Toward Reducing the Diabetes Pandemic: College Students' Perspectives of Type 2 Diabetes

Wanda Reyes-Velázquez, PhD, and Eric W. Hoffman, PhD

The prevalence of diabetes in the United States has been steadily increasing and has now reached pandemic proportions.[1,2] It is estimated that in 2010, 25.6 million people ≥ 20 years of age and 10.9 million people ≥ 65 years of age had diagnosed or undiagnosed diabetes.[3] It also has been estimated that ~ 1.9 million people ≥ 20 years of age were newly diagnosed with diabetes in 2010.

In adults, type 2 diabetes, a condition that can be prevented,[3] accounts for 90–95% of all diagnosed cases.[4] Although type 2 diabetes is not common in the younger population (≤ 20 years of age), there is some evidence that this age-group is still at risk. A recent report from the Centers for Disease Control and Prevention indicated that the rate of diabetes onset is greater among youth aged 10–19 years compared to their younger (< 10 years of age) counterparts.[3] In addition to the current high incidence of diabetes in adults, it has been estimated that 79 million individuals ≥ 20 years of age have pre-diabetes, a condition that may lead to diabetes.[3]

In addition to the serious health complications diabetes can cause, medical expenses for individuals who have this condition are more than two times higher than for individuals without the disease. In 2007, it was estimated that the costs of diabetes in the United States were $174 billion, and it was projected that in 2010, there would be 465,000 new cases of diagnosed diabetes among people 20–44 years of age.[3]

The high prevalence and social cost of type 2 diabetes calls for health care professionals to target individuals at an early age for education about how to delay or prevent the onset of diabetes. It is particularly important to target college students because it has been found that 70% of individuals in this population tend to gain weight during their first year of school.[5] Because the association between elevated BMI and diabetes is well established, college students who are overweight or obese and those with pre-diabetes could benefit from diabetes education at an early age.[6] By the same token, college students who are not overweight or obese could also benefit from diabetes education because it has been reported that individuals in this population often engage in poor nutritional practices[7] and frequently lead sedentary lives.[8] It has also been noted that, by the end of the senior undergraduate year, the prevalence of obesity among college students increases markedly.[9]

The results of a study[8] conducted in spring 2008 of 83,070 students from different colleges indicated that 23.3% of the sample did not exercise, 14.3% exercised only once a week, 16.9% exercised 2 days a week, and 16.8% exercised 3 days a week. In addition, 34.1% indicated they were slightly overweight, and 4.1% reported being very overweight. Only 8.5% reported eating five or more servings of fruits and vegetables per day.

These physical activity levels and dietary patterns do not meet the recommendations of health professionals[10,11] and could pose a significant problem for some college students who might already be at risk for type 2 diabetes. For example,

61.06% of a sample of 660 college students reported a family history of type 2 diabetes in a first- or second-degree relative or both(Sealey-Potts C, Reyes-Velázquez W unpublished observations). This presents a potential problem because family history is significantly associated with the onset of diabetes in the U.S. population.[12]

Given the high prevalence of diabetes and college students' eating and physical activity habits, it is important to develop interventions aimed at educating this population about diabetes prevention. Early education is necessary because balancing physical activity[13] with a healthful diet is good for managing weight and promoting overall health[11] and can also help prevent type 2 diabetes.[14] To educate college students about type 2 diabetes prevention, it is necessary to first identify how they perceive this disease and what elements would make prevention messages effective.

It has been reported that individuals tend to believe that the chance of something negative happening to them is less likely than the chance that it will occur to others.[15] The presence of this optimistic bias among college students was supported by a study about unrealistic optimism and risk perception of type 2 diabetes onset (Reyes-Velázquez W, Sealey-Potts C, unpublished observations). In this study, researchers found that the number of college students who thought their peers were at risk for type 2 diabetes was higher than the number of participants who saw themselves as being at risk for the same disease.

Convincing people to adopt healthy behaviors may be more challenging if they believe they are either not susceptible to a disease or less susceptible than others.[16] Moreover, optimistic bias may result from cognitive misjudgments because prevention campaigns can create a stereotype of high-risk individuals, causing some individuals at risk to incorrectly conclude that their own risk is below average.[16] Consequently, identifying what types of prevention messages would work best for college students is crucial.

Behavior modification theories such as the Health Belief Model, the Transtheoretical Model, and the Theory of Planned Behavior are often used in health interventions.[17,18] However, it has been stated that multiple theories should be combined to design the strongest interventions, while keeping in mind how culture, context, and health problems can affect theoretical applications and the execution of the program.[17] Hence, using persuasive messages is an alternative approach to motivating individuals to modify behaviors.

Fear appeals and positive affect messages have been used to promote better health. Fear appeals are persuasive messages that emphasize the harmful physical or social consequences of failing to comply with message recommendations.[19] The effectiveness of fear appeals often depends on the structure of the message. An effective fear appeal must include a threat, evidence suggesting that a person is specifically vulnerable to the threat, and solutions that are easy to perform and are effective. The assumption is that a heightened sense of fear will lead to behavior change.[20]

Positive affect messages include a subjective feeling or mood component.[21] Messages that have affective and rational components are called emotional benefit appeals. When designing this type of message, it is expected that message recipients will comply with the message to obtain the benefits of the information presented. For example, a message containing an emotional benefit appeal can encourage the audience to eat well by showing healthy people engaging in fun activities. A connection is created in minds of the audience between eating well and having fun.

This study is part of a larger project investigating how to design diabetes prevention messages aimed at college students that could be disseminated through social networking Internet sites. This phase of the project has two goals. First, this study used a qualitative methodology to examine college students' perceptions of type 2 diabetes. Second, type 2 diabetes prevention messages using fear appeals and emotional benefit appeals were tested to identify which types of propositions should be used in a diabetes prevention campaign targeting college students.

Study Method

This study was conducted in fall 2010 at a southern university. To conduct focus groups, which are also known as group interviews,[22] after receiving approval from the institutional review board, three research assistants recruited participants on campus using criterion sampling. This sampling approach reviews and studies cases that meet some criterion of importance set beforehand.[23] To meet our sampling parameters, students had to be at least 18 years of age and indicate they use social networking Internet sites. On the day of the focus group, participants were asked to read an informed consent form. Then, demographic information was collected anonymously.

Following the recommendation that having 6–10 participants in each focus group generates more information than each participant would provide in an individual interview,[22] 10 individuals were assigned to each group. Three focus groups were conducted because it has been recommended that, optimally, projects should consist of three to five groups.[22]

In addition, the third group was not producing new insights, which indicates that the goal of saturation was met. Saturation has been defined as the point at which new data collected do not produce new insights.[22]

A moderator experienced in discussing health topics conducted all the group interviews. At the conclusion of each focus group, participants received a $10.00 giftcard from a local store as an incentive. To ensure full focus groups of 10 individuals, students were over-recruited. An individual who did not get to participate in the study because there were already 10 people in a group received $10.00 and was dismissed.

A funnel-based interview was designed to emphasize free discussion first and then move toward a more structured discussion of specific questions.[22] Three type 2 diabetes prevention messages were

Table 1. Descriptions of Type 2 Diabetes and Information About Drawings Made by Participants

Descriptions of Type 2 Diabetes
1. "It's mostly hereditary. There's two different types of diabetes, specifically about type 2 diabetes, where you may have to inject yourself with insulin at some point in time if your blood sugar is too low. You have to watch what you eat and when you eat and how much of what you eat at all times, and nine times out of 10, you have to carry a blood sugar monitor with you so that you know if you are okay or you are not. And when you get to that point, you actually do kind of figure you do need to eat or not need to eat after a long period of time."
2. "Basically, it is hereditary. [The onset happens] because your pancreas is working, and you have to inject yourself with insulin, and you have low blood sugar. You have to drink enough sugar to get it back up because my grandmother has diabetes, and that happened. And you have to prick yourself to see your blood glucose, and you want to do it not right after you eat because then the number will be off. Yeah, I guess that's it."
Diabetes Knowledge, Concern About the Disease, and What They Think About It
1. "[I am concerned] because there's a chance that me and my brothers and sisters have [diabetes]. None of us have been diagnosed with it yet, but my grandparents had it."
2. Most of them think about diabetes in different situations. a. "I would think [about diabetes] whenever I go to the doctor and then if I just hear people talking about it or have friends that have it and when I see them going through, like, you know, injecting themselves with the insulin and stuff like that. That's when I worry about it. Other than that, [it] is like you don't think about it until it's there, I guess." b. [I think about it] "when I start thinking about the future. Like, one day I want to have kids, and I know that my grandparents got it, so I start thinking maybe I can get it. If I get it, maybe my future kids could get it, so, you know, I just think about the future." c. "I don't think about it often at all. So, I don't know. It will probably occur to me whenever I go home and see my dad having to take [an] insulin shot or whatever, but other than that, I don't really just think about it."
Drawings Made to Talk About Diabetes
1. "The sad face is things that people [with diabetes] have to deal with, like the insulin, pricking their finger, and checking their blood, can't enjoy certain foods and the restaurant, social life, stuff like that. And I put more health problems because my grandma has diabetes, and she ended up having cataracts or some things like that, so she ended up having eye surgery. So it just could lead to more health problems."
2. "I drew a happy face because on the upside, well, I mean, you do have to eat more healthier, and you just have to watch what you eat. Take care of your body a bit more and exercise, so. I mean it's not the end of the world. There's another side to it."
3. "I drew candy, no candy, and then an apple, and I couldn't draw a salad, so I just wrote salad on a bowl. That's a salad. Basically just healthy food whether you have diabetes or [if you want to prevent it], healthy foods and the moderation when it comes to sweets."
4. "I just wrote down some words of when I thought about diabetes. One of them that I have is generational, and another one I have is it has no face [because] anybody can get it."
5. "I drew a really horrible picture. So, if I stand in a grocery store, I guess to me the hardest thing would be picking the right foods to eat and how to go by that."

designed using desktop publishing software. Participants were handed a hard copy of the messages to review during the group interviews. Then, they were shown the message that had the fear appeal on a non-public Facebook profile. The interviews were audiotaped, transcribed verbatim, and imported into Nvivo 8. A codebook was developed. A team of two investigators coded the transcripts.

Study Results

Three focus groups of 10 participants each were conducted. The majority of the participants were female (73.3%, $n = 22$). The mean age was 20.67 ± 2.21 years. Forty-seven percent of the participants were African American, 33.3% were non-Hispanic white, and 20.0% were Hispanic. Participants were classified as freshmen (10.0%), sophomores (30.0%), juniors (26.7%), or seniors (33.3%).

At the beginning of each group interview, participants were asked to mention any health problems they were concerned about, even if they did not have any immediate personal health problems. The subjects mentioned diabetes, cancer, heart disease, alcoholism, breast cancer, arthritis, and high blood pressure as health concerns. A typical participant response was, "I'm concerned about diabetes because it runs in my family, but also, because I'm a

Table 2. Developing Type 2 Diabetes Prevention Material, Message Content, and Reaction to Messages

Developing Type 2 Diabetes Prevention Material
1. "I would also say that we could have a diabetes week because usually you just hear about breast cancer and AIDS awareness week, and we can deal with a week for diabetes, too."
2. "Give, like, T-shirts, and, like, talk to them about it before you give them a T-shirt."
Message Content
1. A participant mentioned that it should be stressed that diabetes "is not the end of the world, that it is something that you can deal with."
2. "You could do statistics, like, facts, like, one out of every college student has diabetes or something like that. Just to get students to know how prevalent it is in their age-group.
Reaction to Message about Risky Pregnancies and the Risk of Having Babies with Birth Defects
1. "I probably wouldn't read it because I don't plan on having kids at all as of now."
2. "Well, the ladies would get my attention. I would read this, but it would probably stop me after I read it because, well, I don't have diabetes, and I'm not planning to have children anytime soon, so, you know, there's nothing for me, so."
3. "It would get me because I do plan on having kids eventually, but I would like to know not the whole 'oh, it's overweight, no exercise.' I would like to know why it specifically would cause that."
4. "I'm looking at it as if I had type 2 diabetes. It would cut on some of my goals. I always wanted to have a big family . . . then, you know, I can't have a family."
Reaction to Message Talking About Erectile Dysfunction
1. "Yeah, well, yeah, of course I would read it because it says guys and erectile dysfunction, yada, yada, yada. Then, when I read, it's just like when it says foods like pizza, cakes. I eat that every day, so that would turn me off, and that would of kind of make me mad. If they said sugar and oil and stuff inside that stuff, then it would've been better."
2. "It gets my attention because it's the whole guys, and then it tells you what the question is. And again, at the bottom where it says take control of your life, it's kind of telling you if you don't do something now, you may not be able to do something later about it. I think that I would definitely make it in color though . . ."
3. "Okay, well it makes me concerned for my male friends or family members, but it wouldn't draw attention to me specifically."
Reaction to Message Containing a Fear Appeal
1. "Yeah, it definitely got my attention, and I would think it's horrible. I didn't think it could get that bad."
2. "I think that the consequence approach would be good, [but] I just don't think done like this. I don't think this is a very good version of it. Or, I don't know [if] there's a lot more they could do to use shock and consequences together, that would make a better approach I think."
3. Although a participant agreed with using a fear appeal, he or she said that, "Probably [it is] the better approach, but there's just not enough information about what this picture is saying."

college student, I'm worried about swine flu and things like that."

General diabetes knowledge

Participants were asked to describe type 2 diabetes. Table 1 shows some of the findings. Participants mostly described this condition by discussing low blood glucose and how to manage the condition. Most participants indicated that diabetes is a disease that has to do with sugar in the body and that it is hereditary.

Participants were asked to identify type 2 diabetes risk factors, how the disease develops, and how it is diagnosed. Although some participants mentioned that physicians look into individuals' family history and lifestyle to identify who has this condition, they were not able to explain what causes type 2 diabetes or identify all the risk factors. Participants indicated that it develops by not eating right and by being overweight. They also provided incorrect information about how it is diagnosed. Some of them talked about lifestyle, but they were not able to specify what would be a healthy lifestyle to prevent the onset of diabetes. As one participant said, "I really don't have an idea." Another participant said, "I know when you go to get your blood work done to get diagnosed, you have to drink a very syrupy . . .

Table 3. Type of Message Participants Would Prefer and Message Graphic Design

Positive Affect
1. "I would say, like, keep it positive with the students. Like, you know, just tell them to work out, I mean, to prevent diabetes, you know, just take care of your body, and also you'll be in shape, and you can prevent other diseases as well."
2. "I think you should keep it positive to let people know that even if you do get it, it's, like, you know, it's like not the end of the world."
Fear Appeal
1. Making reference to a picture of a foot with gangrene, a participant said the following: "This picture kind of stuck, but I would like to know why that happened."
2. "I like it because I like the fear appeal, I guess, and it makes me want to read more about it. And not only that, I like that. I like when ads have pictures with color."
3. Another participant brought up the fact of selective exposure by saying "I think it's effective, it catches your attention, but you know, I don't want to look at it. So the people who want to read it, they're going to read it, but then other people who don't want to see it [are] going to avoid it."
Graphic Design
1. "If it was in color, I'm pretty sure it would grab my attention. But the whole black and white thing, it's just not . . . And then the whole listing of the foods, that's the only reason I would keep reading. So, I would keep reading for that reason. If it was in color I think it would grab more people's attention."
2. "I would use two different fonts instead."

I don't know what it's called, but it's something [that], after you drink it, they measure your blood levels and that's the indicator."

Participants were then asked to identify type 2 diabetes symptoms. They mentioned fatigue, seizures, getting cold easily, sleeping excessively, tingling in your fingers, stress, craving sugar, getting moody, blurred vision, frequent urination, tremors, dizziness, and cataracts. Some students indicated they did not know what the symptoms are, but one of them said, "Your body, like, shuts down."

After asking students about their diabetes knowledge, they were asked whether they were concerned about it. Students who had family members with diabetes indicated concern, but some others said they were not concerned.

Knowledge of diabetes prevention

To identify what students know about type 2 diabetes prevention, the researchers asked students to talk about nutrition and physical activity by creating drawings related to the theme "type 2 diabetes and lifestyle." Although students mostly talked about good and bad foods, they were not able to identify such foods. The participants primarily talked about sweets, not being able to eat certain food such as hamburgers and fries, exercise in general, and diabetes care. Additional detail about participants' comments can be found in Table 1.

Participants were asked what kind of exercise people can do to prevent type 2 diabetes. They mentioned walking, running, bike riding, and cardiovascular exercise. One participant talked about different ways to engage in physical activity, saying, "I think cardio, but I don't really like to run; I swim. But [I would say] anything that will get your heart pumping just like [it] cleanses your body." Only two participants mentioned time, indicating that one should exercise for at least 30 minutes per day. Another student gave an idea about ways to exercise, saying, "I would say change. Instead of driving everywhere, walk more. Instead of taking the elevator, take the stairs."

Effectiveness of prevention materials

To gain a better understanding of how to design effective type 2 diabetes educational materials for college students, participants were asked to describe communication formats that should be used to educate them about diabetes prevention. Participants mostly talked about organizing events and using different types of media such as campus media, Facebook, and e-mail to disseminate information. Some of them stated that, on their campus, events would be the best way to reach out to students. Others suggested conducting screenings and having students with diabetes, physicians, and professors talk about the disease. They also suggested teaming up with student organizations such as sororities and fraternities when trying to educate students about diabetes prevention.

Regarding message content, participants indicated that they would like to learn about symptoms, prevention, and who to talk to if they think they have diabetes. They also said it would be useful to have a description of the life of somebody who has diabetes. Table 2 shows some examples of participants' suggestions regarding prevention material and message content.

Design of prevention messages

To identify how diabetes prevention messages targeting college students should be designed, positive affect messages and fear appeals were explained to the participants. Then,

participants were exposed to two gender-specific messages containing positive affect messages and one message that included a fear appeal. After analyzing the messages, participants were asked which kind of message should be designed for college students.

The first message tested explained the possibility of risky pregnancies and the increased risk of having a baby with birth defects because of diabetes. The message encouraged readers to take control of their lives by eating a healthy diet and engaging in physical activity at least three times a week for 30 minutes each time. There were different reactions to this message. Some participants said they would not pay attention to the message because they are not planning to have children in the near future.

The second message described erectile dysfunction as a consequence of having type 2 diabetes. Like the previous message, this one also encouraged readers to eat a healthy diet and engage in physical activity. Participants' reactions to this message mostly depended on whether the information was relevant to them.

The third message was based on a fear appeal. It showed a foot with gangrene. This message said, "This might be your future. Type 2 diabetes can do this to you." The message then said there is hope because this condition can be prevented and explained what students can do to prevent diabetes. Table 2 includes more participant comments.

After analyzing the messages, participants indicated what kind of message they would prefer. Some preferred messages that focus on the positive. In addition to talking about the content, participants also commented on the graphic design. Students disliked black and white layouts with color pictures. Table 3 includes participant comments about message preferences and graphic design.

Discussion

To help determine what types of diabetes prevention messages should be used for college students, participants in these focus groups described their perceptions of type 2 diabetes and analyzed prevention messages that used either fear appeals or positive affect messages. Although students expressed a range of viewpoints, similar themes predominated within the three focus groups.

According to participants, diabetes is hereditary, and those who are at risk for diabetes because their relatives have it can do nothing to prevent it. This finding is important because, although this study did not concentrate on ethnic differences, it is necessary to point out that a high percentage of the sample was African American and Hispanic. It has been documented that these groups are at a higher risk for type 2 diabetes.[24,25] Although genetics is a significant risk factor for type 2 diabetes, heredity alone is not generally sufficient to cause diabetes in the absence of environmental triggers.[25]

The students also provided erroneous information about the symptoms and treatment of type 2 diabetes. It is therefore advisable to design interventions to educate college students from different ethnic backgrounds about type 2 diabetes risk factors, how to identify symptoms, and when to seek medical attention.

Reducing future morbidity and mortality[26] resulting from diabetes, preventing its onset,[27] and detecting type 2 diabetes at an early stage are all crucial. Lifestyle modification such as weight loss, exercise, and a healthful diet can help prevent type 2 diabetes.[28] Because some college students do not meet exercise and dietary recommendations,[6–11] it is necessary to develop targeted diabetes prevention interventions concentrating on nutrition and physical activity.

Some participants mentioned that correct food selection is a problem for them. Therefore, they should be taught how to gradually make changes to modify their eating habits.

An important question to investigate when designing interventions is whether optimistic bias exists among the target audience. For example, one student participant noted that he or she only thinks about diabetes when he or she goes home and sees the father taking insulin shots. It is necessary to identify whether this person considers him- or herself to be at risk for diabetes because it has been found that college students are more likely to think their peers are at risk for type 2 diabetes than to see themselves as being at risk (Reyes-Velázquez W, Sealey-Potts C, unpublished observations).

Participants analyzed three type 2 diabetes prevention messages designed for this age-group. Although some students liked positive affect messages, some preferred fear appeals. However, they disagreed with the message structure. As stated above, fear appeals must include a threat, evidence suggesting that the person is specifically vulnerable to the threat, and solutions that are easy to perform and effective.[20] Participants requested more information to learn how the health condition used to create the fear appeal developed. Because many college students might not worry about diabetes because they might not be at imminent risk, it is advisable to apply the Elaboration Likelihood model of persuasion,[29] which is a scientific theory that provides a way to persuade an audience or produce an attitude change, when designing the intervention. As prevention messages are designed, it is necessary to keep in mind that they must be pertinent to college students because some participants mentioned that they would not read information that is not relevant to them. Per participants' suggestions, to disseminate prevention information to college students, it would be worthwhile to use interpersonal communication, traditional media, and social networking Internet sites such as Facebook. Although social networking sites are popular among young people,[30] it is necessary to identify how to correctly design persuasive prevention messages to be disseminated on these outlets. It is advised that messages sent out to college students should be in full color and use more than one font.

Designing future interventions

Because participants reacted to positive affect messages and fear appeals differently, it is recommended to

identify whether students in other geographical regions would pay attention to information containing these elements. Like food marketers who use a variety of tactics to persuade consumers, those managing diabetes prevention campaigns must also pay close attention to what techniques, channels, and messages best resonate with each target audience.[31]

Because of the increasing use of social networking Internet sites, mobile communication devices such as smart phones and tablet computers, video-sharing sites, and immersive environments among college students and the flexibility of these digital devices and media,[32] it is advisable to design interventions with a 360° strategy.[33] Interventions applying a 360° strategy should connect with college students online through devices, platforms, and experiences that are engaging and relevant to them. Then, students should be encouraged to participate in offline activities designed for the intervention. If done through the right devices and platforms, there is a greater likelihood that college students will engage with the messages, in turn increasing the likelihood of intervention success.

Study limitations

Although efforts were made to recruit males and females, many men refused to participate in the study. Also, there is a possibility that the group discussion shaped participants' point of view about diabetes. Consequently, they might have provided erroneous information.

Acknowledgment

This research was supported by an enhancement research grant awarded by Sam Houston State University. The authors wish to acknowledge the help provided on this project by the Office of Research and Sponsored Programs, Sam Houston State University instructor Ruth Massingill, and students Cristine Rodriguez and Kathryn Rodgers.

References

[1]Charron-Prochownik D, Ferons MH, Sereika S, Becker D, Rodgers-Fischl A: How to develop CD-ROMs for diabetes education: exemplar "Reproductive-Health Education and Awareness of Diabetes in Youth for Girls" (Ready-Girls). *Diabetes Spectrum* 19:110–115, 2006

[2]Neeser K, Weber C: Cost impact of self-measurement of blood glucose on complications of type 2 diabetes: the Spanish perspective. *Diabetes Technol Ther* 11:509–517, 2009

[3]Centers for Disease Control and Prevention: 2011 National diabetes fact sheet [article online]. Available from http://www.cdc.gov/diabetes/pubs/factsheet11.htm. Accessed 28 February 2011

[4]National Diabetes Education Program: The facts about diabetes: a leading cause of death in the U.S. [article online]. Available from http://ndep.nih.gov/diabetes-facts/index.aspx#type. Accessed 28 February 2011

[5]Washington University of Saint Louis: Study finds more students gaining weight during college years [article online]. Available from http://news.wustl.edu/news/Pages/5690.aspx. Accessed 14 September 2010

[6]Franz MJ, Wylie-Rosett J: The 2006 American Diabetes Association nutrition recommendations and interventions for the prevention and treatment of diabetes. *Diabetes Spectrum* 20:49–52, 2007

[7]Jackson RA, Berry TR, Kennedy MD: The relationship between lifestyle and campus eating behaviors in male and female university students. *Coll Student J* 43:860–871, 2009

[8]American College Health Association: National college health assessment: reference group data report, spring 2008 [article online]. Available from http://www.achancha.org/docs/ACHA-NCHA_Reference_Group_Report_Sprin2008.pdf. Accessed 13 August 2010

[9]Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH: Changes in weight and health behaviors from freshman through senior year of college. *J Nutr Educ Behav* 40:39–42, 2008

[10]Centers for Disease Control and Prevention: How much physical activity do adults need? [article online]. Available from http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html. Accessed 1 September 2010

[11]Krause P: Eat right. Officer Rev 48:28, 2009. Available online from http://web.ebscohost.com.unx1.shsu.edu:2048/ehost/pdfviewer/pdfviewer?vid=8&hid=12&sid=f10551d4-bf51-4cce-8704-6bed99a830fd%40sessionmgr104. Accessed 13 August 2010

[12]Valdez R, Yoon P, Liu T, Khoury M: Family history and prevalence of diabetes in the U.S. population: the 6-year results from the National Health and Nutrition Examination Survey (1999–2004). *Diabetes Care* 30:2517–2522, 2007

[13]Tsai J, Ford ES, Chaoyang L, Guixiang Z, Balluz LS: Physical activity and optimal self-rated health of adults with and without diabetes. *BMC Public Health* 10:365–373, 2010

[14]Retelny VS: The power of diet to prevent diabetes. *Envir Nutr* 33:1–6, 2010

[15]Weinstein ND: Unrealistic optimism about future life events. *J Pers Soc Psychol* 39:806–820, 1980

[16]Weinstein ND: Optimistic biases about personal risks. *Science* 246:1232–1233, 1989

[17]Glanz K, Bishop DB: The role of behavioral science theory in development and implementation of public health interventions. *Annu Rev Publ Health* 31:399–418, 2010

[18]Jones LW, Sinclair RC, Rhodes RE, Courneya KS: Promoting exercise behavior: an integration of persuasion theories and the theory of planned behavior. *Brit J Health Psych* 9:505–521, 2004

[19]Hale JL, Dillard JP: Fear appeals in health promotion campaigns. In *Designing Health Messages*. Maibach E, Parrot R, Eds. Thousand Oaks, Calif., Sage, 1995, p. 65–80

[20]Thompson LE, Barnett JR, Pearce JR: Scared straight? Fear-appeal anti-smoking campaigns, risk, self-efficacy and addiction. *Health Risk Soc* 11:181–196, 2009

[21]Monahan J: Thinking positively: using positive affect when designing messages. In *Designing Health Messages*. Maibach E, Parrot R, Eds. Thousand Oaks, Calif., Sage, 1995, p. 81–98

[22]Morgan DL: *Focus Groups as Qualitative Research*. 2nd ed. Thousand Oaks, Calif., Sage, 1997, p. 80

[23]Patton MQ: *Qualitative Research and Evaluation Methods*. 3rd ed. Thousand Oaks, Calif., Sage, 2002, p. 598

[24]Centers for Disease Control and Prevention: 2007 National diabetes fact sheet [article online]. Available from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf. Accessed 6 September 2010

[25]American Diabetes Association: Genetics of diabetes [article online]. Available from http://www.diabetes.org/diabetes-basics/genetics-of-diabetes.html. Accessed 6 September 2010

[26]Qing L, Yeunjoo S, Xuefeng W, Sungho W, Yuehua C, Elston RC: The effect of multiple genetic variants in predicting type 2 diabetes. *BMC Proc* 7:1–5, 2009

[27]White JR: The future of type 2 diabetes management: prevention, early intervention and pipeline medications. *U.T. Adv Studies Pharm* 6:185–189, 2009

[28]Davies M: Preventing type 2 diabetes. *Diabetes Prim Care* 6:100, 2004

[29]Petty RE, Priester JR: Mass media attitude change: Implications of the Elaboration Likelihood model of persuasion. In *Media Effects: Advances in Theory and Research*. Bryant J, Zillmann D, Eds. Hillsdale, NJ, Lawrence Erlbaum Associates, 1994, p. 91–122

[30]Pelling EL, White KM: The theory of planned behavior applied to young people's use of social networking web sites. *Cyberpsychol Behav* 12:755–759, 2009

[31]Mercer A: Obesity, battle of the bulge-policy behind change: whose responsibility is it and who pays? *Health Ed J* 69: 401–408, 2010

[32]Pew Research Center: Generations and their gadgets [article online]. Available from http://pewinternet.org/Reports/2011/Generations-and-gadgets.aspx. Accessed 8 March 2011

[33]Chester J, Montgomery K, Dorfman L: Alcohol marketing in the digital age [article online]. Available from http://digitalads.org/documents/BMSG-CDD-Digital-Alcohol-Marketing.pdf. Accessed 14 March 2011

Wanda Reyes-Velázquez, PhD, is the director of public relations and assistant professor of communication arts at Marywood University in Scranton, Pa. Eric W. Hoffman, PhD, is a clinical assistant professor in the Edward R. Murrow College of Communication at Washington State University in Pullman.