:278-281, 1988.
In children (N=150) from 7 to 16 years of age with TMJ problems 37% had degenerative arthritis and 46% had meniscal displacement without reduction.

- **Gingival tissue effects with increasing age (#146-157)**

146. Poulton, D.R. and Aaronson, S.A., Relationship Between Occlusion and Periodontal Status, *Am. J. Ortho.*, 47: 690-699, 1961.
Showed significant correlation with overbite, lower incisal crowding, overjet and lack of posterior intercuspation to periodontal status, pocket depth, gingivitis and looseness of teeth.
147. Kalamkarova, S. Kh., Stomotologia (Mosk) 1986 65 (2) 76-78, Engl. Abstr. Deep bites are associated with periodontal disease, bone tissue resorption with looseness and loss of teeth in 142 patients.
148. Ramfjord, S.P. and Major, M.A., Jr., Significance of Occlusion in the Etiology and Treatment of Early, Moderate, and Advanced Periodontitis, *J. Period.*, 52: 511-517, 1981.
Mouth breathing and severe protrusion of teeth causes periodontal problems.
149. Waerhang, J., Eruption of Teeth into Crowded Position, Loss of Attachment, and Downgrowth of Subgingival Plaque, *Am. J. Ortho.*, 78: 453-459, 1980. Found downgrowth of subgingival plaque on erupting crowded teeth.
150. Sandoli, T., Irregularities of the Teeth and Their Relation to the Periodontal Condition with Particular Rererence to the Lower Labial Segment, *Tr. Eruop. Ortho. Soc.*, 49th Congr., 319-333, 1973.
Irregularity and crowding of lower incisors is associated with loss of gingival tissue.
151. Sharpe, W., Relationship of Relapse to Apical Root Resorption and Alveolar Crestal Bone Levels, *Am. J. Ortho.*, 88: 526, 1985. Cases with lower anterior crowding relapse have greater root resorption and lower alveolar crestal bone.
152. Dermant, L.R. and DeMunck, A., Apical Root Resorption of Upper Incisors Caused by Intrusive Tooth Movement: A Radiographic Study, *Am. J. Ortho.*, 90: 321-326, 1986. Intrusion caused root resorption of 18% with 3.6 mm. of intrusion and 2.5 mm. resorption.
153. El-Mangoury, N.H., Gaafar, S.M. and Mostafa, Y.,A., Mandibular Anterior Crowding and Periodontal Disease, *Angle Ortho.*, 57: 33-38, 1987. Plaque and gingival problems greater in crowded cases and returns faster after curettage.
154. Artun, J. and Krogstad, O., Periodontal Status of Mandibular Incisors Following Excessive Proclination, *Am. J. Ortho.*, 91: 225-232, 1987.
The thinness of the mandibular symphisis is correlated with an increase in clinical crown height with gingival recession.
155. Kennedy, D.B., Joondeph, D.R., Osterberg, S.K. and Little, R.M., The Effect of Extraction and Orthodontic Treatment on Dentoalveolar Support, *Am. J. Ortho.*, 84: 183-190, 1983.
Teeth displaced during eruption had more long-term proximal bone loss than normal erupting teeth.
156. Position Paper of American Academy of Periodontology, Periodontal Diseases of Children and Adolescents, *J. Periodont.*, 67: 57-62, 1966. Children 5-11 years have up to 9% loss of periodontal attachment and bone support; 12-15 years have up to 46%. Generalized juvenile periodontis, consisting of marked inflamation and heavy plaque and calculus, begins at or around puberty.
157. Tala, H., Community Periodontal Index of Treatment Needs in Finland, Int. D. J., 37: 179-182, 1987.
(CIPTN) from Ainamo - 6 sextants are measured and there are 6 categories, namely, supragingival calculus, subgingival calculus, pocket 4 to 5 mm., pocket of 6+ mm., bleeding after probing, recession (now eliminated). 43% of 7 year olds had healthy gingival tissue and, rather consistantly dropped so that by 12 years only 27% had healthy tissues.

4. No proof it works on the specific children of that country, such as Germany.

In U.S. there is such a diversion of inherited characteristics from all over the world, such a statement is really quite unbelievable. A preformed positioner which is the adult version of the Nite-Guide® has been used in Germany for 20 years by the orthodontist and is still being used.

5. Orthodontics is simply too complicated for early treatment to work and so it must be done at a later age. Research shows that treatment at early ages takes less time and teeth move more easily with fewer complications.

158. Methenitou, S., Shein, B., Remanathan, G. and Bergersen, E.O., The Prevention of Overbite and Overjet Development in the 3 to 8 Year Old by Nighttime Guidance of Incisal Eruption: A Study of 43 Individuals, *J. Clin. Pediat. Dent.*, 14: 219-230, 1990.
Can prevent overbite from developing by retarding the overeruption of the maxillary permanent incisors with only hour of passive wear, as the child gets older it takes more and more force to obtain similar results.

159. Bergersen, E.O., Preventive and interceptive orthodontics in the mixed dentition with the myofunctional eruption guidance appliance: Correction of crowding, spacing, rotations, crossbites and TMJ, *J. Pedodont.*, 12:386-414, 1988. Showed results of early correction and the differences of forces required at various ages.

160. Bergersen, E.O., Preventative Eruption Guidance in the 5 to 7 Year Old, *J. Clin. Ortho.*, 29: 382-395, 1995. Shows the finished results of potentially compromised deciduous dentitions.

- **Open bite and tongue thrust effects with increasing age is similar to early age requirements for learning language skills (#161 - 165):**

161. Ramsay, C. and Wright, E., *J. Soc. Psych.*, 94:115-121, 1974.
162. Payne, A., *Locating Language in Time and Space*, Acad. Press, N.Y. 1980.
163. Tahta, S., Wood, M. and Loewenthal, K., *Lang. & Speech*, 24:265-272, 1981.
164. Newport, E., *Papers Reports Child Lang. Dev.*, 23: 1-23, 1984.
165. Long, M., *Masturational Contstraints on Language Development*, Univ. of Hawaii, 1987.

- **Language skills learned 4-10 years of age when cerebum is plastic and receptive:**

166. Pennfield, W., *The Second Career*, Little Brown, Boston, 1963.

- **Development of foreign accents at 10 years of age when cerebral neuroplasticity is lost:**

167. Lenneberg, E., *Biological Foundations of Language*, Wiley, NY, 1967.

- **Root resorption problems with increasing age (#168 - 174):**

168. Reitan, K., Tissue Behavior During Orthodontic Tooth Movement, *Am. J. Ortho.* 46: 881-900, 1960.
Early treatment before root fully formed may prevent relapse due to formation of fibers.
169. Reitan, K., Tissue Rearrangement During Retention of Orthodontically Rotated Teeth, *Angle, Ortho.*, 29: 105-113, 1959.
Early treatment before root formed would solve relapse because of fiber development. Fibers around root rearrange first after 28 days, marginal fibers takes longer than 7.5 months.
170. Reitan, K., Initial Tissue Behavior During Special Root Resorption, *Angle Ortho.*, 44: 68-82, 1974.
Cementoid delays root resorption. Uncalcified predentin is not attacked by resorbing cells, therefore treatment before root is fully developed can prevent resporption.
171. Linge, B.O., and Linge, L., Apical Root Resorption in Upper Anterior Teeth, *Europ. J. Ortho.*, 5: 173-183, 1983.
Treating at earlier ages with incomplete root formation reduces risk of root resorption. Functional appliances had half of the resorption that fixed appliances had. Especially risky are Class II elastics, edgewise fixed appliances and pre-treatment signs of resorption.
172. Stenvak, A., Pulp and Dentine Reactions to Experimental Tooth Intrusion, *Tr. Eruop. Ortho. Soc.*, 45th Congr., 449-464, 1969.
Depressing mature teeth causes scar tissue to form and does not completely repair itself if root end is mature. Roots with open apical foramen did not experience damage and recuperated rapidly.

173 Linge, L. and Linge, B.O., Patient Characteristics and Treatment Variables Associated with Apical Root Resorption During Orthodontic Treatment, *Am. J. Ortho.*, 99: 35-43, 1991.
Activators don't cause root resorption. Risk of root resorption lessened whenever fixed phase is reduced with little use of Class II elastics and reduced use of fixed and heavy wires.

174. Rosenberg, M.N., An Evaluation of the Incidence and Amount of Apical Root Resorption and Delaceration Occurring in Orthodontically Treated Teeth Having Incompletely Formed Roots at the Beginning of Begg Treatment, *Am. J. Ortho.*, 61: 524-525, 1972.
Teeth with incomplete root ends will develop normal roots when active orthodontics is done and will have less root resorption when compared to teeth with completely formed roots.

6. Such early treatment has risk of causing (a) TMJ problems (b) root resorption (c) growth problems (d) will tip teeth only (e) periodontal problems.

(a) Early treatment reduces risk of TMJ problems (#175 - 180):

175. Bergersen, E.O., Preventive and interceptive orthodontics in the mixed dentition with the myofunctional eruption guidance appliance: Correction of crowding, spacing, rotations, crossbites and TMJ, *J. Pedodont.*, 12:386-414, 1988.

176. Solberg, W.K., Bibb, C.A., Nordstrom, D.B. and Hansson, T.L., Malocclusion Associated with temporomandibular Joint Changes in Young Adults at Antopsy, *Am. J. Ortho*, 89: 328-330, 1986.
Overbite and overjet is associated with disk damage and damage increases with exposure (age).

177. Riolo, M.L., Brandt, D. and TenHave, T.R., Associations Between Occlusal Characteristics and Signs and Symptoms of TMJ Dysfunction in Children and Young Adults, *Am. J. Ortho.*, 92: 467-477, 1987.
Almost all malocclusions associated with TMJ problems and increases with age.

178. Lieberman, M.A., Gazit, E., Fuchs, C., and Lilos, P., Mandibular Dysfunction in 10 to 18 Year Old School Children as Related to Morphological Malocclusion, *J. Oral Rehabil.*, 12: 209-214, 1985.
Abnormal overbites and occlusal wear are related to joint problems in 369 children.

179. Methenitou, S. et al, 1990. Shows reduction of overbite and overjet at early eage which reduces risk of TMJ problems.

180. Bergersen, E.O., Preventative Eruption Guidance in the 5 to 7 Year Old, *J. Clin. Ortho.*, 29: 382-395, 1995.
Shows the finished results of potentially compromised deciduous dentitions and its effect in reducing the risks of developing TMJ problems caused by overbite, overjet, and improper intercuspation.

(b) Early treatment reduces risk of relapse.

181. Reitan, K., Initial Tissue Behavior During Special Root Resorption, *Angle Ortho.*, 44: 68-82, 1974.
Cementoid delays root resorption. Uncalcified predentin is not attacked by resorbing cells, therefore treatment before root is fully developed can prevent resporption.

182. Linge, B.O., and Linge, L., Apical Root Resorption in Upper Anterior Teeth, *Europ. J. Ortho.*, 5: 173-183, 1983.
Treating at earlier ages with incomplete root formation reduces risk of root resorption. Functional appliances had half of the resorption that fixed appliances had. Especially risky are Class II elastics, edgewise fixed appliances and pre-treatment signs of resorption.

183. Stenvak, A., Pulp and Dentine Reactions to Experimental Tooth Intrusion, *Tr. Eruop. Ortho. Soc.*, 45th Congr., 449-464, 1969. Depressing mature teeth causes scar tissue to form and does not completely repair itself if root end is mature. Roots with open apical foramen did not experience damage and recuperated rapidly.

184. Linge, L. and Linge, B.O., Patient Characteristics and Treatment Variables Associated with Apical Root Resorption During Orthodontic Treatment, *Am. J. Ortho.*, 99: 35-43, 1991. Activators don't cause root resorption. Risk of root resorption lessened whenever fixed phase is reduced with little use of Class II elastics and reduced use of fixed and heavy wires.

185. Rosenberg, M.N., An Evaluation of the Incidence and Amount of Apical Root Resorption and Delaceration Occurring in Orthodontically Treated Teeth Having Incompletely Formed Roots at the Beginning of Begg Treatment, *Am. J. Ortho.*, 61: 524-525, 1972. Teeth with incomplete root ends will develop normal roots when active orthodontics is done and will have less root resorption when compared to teeth with completely formed roots.

(c) Having sufficient growth remaining during orthodontic treatment is essential for long-term overbite stability:

186. Simons, M.E. and Joondeph, D.R., Change in Overbite: A Ten Year Postretention Study, *Am. J. Ortho.*, 64: 349-367, 1973.
Showed that vertical jaw growth has significant influence on success of long-time overbite stability following orthodontic treatment.

(d) Early treatment does not necessarily caues excessive tipping of teeth (#187 - 189):

187. Methenitou, S., Shein, B., Remanathan, G. and Bergersen, E.O., Study found that lower incisors were more lingual in position following early Nite-Guide treatment than that present in control sample.

188. Bergersen, E.O., 1988. Showed results of early treatment without involving excessive tipping of teeth.

189. Bergersen, E.O., 1995. Shows the finished results of potentially compromised deciduous dentitions without involving tipping of teeth.

(e) Early treatment can avoid similar periodontal problems that are seen when treatment is done at later ages (#190-201):

190. Poulton, D.R. and Aaronson, S.A., Relationship Between Occlusion and Periodontal Status, *Am. J. Ortho.*, 47: 690-699, 1961.
Showed significant correlation with overbite, lower incisal crowding, overjet and lack of posterior intercuspation to periodontal status, pocket depth, gingivitis and looseness of teeth.

191. Kalamkarova, S. Kh., Stomotologia (Mosk) 1986 65 (2) 76-78, Engl. Abstr.
Deep bites associated with periodontal disease, bone tissue resorption with looseness and loss of teeth in 142 patients.

192. Ramfjord, S.P. and Major, M.A., Jr., Significance of Occlusion in the Etiology and Treatment of Early, Moderate, and Advanced Periodontitis, *J. Period.*, 52: 511-517, 1981.
Mouth breathing and severe protrusion of teeth causes periodontal problems.

193. Waerhang, J., Eruption of Teeth into Crowded Position, Loss of Attachment, and Downgrowth of Subgingival Plaque, *Am. J. Ortho.*, 78: 453-459, 1980. Found downgrowth of subgingival plaque on erupting crowded teeth.

194. Sandoli, T., Irregularities of the Teeth and Their Relation to the Periodontal Condition with Particular Rererence to the Lower Labial Segment, *Tr. Eruop. Ortho. Soc.*, 49th Congr., 319-333, 1973.
Irregularity and crowding of lower incisors is associated with loss of gingival tissue.

195. Sharpe, W., Relationship of Relapse to Apical Root Resorption and Alveolar Crestal Bone Levels, *Am. J. Ortho.*, 88: 526, 1985. Cases with lower anterior crowding relapse have greater root resorption and lower alveolar crestal bone.

196. Dermant, L.R. and DeMunck, A., Apical Root Resorption of Upper Incisors Caused by Intrusive Tooth Movement: A Radiographic Study, *Am. J. Ortho.*, 90: 321-326, 1986. Intrusion caused root resorption of 18% with 3.6 mm. of intrusion and 2.5 mm. resorption.

197. El-Mangoury, N.H., Gaafar, S.M. and Mostafa, Y.,A., Mandibular Anterior Crowding and Periodontal Disease, *Angle Ortho.*, 57: 33-38, 1987. Plaque and gingival problems are greater in crowded cases and returns faster after curettage.

198. Artun, J. and Krogstad, O., Periodontal Status of Mandibular Incisors Following Excessive Proclination, *Am. J. Ortho.*, 91: 225-232, 1987.
The thinness of the mandibular symphisis is correlated with an increase in clinical crown height with gingival recession.

199. Kennedy, D.B., Joondeph, D.R., Osterberg, S.K. and Little, R.M., The Effect of Extraction and Orthodontic Treatment on Dentoalveolar Support, *Am. J. Ortho.*, 84: 183-190, 1983.
Teeth displaced during eruption had more long-term proximal bone loss than normal erupting teeth.

200. Position Paper of American Academy of Periodontology, Periodontal Diseases of Children and Adolescents, *J. Periodont.*, 67: 57-62, 1966. Children 5-11 years have up to 9% loss of periodontal attachment and bone support; 12-15 years have up to 46%. Generalized juvenile periodontis, consisting of marked inflamation and heavy plaque and calculus, begins at or around puberty.

201. Tala, H., Community Periodontal Index of Treatment Needs in Finland, Int. D. J., 37: 179-182, 1987.
(CIPTN) from Ainamo - 6 sextants are measured and there are 6 categories, namely, supragingival calculus, subgingival calculus, pocket 4 to 5 mm., pocket of 6+ mm., bleeding after probing, recession (now eliminated). 43% of 7 year olds had healthy gingival tissue and, rather consistantly dropped so that by 12 years only 27% had healthy tissues.

7. A Preformed appliance simply cannot work - there is too much human variation as to teeth size, size of arch, freeway space, and individual anatomical variations.

202. Methenitou, S., Shein, B., Remanathan, G. and Bergersen, E.O., 1990.
Showed a significant relation between overjet at 2½ years of age and overbite at 18 years of age in the same untreated individuals. Indicates that a preformed appliance can prevent overbite from developing by retarding the overeruption of the maxillary permanent incisors, and correct overjet as well.

203. Bergersen, E.O., 1988. Showed that early treatment can correct malocclusions by use of preformed appliances.

204. Bergersen, E.O., 1995. Shows the finished results of potentially compromised deciduous dentitions with use of preformed appliances.

205. Hixon, E.H. and Oldfather, R.E.,
Relations of lower permanent incisors to posteriors (canine, premolars) are significantly correlated (r = 0.69).

206. Bergersen, E.O., The Preformed Orthodontic Positioner and Eruption Guidance Appliance, Northwestern Univ., Chicago, IL, 1981. Showed that the following correlations were significant:
Relation of maxillary adult anterior and posterior vs. mandibular anterior and posterior r = 0.86.
Relation of maxillary anteriors vs. mandibular posteriors r=0.80**
Relation of maxillary posteriors vs. mandibular posteriors r=0.80**

Relation of mandibular anteriors vs. mandibular posteriors r=0.64**
Relation of maxillary anteriors vs. maxillary posteriors r=0.61**
Relation of size of teeth to size of arch width significant r=0.28*

207. Bolton, W.A., Disharmony in Tooth Size and its Relation to the Analysis and Treatment of Malocclusion, *Angle Ortho.*, 28: 113-130, 1958. Found the following significant correlations:
Relation upper 1st premolar vs. lower 1st premolar r=0.96
Relation upper 2nd premolar vs. lower 2nd premolar r=0.5
Relation upper 1st premolar vs. lower 1st premolar r=0.61
Relation lower incisors vs. lower canine, premolars r=0.65

208. Pettenella, L. and Menini, G., The Relationship Between the Transverse Diameters of Face, Upper Arch and Teeth, *Tr. Eruop. Ortho. Soc.*, 39th Congr., 281-284, 1963. Mesio-distal width of upper incisors vs. canine-to-canine width r=0.95.

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