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EFFECTS OF THE NATIONAL PREVENTIVE DENTISTRY
DEMONSTRATION PROGRAM ON THE DENTAL
HEALTH KNOWLEDGE AND PRACTICES
OF SIXTH GRADE CHILDREN

by

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R. N., B. A., Ottawa University, 1977

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

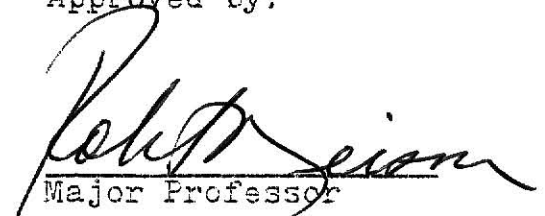
MASTER OF SCIENCE

Department of Adult and Occupational Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1983

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Chapter 1

INTRODUCTION

Health care in America consumes an increasingly large portion of the gross national profit each year. In 1950 the annual expenditure for health care was 12 billion dollars. By 1966 the amount had risen to 46 billion or \$230 per person--6.1% of the gross national profit. From 1966 to 1978 health care expenditures increased at an annual rate of 12.8%. In 1978, \$745 per person went to health care for 8.9% of the gross national profit. By 1981 the figure had risen to 9.8% or \$1,225 per person in America. The national health expenditure for dental services increased from 10.9 billion in 1978 to 17.4 billion in 1981 (Levit, 1982; Gibson and Waldo, 1982; Waldo, 1982).

During the last several years a growing consensus has emerged that the most logical and affordable national health strategy should first emphasize disease prevention, particularly in the young population. Prevention versus treatment is a vital issue.

Oral diseases are the leading morbidity problem in the United States today. More than 98% of all Americans are afflicted with dental disease (Dulac et al., 1983). Dental disease, though not life threatening, is America's most widespread health problem, making it a national health priority.

Because oral disease may be a manifestation of or an aggravating factor in other more widespread systemic disorders, dental health cannot be separated from one's total body health. Consequently, action taken to improve or maintain dental health is directly related to safeguarding total body health.

American children are no different from the rest of the population. More than 98% are afflicted by dental disease. Most have dental caries. The National Dental Caries Prevalence Survey of 1979-1980 estimated that each child in the United States between the ages of 5 and 17 years had 3 decayed (D), missing (M), or filled (F) permanent teeth. Over half of all this disease involved the occlusal surfaces. The survey represented 45.3 million children of which 36% were estimated to be completely caries free while 7% had nine or more DMF teeth. Mild to moderate gingival (gum) inflammation was estimated to occur in 92% of these children with approximately 3% suffering severe gingival conditions that require treatment by a dentist or periodontist (NIDR, 1981; NIDR 1982).

Dental disease has negative effects on a child's self-image, speech, social relationships and ability to learn. The tragedy is that there is no reason for children or adults to suffer the pain, disfigurement and time lost from work and school due to dental caries and periodontal disease. Time lost from work and school for dental visits has been estimated to be 20 million hours per year.

Unfortunately, there is no simple inoculation for dental disease like those that prevent polio and smallpox, but available preventive measures are capable of virtually eliminating dental caries. Preventing dental disease is a life-long daily task and responsibility for each individual.

Statement of the Problem

The effects of the National Preventive Dentistry Demonstration Program (NPDDP) on the dental health knowledge and practices of sixth grade students who completed the four year comprehensive program conducted at the Wichita, Kansas, site was examined by this study.

The Dental Health Test (Appendix A) was given to seven groups of sixth grade students. Six of the groups represent the NPDDP treatment regimens of which five received one or more preventive measures and one received only the yearly examination along with the other Program students, during the four years. The seventh group (control) had no contact with the NPDDP. See Appendix B for descriptions of the various preventive measures and how they were combined into treatment regimens as well as background information regarding the NPDDP. "The combinations were chosen to provide information about the unique and combined effects of certain preventive measures, as well as to test combinations that were likely candidates for an operational school-based program" (Bell et al., 1982).

Significance of the Problem

Over a ten year period, the number of children in Kansas Unified School District 259 (USD 259) reporting private dental care (i.e. by presenting to the school nurse each year a card signed by the dentist following care) has gradually decreased from 24.6% of the school population in 1973 to 20.08% in 1978 and 14.07% in 1983. The number of referrals for care following school visual dental examinations by local dentists declined to 46.4% in 1978 from 64.6% in 1973. In 1983, 41.2% of the children examined were referred for care. This decrease appears to be consistent with the National Dental Caries Prevalence Survey (NIDR, 1981) in which results indicated a reduction in carious surfaces in children aged 5-17 years from 7.06 in the 1970's to 4.77 in the 1980's. However, over 37% of all children in the nation between the ages of 5-17 years still need some form of dental treatment (NIDR, 1982).

Though the district's teachers and school nurses provide some form of dental health instruction and activity during National Dental Health Month, the NPDDP was the first long-term comprehensive program to be undertaken in this community. No evaluation of the effects of either program on the knowledge and/or current practice of students has been conducted.

Though there are numerous health knowledge and behavior inventories, none are designed specifically to assess both knowledge and practice in the area of dental

health (Troyer et al., 1979). More importantly, no assessment of student knowledge regarding the use of fluorides and sealants as preventive dental health measures is documented in the literature.

Definition of Terms

For the purposes of this study, the following definitions will be used:

1. Dental caries -- tooth decay.
2. Disclosing tablet or solution -- a water-soluble stain used to color the plaque on tooth surfaces for easy identification.
3. Fluoride -- an essential, naturally occurring nutrient that is recognized as the most effective agent in the control of dental decay.
4. Gingivitis -- inflammation of gum tissue.
5. Occlusal surface -- the chewing surface of posterior teeth.
6. Periodontal disease -- inflammation and destruction of the tissues supporting the teeth.
7. Plaque -- a mixture of live and dead bacteria and their by-products held next to the teeth and gums in a sticky film. Undisturbed plaque forms colonies on the teeth and gums that cause disease. The film should be removed at least once every 24 hours.
8. Positive dental health practice -- in this non-fluoridated area: daily plaque removal, home administered

fluoride tablets and mouthrinse, regular dental care, and diet that is low in refined sugars.

9. Prophylaxis -- a procedure to remove stains, plaque and calculus from tooth surfaces. The procedure is performed by a dentist or a dental hygienist.

10. Sealant -- a thin layer of plastic resin that is applied to the chewing surfaces of teeth to prevent caries.

11. Sound tooth -- a tooth without decay or filling.

Statement of the Hypothesis

There will be no difference between groups on dental health knowledge scores and reported dental health practices as measured by the Dental Health Test (DHT).

Research Questions

1. Will treatment groups I-VI have higher scores on knowledge items of the DHT than control group VII?

2. Will students in treatment groups I, II and IV be more knowledgeable regarding the effects and benefits of using fluorides than students in the other groups.

3. Will students in treatment groups I and III be more knowledgeable of the benefits and use of sealants than students in the other groups?

4. Will students in treatment groups I, II, IV and V report more positive dental health practices on related items of the DHT than students in the other groups?

5. Will there be a difference in dental health knowledge scores and reported dental health practices between boys and girls within or between groups?

Limitations

1. The NPDDP terminated at the Wichita, Kansas, site in December, 1981.

2. Due to the options given teachers as to when to teach and how to incorporate the NPDDP dental health education lessons, the education component was likely to be more variable than other treatment components.

3. Teachers were not tested to determine the extent of their knowledge and understanding of the information to be presented to students.

4. Reported practices were not correlated with a gingival index.

Chapter 2

REVIEW OF THE LITERATURE

The number of students attending schools in the United States total approximately 45 million or nearly one-third of the nation's population. They are housed in 106,000 schools and taught by 2 million teachers. In addition, 40% of children between the ages of three and five years attend preschool programs (A. Horowitz, 1979; Robinson and Stone, 1979). Therefore, the school system is considered to be the most logical and practical setting for instruction in preventive health care and practice for America's children (Kenny, 1979; Davis et al., 1982).

In addition to providing opportunity to reach the largest number of children over a significant amount of time, the school setting offers other positive benefits. Most teachers have a background in childhood growth and development and are experienced in teaching methods and behavioral science. Teachers and school nurses work with children every day in a learning environment that lends itself to the necessary frequent reinforcement of habit patterns that are in the process of formation. The school setting provides opportunity for maximum communication and group dynamics (Haefner, 1974; Kenny, 1979; Davis et al., 1982).

Dental disease is not accepted as a major concern

in the minds of most people (Dulac et al., 1983). In an editorial of a recent Journal devoted entirely to dental health topics, Davis et al. (1982) state, "Almost all dental disease can be prevented if children and parents are well-informed of the causes of dental disease, practice proper methods of prevention and are aware of the need for regular dental care." However, the dental health program must do more than provide dental facts and toothbrushing and flossing practice. Such efforts should be a part of a well-planned, comprehensive, continuing school health program.

An effective comprehensive dental health education program must include the use of fluorides, reinforced oral hygiene instruction and practice, encouragement for the reduction in consumption of refined sugars, and dental health instruction. A professional dental component consisting of sealant and topical fluoride applications and prophylaxis is highly desirable (A. Horowitz, 1979; Frazier and A. Horowitz, 1980; A. Horowitz and Frazier, 1980).

Plaque Removal

Daily individual plaque removal and regularly scheduled visits to a dentist for examination and prophylaxis has been accepted dental practice for decades. Prophylaxis is a procedure to remove extraneous materials including stains and calculus from tooth surfaces by scaling and polishing techniques. Calculus is a hard,

crust-like deposit that forms at and beneath the gumline. It is the hardening of unremoved plaque. Once plaque has hardened into calculus, it can be removed only by a dentist or a dental hygienist (ADA, 1978). However, estimates are that 30% of the population under the age of 17 years has never been to a dentist and, for children under 12 years of age, this figure has been reported to be closer to 50% (Rebich et al., 1982).

Dental health education programs in schools have been primarily directed at the removal of plaque by proper brushing and flossing techniques. The intended goals of these programs are to reduce dental caries and gingivitis, and to stress the importance of the student's responsibility for his own body and health status. The effectiveness of these mechanical procedures, however, has not been proven (Heifetz and Suomi, 1973; Heifetz et al., 1973; Frazier, 1978; A. Horowitz et al., 1980).

Effective plaque removal requires the use of a disclosing agent, dental floss and a toothbrush. Children in the school setting must have close and adequate supervision. Dental caries and gum inflammation can develop if plaque is not removed frequently and thoroughly, but the exact minimum frequency has not yet been determined (A. Horowitz and Frazier, 1980).

The most available person to teach dental health education to children appears to be the classroom teacher who has been trained in the appropriate skills. Most all

children attend school as compared with the small proportion who visit a dental office on a regular basis (Graves et al., 1975). Boyer, however, in her 1976 study, indicated that many teachers do not consider dental health activities, including the instruction of dental health and the supervision of brushing and flossing techniques in the classroom, to be the responsibility of the public school teacher. Regarding the attainment of quality plaque control, the Conference on Prevention and Oral Health (Carlos, 1973) acknowledged that:

The technical skill, time, effort, and perseverance required to continually maintain a high standard of oral cleanliness exceeds the ability of the average human being. . . . Therefore, mechanical procedures for plaque prevention do not offer a promising solution to the problem of control of dental diseases for the population at large.

In a study by A. Horowitz et al. (1977), the author noted that "daily plaque removal in school requires more enthusiasm and discipline than most students, faculty and program personnel can muster for extended periods of time."

Fluorides

One of the most effective preventive nutrients known is fluoride which is an essential, naturally occurring substance. The positive effects of fluoride on dental health have been proven and documented by hundreds of studies over the last several decades. Fluoride is utilized by the teeth both systemically and topically, thereby making teeth less susceptible to decay. The

importance of the use of fluorides must be given top priority in programs of dental health education, if the efforts are to be effective (Jenny, 1978; A. Horowitz, 1979; A. Horowitz and Frazier, 1980; Rebich et al., 1982; Dulac et al., 1983). Reviews of current dental health education programs reveal that the benefits of using fluorides are not stressed (ADA, 1975; Frazier, 1978; A. Horowitz and Frazier, 1980; Frazier and A. Horowitz, 1980; Silversin et al., 1980). An estimated one-fourth of the school districts in the United States currently provide fluoride programs for their students, leaving an estimated 19.5 million children in grades kindergarten through eight, and approximately 15.5 million in grades nine through twelve, without access to the benefits of such experiences. (Silversin et al., 1980). The concentration on plaque removal measures by dental health education programs may have contributed to this delay in the acceptance of school-based fluoride regimens (Frazier, 1978; A. Horowitz et al., 1980). Participation in school-based fluoride programs is voluntary and requires informed parental consent. In the opinion of Rebich et al. (1982), these programs help to teach children the value of prevention and their personal responsibility for their own oral hygiene.

Systemic Fluorides

Systemic fluorides are those that are ingested in food, water, or tablet form. Following ingestion, the fluoride is circulated through the body via the blood

stream and absorbed by the enamel of the developing teeth, making them more resistant to decay.

The most cost-effective method of providing systemic fluoride is through community water supplies. This method is inexpensive and benefits the entire community regardless of age, economic or educational level, individual motivation or the availability of dental manpower (A. Horowitz, 1979). All water contains at least trace amounts of fluoride, and some areas of the country have an adequate amount naturally present in the water supply. In those communities having insufficient amounts of fluoride in the drinking water, the fluoride concentration can be adjusted to optimal amounts. For the prevention of tooth decay, the recommended level of community water fluoridation is 0.7 to 1.2 parts per million. Research and practical experience spanning nearly four decades document a 50-70% reduction in dental caries for children who, from birth, drink water in which fluoride is adjusted to the recommended level. Where there is no central water supply, fluoride can be added to the school water supply. This method has been shown to reduce decay by approximately 40% (Green, 1979; A. Horowitz, 1979; Schrotenboer, 1981; Rebich et al., 1982).

In areas with an insufficient level of fluoride in the drinking water, fluoride tablets can be given to children as young as three years of age to supplement the dietary fluoride intake. Fluoride drops are available for

younger children. The dosage is prescribed according to the child's age and the level of naturally occurring fluoride in the drinking water.

"Because most children attend school regularly, and because schools operate on a more rigid schedule than do individual families, schools are the logical places for administering self-applied fluorides to children" (A. Horowitz, 1979). The procedure is simple. The tablet is chewed for thirty seconds, then swished thoroughly for thirty seconds, and then swallowed. This method provides systemic benefits to unerupted teeth and topical benefits to the teeth that have already erupted. The tablets can be used effectively in school-based programs because they are easy to dispense and store, cause virtually no litter and require very little time. The cost to the school district for daily tablet administration has been estimated at less than twenty-five cents per child per year. The benefit to children is a 20-40% reduction in dental caries (A. Horowitz, 1979; A. Horowitz and H. Horowitz, 1980; Rebich et al., 1982; Dulac et al., 1983).

Topical Fluorides

Fluorides applied directly to the tooth surface provide topical benefits only and are not intended to be swallowed. Several methods of topical fluoride application are available. The most commonly known method is the use of toothpaste containing fluoride. This protection reduces

dental decay by an estimated 20-30% (Heifetz, 1982).

Professionally applied topical fluorides are highly recommended and are reported to reduce caries formation by 30-40%; however, the procedure is expensive and should be done every six months to one year to be the most effective (A. Howowitz, 1979). Davis et al. (1982) reported that only 61% of the total population visits a dentist in a given year and only 29% on a regular basis.

The use of fluoride mouthrinse has been widely tested and its benefits proven. This procedure, too, is simple. The child is provided a paper cup containing 10 ml of a .2% sodium fluoride solution once a week. The solution is placed in the mouth and swished thoroughly for sixty seconds after which the solution is expectorated back into the cup. The child wipes his mouth with a paper napkin and then stuffs the napkin into the cup to absorb the solution, allowing for easy disposal. This method lends itself easily to school-based programs, because it is minimally disruptive, and the cost is estimated to be less than seventy-five cents per child per year. One quarter of the nation's school districts have adopted this method of protection for approximately eight million children. The disadvantages are that the solution must not be swallowed; the benefits are provided to erupted teeth only and are realized only as long as the program is in effect. First grade level is usually the earliest this method should be instituted as the child must be able to follow the

directions for swishing and not swallowing. An approximate reduction in dental caries of 20-50% can be expected (A. Horowitz and Frazier, 1980; A. Horowitz and H. Horowitz, 1980; Silversin et al., 1980; Ripa, 1981; Rebich et al., 1982; Dulac et al., 1983; Coombs et al., 1983).

Sealants

Pits and fissures are faults in the enamel on the occlusal surfaces of permanent molar teeth that tend to become filled with debris and bacteria, and, under the appropriate conditions, initiate the carious process. Such caries account for approximately 54% of all caries in permanent teeth (NIDR, 1981). More than twenty years ago, Buonocore (1955) first suggested that perhaps a material capable of forming a bond to tooth tissues could be used to seal pits and fissures. Cautious optimism and numerous investigations have led gradually to the development of another recognized effective preventive measure to assist in combating dental caries. The objective of "sealing" pits and fissures is to isolate these areas from the oral environment and the likelihood of decay. The use of pit and fissure sealants as an integral part of an overall preventive dentistry program is highly recommended (Goldman et al., 1977; A. Horowitz, 1979).

The longer the period of time that the teeth are exposed to the oral environment without caries developing, the less likely they will become carious. Thus, when there

is a delay in the application of sealant to sound teeth for a period of time after eruption, the potential benefit for those teeth is reduced. The earlier the teeth can be sealed, the greater the possibility of caries prevention (Charbeneau, 1977).

Pit and fissure sealants are retained on the tooth surface by mechanical bonding, which has been described by Gwinnett (1973) as "The physical entrapment of material within pores or cavities naturally existing or artificially created." The procedure is relatively simple and must be done by a dentist or, where dental practice laws allow, by a dental hygienist or dental assistant.

The first report of a clinical trial using pit and fissure sealants was published in 1967. Since that time considerable evidence has confirmed the long-term preventive effect. In a review of sealant studies, Silverstone (1981) reported that most sealants remain in place for several years and are highly effective in the prevention of dental caries--78-92%.

According to Taylor and Gwinnett (1973), members of the younger age groups who are most susceptible to occlusal caries cannot be protected from them by oral hygiene alone. The Council on Dental Materials and Devices (1976) recognized that sealants, when properly used, provide a barrier to decay causing factors and, therefore, form an acceptable part of proven effective preventive measures.

Sealant application can be done in a school-based

program, but the procedure is expensive. The cost was reported by Corum (1978) to be approximately \$1.00 per tooth surface when done at school by contracting with local dentists. Silverstone (1981) reported the total cost per sealed tooth in a school-based sealant program conducted in Kentucky was estimated to be \$1.75. No current dental health education program includes in its instruction information on the use of sealants as a preventive measure (ADA, 1975).

Nutrition

Diet is one of the principal factors in the development of dental caries with sugar being a major cause. Approximately forty nutrients are necessary for good health. Sugar calories are empty because they contain no nutrients (Hinkle, 1982). In its Public Message on Sugar and Dental Health, the ADA (1979) states:

Sugar plays a pervasive role in American life. For too many people, it has, unfortunately, become associated with treats and comfort, with holidays and other good times as well as with quick energy pickups. The result is a society dependent on sugar with little expectation in the near future of the development of an all-purpose replacement for sugar.

In 1980, Americans were said to use, on the average, more than 130 pounds of sugars and sweeteners a year or $2\frac{1}{2}$ pounds a week. Much of this is in the form of hidden sugars--those used in the preparation of foods--and not just sugar from the sugar bowl (USDA, 1980). Hinkle (1982) reported:

According to Candy Marketer, a magazine of the candy industry, the average American consumed 17.3 pounds of candy in 1979, a 3% increase from the previous year. Total U.S. candy consumption in 1979 also rose, with Americans purchasing 3.8 billion pounds.

Important to consider is the amount of sugar ingested and the frequency of eating sugary foods; the length of time they remain in the mouth; and the physical form of the food. Most hazardous to dental health are sweet, sticky snacks, hard candies, sugar-containing breath mints and cough drops, and sticky dried fruit (Nizel, 1972).

All such foods and beverages are readily available to students from vending machines located on most school campuses, especially at the secondary level. Removing the machines would not likely be a popular suggestion for the school administrator who depends on such sales to produce revenue for activities not included in the regular school budget. But these same machines can dispense milk, juice, cheese, fresh fruit, yogurt, nuts and other nutritious items as well as the sugar laden snacks (A. Horowitz, 1979; A. Horowitz and Frazier, 1980; Hinkle, 1982).

A comprehensive health education program is suggested by A. Horowitz (1979) and Hinkle (1982) in order to change the attitudes of young people regarding snack choices. The students must learn to identify nutritious foods, become aware that the role of sound nutrition is fundamental to good health, and be made to understand the influence of advertising on their decision making. Then

the student has the right to have the opportunity to practice the principles of the nutrition education (Hinkle, 1982). A. Horowitz and Frazier (1980) stated:

Without changes in current practices of advertising items laced with sugar, alterations in the types of foods available in school vending machines, and effective labeling to disclose percentages of ingredients of all packaged foods, efforts to reduce the frequency of consumption of sugary products on behalf of dental health are futile exercises.

Kreitzman (1979) described a planned new program that would monitor caries development over an extended period with the dietary intake patterns recorded and evaluated along with dental caries data. In his opinion, a study of the real food habits of normal people is a critically important factor in gaining a knowledge of the relationships between foods and dental caries.

Dental Health Education

A definition of health education by Wold (1981) states, ". . . health education is a process linking health information with positive 'healthful' behavior changes." Kenny (1977) states that health education includes "the sum total of processes and experiences whereby people are helped to adopt and/or maintain positive health behaviors." As defined by Green (1979), health education is "any combination of learning opportunities designed to facilitate voluntary adaptations of behavior conducive to health." These are but a few of the definitions of health education to be found in the literature.

As repeated studies have shown that level of knowledge alone does not significantly influence a change in behavior, health educators have been forced to examine more carefully the theories and methods behavioral science has to offer to deal with health related behaviors. "Many people seem to regard education as a process similar to inoculation, assuming that appropriate behaviors will automatically follow receipt of information, just as immunization follows inoculation," stated A. Horowitz and Frazier (1980).

Because of the overwhelming evidence of dental disease, which is said to be the number one health problem of the school-age child (Nadar, 1974), a need for effective dental health programs is obvious. The average curriculum is so filled with mathematics, science, language, and other essential subjects--and many groups are calling for even more time to be devoted to these basics--that little time remains to help children learn how to protect their most treasured possession--good health. "In too many cases, they fail to see the connection between their well-being and their daily habits, such as the way they work, the way they eat, the way they play," stated Mulholland (1978).

Dental health appears to carry a low priority in education. Most programs are supported by grant funds and terminate when funding ends. Few teacher training programs include specific preparation for dental health education. Many health educator positions have been eliminated by

budget cuts. Only seven states mandate the teaching of dental health and oral hygiene. In a survey of state school health programs, Castile and Jerrick (1976) reported that the most frequently mandated (35 states) health education program is in the area of drugs. While 16 states mandate comprehensive health education, subject offerings are frequently the option of the local school district.

In 1975 the Bureau of Dental Health Education of the ADA conducted the First National Symposium on Dental Health Education in Schools to provide a forum for the presentation of current school-based programs. These included "Toothkeeper", the American Society for Preventive Dentistry program; "THETA: Teenage Health Education Teaching Assistants", supported by the National Foundation for the Prevention of Oral Disease, Inc.; "Toothtown, U.S.A.", a National Dairy Council program; "Learning About Your Oral Health", the American Dental Association's program; Alabama's "Smile Keeper"; "Tattletooth", developed by the Texas Department of Public Health; and the "Cleaveland System for Dental Health Education" among others. All these programs included some form of plaque removal routine and dental health instruction with the goal of increasing knowledge and motivating positive dental health behaviors. Instruction on the use of fluorides and sealants were not included in most and only mentioned briefly in "Tattletooth".

Most studies have shown programs of this type to be

ineffective and, in some cases, expensive. Little relationship has been shown to exist between dental health instruction and dental behavior. Any positive behavior change has been temporary (Heifetz and Suomi, 1973; A. Horowitz, 1977; Frazier, 1978; Robinson and Stone, 1979; A. Horowitz and Frazier, 1980).

Research in the field of health education has examined many ways of teaching and presenting knowledge, but has found no significant difference between various modes, and that knowledge alone does not promote changes in values, behavior or appropriate decision making. Little causal relationship exists between knowledge and individual attitude and behavior (Greenberg, 1977; Frazier, 1978; Houle, 1982). Rose et al. (1979) found that students who had acquired a sufficient knowledge of concepts of dental health did not necessarily apply this information in their oral hygiene skills, and conversely, those students who had good oral hygiene did not necessarily grasp concepts of dental health.

Heifetz and Sumoni (1973) stated:

As long as behavioral scientists are unable to determine a well-developed technology which induces behavioral change, programs of preventive dentistry which attempt to alter the individual's personal habits and life-style appear to have a limited chance of succeeding. Mindful of this limitation, programs for the prevention of dental caries and periodontal disease must continue to utilize and explore exhaustively those approaches to prevention which operate, for the most part, independently of the patient's performance and cooperation.

An effective dental health education program must

be comprehensive and systematically reinforcing at succeeding grade levels. The goal must be long term, and even then, the positive effects may be counteracted by incidental learning and social conditioning. Many of the current programs focus on elementary age children and are not extended into secondary grades. To be effective, the program must be continuing and permanent. Fluoride and sealant regimens need to be added to the present programs of oral hygiene and dental health instruction (Frazier, 1978; A. Horowitz and Frazier, 1980; Houle, 1982). The integration of these programs, however, must be done with consideration of the overall school programs and their priorities and limitations (Kenny, 1979). Frazier (1978) believed that if such comprehensive programs can be achieved ". . . the consequences of dental disease could be almost totally prevented or controlled." Coombs et al. (1983) suggest that school health personnel must "find ways to play a more visible leadership role in developing a constituency for long-term support of their health programs."

A. Horowitz and Frazier (1980) made this statement:

Students and the general public should not be denied information about thorough plaque removal, the need to eat sweets less frequently and the desirability of routine professional care. However, almost everyone beyond preschool age knows that "you should brush your teeth," "you should not eat sweets between meals," and "you should visit your dentist twice a year." However knowing is not doing. Information alone does not change behavior whether it is removing plaque, restricting the frequency of sugar consumption, using fluorides optimally, or obtaining appropriate dental

care. Likewise, doing is not knowing. For example, implementing a school-based program of self-applied fluorides (tablets or rinses) will directly benefit student's oral health but may not teach them what fluorides are and why they are important for oral health. Rinsing by rote will reduce dental caries, but will not make a more informed consumer or voter. Ultimately, both protection and understanding must be achieved.

Chapter 3

METHOD

Description of Subjects

Between November, 1977 and December, 1981, USD 259 participated, along with nine other sites across the nation, in the NPDDP which was funded by the Robert Wood Johnson Foundation, administered by the American Fund for Dental Health, and evaluated by The Rand Corporation. Site selection was made from the applications of over 100 districts throughout the country. The purpose of the NPDDP was to measure the cost and effectiveness of various types and combinations of school-based preventive care procedures. The final results of this endeavor are not yet available, but will be published in the near future. Five of the selected sites, including USD 259, have a non-fluoridated community water supply while the other five represented fluoridated communities.

Sixteen elementary schools within USD 259 were selected to participate. Selection was made on the basis of low mobility history (to reduce experimental mortality); commitment of interest from administration, faculty and community; and use of the city water supply.

All children enrolled in the fall of 1977 in grades one, two and five in the 16 selected schools were eligible

for program participation for which informed parental consent was required. Detailed information explaining the program's purposes and procedures, along with a letter requesting their permission to have their children participate, and a form on which to indicate whether or not consent was given for participation, was sent to all parents of the 2272 eligible children. A positive response was received from 79%, a negative response from 15%, and no response from 6%. These children comprised the longitudinal study group and received the baseline clinical dental examination; they were also scheduled to receive some combination of preventive care and/or a series of annual clinical dental examinations (Appendix B).

Random samples of children who, in the fall of 1977, were in grades three, four, six, seven and eight and were attending the same schools or representative junior high schools were also included in the baseline clinical dental examinations as the cross-sectional group. The purpose was to develop benchmark data against which the longitudinal group could be assessed in subsequent years.

The program consisted of six different treatment groups. Five of these groups received one or more preventive measures which had previously been proven singly safe and effective in reducing tooth decay. Children in the sixth group did not receive any of the preventive measures, but did receive, along with children in the other five groups, a clinical dental examination at the beginning

of the program, then annually for four years (Appendix B).

Schools, rather than individual children, were assigned to treatment regimens because certain preventive measures, such as toothbrushing, are most effectively administered to children when they are in classroom groups. The assignments were made by The Rand Corp. in a way that minimized differences in the number and characteristics of the children assigned to each regimen.

The design of the NPDDP did not include any measurement of dental health knowledge or practice of participating children. The intent of this study that occurred 16 calendar months after the end of the NPDDP at this site, was to examine the effects of the Program on the dental health knowledge and reported practices of sixth grade students who participated for the four years, beginning in their first grade year.

Sample Selection

The decision was made to test only one grade level of the NPDDP participants. The original Program first grade level was chosen; because as 1982-83 sixth graders, they attended elementary centers that provided easier access to students.

Sampling procedures for this study initially employed a computer generated random sample of 1982-83 sixth graders in the district, which was expected to provide a sample of participants from each of the six NPDDP

treatment groups in addition to a new control group. However, this method did not generate adequate numbers of children per each NPDDP group.

The next effort employed the use of a computer generated alphabetical list of 1982-83 sixth graders. Using a like list of program participants from the end of the NPDDP (December, 1981), 238 children currently enrolled in USD 259 who had participated in the entire NPDDP process and the regimen in which they participated were identified. As a result, all available participants of the original six NPDDP treatment groups were included in this study (Table 1).

Table 1
NPDDP Treatment and Control Groups

Group	Number of Students	Male	Female
I	43	25	18
II	40	19	21
III	39	25	14
IV	46	25	21
V	37	16	21
VI	33	14	19
VII	53	26	27
Total	291	150	141

To obtain a control group for this study, all sixth grade students who had attended any one of the 16 NPDDP study schools (Appendix B) between September, 1977 and

December, 1981, were deleted from the list to reduce any Hawthorne effect as the result of children who were not in the original NPDDP study sample, but may have participated in classroom activities with sample children. Students enrolled in Special Education classes, except those in the Gifted program, were also deleted to be consistent with NPDDP procedure. A random sample of 53 students was then drawn from the remaining list (Table 1).

Instrument

Dental health knowledge inventories are available, but often are neither valid and/or reliable. The literature reveals no instrument to assess the correlation between dental health knowledge and reported practice. Furthermore, assessment of student knowledge and use of fluorides and sealants has not been documented. As the result of a common interest in these issues, the Coordinator of Health Education and Promotion Activities for the National Caries Program of the National Institute of Dental Research, Bethesda, Maryland, Alice M. Horowitz, R.D.H., M.A., developed and pretested the instrument used in this study (Appendix A). The instrument has not been tested for validity and reliability; therefore, all claims are made at face value. By consensus, a panel of experts determined the correct response to individual items. A small group of children were tested by the developer and by the investigator to determine readability of the instrument.

Problem areas identified during the pretest were revised accordingly. Some other problems appeared following administration of the DHT to the study sample.

Procedure

In accordance with USD 259 Board of Education Policy (P9030.00), a formal "Request for Research Approval and Agreements" was presented to the Director of Research, Planning, and Development Services. A date was set for the investigator to meet with the Research Council to present a proposal for the study. The support of this body was received and permission granted to proceed. All considerations for the Rights and Privacy of Human Subjects have been met. In the opinion of the Council, additional parental consent for this study was not required.

Encouragement for the pursuit of this study has also been received from the National Director of the NPDDP and the Coordinator of Health Education and Promotion Activities of the National Caries Program, National Institute of Dental Research, who has provided valuable assistance.

Informational letters were sent to the principal of each attendance center of the selected children, in addition to the Directors of Elementary Education, Pupil Services, Research, Planning and Development Services, and the Coordinator of Health Services (Appendix C).

Permission was granted by the Research Council to identify the school nurses as contact persons and test supervisors. Informational letters were sent to the school nurse (Appendix C) of each affected attendance center with a form to be returned to the investigator indicating the nurse's willingness to participate. The selected dates of test administration was included in the communications and, despite the fact that the time of year was extremely busy, all forms were received affirmatively.

Following receipt of the instrument in its final form from the developer and the completion of the sample selection, a five digit number was assigned to each participant to identify group number, number within group, sex and race. The instrument was duplicated, collated, and an identification number was placed on each. Children from more than one group were represented at most attendance centers. Therefore, a removable "post-it note" was placed on each instrument with the name of the child who was to receive that particular test, to assure matching of numbers and names. The name was removed once the test was in the hands of the student. On the first day of the designated test week, a letter of instruction (Appendix C) was provided to each school nurse along with copies of the DHT for the selected student(s) at that school. The number of students per school ranged from one to 18.

The school nurse, who is adept in scheduling and well informed as to her school's routine and personnel,

made arrangements with the principal and involved persons to take the designated student(s) to a quiet area for administration of the test. To help assure uniformity, the instructions sent to each nurse included the specific directions to be given to all participants. The DHTs were returned to the investigator the same day they were completed. Nurses made every effort to have the DHT administered to all absentees by the last day of the designated test period.

The use of school nurses as contact persons and test supervisors was extremely effective as demonstrated by the 97.9% completion rate. The number of completed DHTs returned to the investigator by group are as follows:

Group I	40 of 43
Group II	40 of 40
Group III	39 of 39
Group IV	46 of 46
Group V	37 of 37
Group VI	33 of 33*
Group VII	50 of 53
Total	<u>285 291</u>

Statistical Treatment

A posttest-only control-group experimental design was employed in this study. A one-way analysis of variance

* One DHT not coded.

was used to determine if any of the seven groups differed significantly on the knowledge score, as well as to determine differences between sex on knowledge. The score was obtained by computing the number of correct responses (17) to the items on the test relating to knowledge of dental health.

A Scheffe procedure was then used to specify which groups differed significantly from one another. The non-parametric Chi-square test was used to analyze the ranking items and, also, to determine if significant differences existed between groups or sex on the frequency of like responses on all item choices.

A t test was used to determine differences on knowledge score by sex within groups. This test was also performed on each item of reported practice by sex within groups.

Chapter 4

FINDINGS

The NPDDP design did not include a measurement of the knowledge or practices of its participants. This study examined both the knowledge and reported practices of sixth grade students from each of the six NPDDP treatment groups and a new control group. The hypothesis states: there will be no difference between groups on dental health knowledge scores and reported dental health practices as measured by the DHT.

Research Question 1

An analysis of variance on the knowledge scores of each of the seven groups showed a statistically significant difference did exist between groups (Table 2).

Table 2

Total Knowledge Scores of All Groups
Analysis of Variance

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	6	137.7701	22.9617	4.122	0.006*
Within groups	277	1542.9725	5.5703		
Total	283	1680.7427			

*Significant beyond the 0.01 level (2.90 required).

Application of the Scheffe test indicated a statistically significant difference between treatment group I and control group VII (Table 3). The null hypothesis relating to knowledge scores, therefore, was not attained.

Table 3
Multiple Range Test -- Scheffe Procedure

Mean	Group	Group						
		I	II	III	IV	V	VI	VII
7.8800	VII							
8.0541	V							
8.5250	II							
8.5870	IV							
9.2813	VI							
9.3077	III							
9.9500	I							*

* Denotes pairs of groups significantly different at the 0.05 level.

The frequency distribution of individual scores (Appendix D, Table 15) shows little difference in median and mode across groups. Groups I, II, IV and V had the same dental health education lessons; however, in the mean ranking (Table 3) groups III and VI closely follow group I, the only group significantly higher than the control group VII. Group III had the clinical component only, i.e., no NPDDP education lessons or classroom activities. Group VI was the NPDDP control group and received only a clinical dental examination once each year. This finding may

indicate that classroom dental health instruction alone did not make the difference in knowledge, but only the combination of all treatment components. However, group II differed in content from group I in only one clinical procedure--no sealant application.

Another possible explanation may be related to the regular dental education program provided to students in USD 259 through the Department of Health Services and the long standing commitment of support to dental health education by both the Board of Education and the local dental society. In the 1962-63 school year, USD 259 participated in the first Crest Dental Health distribution of toothbrush and toothpaste kits with each student in the district receiving a kit. The following year, the Wichita District Dental Society (WDDS) approached the Board of Education to pledge support to the school district to further dental health education. Materials have been provided to the district from the private funds of dental society members on a regular basis since that time. The Board of Education appropriated funds to provide additional materials and school nurse time for Dental Health Enhancement in the 1973-74 school year and continue to do so. In addition, a one semester Dental Health Enhancement workshop with university credit has been conducted five different times for principals, teachers and school nurses. The workshop was a cooperative effort of USD 259, the WDDS and Wichita State University (WSU), which afforded each par-

ticipant personal and professional gains, instructional materials, and current factual information regarding the various dental specialities. USD 259 provided the funds, WDDS provided the presentors from various dental specialty areas and WSU awarded the credit.

The major emphasis of the classroom instruction occurs during National Dental Health Month when lessons are presented by school nurses at all elementary grade levels with an actual toothbrushing and flossing demonstration and practice at the fourth grade level. School nurses serve as resource persons for teachers throughout the year on health topics including dental health. The content of the lessons presented includes information on plaque removal, nutrition, and regular dental care.

The mean knowledge scores by group are displayed graphically in Figure 1. Attention is called to the fact that no group has had contact with the NPDDP for 16 calendar months.

A frequency distribution was obtained on the responses to each choice offered on all test items. As the data are on a nominal scale, a Chi-square procedure was performed on each distribution to test the possible difference between each group. From all DHT item choices, 15 showed a significant difference (Table 4); all but one had weak correlation. "If you floss your teeth, how often do you do so?" resulted in a significance beyond the 0.05 level of correlation. Significance on "What are sealants

for?" approached a 0.05 correlation.

The NPDDP education component included ten specially designed, progressive dental health lessons for each grade each of the four program years, twice weekly supervised toothbrushing and flossing, and diet regulation (i.e., encouragement for the reduction of refined sugar intake). Students in the groups that received dental health education would be expected to be more knowledgeable of basic dental health facts than those in the other groups.

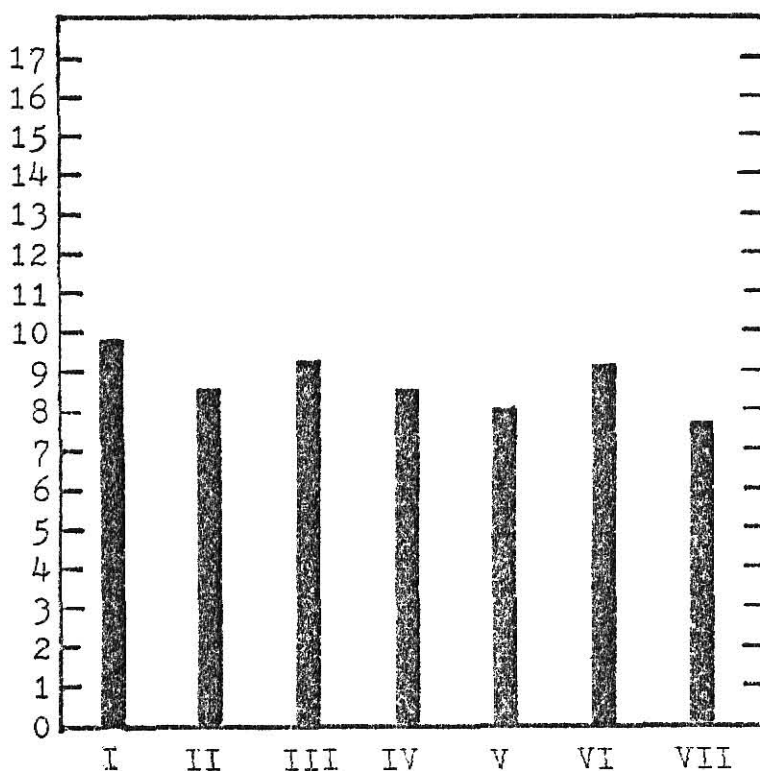


Figure 1

Mean Knowledge Scores by Group

Table 4

Items Measuring Knowledge and Practice that
Showed Significance between Groups

DHT Item	Page	Significance	Contingency Coefficient
3	1	0.0284	0.34901
4	2	0.0206	0.22519
12	2	0.0214	0.40657*
16	2	0.0000	0.45086
1e	3	0.0092	0.23935
1i	3	0.0286	0.21892
1j	3	0.0002	0.29179
1k	3	0.0237	0.22254
3b	3	0.0166	0.22909
3d	3	0.0166	0.22912
5b	3	0.0012	0.26959
7c	3	0.0028	0.38742**
8	4	0.0000	0.34326
9j	4	0.0136	0.23271
10a	4	0.0476	0.31984

* Correlation significant at the
0.05 level.

** 0.388 required for correlation
to be significant at the 0.05 level.

Table 5 describes the distribution of responses to knowledge items relating to prevention of gum disease. The frequency and percentage of each group response to each item's choices is given. The correct response(s) is indicated by an asterisk. (Correct response refers to the consensus of a panel during instrument development.)

Table 5

Responses to Gum Disease Knowledge
By Item and Group

Item/Response Choices	Group									
	I	II	III	IV	V	VI	VII			
	N	%	N	%	N	%	N	%	N	%
What do you think is the best way to keep from getting gum disease?										
Floss	4	11	4	10	5	13	9	20	4	9
*Brush and floss	5	14	3	8	4	11	6	14	3	7
Brush and proper nutrition	0	0	0	0	0	5	1	2	0	4
Brush and regular dental care	1	3	1	3	0	0	0	0	1	7
Brush and rinse	0	0	0	0	0	0	0	0	0	7
Brush	10	28	14	37	23	60	19	42	13	42
Other	14	39	16	42	4	11	10	22	9	17
Don't know	2	5	0	0	0	0	0	0	0	0
The purpose of toothbrushing is: (Check all correct answers)**										
To remove dental plaque	20	51	24	61	18	47	21	46	16	55
To make your breath smell good	5	13	2	5	2	5	0	0	3	26
To make your teeth feel good	3	8	8	20	6	16	12	26	8	29
To prevent cavities	18	46	25	64	21	55	27	59	21	61
To prevent gum disease	15	38	21	54	18	48	25	53	16	51
*All of the above	16	41	14	36	17	45	18	39	14	29
When is the best time to eat sweets?										
Between meals	9	24	4	10	5	13	5	11	6	10
*With meals	15	40	15	39	18	47	19	42	13	27
Before going to bed	0	0	1	3	0	0	2	4	0	2
I'm not sure	10	26	9	24	9	24	12	27	11	43
Other	4	10	9	24	6	16	7	16	5	18

Table 5 (Continued)

Item/Response Choices	Group									
	I	II	III	IV	V	VI	VII			
	N	%	N	%	N	%	N	%	N	%
Which of these activities help prevent gum disease?			(Check	all correct	correct answers)	answers)**				
*Brush teeth	37	95	36	95	45	98	34	92	28	87
Rinse with fluoride	34	87	27	71	37	80	24	65	27	84
Rinse with water after eating	20	51	17	45	19	41	19	51	13	41
*Floss teeth	33	85	33	87	43	93	33	89	26	81
Use a fluoride toothpaste	32	82	29	76	35	76	24	65	29	91
Go to the dentist regularly	36	92	34	89	42	91	31	84	28	87
Not eat sweets between meals	26	67	20	53	26	56	14	38	20	62
Have a fluoride treatment	29	74	25	66	34	74	26	70	26	81
Use disclosing tablets	20	51	16	42	20	43	19	51	14	44
Have sealants placed on teeth	19	49	12	32	8	17	9	24	9	28
Take fluoride tablets	27	69	18	47	28	60	17	46	19	59
Drink water with fluoride in it	21	54	19	50	20	43	10	27	15	47
Drink fresh spring water	12	31	8	21	11	24	2	5	8	25
Take vitamins	15	38	17	45	13	28	4	11	10	31

* Correct response

** Multiple responses prevent totals of 100%

The open-ended style of "What do you think is the best way to keep from getting gum disease?" produced a variety of responses. Most could be placed in the six listed categories of which the correct response was "brushing and flossing." Statements that could not be placed into the listed areas were included in the category of "other" (Appendix E). Only five students chose to respond with "don't know." Though a low percentage of all groups stated their response simply "brushing and flossing," the great majority included "brushing" in combination with other measures.

All groups responded similarly to the purpose of toothbrushing. Students were instructed to "check all correct answers" with one answer being "all of the above." If the latter had been deleted, a more precise distribution could have been observed.

Both the NPDDP lessons and the USD 259 regular program of dental health education stresses all areas of nutrition, including the recommendation of eating sweets with meals and brushing afterwards. However, a large percentage of "I'm not sure" regarding the best time to eat sweets occurred. The written responses to "other" (Appendix E) leads one to believe that at least some students based their response on family practice rather than on knowledge of fact.

The students were asked to check all of the listed activities that help to prevent gum disease. "Brushing

teeth" and "flossing teeth," the correct responses, were the choice of a large percentage of all groups, as were most all activities, which indicates to the investigator that the students were not making the distinction between gum disease and tooth decay.

The students were instructed to rank the activities by placing a (1) beside the activity that helps prevent gum disease the most, a (2) beside the second best activity, and a (3) for third best. The concept of ranking was apparently not a developed skill for this age group as evidenced by the number of students who either put a rank number beside every activity listed or skipped the item completely. Also, this was the last item and, because the skill level was frustrating, was easily ignored. The duality of checking all correct answers and then ranking them on the same list may have caused the confusion. In the future, some pre-instruction in the ranking concept and a rearrangement of the directions is recommended.

Table 6 shows the student's ranking by group of the activities that prevent gum disease. "Brushing teeth" was ranked first by all groups and "flossing teeth" second by all NPDDP education component groups (I, II, IV, V). Rankings of each activity by group (Appendix F) show very little difference between groups.

Research Question 2

The next research question asked: Will students in

Table 6
Activities that Prevent Gum Disease
Ranking by Group

Group	First			Second			Third		
	Activity*	N	f %	Activity	N	f %	Activity	N	f %
I	A	24	12 50	C	26	8 31	B	26	6 31
II	A	33	26 79	C	33	10 30	E	33	10 30
III	A	30	14 47	D	31	7 22	E	31	7 22
IV	A	39	24 61	C	39	12 31	E	39	10 26
V	A	29	20 69	C	29	10 34	E	29	10 34
VI	A	24	13 54	B	24	7 29	C	24	7 29
							E	24	7 29
VII	A	33	17 51	E	33	8 24	C	33	6 18

* A = Brushing teeth
 B = Rinsing with fluoride
 C = Flossing teeth
 D = Using a fluoride toothpaste
 E = Going to the dentist regularly

groups I, II and IV be more informed regarding the effects and benefits of using fluorides than students in the other groups? Participants of groups I, II and IV received daily fluoride tablets and weekly fluoride mouthrinses at school during the four years of the NPDDP. Only one lesson (at the fifth grade level) was devoted specifically to fluorides. Only as the result of their experience in the fluoride regimens of the NPDDP can these groups be expected to be more knowledgeable of fluoride effects and benefits.

Data in Table 7 describe the responses given by group to DHT items dealing with knowledge of fluoride benefits. The open-ended question "What do you think is the best way to prevent tooth decay?" yielded multiple responses where a single response was expected. The correct response, "use of fluorides," was not stated as such by any of the 284 respondents. The statements were grouped into the additional five listed categories. Of the 60 categorized as "other" (Appendix E), eight responses included the use of fluorides in addition to other measures and were spread across all groups. A total of only 11(4%) across all groups included the use of fluorides in their response. The wording in this question should be revised prior to further testing.

The respondents were asked to check all of the listed activities that help to prevent tooth decay. All activities that included fluoride are the correct responses. The largest percentage of each group selected "brushing,"

Table 7

Responses to Fluoride Knowledge
By Item and Group

Item/Response Choices	Group													
	I		II		III		IV		V		VI		VII	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
What do you think is the best way to keep from getting tooth decay?														
*Use of fluorides	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brush and floss	9	22	13	32	11	28	14	30	10	27	7	21	11	23
Brush and proper nutrition	2	5	2	5	4	10	6	13	4	11	3	9	5	10
Brush and regular dental care	2	5	3	8	0	0	1	2	2	5	0	0	2	4
Brush and fluoride rinse/paste	0	0	0	0	1	2	0	0	1	3	2	6	0	0
Brush	18	46	10	25	15	39	21	46	10	27	12	37	23	47
Other	9	22	12	30	8	21	4	9	10	27	9	27	8	16
Which of these activities help prevent tooth decay? (Check all correct answers)**														
Brush teeth	39	100	39	100	38	100	46	100	35	95	31	97	48	98
*Rinse with fluoride	37	95	36	92	30	79	39	85	30	81	29	91	39	80
Rinse with water after eating	19	49	20	51	12	32	15	33	16	43	17	53	21	43
Floss teeth	39	100	38	97	37	97	42	91	32	86	32	100	44	90
*Use a fluoride toothpaste	38	97	36	92	34	89	45	98	29	78	32	100	45	92
Go to the dentist regularly	38	97	37	95	35	92	40	87	33	89	31	97	42	86
*Not eat sweets between meals	32	82	25	64	25	66	32	70	23	62	28	87	34	69
*Have a fluoride treatment	35	90	37	95	31	82	35	76	29	78	29	91	38	78
Use disclosing tablets	24	61	26	67	13	34	21	46	19	51	17	53	18	37
*Have sealants placed on teeth	24	61	12	31	14	37	8	17	8	22	9	28	10	20
*Take fluoride tablets	34	87	31	80	21	55	35	76	23	62	25	78	32	65
*Drink water with fluoride in it	18	46	17	44	16	42	15	33	13	35	14	44	22	45
Drink fresh spring water	10	26	8	20	7	18	10	21	2	5	11	34	12	24
Take vitamins	13	33	11	28	16	42	12	26	4	11	11	34	15	31

Table 7 (Continued)

Item/Response Choices	Group													
	I		II		III		IV		V		VI		VII	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
What are fluorides for?														
To help clean teeth	13	33	19	49	19	50	24	52	15	40	18	56	26	53
*To prevent tooth decay	22	56	16	41	24	63	31	67	20	54	26	81	34	69
To keep fillings in place	1	3	3	8	2	5	1	2	2	5	3	9	7	14
To make teeth white	9	23	12	31	7	18	6	13	8	22	10	31	22	45
To prevent bad breath	4	10	5	13	4	10	9	20	6	16	3	9	9	18
To prevent gum disease	10	26	7	18	16	42	13	28	8	22	15	47	18	37
All of the above	12	31	8	20	7	18	3	6	7	19	4	12	7	14
I'm not sure	3	8	4	10	2	5	1	2	4	11	0	0	5	10
Does the water supply in your community have fluoride added to it?														
Yes	5	13	1	3	1	3	1	2	0	0	1	3	1	2
*No	9	23	9	23	8	22	9	20	11	30	11	34	7	14
Don't know	25	64	29	74	28	75	36	78	26	70	20	63	41	84

* Correct response.

** Multiple responses prevent totals of 100%.

"flossing," and "going to the dentist regularly." However, at least 55% of students checked some activities that included fluoride. Though very little difference is evident in responses between groups, this finding indicates that the students are, at least, aware of fluoride use, but not as the most effective weapon against tooth decay. Some of the activities are seen in television commercials, while others are experienced by those students who visit their dentist regularly. The fact that groups I, II, and IV had the experience of fluoride tablets and mouthrinse in the NPDDP did not seem to increase their awareness or understanding of the activities.

Students were instructed to rank the activities that prevent tooth decay according to: (1) helps prevent tooth decay most, (2) second best, and (3) third best. The concept of ranking, as previously noted, was apparently not a developed skill for many students as evidenced by the many who skipped the item completely, put a 1, 2 or 3 beside every choice, or put the 1, 2 or 3 beside choices in the following item. This confusion occurred on approximately 38% of the instruments which casts some doubt on the validity of the results.

"Brushing teeth" was ranked first by the majority of all groups (Table 8). The correct response for the first ranking was "drinking water with fluoride in it" and was the choice of only two students from the NPDDP fluoride regimens.

Table 8
Activities that Prevent Tooth Decay
Ranking by Group

Group	First			Second			Third		
	Activity*	N	f %	Activity	N	f %	Activity	N	f %
I	A	21	16 76	B	26	23 88	D	24	8 33
II	A	26	23 88	B	26	7 27	D	26	8 31
III	A	23	17 74	C	23	8 35	D	23	6 30
IV	A	34	30 88	B	36	12 33	B	35	11 31
				D	36	8 22	D	35	8 23
V	A	28	24 86	B	26	9 35	D	26	8 31
VI	A	22	16 73	B	21	8 38	D	21	6 28
VII	A	27	18 67	C	26	6 23	B	26	10 38
				D	26	6 23			

* A = Brushing teeth
 B = Flossing teeth
 C = Using a fluoride toothpaste
 D = Going to the dentist regularly

"Flossing teeth" was ranked second best in preventing tooth decay by the majority of all groups except III and VII where "using a fluoride toothpaste" was the choice for second position. An equal number of students in group VII considered "going to the dentist regularly" as second best. The correct second ranking, "taking fluoride tablets," was the choice of only one student from groups in which daily fluoride tablets were a part of the NPDDP treatment. All groups except VII ranked "going to the dentist regularly" as third choice. Group VII chose "flossing teeth" as number three. The correct third ranking was "having sealants placed on teeth." Only one student from the groups that received sealant applications on their teeth for the four years of the NPDDP (I and III) considered sealants as number one. Because only a few local dentists use sealants in their practice, most of these students may not have had an application since the end of the Program or may not know if they have had.

Though a large percentage of students had difficulty with the ranking, the results indicate that those who did grasp the concept were consistent with the overall responses on the previous item in which the students checked all activities that prevent tooth decay. The ranking of each listed activity by group (Appendix F, Table 18) reveals no meaningful differences between groups.

The highest percentage of correct responses to "What are fluorides for?" occurred in group VI, the NPDDP

control group, and group VII, the control group of this study. Again, if "all of the above" had been deleted a more precise percentage distribution could have been observed. H. Horowitz (1980) reported:

Even in the United States where community fluoridation is widespread, a Gallup Poll in 1977 revealed that 51 percent of adults do not know what fluoridation is or does. About 45 million U.S. adults served by public water systems are not certain whether the water they drink contains fluoride or not.

Similarly, the vast majority of students in this study (64-84%) did not know if fluoride is added to the local water supply. This finding, along with the results of the responses to the previous fluoride items, points clearly to the need for a reassessment of the content of dental health education instruction, be it a local or a national program.

Several possible reasons for the lack of reported knowledge of fluoride benefits are apparent to this investigator:

1. Neither the NPDDP nor the regular program lessons stress the use and benefits of fluorides. These programs place the strongest emphasis on brushing, flossing, proper nutrition and regular dental care.
2. No school-based fluoride program has been in effect in USD 259 since the end of the NPDDP in December, 1981.
3. Groups with the fluoride component as part of the NPDDP treatment regimen were participating in a somewhat meaningless routine. The inservice provided for teachers should place a strong emphasis on the value of

including and stressing the purposes of all activities.

4. Some problems in wording and placement of items on the DHT, as previously noted, could have affected the results.

5. Fluoridation has been a strong political issue in this community for several years. A proposal for fluoridating the city water supply has gone to referendum twice in the last 15 years and was soundly defeated each time. The subject last appeared on the ballot during the first year of the NPDDP. This situation, undoubtedly, affects the limited inclusion of fluoride facts in dental health education programs in this district. The issue caused many parents to not enroll their children in the NPDDP for fear they would be assigned to a fluoride regimen.

Research Question 3

The third question asked if students from NPDDP regimens in which sealant applications were a part of the treatment provided (groups I and III) will be more knowledgeable of the benefits and use of sealants than will students from other groups. Table 9 describes the responses to DHT items relating to sealant knowledge and use. Students in groups I and III had sealants applied to their molar teeth by a dentist and dental hygienists (with special permission for the State Dental Board) in an on-site dental clinic, during the four years of the NPDDP.

Table 9

Responses to Sealant Knowledge
By Item and Group

Item/Response Choices	Group													
	I	II	III	IV	V	VI	VII							
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
What are tooth sealants for?														
To help clean teeth	0	0	1	2	1	3	0	0	1	3	1	2	1	2
To make teeth hard	3	7	1	0	1	3	1	3	1	3	2	4	2	4
*To keep bacteria out of tooth	19	49	19	24	4	11	5	18	4	11	5	10	10	21
To keep fillings in	2	5	4	2	0	0	1	3	0	0	1	3	3	6
I'm not sure	15	39	15	72	30	83	31	76	22	76	32	67	32	67
Place an X on the tooth where sealants are used.														
*Proper placement	16	41	20	53	9	24	5	16	5	16	5	10	5	10
I'm not sure	23	59	18	47	28	76	41	84	27	84	44	90	44	90
Which of these activities help prevent tooth decay?														
*Have sealants placed on teeth	24	61	14	37	8	22	8	17	9	28	10	20	10	20
(One of correct responses from several choices)														
Have sealants been put on your teeth?														
Yes	20	50	26	67	5	13	10	22	4	13	5	10	5	10
No	2	5	2	5	6	16	5	11	4	13	15	31	15	31
Don't know	18	45	11	28	26	70	30	67	23	74	29	59	29	59

* Correct response.

Students in these two groups were more knowledgeable on all items relating to sealants than any of the other groups. However, a large percentage of students in these groups responded with "I'm not sure" and "don't know." Only one of these students ranked "having sealants placed on teeth" as one of the three most important ways to prevent tooth decay.

Several reasons may exist to explain this observation:

1. Although personal relationships between students and clinic personnel were excellent, the amount of teaching/learning that took place is questionable. The students apparently went to the clinic twice each school year as a matter of routine without knowing and/or understanding the purpose.

2. The NPDDP dental health education lessons did not discuss the use and purpose of sealants. Teachers may not have known or understood what occurred during the clinic visit and, therefore, did not support the experience with classroom discussion. Though teachers were encouraged and invited to observe the clinic process, very few did. The attitude of most teachers was that the 20-30 minutes each child spent in the clinic on each visit represented more time than their full academic schedules could accommodate, without adding more.

3. Sealants as a preventive measure had not been used by the local dental community until the NPDDP began.

By the end of the Program a few dentists, primarily pedodontists and the NPDDP Wichita site dentist, were including sealants in their practice. The technique is, however, still not widely used in this community.

4. No school-based program of sealant application has occurred since December, 1981.

Research Question 4

Will students in treatment groups I, II, IV and V report more positive dental health practices on related items of the DHT than students in the other groups? Table 10 describes the responses by group to the items dealing with individual practice. Two students reported not having their own toothbrush, which may or may not be accurate. Situations do occur where children state that they share toothbrushes at home. The NPDDP provided new toothbrushes at regular intervals throughout the four years to students in groups I, II, IV and V. School nurses routinely provide brushes to any student in the total population who is known to have the need.

Responses to the related items of "how many times do you usually brush your teeth," "how many times did you brush yesterday," and "how often do you use toothpaste" were consistent in two-thirds of the total respondents. This approach has been known to define real use; though just how truthful these youngsters were in their responses to practice items is not known.

Table 10

Responses to Dental Practice
By Item and Group

Item/Response Choices	Group													
	I		II		III		IV		V		VI		VII	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
How often do you usually brush your teeth?														
Once a day	13	33	12	31	10	28	12	27	12	33	8	25	12	20
Twice a day	24	60	23	59	25	69	31	69	20	54	22	69	37	76
More than twice a day	1	2	1	2	1	3	0	0	2	5	1	3	0	0
Once a week	2	5	3	8	0	0	1	2	2	5	1	3	2	4
Once a month	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Never	0	0	0	0	0	0	1	2	1	3	0	0	0	0
How many times did you brush your teeth yesterday?														
Once	15	39	14	39	16	42	12	29	14	42	7	22	16	34
Twice	20	53	20	55	19	50	22	54	15	46	19	59	25	53
Three times	3	8	2	6	3	8	6	15	3	9	4	13	6	13
Four times	0	0	0	0	0	0	1	2	1	3	2	6	0	0
Do you have your own toothbrush?														
Yes	40	100	40	100	39	100	45	98	37	100	31	97	50	100
No	0	0	0	0	0	0	1	2	0	0	1	3	0	0
Do you use toothpaste?														
Yes	39	100	39	100	34	90	43	93	36	97	32	100	49	100
No	0	0	0	0	4	10	3	7	1	3	0	0	0	0

Table 10 (Continued)

Item/Response Choices	Group									
	I		II		III		IV		V	
	N	%	N	%	N	%	N	%	N	%
If yes, what kind?										
Aim	6	15	6	15	4	11	4	9	2	6
Crest	24	60	26	65	24	69	28	64	21	66
Aqua Fresh	1	3	2	5	2	6	2	7	0	0
Colgate	5	12	5	12	4	11	7	16	5	16
Macleans Fluoride	0	0	0	0	0	0	0	0	0	0
Other	4	10	1	3	1	3	2	4	4	12
How often do you use toothpaste?										
Once a day	15	38	12	30	12	31	14	31	8	25
Twice a day	24	60	24	60	27	69	29	63	22	69
More than twice a day	0	0	0	0	0	0	0	0	1	3
Once a week	1	2	4	10	0	0	1	2	1	3
Once a month	0	0	0	0	0	0	1	2	0	0
Never	0	0	0	0	0	0	1	2	0	0
Do you use dental floss?										
Yes	31	80	25	64	28	74	29	63	21	57
No	8	20	14	36	10	26	17	37	16	43
If yes, how often?										
Once a day	8	24	6	23	12	39	7	24	11	50
Twice a day	8	24	9	35	1	3	5	17	3	14
More than twice a day	2	6	0	0	0	0	0	0	0	0
Once a week	11	34	7	27	16	52	13	45	4	18
Once a month	4	12	4	15	2	6	4	14	4	18

Most students report using fluoride toothpaste and dental floss. A large percentage in each group report using dental floss only weekly or monthly, which is far from the recommended daily use.

Milk or water was the leading drink of choice reported by all groups except II where the choice was soft drinks and milk. Iced tea and kool aid were the only "other" choices reported (Appendix E).

The majority of students reported that most of their dental health information was obtained from school or from their dental office/clinic. This finding suggests that dental office/clinic education programs offer information similar to that provided in the school programs.

Reported practices relating to fluoride use, especially important in non-fluoridated communities, are shown in Table 11. A large portion of all groups reported using fluoride toothpaste. Those that use mouthrinses were nearly equal to those who did not. The majority in all groups indicated the use of mouthrinses that do not contain fluoride (Appendix E). Fluoride rinses for home use are recommended to be used daily. Four of the 17 students reporting using a fluoride mouthrinse (Fluorigard or Act) indicated they used it only once a week or once a month. Similar responses occurred regarding the taking of fluoride tablets. Only 12 of the 44 who reported taking the tablets, indicated they took them once a day as is recommended.

Table 11

Responses to Fluoride Practice
By Item and Group

Item/Response Choices	Group											
	I		II		III		IV		V		VI	
	N	%	N	%	N	%	N	%	N	%	N	%
Does your toothpaste have fluoride in it?												
Yes	35	88	37	93	37	95	37	80	34	92	31	97
No	1	2	0	0	0	0	1	2	0	0	0	0
Don't know	4	10	3	7	2	5	8	18	3	8	1	3
Do you use a mouthwash or mouthrinse?												
Yes	21	54	18	45	16	41	25	54	16	43	19	59
No	18	46	22	55	23	59	21	46	21	57	13	41
If yes, what kind?												
Fluorigard	1	6	1	6	1	7	3	13	0	0	1	5
Act	1	6	2	12	2	13	0	0	2	13	2	11
Other	11	65	12	70	12	80	19	79	13	81	12	67
Don't know	4	23	2	12	0	0	2	8	1	6	3	17
How often do you use a mouthwash or mouthrinse?												
Once a day	10	37	9	43	7	37	11	38	11	55	13	55
Twice a day	4	15	3	14	5	26	4	14	2	10	3	12
More than twice a day	0	0	0	0	0	0	0	0	0	0	0	0
Once a week	7	26	5	24	5	26	12	41	4	20	3	12
Once a month	6	22	4	19	2	11	2	7	3	15	5	21

Table 11 (Continued)

Item/Response Choices	Group													
	I		II		III		IV		V		VI		VII	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Do you take fluoride tablets?														
Yes	6	15	2	5	7	19	10	23	7	19	6	19	8	16
No	33	85	37	95	30	81	34	77	30	81	26	81	41	84
If yes, how often?														
*Once a day	3	38	1	50	4	40	3	30	2	29	1	17	2	18
Twice a day	1	12	0	0	0	0	1	10	0	0	0	0	4	36
More than twice a day	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Once a week	1	12	0	0	3	30	2	20	3	42	5	83	0	0
Once a month	3	38	1	50	3	30	4	40	2	29	0	0	5	46

* Correct response.

More similarity than differences were apparent in all groups regarding dental practice, which may indicate that the regular dental health education program provided by USD 259 has been as influential on practices as was the NPDDP classroom components. The null hypothesis relating to reported dental health practice was attained.

Research Question 5

The last research question asked: "Will there be a difference in dental health knowledge scores and reported dental health practice between boys and girls within or between groups? An analysis of variance on the knowledge scores of boys and girls between groups revealed no significant difference between sex (Table 12).

Table 12

Knowledge Scores Between Groups by Sex
Analysis of Variance

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	1	1.9516	1.9516	0.328	0.5674
Within groups	282	1678.7700	5.9531		
Total	283	1680.7214			

Girls are reported to be generally more receptive to dental health education and have more positive dental practices than boys (Hart and Behr, 1980). Though such a result was expected in this study, the results did not

support the expectation.

A t test was then performed on the knowledge scores by sex within groups. No significant difference occurred between boys and girls within any group (Table 13). Group VII approached significance (0.052) in favor of girls.

A t test was also done on each item of reported practice by boys and by girls within groups. In only six instances did the t value reach or approach significance (Table 14). The significance was in favor of girls in four of the six instances. The frequency and percentage of responses to each practice item by sex between groups (Appendix G, Table 18) and within groups (Appendix G, Table 19) reveal no meaningful differences.

The Chi-square procedure was performed on the frequency distributions of responses by sex to all dental health practice items. No significant difference was identified in any group between boys and girls.

Table 13

A Comparison of Mean Knowledge Scores
Boys and Girls Within Groups

Group	N		Mean Score	Standard Deviation	Pooled Variance Estimate		
					T Value	Degrees of Freedom	2-Tail Prob.
I	21	Boys	10.1429	1.590	0.41	37	0.682
	18	Girls	9.8333	2.975			
II	19	Boys	8.1053	2.052	-1.32	37	0.194
	20	Girls	8.8500	1.424			
III	24	Boys	9.6250	2.683	1.28	36	0.208
	14	Girls	8.5000	2.473			
IV	25	Boys	8.5200	2.600	-0.20	44	0.840
	21	Girls	8.6667	2.221			
V	16	Boys	7.3125	3.049	-1.38	35	0.176
	21	Girls	8.6190	2.692			
VI	14	Boys	9.6429	2.530	0.74	30	0.464
	18	Girls	9.0000	2.351			
VII	25	Boys	7.3200	2.056	-1.99	47	0.052
	24	Girls	8.4583	1.933			

Table 14

Items with T Value Significance
By Sex Within Groups

Group	Item	N	Mean Score	Standard Deviation	Pooled Variance Estimate		
					T Value	Degrees of Freedom	2-Tail Prob.
I	What kind of toothpaste do you use?	21	Boys	2.0000	0.632	-2.44	37
		18	Girls	3.0556	1.862		
II	How many times did you brush your teeth yesterday?	15	Boys	1.4667	0.743	-2.01	33
		20	Girls	1.8500	0.366		
IV	What kind of mouthwash or mouthrinse do you use?	15	Boys	3.0667	0.258	2.07	22
		9	Girls	2.4444	1.130		
V	Does your toothpaste have fluoride in it?	16	Boys	1.3750	0.806	2.14	35
		21	Girls	1.0000	0.0		
	If you take fluoride tablets how often do you do so?	3	Boys	2.0000	1.732	-2.77	5
		4	Girls	4.5000	0.577		
	Have sealants been put on your teeth?	16	Boys	2.1250	0.806	-3.78	35
		21	Girls	2.9048	0.436		

Chapter 5

SUMMARY OF FINDINGS

The Research Problem

As the cost of health care continues to consume greater portions of American's income each year, increased emphasis on basic health education has become a necessity. Dental health is no exception. Locally, 86% of the population of USD 259 do not report receiving regular dental care--an increase of 10% over ten years. In 1983, 41% of the children who received a visual dental examination by a volunteer dentist during school dental inspections, were referred for care. Few community resources are available to those who cannot afford to pay for the needed restorative treatment. Maintenance care is out of the question for a growing number of local families.

USD 259, along with nine other sites across the nation, participated in the NPDDP between November, 1977 and December, 1981. Participating children were expected to derive lasting benefits from the experience. The final report of the NPDDP results is not available, but will be published in the near future, and is expected to provide valuable information regarding the effects of the preventive procedures on the surfaces of the teeth of participating children. The study described in this paper

has examined the effects of the NPDDP on the dental health knowledge and reported dental health practices of sixth grade students who were Program participants for four years.

Method

Approval for the study was obtained from the USD 259 Research Council. Two hundred thirty-eight students who enrolled in the NPDDP as first graders in the fall of 1977, had continuous participation throughout the four years of the Program, and were still in the USD 259 population in the spring of 1983 were identified. These students represented all six original NPDDP treatment regimens. A control group was randomly selected from students in the USD 259 1982-83 sixth grade population who had not attended any of the NPDDP participating schools during the four program years.

A Dental Health Test developed by Alice M. Horowitz, R.D.H., M.A., of the National Institute of Dental Research was given to sample subjects by the school nurse in each attendance center. A total of 285 of the 291 instruments were completed and returned to the investigator. Some problems were encountered with the DHT in regard to wording, placement of items, and directions. Students displayed difficulty with the two items that required the ranking of activities according to their importance. Future such testing should include pre-instruction to

clarify the process for this age group.

Confusion of the testees was observed in other areas and was apparently related to the number of answers to be given on a particular item. In future testing, consideration should be given to instrument revision, including the clustering of items requiring one answer and those requiring more than one answer. Another option would be to state on each item whether to check one answer, more than one answer or all that apply.

Findings

Though treatment groups I, II, IV and V included the same dental health lessons and toothbrushing/flossing instruction and practice, an analysis of variance on the mean knowledge scores of the DHT revealed a statistically significant difference only between treatment group I and the control group (VII). Two groups that did not receive dental health lessons or brushing/flossing at school in the NPDDP (III, VI) were second and third respectively in the mean ranking. Treatment group II did not include sealant applications on student's teeth; otherwise, it was the same as group I, but was fifth in the mean ranking.

Groups I, II and IV included daily fluoride tablets and weekly fluoride mouthrinse in the NPDDP treatment regimens. Students in these groups were expected to be more knowledgeable regarding the benefits and use of fluorides, but their responses were not significantly

different from other groups. Students in these groups did not rank any fluoride measure in the top three best ways to prevent dental decay. The control group for the NPDDP (group VI) and the control group for this study (group VII) demonstrated higher percentages than all other groups regarding the purpose of fluoride. Sixty-four to 84% of all students did not know that the local water supply is not fluoridated.

Groups I and III included sealant applications in the clinical NPDDP treatment. As expected, students in these groups appeared more knowledgeable of sealants and their use than were students in other groups, however not to a statistically significant degree. Thirty-nine to 47% of students in these groups reported they were "not sure" about sealant information.

Students in groups I, II, IV and V were expected to report more positive dental health practices than students in other groups because of the dental health lessons and the supervised brushing/flossing practice included in these NPDDP treatment regimens. Few significant differences were observed between groups on reported dental health practice.

Girls were expected to have higher knowledge scores on the DHT and to report more positive dental health practice than boys. Few significant differences were identified within or between groups using sex as the variable.

Problems with wording, placement of items, and

directions were found in the DHT. Ranking items in order of importance and/or the dual use of a single listing of choices was difficult for a large percentage of the sixth grade subjects.

Conclusions

Based on the subjects in this study:

1. Little difference existed in mean knowledge scores between NPDDP groups. Only the comprehensive group that included clinical preventive procedures was significantly different than the control group.
2. No meaningful difference could be noted between groups with regard to the knowledge of fluoride use and benefits.
3. Students who participated in sealant regimens of the NPDDP were somewhat more knowledgeable of the use and purpose of sealants than students in other groups, but not significantly so.
4. Students in all groups reported similar dental health practice.
5. No statistically significant difference occurred between boys and girls on knowledge scores or reported dental health practice.
6. The regular dental health education program of USD 259 appears to provide essentially the same level of knowledge as did the NPDDP classroom components.
7. The null hypothesis regarding knowledge scores

was not retained.

8. The null hypothesis regarding reported dental health practice was retained.

Implications

1. The content of dental health education needs to be restructured to include emphasis on preventive procedures documented to be most effective in preventing dental decay and gum disease (i.e., fluorides and sealants).

2. Though routine participation by students in school-based fluoride and sealant programs is effective in reducing tooth decay, educational reinforcement must be included to assure effective gains in dental health knowledge, practice and awareness; and to produce a generation of wise dental consumers.

3. A valid and reliable measurement of student's dental health knowledge and reported practices is needed to effectively evaluate any existing program of dental health education.

Recommendations

1. The validity and reliability of the DHT should be established by repeated testing with comparable subjects.

2. After revision, the DHT should be given to another grade level of NPDDP students at this site.

3. The DHT should be replicated in another NPDDP

site where no established dental health education program was conducted prior to, during or since participation in the Program and where the use of fluorides is not a political issue.

4. Dental health education programs should be revised to include emphasis on preventive measures documented to have the greatest effect on the reduction of tooth decay (i.e., fluorides and sealants).

5. School-based programs of self-applied fluorides should be provided for students having parental consent.

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APPENDIX A
DENTAL HEALTH TEST

ID# _____ 1

Dental Health Test**PLEASE ANSWER THE FOLLOWING QUESTIONS, THEN GO ON TO THE NEXT PAGE.****DO NOT RETURN TO THIS PAGE**

1. What do you think is the best way to keep from getting tooth decay (cavities)?

2. What do you think is the best way to keep from getting gum disease?

3. Which of the following do you drink most? (Check one)

_____ Plain water
_____ Soft drinks
_____ Juice

_____ Milk
_____ Other

4. Where have you gotten most of your information about dental health? (Check one)

_____ Home
_____ School
_____ Dental office or clinic

_____ Friends
_____ Television
_____ Other (explain)

AGE _____

SEX _____ Girl _____ Boy

(GO TO THE NEXT PAGE. DO NOT RETURN TO THIS PAGE.)

2

1. How often do you usually brush your teeth? ☐ Once a day ☐ Once a week
☐ Twice a day ☐ Once a month
☐ Never
2. How many times did you brush your teeth yesterday? _____
3. Do you have your own toothbrush? ☐ Yes ☐ No
4. Do you use toothpaste? ☐ Yes ☐ No
5. If yes, what kind? _____
6. How often do you use toothpaste? ☐ Once a day ☐ Once a week
☐ Twice a day ☐ Once a month
7. Does your toothpaste have fluoride in it? ☐ Yes ☐ No ☐ Don't know
8. Do you use a mouthwash or mouthrinse? ☐ Yes ☐ No
9. If yes, what kind? _____
10. How often do you use a mouthwash or rinse? ☐ Once a day ☐ Once a week
☐ Twice a day ☐ Once a month
11. Do you use dental floss? ☐ Yes ☐ No
12. If yes, how often? ☐ Once a day ☐ Once a week
☐ Twice a day ☐ Once a month
13. Do you take fluoride tablets? ☐ Yes ☐ No
14. If yes, how often? ☐ Once a day ☐ Once a week
☐ Twice a day ☐ Once a month
15. When was the last time you went to your dentist's office or clinic? ☐ This year ☐ A few years ago
☐ Last year ☐ Never
16. Have sealants been put on your teeth? ☐ Yes ☐ No ☐ Don't know

(GO TO THE NEXT PAGE. DO NOT RETURN TO THIS PAGE.)

3

1. Which of these activities help prevent tooth decay? (Check all correct answers)

<input type="checkbox"/> Brushing teeth	<input type="checkbox"/> Using disclosing tablets or solutions
<input type="checkbox"/> Rinsing with fluoride	<input type="checkbox"/> Having sealants placed on teeth
<input type="checkbox"/> Rinsing mouth with water after eating	<input type="checkbox"/> Taking fluoride tablets
<input type="checkbox"/> Flossing teeth	<input type="checkbox"/> Drinking water with fluoride in it
<input type="checkbox"/> Using a fluoride tooth paste	<input type="checkbox"/> Drinking fresh spring water
<input type="checkbox"/> Going to the dentist regularly	<input type="checkbox"/> Taking vitamins
<input type="checkbox"/> Not eating sweets between meals	
<input type="checkbox"/> Having a fluoride treatment at the dentist's office	

2. Now, place a 1 in front of the activity listed above that helps prevent tooth decay most; Place a 2 by the activity that is second best; and Place a 3 by the activity that is the third best way to prevent tooth decay.

3. What are fluorides used for?

<input type="checkbox"/> To help clean teeth	<input type="checkbox"/> To prevent bad breath
<input type="checkbox"/> To prevent tooth decay	<input type="checkbox"/> To prevent gum disease
<input type="checkbox"/> To keep fillings from falling out	<input type="checkbox"/> All of the above
<input type="checkbox"/> To make teeth white	<input type="checkbox"/> I am not sure

4. Does the water supply in your community have fluoride added to it?

☐ Yes ☐ No ☐ I don't know

5. The purpose of toothbrushing is: (Check all correct answers)

<input type="checkbox"/> To remove dental plaque	<input type="checkbox"/> To prevent cavities
<input type="checkbox"/> To make your breath smell good	<input type="checkbox"/> To prevent gum disease
<input type="checkbox"/> To make your teeth feel good	<input type="checkbox"/> All of the above

6. When is the best time to eat sweets?

<input type="checkbox"/> Between meals	<input type="checkbox"/> Before going to bed
<input type="checkbox"/> With meals	<input type="checkbox"/> I'm not sure
	_____ Other (write in)

7. What are tooth sealants for?

<input type="checkbox"/> To help clean teeth	<input type="checkbox"/> To keep bacteria from getting in the tooth
<input type="checkbox"/> To make teeth hard	<input type="checkbox"/> To keep fillings from falling out
	<input type="checkbox"/> I'm not sure

(GO TO THE NEXT PAGE. DO NOT RETURN TO THIS PAGE.)

8. Place an X on _____ the tooth where sealants are used.



_____ I'm not sure

9. Which of these activities help prevent gum disease? (Check all correct answers)

- | | |
|--|--|
| <input type="checkbox"/> Brushing teeth | <input type="checkbox"/> Using disclosing tablets or solutions |
| <input type="checkbox"/> Rinsing with fluoride | <input type="checkbox"/> Having sealants placed on teeth |
| <input type="checkbox"/> Rinsing mouth with water after eating | <input type="checkbox"/> Taking fluoride tablets |
| <input type="checkbox"/> Flossing teeth | <input type="checkbox"/> Drinking water with fluoride in it |
| <input type="checkbox"/> Using a fluoride toothpaste | <input type="checkbox"/> Drinking fresh spring water |
| <input type="checkbox"/> Going to the dentist regularly | <input type="checkbox"/> Taking vitamins |
| <input type="checkbox"/> Not eating sweets between meals | |
| <input type="checkbox"/> Having a fluoride treatment at the dentist's office | |

10. Now, place a 1 in front of the activity listed above that helps prevent gum disease most; Place a 2 by the activity that is second best; and Place a 3 by the activity that is the third best way to prevent gum disease.

APPENDIX B

NATIONAL PREVENTIVE DENTISTRY DEMONSTRATION
PROGRAM INFORMATION

National Preventive Dentistry
Demonstration Program

Background

The Robert Wood Johnson Foundation is a private philanthropy interested in improving the nation's health care. Increasing access to and the quality of ambulatory care, including dental care, has been its highest priority. Established in 1936 as a local institution primarily active in New Brunswick, New Jersey, the Foundation expanded horizons in 1971 and emerged as a major national philanthropy. Since then, the Foundation has committed more than \$219 million for grants; included among these are twenty-three grants totaling \$17.5 million in support of dental health care projects.

The American Fund for Dental Health (AFDH) is a national, non-profit organization whose mission is to improve the dental health of Americans through support of dental education, research and service.

In 1973, the Fund convened an ad hoc committee consisting of dental practitioners and educators to examine the national needs related to the delivery of dental care and to establish priorities for Fund activities. The need for a preventive dentistry demonstration program emerged as one of the highest priorities. Subsequently, the demonstration program was suggested to the Foundation which funded a grant for project planning. The AFDH then appointed a National Advisory Committee to develop what has become the

National Preventive Dentistry Demonstration Program.

Two separate grants were provided by the Robert Wood Johnson Foundation. One of the grants was to the AFDH; the other grant was to The Rand Corporation, a nonprofit research agency that conducts policy analysis studies for the public welfare and national security of the United States of America.

AFDH was responsible for providing and supervising the preventive care, collecting the data, and conducting the annual dental examinations. Rand was responsible for monitoring these activities, developing the data collection forms, and conducting the data analyses. AFDH and Rand worked together in designing the program, selecting the sites and establishing the procedures for areas of joint responsibility. The general administration of the program was the responsibility of the program staff based in Lexington, Kentucky. A local staff in each community selected conducted the clinical program.

Purpose

The project was intended to provide data on the effectiveness of already validated preventive dentistry procedures when applied in combinations by appropriate dental auxiliary and school personnel. Additionally, the project was designed to show the costs involved in administering relatively inexpensive preventive regimens on a large scale, and the savings that can result from their use when

compared with the costs of restorative or therapeutic dental services needed to correct the damage that would have accrued had there been no prevention. Such cost-benefit data should have significant impact on the continuing refinement and improvement of dental health care delivery systems and any national health policy developed. Information derived from this project is expected to encourage the expansion and improvement of preventive dental care delivery throughout the United States.

Design

The preventive dentistry program was designed to demonstrate the cumulative effect of various combinations of selected preventive procedures that are known to be effective when used individually. The program was national in scope. Geographical areas known to represent variations in the severity of dental diseases and degree of water fluoridation were involved. The program was school-based in the sense that the preventive care was provided to children within their school buildings. Certain procedures were provided by school personnel while others were provided by legally qualified dental personnel.

Data was collected by a team of trained examiners and processes, analyzed, and interpreted by The Rand Corporation. The information derived from the study will be communicated to the dental profession and general public through a series of publications and presentations currently being prepared.

The project focused on the results of the application of preventive procedures on the permanent teeth. The reason for this was that the greatest potential benefit of a preventive program is associated with the preservation of the permanent teeth, particularly the first and second molars. As a preventive program should ideally be timed to maximize participation as soon as possible after the first and second permanent molars erupt into the mouth (generally ages five to six, and eleven to twelve respectively), this project involved first, second, and fifth grade pupils at the outset.

The original design provided for a 36 month clinical phase but was later altered to 48 months. The first year was devoted to planning, preparation, site selection, equipment development and procurement, and pilot testing. The sites were then activated on a phased schedule so that each site's preventive care ran for the 48 months. The program's final year has been spent in analyzing data and in preparing reports of the results. These data, expected to be released soon, will include the results of dental examinations on approximately 25,000 children and information regarding the personnel, supplies, equipment, facilities, and time required to provide various kinds of school-based preventive care.

Preventive Procedures

The procedures were applied in various combinations

of proven and approved preventive measures. Descriptions of each measure and how the measures were combined into the various treatment regimens follows on the next pages.

NPDDP Study Schools -- USD 259

<u>School</u>	<u>Treatment Group</u>
Kensler	I
Greiffenstein	I
Garrison	II
Harris	II
Kelly	II
Hyde	III
McLean	III
Price	III
Michner	IV
OK	IV
Peterson	IV
Cleaveland	V
Pleasant Valley	V
South Hillside	V
Fabrique	VI
Woodman	VI

Sources:

National Preventive Dentistry Demonstration Program
Information and Guidelines for Sponsoring Agency, 1976.

National Preventive Dentistry Demonstration Program
Procedure Manual, 1977.

Organization of Treatment Components into Regimens
Nonfluoridated Sites

Regimen	Title	Clinic	Classroom
I	Comprehensive	Examination *Prophy/Gel Sealants	Mouthrinse Plaque Control Education Prog. Diet Regulation Fluoride Tablet
II	Modified Comprehensive	Examination *Prophy/Gel	Mouthrinse Plaque Control Education Prog. Diet Regulation Fluoride Tablet
III	Clinic Care Only	Examination *Prophy/Gel Sealants	
IV	Classroom Activities Only	Examination	Mouthrinse Plaque Control Education Prog. Diet Regulation Fluoride Tablet
V	Modified	Examination	Plaque Control Education Prog. Diet Regulation
VI	Longitudinal Comparison	Examination	
XC	Cross-Sectional Comparison	Examination at Baseline	

* Prophylaxis and Fluoride Gel Treatment

Source: National Preventive Dentistry Demonstration
Program Procedure Manual

Description of Treatment Components

Treatment Component	Procedure and Rationale	Frequency of Treatment	Personnel Required
Fluoride paste prophylaxis (Prophy)	An acidulated phosphate fluoride (APF) paste is used in a professional cleaning of the child's teeth. This 30-minute procedure provides topical fluoride protection and prepares tooth surfaces for the acidulated phosphate fluoride gel treatment.	Twice per year.	Auxiliary personnel consistent with minimum state dental practice legislation.
Acidulated phosphate fluoride gel (Gel)	Application of 1.23% fluoride ion gel in a foam tray. This tray is kept in the mouth for a period of 4 minutes. Both arches are treated at the same sitting. The gel treatment is applied immediately after the prophylaxis and provides topical protection to all tooth surfaces.	Twice per year in conjunction with the prophylaxis.	Auxiliary personnel consistent with minimum state dental practice legislation.
Sealant	A sealant is a plastic-like resin that adheres to the teeth. This transparent coating (Delton) is applied in about 30 minutes to the occlusal surfaces of posterior teeth of both arches that are not already carious or filled. The sealant provides topical protection to the surfaces treated.	After initial application, sealants are checked every 3 months.* If a sealant is lost, it is reapplied a maximum of 3 times.	Dental or auxiliary personnel consistent with minimum state dental practice legislation.

Description of Treatment Components (Continued)

Treatment Component	Procedure and Rationale	Frequency of Treatment	Personnel Required
Systemic fluoride tablet	One mg of fluoride by 2.2 mg of neutral sodium fluoride tablet is chewed and swished for one minute and then swallowed. This procedure provides both systemic and topical fluoride protection.	One tablet per day during the school year.	Classroom teacher or aide.
Fluoride mouthrinse	A 0.2% neutral sodium fluoride solution is served to the child in a paper cup. The child swishes the solution between the teeth for 60 seconds and then expectorates into the cup. The child does not swallow the solution. This procedure provides topical fluoride protection.	Once per week for each week of the school year.	The classroom teacher or aide supervises the administration of the mouthrinse.
Plaque control	Children in all grades brush in school without dentifrice. Children in grades 5 and 6 also use dental floss. These procedures are designed to remove plaque (and thereby the bacteria) that causes tooth decay and gingivitis. A supply of ADA approved fluoride dentifrice is provided for home use (3 to 4 times per year).	Twice weekly supervised exercises in the classroom. Dis-closing solution is used at least once per month.	Dental auxiliary demonstrates appropriate procedures and periodically visits classrooms to ensure that they are being followed. Teacher or aide provides routine supervision of classroom activities.

Description of Treatment Components (Continued)

Treatment Component	Procedure and Rationale	Frequency of Treatment	Personnel Required
Education program	This program consists of a series of 10 units (about 50 minutes each) that were selected for the program from existing materials designed to promote appropriate oral hygiene and health. Different materials were prepared for each grade level.	Classroom teacher decides whether to teach as a unit or spread over school year.	Classroom teacher after orientation by program education coordinator.
Diet regulation	This component consists of efforts to reduce the frequency of refined carbohydrates in school food programs and to encourage the elimination of cariogenic snacks.	Every school day throughout the year.	Education coordinator working with school dietitian, administrators, parents, and children.

* After the first treatment year, the interval between sealant checks was increased to six months.

Source: National Preventive Dentistry Demonstration Program Procedure Manual.

National Advisory Committee*

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APPENDIX C
COMMUNICATIONS

April 18, 1983

TO: *

FROM: Barbara Russell, R.N.

SUBJECT: Special Study

You may recall that selected schools in USD 259 participated in the National Preventive Dentistry Demonstration Program from the fall of 1977 through December, 1981. With the approval of the Research Council, I am conducting a follow up study on the effects of the NPDDP on the knowledge and dental health practice of sixth grade students. Sixth graders (**) identified by means of a stratified random sample, will be asked to complete a short questionnaire during the week of April 25-29. The questionnaire concerns dental health knowledge and practices. Early trials indicate the questionnaire can be completed in six to twelve minutes by sixth grade students.

I am seeking the assistance of your school nurse to supervise the pupil(s) in your building as they complete the questionnaire. I will provide the names of the selected pupil(s), the materials, and the instructions. Parental consent is not required. Confidentiality is assured.

I hope this will meet with your approval. If you have questions or concerns, please contact me through my base school, Longfellow.

cc: Dr. Ralph Walker
Dr. Don Younglund
Dr. A. W. Dirks
Mrs. Donna Travis

* Principal's name was inserted here.

** Number of students selected and school name inserted here.

April 18, 1983

TO: *

FROM: Barbara Russell, R.N.

SUBJECT: Special Study

As you recall, selected schools in USD 259 participated in the National Preventive Dentistry Demonstration Program from the fall of 1977 through December, 1981. With the approval of the Research Council, I am conducting a follow up study on the effects of the NPDDP on the knowledge and dental health practices of sixth grade pupils. Sixth graders, identified by means of a stratified random sample, will be asked to complete a short questionnaire concerning dental health knowledge and practices, during the week of April 25-29. Early trials indicate the questionnaire can be completed in six to twelve minutes by most sixth graders. The sample selected ** pupil(s) in your building.

I am seeking your assistance to supervise the pupil(s) in your building as they complete the questionnaire. I am well aware that we are in a very busy time of year. I was hoping to do this much earlier but it did not work out that way. So, after reviewing this request, if you feel you do not have time to do this, I will certainly understand. Just please call me so that I can make other arrangements.

I would ask you:

1. to consult with your principal about the request,
2. to arrange with the teacher(s) a convenient time to take the selected pupil(s) out of class to complete the questionnaire,
3. to arrange for a suitable quiet area for the activity,
4. to supervise the pupil(s) as the questionnaire is completed,
5. to send the completed questionnaires to me at Longfellow school.

I will provide you with the list of pupil(s) selected, the questionnaires, and the instructions for administration. Parental consent is not required. A similar request has been sent to your principal.

cc: Dr. Ralph Walker
Dr. Don Younglund
Dr. A. W. Dirks
Mrs. Donna Travis

* Name of nurse inserted here.

** Number of pupils inserted here

In order that I can get the materials to you at the appropriate time, please fill this out and return to me in the enclosed envelope by Friday, April 22, 1983.

_____ I am willing to supervise this activity in this school on (date)_____.

_____ I will be unable to participate.

April 25, 1983

TO: *

FROM: Barbara Russell, R.N.

SUBJECT: Special Study Questionnaire

Thank you for your assistance with this project. I really appreciate your time and effort. Please read the following instructions completely and carefully before you begin! Call me if you have questions or concerns--262-8825.

1. SELECTION:

- a. Pupils selected to complete the questionnaire were chosen according to strict research criteria; therefore NO substitutions can be made.
- b. If a selected pupil is absent on the day you have chosen to administer the questionnaire, please try again.
- c. Try to complete the process between April 25-29.
- d. May 6 is the last possible day to use.
- e. If any of the pupils are no longer in your school, please make note on the name tag and return it to me immediately.

2. ADMINISTRATION ENVIRONMENT:

- a. Select a quiet area free of interruptions.
- b. Take only as many pupils at one time as you can comfortably supervise. (There is from one to 26 in a given school.)
- c. If at all possible, administer the questionnaire to all selected pupils on the same day.

3. EXPLANATION TO PUPILS:

The purpose of this activity is to determine if there is a difference between pupils who participated in the National Preventive Dentistry Demonstration Program and those who did not, in regard to the information on the questionnaire. All 6th grade pupils now enrolled in USD 259 who participated in the NFDDP the entire 4½ years

were selected. In addition, a group of 6th grade pupils who did not attend any of the NPDDP schools during the $4\frac{1}{2}$ years of the program were selected on the basis of random choice.

4. INSTRUCTIONS TO PUPILS:

- a. Each pupil should bring a pencil.
- b. Each pupil should receive the questionnaire with his/her name on it.
- c. Complete each page before going to the next page.
- d. DO NOT return to a page after it is turned.
- e. DO NOT write name on questionnaire.
- f. They may not be familiar with some items, but they should just do the best they can.

5. MISCELLANEOUS INSTRUCTIONS FOR NURSE:

- a. Watch closely to assure that no pupil returns to a page once it has been turned.
- b. You may pronounce a word or read a question to a pupil, but DO NOT define any words!
- c. Have each pupil remove the name tag from the form before handing it in.
- d. Send completed form to me at Longfellow on the same day it is administered.
- e. Questionnaires for absent pupils should be sent to me at Longfellow on the same day it is completed.

Thanks again for your help. Don't hesitate to call if you have questions.

* Name of nurse inserted here.

APPENDIX D
DISTRIBUTION OF SCORES

Table 15
Dental Health Test Scores by Group

Group													
I		II		III		IV		V		VI		VII	
*x	f	x	f	x	f	x	f	x	f	x	f	x	f
17	--	17	--	17	--	17	--	17	--	17	--	17	--
16	--	16	--	16	--	16	--	16	--	16	--	16	--
15	--	15	--	15	--	15	--	15	1	15	--	15	--
14	2	14	--	14	--	14	--	14	--	14	--	14	--
13	3	13	--	13	4	13	3	13	--	13	1	13	--
12	6	12	2	12	7	12	1	12	2	12	5	12	1
11	6	11	2	11	6	11	7	11	4	11	6	11	4
10	5	10	9	10	2	10	5	10	7	10	2	10	8
9	7	9	7	9	3	9	9	9	3	9	8	9	5
8	6	8	10	8	7	8	6	8	5	8	3	8	10
7	3	7	4	7	4	7	5	7	3	7	4	7	10
6	--	6	5	6	1	6	4	6	3	6	1	6	7
5	1	5	--	5	4	5	5	5	3	5	--	5	3
4	1	4	1	4	1	4	--	4	5	4	1	4	--
3	--	3	--	3	--	3	1	3	1	3	1	3	2
2	--	2	--	2	--	2	--	2	--	2	--	2	--
1	--	1	--	1	--	1	--	1	--	1	--	1	--
0	--	0	--	0	--	0	--	0	--	0	--	0	--

* x = score f = frequency

APPENDIX E
RESPONSES TO "OTHER" CATEGORIES

What Do You Think Is The Best Way To Keep
From Getting Gum Disease?
"Other" Category

Response	Number
Brush, floss, go to the dentist	10
Don't chew tobacco/smoke.	6
Eat very little sugar/don't eat too much candy. . .	5
Go to the dentist	5
Brush, don't chew tobacco	4
Brush, don't stick anything harmful in your mouth .	4
Take care of your teeth and gums.	4
Brush, floss, use fluoride.	2
Brush, use water pik.	2
Chew sugarless gum.	2
Don't put dirty things in your mouth.	2
Brush, don't chew on hard things.	1
Brush with fluoride	1
Brush, go to dentist, use fluoride toothpaste . . .	1
Brush, go to dentist, don't eat sweets.	1
Brush, don't eat junk food.	1
Brush along gumline to take off the plaque.	1
Brush, floss, eat the right kind of food.	1
Brush, go to dentist, don't stick harmful things in your mouth	1
Don't use anyone's toothbrush	1
Don't chew gum.	1
Don't be careless with your gums.	1
Don't brush and floss gums.	1
Don't eat bad stuff that's not good for you	1
Eat vegetables.	1
Eat the right kind of food.	1
Floss, go to dentist regularly.	1
Keep gums healthy and good.	1
Rinse with salt water	1
Use fluoride.	1
brush, floss, rinse with fluoride	1
Total	65

When Is The Best Time To Eat Sweets?
"Other" Category

Response	Number
Before brushing	6
Never	5
For special occasions/parties	5
Anytime, just so you brush afterward.	3
When you get home from school	3
Not very often.	2
Snack time.	2
After dinner.	2
After eating.	1
After brushing.	1
After lunch	1
After school or for dessert	1
All the time.	1
Anytime, but not often.	1
Anytime except before dinner, but not a lot	1
Before lunch.	1
Before you brush the second time.	1
For dessert	1
Just after or before brushing	1
Twice a week.	1
When Mom says its ok.	1
Sometimes	2
Not specified	1
Total	44

What Kind Of Toothpaste Do You Use?
"Other" Category

Response	Number
Different kinds	8
Close Up.	5
Gleem	2
Close Up Fluoride	1
Pearl Drops	1
Pepsodent	1
Total	18

What Do You Think Is The Best Way To
Keep From Getting Tooth Decay?
"Other" Category

Response	Number
Brush, floss, go to the dentist	20
Brush, floss, good nutrition.	11
Don't eat a lot of sweets/candy/junk.	9
Brush and rinse	3
Good nutrition.	3
Brush, floss, use fluoride.	2
Brush, floss, use fluoride mouthwash.	2
Brush, floss, go to dentist, good nutrition . . .	2
Brush, floss, use mouthwash	1
Brush, floss, use fluoride toothpaste	1
Brush, floss, go to dentist, use fluoride rinse .	1
Brush, floss, go to dentist, use fluoride toothpaste.	1
Brush with fluoride toothpaste.	1
Brush, go to dentist, good nutrition.	1
Brush, go to dentist, good nutrition, have fluoride treatment.	1
Floss	1
Total	60

Which Of The Following Do You Drink Most?
"Other" Category

Response	Number
Iced tea.	2
Koolaid	1
Not specified	10
Total	13

What Kind Of Mouthwash Or Mouthrinse Do You Use?
 "Other" Category

Response	Number
Scope	66
Listerine	16
Listermint.	8
Water	4
Signal.	4
Revco	2
Cepaco.	1
OmiGel.	1
MFP	1
Total	103

APPENDIX F
GROUP RANKINGS OF PREVENTIVE ACTIVITIES

Table 16

Activities that Help Prevent Gum Disease
By Item and Group

Item	Rank	Group													
		I	II	III	IV	V	VI	VII							
*Brushing	1st	12	50	26	79	14	47	24	62	20	69	13	54	17	52
	2nd	7	27	5	15	9	29	9	23	7	24	4	17	6	18
	3rd	1	4	0	0	6	19	3	8	0	0	0	0	1	3
Rinsing with fluoride	1st	2	9	0	0	0	0	2	5	2	7	0	0	2	6
	2nd	2	8	3	9	2	7	5	13	2	7	7	29	1	3
	3rd	6	23	3	9	4	13	5	13	3	10	0	0	2	6
Rinsing mouth with water after eating	1st	0	0	0	0	0	0	0	0	0	0	1	4	0	0
	2nd	0	0	1	3	2	7	0	0	0	0	0	0	1	3
	3rd	1	4	0	0	1	3	1	3	1	3	0	0	4	12
**Flossing teeth	1st	1	4	3	9	6	20	7	18	6	21	2	8	2	6
	2nd	8	31	10	31	5	16	12	31	10	35	5	21	7	22
	3rd	3	11	5	15	5	16	7	18	5	17	7	29	6	18
Using a fluoride toothpaste	1st	1	4	0	0	2	7	1	2	0	0	0	0	5	15
	2nd	3	11	3	9	7	22	4	10	3	10	2	8	2	6
	3rd	2	8	1	3	3	10	1	2	2	7	4	17	4	12
Going to the dentist regularly	1st	6	25	2	6	5	17	3	8	1	3	3	13	3	9
	2nd	3	11	7	21	4	13	5	13	4	14	3	13	8	24
	3rd	4	15	10	31	7	23	10	26	10	35	7	29	5	15
Not eating sweets between meals	1st	0	0	0	0	1	3	0	0	0	0	0	0	0	0
	2nd	1	4	1	3	0	0	0	0	0	0	1	4	2	6
	3rd	2	8	2	6	1	3	1	2	0	0	0	0	1	3

Table 16 (Continued)

Item	Rank	I	II	III	Group			V	VI	VII
					IV					
Having a fluoride treatment at dentist's office	1st	1	4	2	6	2	5	0	5	2
	2nd	1	4	1	3	2	5	3	2	3
	3rd	3	11	7	21	3	13	4	1	4
Using disclosing tablets or solutions	1st	1	4	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	0	0	1	3	2	5	2	0	0
Having sealants placed on teeth	1st	0	0	0	0	0	0	0	0	0
	2nd	1	4	1	3	1	3	0	0	0
	3rd	1	4	1	3	0	0	0	1	4
Taking fluoride tablets	1st	0	0	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	2	8	1	3	0	0	2	0	0
Drinking water with fluoride in it	1st	0	0	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	0	0	0	0	3	8	0	3	13
Drinking fresh spring water	1st	0	0	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	1	4	0	0	0	0	0	0	0
Taking vitamins	1st	0	0	0	0	0	0	0	0	0
	2nd	0	0	1	3	1	2	0	0	0
	3rd	0	0	2	6	1	2	0	1	4

Correct response: *1st, **2nd, any other acceptable for 3rd

Table 17

Activities that Help Prevent Tooth Decay
By Item and Group

Item	Rank	Group													
		I	II	III	IV	V	VI	VII							
Brushing	1st	16	76	23	88	17	74	30	88	24	86	16	73	18	66
	2nd	3	13	3	11	3	13	4	11	1	4	1	5	4	15
	3rd	0	0	0	0	2	9	0	0	0	0	0	0	2	8
Rinsing with fluoride	1st	0	0	0	0	0	0	0	0	1	3	1	5	0	0
	2nd	1	4	3	11	3	13	6	17	4	15	2	9	1	4
	3rd	3	13	1	4	1	4	4	11	2	8	1	5	0	0
Rinsing mouth with water after eating	1st	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2nd	0	0	1	4	0	0	0	0	1	4	1	5	0	0
	3rd	1	4	1	4	0	0	1	3	2	8	0	0	1	4
Flossing teeth	1st	0	0	0	0	1	4	1	3	0	0	0	0	1	4
	2nd	8	33	7	27	5	22	12	33	9	35	8	38	6	23
	3rd	2	8	7	27	5	22	11	31	5	19	5	24	10	38
Using a fluoride toothpaste	1st	0	0	0	0	1	4	0	0	2	8	1	5	3	11
	2nd	4	17	4	16	8	35	1	3	3	11	1	5	6	23
	3rd	4	17	2	7	3	13	5	14	3	11	4	19	0	0
Going to the dentist regularly	1st	2	9	2	8	4	18	2	6	1	3	2	9	3	11
	2nd	2	8	6	23	2	9	8	22	5	19	5	24	6	23
	3rd	8	34	8	31	6	26	8	23	8	31	6	28	4	15
Not eating sweets between meals	1st	0	0	0	0	0	0	1	3	0	0	0	0	1	4
	2nd	2	8	1	4	1	4	0	0	1	4	1	5	0	0
	3rd	1	4	1	4	2	9	1	3	0	0	4	19	2	8

Table 17 (Continued)

Item	Rank	I	II	III	Group			V	VI	VII
					IV	IV	IV			
Having a fluoride treatment at the dentist's office	1st	0	0	0	0	0	0	0	1	4
	2nd	3	1	1	4	11	8	2	2	9
	3rd	2	4	4	15	3	15	4	0	0
Using disclosing tablets or solutions	1st	1	5	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	1	4	0	0	0	4	1	0	0
***Having sealants placed on teeth	1st	1	5	0	0	0	0	0	0	0
	2nd	1	4	0	0	0	0	0	0	0
	3rd	0	0	0	0	3	0	0	1	4
**Taking fluoride tablets	1st	1	5	0	0	0	0	0	0	0
	2nd	0	0	0	0	1	0	0	0	0
	3rd	0	1	0	0	3	4	1	0	4
*Drinking water with fluoride in it	1st	0	0	0	0	0	0	0	1	4
	2nd	0	0	0	0	0	0	0	0	0
	3rd	1	4	0	0	3	0	0	0	0
Drinking fresh spring water	1st	0	0	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	1	4	0	0	0	0	0	0	0
Taking vitamins	1st	0	0	0	0	0	0	0	0	0
	2nd	0	0	0	0	0	0	0	0	0
	3rd	0	0	0	0	3	0	0	0	4

Correct response: *1st, **2nd, ***3rd

APPENDIX G
REPORTED PRACTICES
BY SEX

Table 18

Responses to Dental Practice
By Sex between Groups

Item/Response Choices	Boys		Girls	
	N	%	N	%
How often do you usually brush your teeth?				
Once a day	45	32	30	21
Twice a day	82	59	99	73
Three times a day	3	2	3	2
Four times a day	8	6	2	1
Five times a day	0	0	0	0
Six times a day	2	1	0	0
How many times did you brush your teeth yesterday?				
One time	55	42	36	28
Two times	64	49	75	58
Three times	10	8	17	13
Four times	2	1	2	1
Do you have your own toothbrush?				
Yes	142	99	136	100
No	2	1	0	0
Do you use toothpaste?				
Yes	137	95	135	99
No	7	5	1	1
If yes, what kind?				
Aim	17	12	16	12
Crest	91	66	73	56
Aqua Fresh	6	4	9	7
Colgate	17	12	24	18
Macleans	0	0	0	0
Other	8	6	9	7
How often do you use toothpaste?				
Once a day	53	47	31	23
Twice a day	79	55	100	74
More than twice a day	0	0	2	1
Once a week	9	6	2	1
Once a month	2	1	0	0
Never	1	1	0	0
Does your toothpaste have fluoride in it?				
Yes	126	87	126	93
No	1	1	0	0
Don't know	17	12	10	7

Table 18 (Continued)

Item/Response Choices	Boys		Girls	
	N	%	N	%
Do you use a mouthwash or mouthrinse?				
Yes	69	48	71	52
No	75	52	65	48
If yes, what kind?				
Fluorigard	3	4	5	8
Act	2	3	7	11
Other	54	82	47	72
Don't know	0	0	6	9
How often do you use a mouthwash or rinse?				
Once a day	35	38	38	47
Twice a day	17	18	18	22
More than twice a day	0	0	0	0
Once a week	21	23	18	22
Once a month	19	21	7	9
Do you use dental floss?				
Yes	95	66	99	73
No	49	34	37	27
If yes, how often?				
Once a day	36	37	34	35
Twice a day	16	17	25	25
More than twice a day	0	0	2	2
Once a week	33	34	29	29
Once a month	12	12	11	11
Do you take fluoride tablets?				
Yes	20	16	26	19
No	103	84	108	81
If yes, how often?				
Once a day	9	43	4	13
Twice a day	2	9	4	13
More than twice a day	0	0	0	0
Once a week	4	19	10	33
Once a month	6	29	12	40
When was the last time you went to your dentist's office?				
This year	81	59	89	65
Last year	41	30	35	26
Few years ago	14	10	8	6
Never	2	1	4	3
Other	0	0	0	0

Table 18 (Continued)

Item/Response Choices	Boys		Girls	
	N	%	N	%
Have sealants been put on your teeth?				
Yes	42	29	29	22
No	27	19	16	12
Don't know	73	52	89	66

Table 19
Responses to Dental Practice
By Sex Within Groups

Item/Response Choices	Group									
	I		II		III		IV		V	
	N	%	N	%	N	%	N	%	N	%
How often do you usually brush your teeth?										
Once a day	8	38	7	37	7	32	6	25	7	44
Twice a day	11	52	8	42	14	64	16	67	10	74
Three times a day	1	5	1	5	1	4	0	0	0	0
Four times a day	1	5	3	16	0	0	1	4	1	7
Five times a day	0	0	0	0	0	0	0	0	0	0
Six times a day	0	0	0	0	0	0	1	4	1	6
Once a day	5	28	4	21	2	15	6	29	5	24
Twice a day	13	72	15	79	11	85	15	71	13	62
Three times a day	0	0	0	0	0	0	0	0	2	9
Four times a day	0	0	0	0	0	0	0	0	1	5
Five times a day	0	0	0	0	0	0	0	0	0	0
Six times a day	0	0	0	0	0	0	0	0	0	0
How many times did you brush your teeth yesterday?										
One time	9	47	10	67	10	44	6	28	8	57
Two times	7	37	3	20	12	52	14	64	5	36
Three times	3	16	2	13	1	4	1	4	1	7
Four times	0	0	0	0	0	0	1	4	0	0
One time	5	28	3	15	5	36	6	32	6	32
Two times	13	72	17	85	7	50	8	42	10	53
Three times	0	0	0	0	2	14	5	26	2	10
Four times	0	0	0	0	0	0	0	0	1	5
One time	8	33	3	17	3	17	3	17	3	17
Two times	15	63	11	61	11	61	11	61	11	61
Three times	1	4	3	17	3	17	3	17	3	17
Four times	0	0	0	0	1	5	0	0	1	5

Table 19 (Continued)

Item/Response Choices	Group													
	I		II		III		IV		V		VI		VII	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Do you have your own toothbrush?														
Yes	21	100	19	100	24	100	24	96	16	100	13	93	25	100
No	0	0	0	0	0	0	1	4	0	0	1	7	0	0
Do you use toothpaste?														
Yes	18	100	20	100	14	100	21	100	21	100	18	100	24	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	0
If yes, what kind?														
Aim	3	14	3	16	3	14	2	9	0	0	0	0	6	24
Crest	16	76	14	74	17	77	13	56	10	66	10	72	11	44
Aqua Fresh	1	5	0	0	0	0	3	13	1	7	0	0	1	4
Colgate	1	5	2	10	2	9	3	13	1	7	3	21	5	20
Macleans	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	2	9	3	20	1	7	2	8
Aim	3	17	3	15	1	8	2	10	2	9	2	11	3	14
Crest	8	44	11	55	7	58	15	71	10	48	11	61	11	53
Aqua Fresh	0	0	2	10	2	17	0	0	2	9	0	0	3	14
Colgate	3	17	3	15	2	17	4	19	7	34	2	11	3	14
Macleans	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	4	22	1	5	0	0	0	0	0	0	3	17	1	5

Table 19 (Continued)

Item/Response Choices	Group									
	I		II		III		IV		V	
	N	%	N	%	N	%	N	%	N	%
How often do you use toothpaste?										
Once a day	10	48	7	37	9	37	7	28	7	44
Twice a day	10	48	8	42	15	63	15	60	7	44
More than twice a day	0	0	0	0	0	0	0	0	0	0
Once a week	1	4	4	21	0	0	1	4	1	6
Once a month	0	0	0	0	0	0	1	4	1	6
Never	0	0	0	0	0	0	1	4	0	0
Once a day	4	22	4	20	2	14	7	33	5	24
Twice a day	14	78	16	80	12	86	14	67	14	66
More than twice a day	0	0	0	0	0	0	0	0	1	5
Once a week	0	0	0	0	0	0	0	0	1	5
Once a month	0	0	0	0	0	0	0	0	0	0
Never	0	0	0	0	0	0	0	0	0	0
Does your toothpaste have fluoride in it?										
Yes	20	95	19	100	23	96	18	72	13	81
No	0	0	0	0	0	0	1	4	0	0
Don't know	1	5	0	0	1	4	6	24	3	19
Yes	15	83	18	90	14	100	19	90	21	100
No	0	0	0	0	0	0	0	0	0	0
Don't know	3	17	2	10	0	0	2	10	0	0

Table 19 (Continued)

Item/Response Choices	Group											
	I		II		III		IV		V		VI	
	N	%	N	%	N	%	N	%	N	%	N	%
Do you use a mouthwash or mouthrinse?												
Yes	12	57	9	48	8	33	15	60	7	44	7	50
No	9	43	10	5	16	67	10	40	9	56	7	50
Yes	9	50	8	40	7	50	10	48	9	43	12	67
No	9	50	12	60	7	50	11	52	12	57	6	23
If yes, what kind?												
Fluorigard	1	9	0	0	0	0	0	0	0	0	1	14
Act	0	0	1	11	0	0	0	0	0	0	1	14
Other	6	55	7	78	7	100	14	93	7	100	5	72
Don't know	4	36	1	11	0	0	1	7	0	0	0	0
Fluorigard	0	0	1	13	1	15	3	33	0	0	0	0
Act	1	17	1	13	2	27	0	0	2	22	1	9
Other	5	83	5	62	4	58	5	56	6	67	7	64
Don't know	0	0	1	12	0	0	1	11	1	11	3	27

Table 19 (Continued)

Item/Response Choices	Group									
	I		II		III		IV		V	
	N	%	N	%	N	%	N	%	N	%
If yes, how often?										
Once a day	3	19	2	18	7	39	3	21	7	70
Twice a day	3	19	2	18	0	0	3	21	1	10
More than twice a day	0	0	0	0	0	0	0	0	0	0
Once a week	8	50	5	46	10	56	5	36	1	10
Once a month	2	12	2	18	1	5	3	22	1	10
Boys										
Once a day	5	32	4	29	4	33	4	27	4	33
Twice a day	4	25	7	50	1	8	2	13	2	17
More than twice a day	2	12	0	0	0	0	0	0	0	0
Once a week	3	19	1	7	6	50	8	53	3	25
Once a month	2	12	2	14	1	8	1	7	3	25
Girls										
Once a day	5	32	4	29	4	33	4	27	4	33
Twice a day	4	25	7	50	1	8	2	13	2	17
More than twice a day	2	12	0	0	0	0	0	0	0	0
Once a week	3	19	1	7	6	50	8	53	3	25
Once a month	2	12	2	14	1	8	1	7	3	25
Do you take fluoride tablets?										
Yes	3	14	0	0	4	17	6	25	3	19
No	18	86	19	100	20	83	18	75	13	81
Boys										
Yes	3	14	0	0	4	17	6	25	3	19
No	15	83	18	90	10	77	16	80	17	81
Girls										
Yes	3	17	2	10	3	23	4	20	4	19
No	15	83	18	90	10	77	16	80	17	81

EFFECTS OF THE NATIONAL PREVENTIVE DENTISTRY
DEMONSTRATION PROGRAM ON THE DENTAL
HEALTH KNOWLEDGE AND PRACTICES
OF SIXTH GRADE CHILDREN

by

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R. N., B. A., Ottawa University, 1977

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Adult and Occupational Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1983

EFFECTS OF THE NATIONAL PREVENTIVE DENTISTRY
DEMONSTRATION PROGRAM ON THE DENTAL
HEALTH KNOWLEDGE AND PRACTICES
OF SIXTH GRADE STUDENTS

The purpose of this study was to examine the effects of the National Preventive Dentistry Demonstration Program (NPDDP) on the dental health knowledge and reported practices of sixth grade students who participated in the Program for its four year duration at the Wichita site. United School District (USD) 259 in Wichita, Kansas, was one of ten sites in the United States for the NPDDP, whose purpose was to demonstrate the costs and effectiveness of various types and combinations of school-based preventive procedures.

In April, 1983, a Dental Health Test (DHT) was given to 284 students representing the six NPDDP treatment groups and a control group. No contact with the NPDDP by any group had occurred for 16 calendar months.

Though NPDDP treatment groups I, II, IV and V included the same dental health education component, a statistically significant difference was found only between group I, that included all clinical and educational components of the Program, and the control group, VII. No meaningful difference was found to exist between groups on knowledge of the use and benefits of fluorides and sealants. Student's experience in NPDDP fluoride and sealant regimens did not apparently increase their awareness and understanding of the activities. Students in all groups reported similar dental health practices with no significant difference between boys and girls. The regular dental health education program in USD 259 appears to be as influential on knowledge and reported practices as was the classroom components of the national program.

A restructuring of dental health education programs to include emphasis on preventive procedures documented to be most effective in preventing dental decay and gum disease (fluorides and sealants), in addition to the usual plaque removal techniques, is needed. Educational reinforcement must accompany routine participation by students in school-based fluoride and sealant programs to assure effective gains in dental health knowledge, practice and awareness of students. After revision, the validity and reliability of the DHT should be established by repeated testing with comparable subjects.