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Oral Health Student's Perceptions on Addressing Signs of Disordered-Eating

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One of the numerous challenges faced by the oral health curriculum is how to prepare dental and dental hygiene students to address sensitive oral- systemic health issues in a way that will positively benefit their patients' health. Oral-systemic health topics may include, but are not limited to: heart and lung diseases, stroke, low-birth-weight, premature births, tobacco cessation, hypertension, skin cancer, domestic and substance abuse and eating disorders.[7,13,15] In the United States heart disease and cancers have claimed the lives of over 1,167,041 people in 2009, these are the two leading disease causing deaths.[1] Due to the lack of awareness regarding the significant connection among oral health and systemic heath, many individuals are oblivious to its significance to overall health. Many of the health issues listed above can be detected in the oral cavity of the patient thus allowing dentists and dental hygienists to be the first to encounter the symptoms, making diagnosing and treating these diseases crucial.

With major oral systemic diseases such as heart disease and cancer many overlook the destructive power of eating disorders. The American College of Physicians lists eating disorders such as: anorexia nervosa, bulimia nervosa and eating disorder not otherwise specified, as one of the nine most serious problems affecting adolescents and young adults, and anorexia nervosa as the third most common chronic illness.[6]Among adolescents and adult women, it is estimated that 0.5 to 1 percent meet the diagnostic criteria for anorexia nervosa and 1 to 2 percent meet the criteria for bulimia.[8] Eating disorders are not exclusively diagnosed in the female gender. An estimated 1 million males are affected with some form of eating disorder.[6] Eating disorders include bulimia nervosa, anorexia nervosa and Eating Disorders Not Otherwise Specified (EDNOS)[5]. Bulimia nervosa is described as consuming copious amounts of food in a short amount of time which is then followed by vomiting to relive one's self of the food. This exposes the oral cavity to the acidic gastric fluids in the stomach and deprives the individual of nutrients causing malnutrition.[3]Anorexia nervosa is an eating disorder characterized by the restriction of food consumption in the hope that greater weight loss can be achieved by the individual.[17] EDNOS includes individuals that do not fall into one specific eating disorder category such as anorexia nervosa or bulimia nervosa. Patients that suffer from EDNOS show symptoms of eating disorders but cannot be classified since they do not have all the symptoms of one specific eating disorder. For example, an individual that binge eats which is followed by throwing up, might

consume large amount of foods on certain days and not throw up.[5,8] Due to the harmful nature of these diseases the oral cavity of a patient with an eating disorder will more than likely consist of dental erosion, traumatized oral mucosal membranes and pharynx, dry mouth, dental caries (cavities), periodontal disease, and soft tissue lesions.[7] Since these symptoms are manifested in the oral cavity the oral healthcare provider has a critical role with regard to identification of the oral signs of eating disorders, communication of these findings with patients, and making appropriate referrals and tailored treatment plans based on patient willingness for change.

This concept of early detection, communication, and referral is referred to as secondary prevention.[4] Many oral healthcare providers do not recognize their responsibility and opportunities by becoming involved in a variety of roles reflective of primary care functions such as counseling for tobacco cessation, recognition and referral of hypertension, skin cancer and domestic and substance abuse, as well as the recognition and treatment of the dental manifestations of disordered eating behaviors associated with bulimia nervosa, anorexia nervosa andEDNOS.[10] This failure to recognize may be contributed to the knowledge, attitudinal beliefs and perceived self-efficacy of dental and dental hygiene students.

A web-based educational program was piloted by Dr. DeBate in the hope to educate dental and dental hygiene students on secondary prevention of eating disorders in patients. The web-based educational program is geared towards the ability of dental and dental hygiene students to identify oral symptoms that may be the result of eating behaviors; then to take the appropriate steps to provide a treatment plan where the patient general health can be improved.

This web-based educational program targeted specific categories that were presented as barriers for dental and dental hygienist students to detection, communication and referral patients with disordered eating behaviors. Being able to break through these barriers will allow the oral physician the ability to diagnose these problems. The Health Belief Model and Information Motivation Behavior Skill Model were used as the conceptual framework for this research. The Health Belief Model is used for assessment of factors related to behavioral adoption.[6] This suggests that the adoption of prevention and screening behaviors (secondary prevention) will occur if the individual or population of interest believes that adopting the behavior will limit the susceptibility or mitigate the severity of the oral health issue, in conjunction with the belief that the benefits of adopting this behavior will outweigh the barriers.[6] Figure 1 shows an illustration

of the flow of the Health Belief Model. The Information Motivation Behavior Skill Model, just as in the Health Belief Model, determines if the factors such as motivation, information and behavior are significant enough to warrant change in the health related behavior of the provider. It concludes that if the health care provider has the proper education, the means to act towards change and the procedural knowledge to do so, they have increased there likely hood to positively influence their patients behaviors to ensure a healthier lifestyle. The Information Motivation Behavior Skill Model is also depicted in Figure 1.

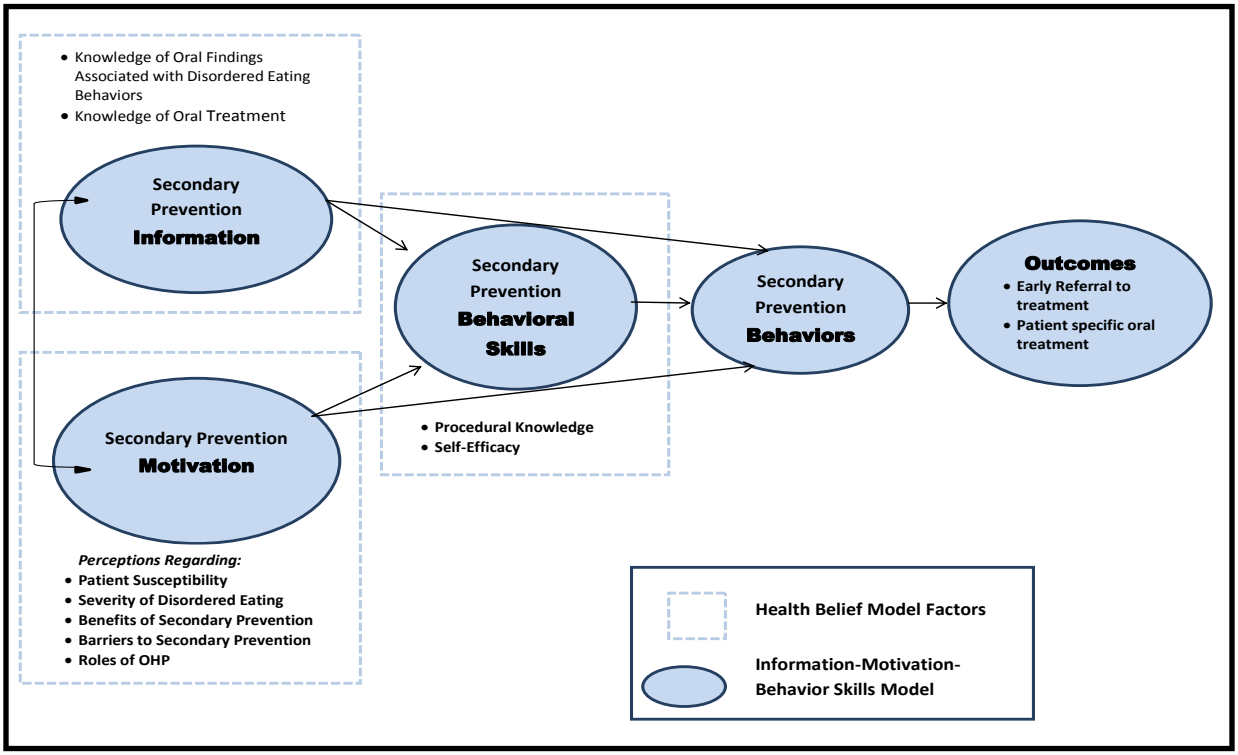

Figure1. Represents the Health Belief Model and the Information Motivation Behavior Skill Model as they were incorporated in the web based educational program conducted by Dr. Rita D. DeBate.

Using these two models as the basis for this study an assortment of questions were generated to understand how dental and dental hygiene students differ in the following categories: Professional Role Beliefs, Legal Role Beliefs, Perceived Susceptibility of Eating disorders (ED), Perceived Severity of ED, Perceived Benefits of Secondary Prevention, Perceived Barriers to Secondary Prevention, ED and Oral Findings Knowledge, Procedural Knowledge regarding Secondary Prevention of ED and Self-Efficacy regarding secondary prevention of ED. Professional role and legal beliefs analyzed the perception of the participants professional responsibly to identify and refer patients with eating disorder behaviors. Perceived susceptibility was used to measures the individual's proneness to eating disorders.[9] Perceived severity analyzed how severe eating disorders behaviors were in the minds of the participants. This category was also used to show the severity of the individual's decision making or actions taken when encountering patients with an eating disorders.[9] Perceived benefits and barriers compared the benefits dental and dental hygiene students saw by being able to identify, referral and treat patients but also the barriers that would hinder this process of treatment for the patient. ED and oral finding knowledge and procedural knowledge showed the skills and information that the participants had related to identifying, referring and treating patients with eating disorders. Self-efficacy asks the question "how easy or difficult would it be for you to…." provided treatment, approach a patient and refer a patient that show signs of behavioral eating disorder. Self-efficacy shows the confidences level of the dental and dental hygiene students.

To gain broader insights into educational needs of dental and dental hygiene students, this study sought to determine whether knowledge, attitudes, and self-efficacy to address disordered eating behaviors differed among dental and dental hygiene students. Using the previously stated variables we will show that oral health providers perform secondary prevention behaviors (i.e., identify signs, communicate findings with patients, and make appropriate referrals & tailored treatment plans based on patient readiness) is strongly correlated with their knowledge, perceived self-efficacy, and attitudinal belief.

Methods

Dr. DeBates' web-based educational program was used to acquire the information needed to examine the knowledge, attitudes, and self-efficacy to address disordered eating behaviors among dental and dental hygiene students. This study contained control and intervention groups which were both subjected to a pre and post-test assessment. The control group was not subjected to the web-based educational program while the intervention groups participated in the web-based educational program which educated these individual to be able to identify, communicate and make appropriate referrals & tailored treatment plans. By controlling the samples exposure to the web-based educational program, we would then be able to analyze the positive/negative affect that the web-based educational program had on the participant's knowledge, perceived self-efficacy, and attitudinal beliefs towards behavioral eating disorders. The pre and post-test used a baseline Likert-type questionnaire. To tailor the needs for this study only pretest data was collected and analyzed for significant differences regarding whether knowledge, attitudes, and self-efficacy to address disordered eating behaviors differed among dental and dental hygiene students. By using only pretest data neither the control group nor the intervention group was exposed to the web-based educational program. This allowed the data to show only what the baseline dental and dental hygiene perceptions were regarding eating disorders. The baseline Likert-type questionnaire used a 4 point rating system (Strongly agree=3, Agree=2, Disagree=1, Strongly disagree=0) allowing the distinction between a positive result and a negative result, a bipolar scaling method. The baseline Likert-type questionnaire was completed by 476 dental and 190 dental hygiene students in 27 classes across the country. The participants also completed a demographic questionnaire to determine their respective gender, race, year in program, previous courses in eating disorders and knowledge of someone with an eating disorder.

Multiple independent samples t-tests were conducted to compare dental and dental hygiene attitudinal beliefs, self-efficacy, and knowledge. Since our sample population (476 dental and 190 dental hygiene students) was not representative study among all the demographics, a post-hoc hierarchical linear regression models were performed to account for this clustering and to control for potential confounding demographic factors such as gender, knowing someone with an eating disorder, having a course on eating disorders, clinical

experience, race/ethnicity. A t-test for the demographics of participating dental and dental hygiene students was only considered significant if the p value was < .05.

Results

Table 1 illustrates the demographic results collected from the sample Dental (n=476) and Dental Hygiene students (n= 190). The results were analyzed using a sample t-test to produce a P- value that would indicate a statistically significant difference (tests were determined to be significant if p<.05). The participants included 240 males and 426 female individuals. Hispanic or Latino ethnicity included n=71. 465 students were white (n=465), 13 Black/African American students (n=13), 142 students were Asian (n=142), 8 participants were Native Hawaiian/Pacific Islander (n=8), 7 individuals were American Indian/Alaska Native (n=7), 30 students indicated they contained More than one race (n=30) and 38 indicated they had no race (n=38).

Table 1 also displays the participant's year in their program (whether it be dental school or hygiene school), previously taken courses in eating disorders, currently or previously enrolled in a clinical practice course and knowledge of someone with an eating disorder. The results showed that there was 295 students (n=295) that were in their first year, 273 (n=273t) second years, 67 (n=67) third years, 30 (n=30) fourth years and 1 (n=1) were fifth or more years in their programs. Three hundred and six students (n=306) confirmed that they have previously taken courses in eating disorders while 360 students (n=360) did not. Of all the students 467 (n=467) are currently or have been previously enrolled in a clinical practice course, while 199 (n= 199) have not been enrolled in clinical practices. When asked if they knew of someone with an eating disorder 408 students (n=408) answered yes, whereas 258 students (n=258) answered no.

The P-values for the following variables male, Hispanic or Latino, Asian, no race, first year in program, yes to taking a previous course in eating disorders and yes to being currently or previously enrolled in a clinical practice course were all found to be statistically significant when compared between dental and dental hygiene students (p-value <.001).

Table 1. Demographics of Participating Dental and Dental Hygiene Students

Variables	Dentists n(%)	Dental Hygienists n(%)	P-value*
Gender			
Male	229(48.1)	11(5.8)	<.001*
Female	247(51.9)	179(94.2)	
Ethnicity			
Hispanic or Latino	38(8.0)	33(17.4)	<.001*
Race			
White	322(67.6)	134(70.5)	.47
Black/African American	6(1.3)	7(3.7)	.697
Asian	123(25.8)	19(10.0)	<.001*
Native Hawaiian/Pacific Islander	7(1.5)	1(0.5)	.312
American Indian/Alaska Native	2(0.4)	5(2.6)	.012*
More than one	21(4.4)	9(4.7)	.855
No race	18(3.8)	20(10.5)	.001*
Year in Program			
First	192(40.3)	103(54.2)	<.001*
Second	209(43.9)	64(33.7)	
Third	58(12.2)	9(4.7)	
Forth	17(3.6)	13(6.8)	
Fifth or more	0(0)	1(.5)	
Previous course in eating disorders			
Yes	194(40.8)	112(58.9)	<.001*
No	282(59.2)	78(41.1)	
Currently or previously enrolled in a clinical practice course			
Yes	290(60.9)	177(93.2)	<.001*
No	186(39.1)	13(6.8)	
Know someone with an eating disorder			
Yes	291(61.1)	117(61.6)	.915
No	185(38.9)	73(38.4)	

*Test are significant at p<.05
** Sample size of Dentist n=476 and Dental Hygienists n= 190

Table 2 contains variables that were analyzed during the baseline Likert-type questionnaire. Each variable produced a mean, standard deviation and the p-value for the dental and dental hygiene students. As stated before the p-values are considered significant when $p < .05$.

The professional and legal role beliefs variables were used to understand how dental and dental hygiene students perceived there professional and legal obligations regarding eating disorder decisions. The mean indicates how strongly dental/dental hygiene students agreed or disagreed with the roles they were asked. The mean was higher in dental hygiene, in both professional and legal role beliefs and the p-values were also statistically significant ($p<.001$).

Perceived susceptibility was used to measures the individual's proneness to eating disorders.[8] Perceived severity analyzed how severe eating disorders were in the minds of the participants. The mean was higher in dental hygiene students $m=13.93$ then in dental students $m=13.56$ for perceived severity. While in perceived susceptibility the means was higher in dental students ($m=15.55$) then dental hygiene ($m=15.08$). The p-values was not statistically significant for the Perceived Susceptibility of eating disorders while the p-values of Perceived Severity of eating disorders was statistically significant ($p<.009$).

Perceived benefits of secondary prevention mean was higher in dental hygiene students ($m=12.15$) then in dental students ($m=11.63$) with a statistical significant p-value of .003. Perceived barriers to secondary prevention means were higher in dental students then in dental hygiene students (9.31 vs. 8.22 respectively). The p-value associated with this variable was statistically significant ($p<.001$).

Eating disorders and oral findings knowledge as well as procedural knowledge regarding secondary prevention of eating disorders were both shown to be statistically insignificant ($p=.685$ and $p=.092$). The means of both variables were higher in dental hygiene students then in dental students. Self-Efficacy regarding secondary prevention of eating disorders means was 11.95 in dental students and 14.06 in dental hygiene students. The p-value was also shown to be statistically significant with a p-value of $<.001$.

Table 2. Hierarchal Linear Models Comparing D and DH Students

Variable	Dental (D) student M ± SD	Dental Hygiene (DH) student M±SD	P-Value
Professional Role Beliefs	9.90(1.83)	10.40(1.64)	.001*
Legal Role Beliefs	7.41(2.66)	8.53(2.60)	<.001*
Perceived Susceptibility of ED	15.55(5.64)	15.08(4.80)	.276
Perceived Severity of ED	13.56(1.77)	13.93(1.60)	.009*
Perceived Benefits of Secondary Prevention	11.63(2.04)	12.15(2.02)	.003*
Perceived Barriers to Secondary Prevention	9.31(2.87)	8.22(3.31)	<.001*
ED and Oral Findings Knowledge	3.62(4.90)	3.61(.89)	.685
Procedural Knowledge regarding Secondary Prevention of ED	4.16(1.45)	3.96(1.46)	.010*
Self-Efficacy regarding secondary prevention of ED	11.95(6.11)	14.06(3.88)	<.001*

*Tests were considered significant if $p \leq .05$
Independent variables controlled for include: gender, previous course covering Eating disorders (ED), knowing someone with an ED, being a 1st year D/DH student, clinical experience, race/ethnicity (Asian, Hispanic.)

Discussion

There is great debate when it comes to understanding the role dentist and dental hygienist play in oral-systemic disease.[2,12,14] Dentist and dental hygienist face a significant barrier to performing secondary prevention of oral systemic disease: their own strongly held perception that actual or potential patients do not or would not like them to become involved in mental or physical health matters other than those involving the teeth.[10] Dentist and dental hygienist do not recognize their responsibility and opportunities by becoming involved in a variety of roles reflective of primary care function, such as counseling for tobacco cessation, recognition and referral of hypertension, skin cancer and domestic and substance abuse, as well as the recognition and treatment, secondary prevention, of the dental ravages of eating disorders.[11] This harsh reality could be contributed to the lack of education dental and dental hygienist receive during their training.

The results from this study show that differences in attitudes toward secondary prevention behaviors such as identifying, communicating with patients, treating, and referring patients with signs of disordered eating behaviors exist among dental and dental hygiene students. Having the procedural knowledge to diagnose a patient with an eating disorder will benefit the patient very little if the dentist or dental hygienist is unable to communicate the specific treatment needed to improve their health. These variables that contribute to the lack of treatment for a patient with eating disorders can be diminished if more educational programs were available to dental or dental hygiene students. This study sought out to show the significant difference among dental or dental hygiene students and why such an educational program about secondary prevention is necessary for the future of oral health providers.

Table 1 depicts demographics of participating dental and dental hygiene students. With regard to gender, there is a significantly ($p<.001$) more amount of male dental students ($n=229$) compared to dental hygiene students ($n=11$). On the other hand female dental students and hygiene students were much closer in number, 247 and 179 respectively. Many careers come with gender stereo types; many in society believe that dental hygienist is a female-dominated profession, just as being a construction worker is portrayed as a male dominated field. Continuing with this gender stereo type females are seen to be more caring and sensitive while men are more blunt and direct to the point. This is why a post-hoc hierarchical linear regression models were performed to account for this clustering and to control for potential confounding demographic factors. When comparing dental and dental hygiene students, Asians showed statistical significance difference between dental and dental hygiene students ($p<.001$), as well as the American Indian/Alaska Native ($p<.012$) and the no race category ($p<.001$). This shows that there was a significant difference between dental and dental hygiene students within these races. The difference between dental and dental hygiene students was not significant for the other races.

Each participant was also asked to identify the year they were in there program. A majority of the students that participated were first and second year students with the first year students being statistically significant ($p<.001$). Since many of the students were first and second year students many of them have had very little or close to no exposure with patients. Exposure to patients allows the dental or dental hygiene student to gain experience, knowledge and communication skills that would otherwise go undeveloped. These underdeveloped skills and the lack of education on how to address sensitive oral-systemic health diseases such as eating disorders reinforces why additional education is crucial to prepare these dental and dental hygiene students to address oral systemic disease such as eating disorders.

The final reported demographics were: previous course in eating disorders, currently or previously enrolled in a clinical practice course, and knows someone with an eating disorder. Both

previous courses in eating disorders, and currently and previously enrolled in a clinical practice course were statistically significant (p<.001) for individuals who participated in the study. Knowledge of someone with an eating disorder was not statistically significant. The demographic data that was provided by the participants in Table 1 are useful when we are analyzing the data from Table 2.

Participants also answered questions regarding their professional role beliefs and legal role beliefs; these questions showed how strongly the participant believed that it was his/her role to: identify, communicate and making referral for treatment for patients with eating disorders. The means of the professional role beliefs was higher among dental hygiene students 10.4 compared dental students 9.9. This pattern was consistent in the legal role belief, 7.41 in dental students and 8.53 in dental hygiene students. In both variables the p-value was <.001 making them statistically significant. This shows that dental hygiene students were more likely to report they have a professional (p=.001) and legal (p= .001) responsibility to perform secondary prevention with patients with eating disorders.

How dental and dental hygiene students perceive eating disorders are crucial for improvement of secondary prevention of eating disorders. Perceived susceptibility measures the individual's belief that they are prone to an eating disorders, while perceived severity analyzed how severe eating disorders were in the minds of the participants. The two variables above will show whether or not the participants think eating disorders are severe enough to be treated and how susceptible individuals are in regards to eating disorders. The p- value for perceived susceptibility was not statistically significant (p=.276). Perceived severity of eating disorders was statistically significant (p=.009). Dental hygiene students consider eating disorders more severe than dental students. As the demographics data shows dental hygiene students consist of more women than men. Since women are affected, statistically, more by eating disorders then men; one could assume that women would see eating disorders as more severe, since it statistically could affect them more[9, 10].

Many individuals will not change their behavior towards providing secondary prevention for patients with eating disorders unless they feel that the benefits of doing so out way the barriers preventing them from identifying, communicating and treating or referring the patient. Dental hygiene students scored lower in perceived barriers to identifying, communicating with, and treating patients with signs of disordered-eating behaviors (p<.001) and scored higher on the perceived benefits of secondary prevention (p=.003). The interaction that dental hygienist have with patients possibly could allow them to become more confident with patients; thus building trust and allowing them to communicate the needs of the patient with less perceived barriers.

Eating disorders and oral findings knowledge was not statistically significant (p=.685) between dental and dental hygiene students. This may indicate that both dental and dental hygiene students have the same educational knowledge about eating disorders. In both dental and dental hygiene students the means were low (n=3.62 and n=3.61 respectively) showing that both dental and dental hygiene students would greatly benefit from future education about eating disorders. Dental students scored significantly higher (p=.010) in procedural knowledge regarding secondary prevention of eating disorders.

An increase in self-efficacy regarding secondary prevention of eating disorders would increase the chances of a dental and dental hygiene students to approach a patient who shows symptoms of eating disorders, and offer treatment if necessary or a referral for care. An increase in self-efficacy will lead to a decrease in perceived barriers, which will increase the secondary prevention of eating disorders. Self-efficacy regarding secondary prevention of eating disorders increased from dental to dental hygiene students (m=11.95 and m=14.06 respectively) and was statistically significant (p<.001). Dental hygiene students are more confident in communicating and treating or refereeing patients that show signs of eating disorders. As stated previously dental hygienists spend ample amount of time with patients and are able to build trust with their patients, thus giving them more confidence to communicated and treat or refer patients.

Although dental and dental hygiene students were from different dental and dental hygiene programs across the U.S., this was a non-representative sample. Despite this limitation, results suggest that dental hygiene students are more likely to believe that they should address eating disorders with patients and are more confident in their abilities to: identify, communicate with and treat patients who exhibit signs of disordered eating, but may have less skills-based (procedural) knowledge than dental students. These results are consistent with the higher levels of secondary prevention behaviors reported among practicing dental hygienists compared to dentists. As the results show there is a need for the inclusion of training on secondary prevention of eating disorders within the respective curriculum.

Conclusion

This study suggests that further education on secondary prevention of eating disorders is of significant importance in dental and dental hygiene education. Differences in perceived role and beliefs regarding disordered-eating behaviors exist among dental and dental hygiene students. Increasing knowledge and self-efficacy of identifying, communicating, and making referrals may influence future professional practice behaviors. This increase in knowledge and self-efficacy will then strengthen the oral health provider's roles to deliver oral/systemic secondary prevention with regard to disordered-eating behaviors. The need for an increase in

education regarding disordered eating behaviors is met with such programs as Dr. DeBates' web-based educational program. Additional research must be done to determine whether the differences that were found carry over into the practice of dentistry. The small sample size used for this study has limited the significance of these findings. This study is a useful tool for encouraging the future of dental and dental hygiene programs, specifically regarding the secondary prevention of eating disorders.

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