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# Psychosocial Behavioral Patterns for Adolescents

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As with any age group, adolescents have a variety of factors that influence their behavior. These factors have psychologic and social components. Attitudes, values, beliefs, and self-concept are impacted by external forces such as peer pressure and parental authority and determine responses to many life situations including behavior related to oral health care. For adolescents, the considerations related to peers are as important as (if not more important than) they are at any other time in life, despite what parents or health professionals may desire or seek to instill.

In the development of beliefs as postulated by Rokeach [1], "the particular authorities relied on for information differ from one person to the next and…depend on the learning experiences within the context of the person's social structure—family, class, peer group…." Initially, the parents serve as the reference in relation to beliefs; however, as the child grows, his or her range of references (individuals or groups) expands. These encounters may serve as positive or negative references with respect to the originally held beliefs. As the adolescent has broader experiences, some of these experiences will certainly be with individuals or groups holding different beliefs. As the adolescent may begin to accept some of these groups (particularly peer groups) as credible authority, there may be a "converting" of beliefs to be more in line with the referent. The "authorities" with whom the individual identifies is an important component of developing beliefs and possible subsequent behavior [1].

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Erik Erikson's psychosocial theory of personality development proposed that the individual progresses through interaction with an ever-widening social world [2]. He viewed development as consisting of the progressive resolution of conflict between the need of the child and social demand. The fifth of his eight proposed stages is the one most closely associated with adolescence. In this stage, the adolescent searches for a sense of identity. This may involve casting the parents (and other traditional authority figures) in the role of adversaries. In the process, the adolescent may try to discard certain roles and ways of behaving, reformulate, and then try again. Success is the development of a sense of self that leads to being able to make consistent decisions [2].

Among the many formative issues in adolescents, determinants for health behaviors are being shaped. Areas specifically related to oral health include (1) self-concept and its relationship to oral health and compliance with orthodontic care; (2) tobacco use; (3) special considerations including anorexia, bulimia, and troubled youths; and (4) health promotions. Adolescents' attitudes toward oral health can impact each of these areas. Issues related to oral health care can be considered from the standpoint of being related to positive health behavior or to risk behaviors.

Patterns of behavior developed in adolescence can form the basis for future health. Incorporation of primary preventive behaviors such as tooth brushing, flossing, and wearing mouthguards can be important in preventing disease and protecting against injuries that have far-reaching effects. Preventing the initiation of harmful behavior such as tobacco use can be important for future health.

## Self-concept

### *Relationship to oral health*

Two dimensions of self-concept have been investigated in relation to dental health behavior: self-esteem and locus of control. Self-esteem is a "personal, subjective evaluation of an individual's worth and is derived from the reflected appraisal of others and has a 'positive-negative' dimension" [3]. Locus of control "describes the degree to which an individual perceives that events that happen to them are causally related to their own behavior." When the perception of the causal relationship is strong, the individual is described as having an internal locus of control. If the individual's perception is that events are determined by outside forces over which there is little control, then the individual is described as having high external locus of control. The term *health locus of control* has been used to refer to perceived control in the area of personal health and well-being.

In relation to dental health behavior, prior research has shown that people who value themselves more may take better care of themselves. Other factors such as quality of parenting and social class also may play a role.

In a 1997 article, Macgregor and colleagues [3] reported on the results of a large survey conducted on 12- to 16-year-olds in England. Questions sought information related to toothbrushing frequency, use of dental floss, dental visits, and whether the respondents recalled advice about toothbrushing from the previous dental visit. In addition, questions were included to assess self-esteem and health locus of control. Information on the types of newspapers in the home was used as an assessment of socioeconomic status.

Despite some differences based on sex and age groups, the general findings of the study showed that there was a positive correlation between toothbrushing and flossing (for both sexes) and a positive relationship between toothbrushing and social group (brushing increased as socioeconomic class increased). Self-esteem was positively correlated with toothbrushing frequency for most age groups [12–15], whereas health locus of control was related for some age groups and not others. Data on flossing were not related to self-concept. Individuals with a more positive self-concept were more likely to report frequent dental visits than those with a poorer view of self.

The investigators reported that the findings of this study are consistent with prior research and implied that self-concept may play an important role in dental health behavior. They further suggested that those who have lower self-esteem may be less likely to comply with health advice. As with any behavior, the issues are multifaceted, and further research is warranted because the results of this study may not generalize to other groups. Nevertheless, the psychosocial components seem worthy of consideration.

Another consideration is that of perceived oral health in relation to dental attitudes and behavior. Adolescence is a time when many attitudes that affect future behavior develop. Östberg and colleagues [4] conducted a study as part of a comprehensive school questionnaire process in Sweden to investigate the association between dental attitudes and behavior and self-perceived oral health in adolescents. Differences between boys and girls were studied. In addition to self-perceived oral health, the survey assessed satisfaction with the appearance of teeth, gingival bleeding (self-assessed), importance of having sound teeth, attitudes toward dental visits, use of floss, and consumption of sweets.

The results of the study indicated that the boys and girls who considered sound teeth to be important also perceived their oral health to be good, reported lower frequency of gum bleeding, and were more satisfied with the appearance of their teeth. Those who experienced dental visits as unpleasant were less likely to perceive their oral health as good and were less satisfied with the appearance of their teeth. It is interesting to note that daily consumption of sweets was related to low scores in perceived oral health for girls and boys. Girls, more often than boys, perceived their oral health to be good, except in the area of perception of the appearance of their teeth. The investigators concluded that there are strong associations between attitudes and perceived oral health. This consideration, in addition to sex

differences, is important when developing strategies for health promotion among adolescents.

In a later article, Östberg and coworkers [5] reported on additional analysis of the results of the survey conducted in Sweden. Two aspects of socioeconomic status as risk factors in perceived oral health were explored: (1) family characteristics—living with two parents, single mother, single father, or neither parent; and (2) parental employment status. The results indicated that most of the adolescents lived with both parents and that there were low unemployment rates. Nevertheless, family characteristics were shown to have a role in self-perceived oral health. The adolescents who lived with a single mother or neither parent perceived their oral health to be poor and reported higher frequencies of gingival bleeding significantly more often. The parental employment status did not show any difference for self-perceived oral health. Female adolescents had a more positive perception of their own oral health regardless of family characteristics and parental employment. The possible reasons for the lower perceived oral health by adolescents living with a single mother were suggested to be economics and time. The investigators further state that the impact of socioeconomic status on oral health outcomes is well established. They stress the importance of taking into consideration the adolescents' sex and single-parent family status in strategies for oral health promotion.

In another study, Östberg and colleagues [6] further investigated adolescents' perception of (1) general oral health, (2) their personal oral health, (3) factors that influence their health, and (4) factors that they can control. This study used a qualitative design that included a semistructured interview format conducted by a dentist. In addition to questions about dental health attitudes and habits, social and lifestyle issues were addressed. The information obtained was analyzed, coded, categorized, and compared.

*General oral health*

Two categories of general oral health were defined as action (physical things done to affect the condition of the mouth) and condition (the status of the mouth). The most commonly defined action was toothbrushing; two aspects of condition were function and appearance.

*Personal oral health*

The most outstanding criterion for evaluating personal oral health was presence or absence of caries.

*Factors that influence health*

Four categories were defined as influencing adolescents' health: oral health care, social support, social impact, and external factors. For oral health care, the most important reported influences were cleaning the teeth and eating and drinking habits; dental education at school was cited to some extent. For social support, parents appeared to be very important. Parents

serve as models for oral health habits, dental visits, awareness, and encouragement. In some cases, parent's dental problems were noted as a reason for the adolescent's concern. Other sources of support such as peers were rarely mentioned. For social impact, appearance was the highest concern for girls and boys and a motive for caring for teeth. For external factors, time was the most frequently reported influencing factor (ie, lack of time being cited as the reason for insufficient healthy behavior). Advertising had some effect on opinions concerning toothpaste for whitening and for chewing gum.

*Factors that can be controlled*

Regarding their own oral health, toothbrushing was cited as the main influence that adolescents perceived they could control and might improve. Adolescents were aware of influences such as flossing and eating habits but believed these were harder to master.

The results of the study indicate that it is important to understand adolescents' perspective on oral health and their perceived influence on their own oral health. It is important to find factors that enhance adolescents' awareness of their own resources and mechanisms to communicate this knowledge to the support network (dentists, dental staff, and parents).

*Compliance with orthodontic care*

Orthodontic treatment in today's society is typically an elective procedure. Although adults represent an ever-growing segment of the patient population, the adolescent patient is still the primary age group in most orthodontic practices. The psychosocial aspects involved in orthodontic care fall into two categories: those factors affecting the adolescent patient's desire to undergo care and those related to compliance during care.

*Factors affecting the decision to undergo orthodontic treatment*

The most likely motivation for any patient to seek care stems from the patient's (or parent's) desire to improve the smile; however, there may be factors influencing the adolescent patient's decision to undergo orthodontic treatment. Trulsson and colleagues [7] interviewed adolescent patients in an effort to analyze the factors affecting their decision to undergo orthodontics. The teenagers in the study believed that they would make the final decision to initiate orthodontic treatment, but this decision was heavily influenced by "the norm in their actual or desired reference group…[and] by the surrounding world including the media's ideal body image." The teenagers wanted orthodontic care so they could "be like everyone else" and "to obey social norms." In addition, the teenagers thought that a "nice appearance would lead to a high self-esteem." These investigators noted that the teenagers in the study were not aware of the factors influencing their decision to undergo orthodontics.

*Factors affecting compliance*

Orthodontic care is somewhat unique in dentistry due to the length of time required to treat the patient. The relationship between the patient and orthodontist begins at an initial examination/consultation visit and lasts well after the braces have been removed, into the retention phase of care. After consultation with an orthodontist, the patient is given a treatment plan to address the chief concern and any other problems the orthodontist has diagnosed. The orthodontist or his or her representative typically discusses with the patient the amount of compliance that is necessary during treatment.

As reported by Hasegawa and colleagues [8], compliance with orthodontic care was categorized as follows: (1) following instructions regarding proper appliance wear (rubber bands, headgear, and maintenance of appointments for proper adjustments) to achieve the desired treatment results; and (2) maintaining adequate oral hygiene during the time necessary to achieve those results. Lack of compliance in either area can impact the final treatment results. If the patient does not follow the instructions related to appliance wear, then the orthodontist may not complete care with the desired occlusal result. Poor oral hygiene can result in enamel decalcifications, caries, gingivitis, and periodontitis. These conditions can negatively impact the smile and, therefore, are contrary to the prime reason for initiating care (ie, improving the esthetics of the smile). Noncompliance can result in the patient being worse after treatment than before treatment [8]; therefore, it is incumbent on the orthodontist and orthodontic staff to develop a relationship with the patient that will foster a high level of compliance throughout all stages of care.

Some literature addresses behavior modification and patient compliance. Slakter and colleagues [9] introduced a rating scale for assessing patient compliance called the Orthodontic Patient Compliance scale. This scale or a modification of it has been used in recent studies to assess compliance in adolescent patient populations undergoing orthodontic care. Richter and coworkers [10] evaluated the effect on compliance of two different reward systems. The study population was separated into two groups: above-average compliers and below-average compliers. Each group was further divided into three subsets: (1) the control set, which received only instructions; (2) the award set, which received instructions and written evaluations of compliance; and (3) the reward set, which received instructions, a written report, and eligibility to receive rewards for following instructions. The factors evaluated in the study included oral hygiene, appliance wear, appliance maintenance, and appointment punctuality. The results showed that those individuals in the above-average compliance group maintained their high level of compliance in all areas assessed, whereas individuals in the below-average compliance group improved their oral hygiene only when reward incentives were provided. Compliance in the below-average group did not improve in any other area with any of the methods used. The same study also found that age and sex did not

influence compliance, but there was a positive correlation with scholastic achievement.

If orthodontists knew their patient's level of compliance before treatment, then the treatment plan might be altered to provide the plan most beneficial for the associated level of compliance. Nanda and Kierl [11] examined numerous factors including age, financial status, sex, two-income families, academic performance, and one- versus two-parent homes. None of these factors consistently predicted patient compliance with orthodontic treatment. One factor not evaluated in this study was the patient's "physical presence or being overweight." Conti and colleagues [12] used a modification of Slakter's compliance scale to assess whether obviously overweight children were more or less compliant than children not obviously overweight. These researchers found that obviously overweight boys and obviously overweight girls were significantly less compliant than the nonoverweight control population. It was noted that overweight children are well aware of their condition and have been teased or perhaps even humiliated. Furthermore, these children have likely received encouragement from parents, peers, teachers, and others to lose weight, but they usually remain obviously overweight for the duration of their orthodontic treatment. Finally, these researchers postulated that the obviously overweight child may have established "defense mechanisms that center on ignoring directions," including "beneficial directives for successful resolution of an orthodontic treatment plan. This behavior of disregarding beneficial advice may contribute to justifying their self-image when challenging, or trying to adapt to, the social norms of their environment."

Even if all noncompliant adolescent patients could be identified before treatment, the orthodontist must still manage the care of these patients after the decision is made to initiate care. In an editorial article on management and marketing, the work of Mary Osborne (MHO Resources) and Joan Unterschuetz (Continuums Consulting) was described [13]. This work involves engaging the noncompliant orthodontic adolescent patient in an age-appropriate manner. The tenet of their recommendations is that children change with development, and adult expectations should change with that development. Children progress from compliance (age 8–10 years) to cooperation (age 12–14 years) to collaboration (age 14–16 years). It was noted that most orthodontists often discuss compliance issues with their adolescent patients, but that the compliance discussion is lowest level of engagement. Orthodontists and their staff can develop "attitudes and skills to help meet young people at their highest level of participation." With the proper attitudes and skills, orthodontists may be able to engage the adolescent patient in a collaborative effort to improve the treatment result.

## Tobacco use

In 1993, Sussman and colleagues [14] reported on the results of a school-based project designed to encourage no tobacco use by adolescents. The

project was called Project TNT (Toward No Tobacco Use). The project focused on prevention and cessation and was conducted in junior high schools in California over a 5-year period. The program was based on the concept that social influences are among the most important determinants for adolescent tobacco use and that many of these are related to the peer-group context. These investigators reported on two main types of social influences: normative and informational. Normative influences refer to the pressure applied by the peer group to achieve acceptance for conformity or be rejected for nonconformity. Informational influences refer to the more subtle pressures on values related to tobacco use that may come from advertising promoting tobacco use, from parents who smoke, and from other media such as movies and music videos containing images of tobacco use. The informational sources may imply that tobacco use is widespread and that the adolescent can achieve a more desirable image through its use.

The research project involved the application of four different curricula and a comparison of their effectiveness in reducing the initial and weekly use of cigarettes and smokeless tobacco. Three of the curricula were based on single approaches to counteract the causes of unhealthy behaviors: (1) development of refusal assertion skills (related to the normative influences); (2) provision of information to help students evaluate and, if necessary, counter and correct the social sources of information (prevalence of use and image enhancement); and (3) provision of information about the physical consequences in the short- and long-term. The fourth curriculum involved using a combined approach. There also was a standard or control curriculum, which was mostly done in an assembly format as opposed to in-classroom information. The study investigated the trial use of smokeless and smoked tobacco immediately following the program and at 1-year follow-up. Weekly use immediately and at 1-year follow-up was investigated with regard to relative effectiveness of the different approaches on behavioral outcomes. The data were collected using questionnaires. The analyses suggested that, with the exception of the component in which refusal skills were taught, each of the programs resulted in reduction of initial and weekly use of cigarettes. For the use of smokeless tobacco, all programs were effective, except the one aimed at correcting social misconceptions. The combined approach was the most effective in reducing the initial and weekly use of both types of tobacco. Because there are probably different reasons for beginning and continuation of tobacco use, it seems logical that a multifaceted approach would have the most impact. The investigators concluded, however, that implementing even one of the programs could be important for prevention. Of note, boys used smokeless tobacco more frequently than girls, and trial of both types of tobacco was more prevalent in rural schools.

Castiglia [15], in a clinical report, discussed issues related to smokeless tobacco in adolescents. Evidence shows that the danger to health is an increase in risk of oral cancer. Noncancerous oral conditions have also been reported

in association with smokeless tobacco use, including discoloration of teeth, gingivitis, gingival recession, and other soft tissue changes.

Castiglia [15] reported that among boys, there is a belief that smokeless tobacco is safer than cigarettes. Although warnings about cigarettes have been somewhat effective, boys believe that smokeless tobacco is a safer alternative despite evidence that suggests that smokeless tobacco use is a precursor to cigarette smoking. A number of studies have investigated characteristics associated with smokeless tobacco use, including male sex, participation in sports, living in the southeast, living in a rural area, and being prone to problems.

Research has also been conducted on methods that impact tobacco use. Educational interventions have been found to be effective in changing the pattern of use, apparently the result of a change in values concerning use. The students who did not receive instruction were significantly more in favor of smokeless tobacco.

Castiglia [15] asserted that there are a number of resources available for health education information related to tobacco use, including the American Cancer Society, American Dental Association, American Lung Association, and the National Cancer Institute Smokeless Tobacco Education Program. These resources could be beneficial for school programs and for dental health practitioners. She also recommends that if boys insist on using smokeless tobacco, then they should have more opportunities for oral examinations. Dental health care providers must be prepared to provide education, screening, and intervention. The user should be made aware of the importance of careful oral hygiene and signs and symptoms of changes in the oral mucosa. Perhaps most important, the oral health care provider should ask the young patients about tobacco use.

In addition to school education programs, preventive intervention by dental care staff has also been investigated. A study by Skjöldebrand and Gahnberg [16] in Sweden investigated tobacco use among 12- to 19-year-olds who came to a public dental clinic for checkups. The study was conducted over 3 years and consisted of gathering epidemiologic data, providing information on the detrimental health effects of tobacco, and assessing the effects of tobacco use. The information was presented in the reception area and during the checkup. There also was coordination with the dental health education program at school. Brochures, posters, and videos were provided in the reception areas of the clinic, and individual information was provided by the dental staff. The information was provided to all those participating in the study, even if they reported not using tobacco.

The results of the study suggested increased use of tobacco with age and no differences between boys and girls. There was, however, a statistically significant lower proportion of use in year 3 compared with year 2, suggesting that the information provided had a positive effect. The researchers noted some considerations for their study. First, the interview method they used (compared with an anonymous questionnaire) may have resulted in lower

reported tobacco use. Second, the individuals who came to the dental health clinic in this study represented a higher proportion of well-educated households than the national average. The researchers suggest that the attitudes toward tobacco in these households might be less permissive. Nevertheless, intervention by the dental staff through providing information appeared to have an influence on the tobacco habits of adolescents. The researchers recommended the systematic incorporation of information on tobacco in dental care services.

If the tobacco use behavior of adolescents can be affected by intervention, then how do dental practitioners view their role in this process? In the 2000 Report of the Surgeon General, 30% of high school senior girls and 33% of high school senior boys reported smoking in the prior 30 days. There also is evidence that as many as 80% of adult smokers began smoking before the age of 18. Children in kindergarten can correctly identify brands of cigarettes, highlighting the importance of tobacco intervention in adolescents [17].

The role of the dentist in preventing or reducing tobacco use among adolescents may be crucial. As Shenkin and colleagues [17] reported in a 2003 study, however, pediatric dentists may not feel prepared to assume this role with adolescents. These investigators conducted a pilot survey to determine the attitudes of pediatric dentists regarding their role in tobacco intervention and cessation education. The instrument was adapted from one used previously with pediatricians. Prior studies that explored the role of pediatricians found that adolescents were honest with the pediatrician about their tobacco use and that there was considerable opportunity for intervention. The investigators believed that there also is an important role for the pediatric dentist and, therefore, sought to assess their attitudes about and their confidence in assuming that role.

The questionnaire was administered to dentists attending the annual meeting of the American Academy of Pediatric Dentistry. The results suggested that most of the respondents agreed that dentists should play a role in tobacco intervention with their young patients; however, most also reported that they were not comfortable with that role. Only 18% reported having received training in tobacco cessation counseling. Those who had received training were more likely to accept their role and be confident of their ability to provide tobacco intervention. The researchers concluded that although pediatric dentists consider tobacco intervention an important role, they do not consider themselves well prepared for the responsibility. A more comprehensive national survey was recommended to further investigate this issue.

Because prevention and cessation of tobacco use among adolescents appears to be amenable to intervention, the role of the dental heath professional is an important one. The fact that adolescents respond positively to dental health professionals in this regard is an optimistic sign. Access to dental care is a consideration here as in all other aspects of dental care. Developing

a comfort level for dentists through educational programs is an important consideration.

## Special considerations

### *Anorexia and bulimia*

The disorders of anorexia and bulimia have a strong psychologic component. Anorexia tends to appear most frequently in white girls, with the peak age around 12 or 13 years. Bulimia may occur at slightly older ages but may have its beginning in adolescence. In addition to the physical manifestations of these disorders, Waldman [18] described psychologic and social aspects that may be associated with these disorders. Family characteristics of these girls included having a high socioeconomic status, being white, and having a female predominance. Parental expectations leaned more toward achievement than internal contentment, and these families valued outward appearances. In response, the adolescents of these families may be hardworking, eager to please, and perfectionistic. The parents may not reward self-initiated and identity-forming behaviors. Therefore, the child comes to rely on externally imposed values and approval to maintain self-esteem, which comes at the expense of the developmental process toward autonomy (ie, unable to proceed in Erikson's stage of development toward identity). Consequently, the ''pursuit of thinness'' may become an area in which the adolescent seeks to gain control over the environment and thus bring a sense of self-control. Despite extreme weight loss, anorexics express almost no concern for their condition.

Bulimia, on the other hand, may present with normal weight because the behavior pattern is binge and purge, not solely fasting. Those who have bulimia may share the same obsessive concern with body size and fear of obesity as those who have anorexia; however, they tend to have a less distorted body image and may express concern about their behavior. Waldman [18] presented traits and family characteristics associated with those who develop bulimia. Prebulimic adolescents are usually high achievers who may be very dependent on their parents. They have social anxiety and difficulty establishing personal relationships. They may also have more serious antisocial behaviors such as kleptomania, drug abuse, or sexual promiscuity. These behaviors may be indicators of an inability to develop effective self-control. There also is evidence that the families of bulimics tend to use food for celebration and consolation. They may rely on food as a reward and to solve problems (eg, discussion and problem solving at the dinner table).

Social issues and influences play an important role in the desire to be thin. The bulimic's personal self-evaluation is overly influenced by body shape and weight. Bulimics may have been overweight at some point in their childhood and developed the characteristic behaviors to control the compulsion to overeat in response to these influences.

Dentists may be able to identify signs and symptoms of anorexia or bulimia. Referral to a family physician is appropriate when either condition is

suspected. In the case of bulimia, there may be signs related to the teeth such as erosion and discoloration due to stomach acid from induced vomiting. The process initially occurs on the lingual aspects of all teeth and most aspects of the posterior teeth.

Treatment for anorexia and bulimia has medical and psychologic components. A combined approach of psychotherapy, behavior modification, and family therapy seems to have the best potential for long-term benefits. Addressing self-esteem and personal control seem to be important treatment considerations. As with any psychologic disorder, early identification and treatment probably lead to the best prognosis, although there may be lifelong features.

As our society has become so focused on issues related to weight, body shape/image, and the latest fad, it is important to recognize the effect that these messages may have on adolescents. Anorexia and bulimia can be seen as an extreme attempt of the individual to address social expectations.

### *Troubled youth*

Because adolescence is a time transition affected by many factors in the development of identity and autonomy, there are many opportunities for problems to arise. If influences lead the adolescent in the direction of illegal behavior, then incarceration in juvenile detention centers may be the result. As Studen-Pavlovich and colleagues [19] reported, adolescents who are incarcerated deal with issues beyond those experienced by the general adolescent population. They experience a greater incidence of health and social problems including drug use, serious mental health problems, depression, thought disorders, and mental retardation. It also was reported that about half of the youth in detention were diagnosed with learning disabilities that had not previously been addressed or were mislabeled as discipline problems.

Studen-Pavlovich and colleagues [19] reported on a community outreach program implemented by the University of Pittsburgh School of Dental Medicine to provide dental treatment to individuals incarcerated in two juvenile facilities. Dental treatment was received for any emergent conditions, restorative needs, and preventive services including sealants and preventive resins. The services were provided by the dental students in the school clinics. The importance of dental care for troubled youth may not often be recognized. Access to dental care for these individuals may also be limited; however, it is an important component of their overall care and progression toward a healthier life.

## Health promotion

### *Access to care*

There are many barriers to accessing dental care. Freeman [20] discussed psychosocial barriers and presented four main barriers for adults: dental

anxiety, financial costs, perception of need, and lack of access. In reality, these factors may not occur independently but may function together to create barriers resulting in noncompliance and not seeking care. Psychosocial factors such as parental dental attendance, attitudes about education, and the sex of the adolescent may have an impact on adolescents' awareness of their dental health needs. These factors can have a positive or negative effect depending on whether they serve to increase or lower the individual's awareness.

Psychologic changes that occur during adolescence are related to the evolving relationship with parents, which can have an impact on the relationship with dental professionals. It is possible that the adolescent perceives the dentist as an authority figure who has to be questioned and, thus, noncompliance may be an issue. On the other hand, concern about appearance may provide a motivation for regular attendance and increased perception of need. Dental professionals must acknowledge the possible barriers associated with the psychological stage of development in adolescents as these barriers relate to dental attendance and compliance with preventive advice. This will enhance the ability of the dental professional to assist adolescents in accessing and accepting dental health care.

### *School-based dental health education programs*

In addition to the dentist–patient relationship, the value of school-based dental health education programs has been investigated in support of changes in knowledge and behavior. Redmond and coworkers [21] studied adolescents because they are an important target group for health education issues such as smoking and oral health. The key factor in the intervention method they investigated was to promote interest by using a novel design and content that would appeal to adolescents. Because they do not often consider how their immediate behavior might pose a threat in the long-term, adolescents are a difficult group to influence on matters that will affect them as adults.

Redmond and coworkers [21] designed leaflets to promote interest in oral health based on information obtained from focus groups. The focus groups suggested that linking oral health to appearance and fresh breath were important, whereas disease prevention and visiting the dentist received little interest. Presentation in a magazine-like format with few words and many pictures was reported as being more appealing than the traditional content-laden type of leaflet. The main approach of the leaflet's content was centered on a self-improvement tact that encouraged self-esteem and enhanced decision-making skills.

The leaflets were distributed over 1 year in conjunction with a dental health education program. A questionnaire was administered to assess the effectiveness of the leaflets: Were they read? Did they influence brushing behavior? Were they enjoyable? Was the story interesting? Were they

attractive? The results indicated that girls, more than boys, read the leaflets. Although girls and boys reported about equally that they had thought more about caring for their teeth, more girls reported that they brushed their teeth more after reading the leaflets. Compared with boys, girls were more positive in their opinion about the leaflets, finding them more enjoyable, attractive, and interesting.

The findings suggest that the leaflets demonstrated some value as part of an overall program to improve oral health. The leaflets supported the ideas of improved appearance and social acceptability as the reward for improved oral hygiene. The investigators concluded that in producing materials designed to have an impact on the oral health behavior of adolescents, the method of presentation and appearance are important considerations. They further noted that the process of communicating health-related information is complex and it is difficult to determine the effectiveness of printed material in affecting change. Whether positive responses to the material resulted in long-term change could not be determined.

In another article, Redmond and colleagues [22] reported on the school-based aspect of the dental health education program described previously. This article focused on the school program's impact on knowledge, reported behavior, and plaque scores. As with the leaflets, the key element in this component was to persuade the adolescents that appropriate oral health behavior would contribute greatly to social acceptability and attractiveness. The teaching program took place over 1 year. The material was presented to small groups in interactive sessions, with students being encouraged to participate. Toothbrushing instruction was provided, and toothbrushes, toothpaste, and disclosing tablets were supplied for home use. These materials were provided in addition to the leaflets described earlier. Oral health knowledge, reported behavior, and plaque scores were recorded at baseline, at 6 months, and at 12 months.

The results of the study indicated significant improvement in knowledge about periodontal disease, the role of dietary factors in oral disease (consumption of sweets), and dental caries. There also were reported increases in the duration of brushing and a reduction in the proportion of sites with plaque. The investigators suggested that these findings indicated an increase in knowledge of dental disease but only limited improvement in reported behavior. Many of the participants reported brushing at least once a day at the baseline measure. The reduction in proportion of sites with plaque and the self-reported reduction in gingival bleeding suggest a clinical benefit for the educational program.

### *Self-assessment models*

The effectiveness of self-assessment models in improving gingival health was investigated by Kallio and colleagues [23]. In a study reported in 1997, they compared the effectiveness, in terms of cognitive and clinical changes,

of two self-care–promoting interventions. They also assessed the impact of age, sex, oral care practices in the home, locus of control, and socioeconomic status. The students were assigned to one of the two self-assessment test groups: bleeding or plaque. The students completed a questionnaire at baseline and at final clinical examination (end of the school year). They received an interim clinical examination at 3 months.

The self-assessment group for bleeding tested for the presence or absence of bleeding after toothbrushing and an interproximal cleaning with toothpicks. The plaque group self-assessed with disclosing dye (once after brushing and again after brushing combined with interproximal cleaning with toothpicks to remove disclosing dye).

The results of the study indicated increased improvement in gingival status related to recognizing gingivitis during the follow-up period. The higher socioeconomic group was associated with better gingival health improvement than the lower socioeconomic group. This was consistent for all levels of baseline bleeding on probing.

The researchers concluded that the self-assessment method resulted in a positive cognitive change, with clinical improvement also demonstrated. This study indicated that a self-assessment approach can be an effective motivational technique for adolescents. The reported increase in toothbrushing and its association with improved gingival health (although not statistically significant) suggested that in addition to the cognitive change, behavior change also occurred. The impact of higher socioeconomic status and positive response of the more mature adolescents should be taken into consideration.

## Summary

The development of positive oral health behavior in adolescents is a complex process. Psychosocial factors are important considerations for understanding the issues faced by adolescents and for applying the most effective approaches to assist in their development in general and their health behavior in particular. As with most health issues, a comprehensive plan involving a number of aspects is probably the most effective plan. Knowledge is necessary, but there must also be shifts in attitudes and the development of health-related behaviors. Establishing these attitudes and behaviors in adolescence is crucial because patterns of behavior developed in adolescence can form the basis for future health.

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