Understanding Reduced-fat Milk Consumption Among Male Adolescents Using the Theory of Planned Behavior

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ABSTRACT

This study identifies factors that influences reduced-fat milk consumption among 560 male students, ages 13-18 years, attending North Los Angeles County public high schools. Participants completed a group-administered Theory of Planned Behavior-based questionnaire. The majority of the participants, 94.8%, reported that they currently drank some kind of milk. Of those who reported that they drank milk, 68.2% reported that they currently drank reduced-fat milk or skim milk. Attitude, subjective norm and perceived behavioral control were each significant predictors of intention to drink reduced-fat milk and together explained 62% of its variance. The strongest predictor was attitude, followed by perceived behavioral control and subjective norm. Taste and possible health benefits were the primary predictors of attitude; parents, siblings and doctors' opinions predicted subjective norm; and availability of reduced-fat milk at home and school predicted perceived control. These findings may guide health professionals in planning programs intended to increase reduced-fat milk consumption among male adolescents.

Osteoporosis, a debilitating skeletal disease characterized by low bone mineral density (BMD), is associated with bone fragility and fractures.[1] Rodriguez, et al.,[2] and Bacon,[3] using the 1970-1983 and 1965-1993 National Hospital Discharge Survey (NHDS) data respectively, reported that the incidence rate for hip fractures among older males is increasing. Although not as prevalent as in women, hip fractures in men represent a public health concern.[4] Nearly one-third of hip fractures occur in men.[5] Studies have shown that the mortality rate following hip fractures is higher in men than in women.[6] Moreover, Center, et al.,[7] investigating the mortality that is associated with all fractures in elderly women and men found that men in all major fracture groups had consistently higher standardized mortality ratios than women. Siddiqui, et al.,[1] reported that almost 1.5 million American men have osteoporosis, and an additional 3.5 million are at risk. The National Institutes of Health (NIH) reported that one in eight men over 50 will have an osteoporosis-related fracture in his lifetime.[10] Melton, et al.,[8] based on the results of their study, reported that bone density predicted fracture risk in men as it did in women; and Vega, et al.,[9] concluded that men with vertebral osteoporotic fractures had reduced vertebral BMD that could be the result of achieving a reduced bone size at the end of the growth period or a failure of periosteal

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increase during adult life. The NIH reported that osteoporosis is more likely to occur if one did not achieve optimal bone mass during one's bone building years.[10] This is alarming since, based on 2000 Census data, The National Osteoporosis Foundation (NOF) reported that in 2002 11.8 million men were estimated to have low bone mass and this number is expected to increase to 14.4 million by 2010.[11] Therefore, to reduce the prevalence of osteoporosis and its associated fractures, osteoporosis prevention efforts should focus on building optimal bone mass during childhood and adolescence and on promoting lifelong bone health in both males and females.

Approximately 50% of total bone mineral density (BMD)/ bone mineral content (BMC) is developed during the adolescent years.[12] Theintz, et al.,[13] reported that the gain in BMD/BMC among males was significantly high between the ages of 13 and 17 years. Studies have shown that bone mineral acquisition is affected by dietary calcium; therefore it is important that adolescent males consume the Recommended Dietary Allowance (RDA) for calcium, 1,200 mg per day.[14] However, data from the United States Department of Agriculture (USDA) 1994-1995 Continuing Survey of Food Intakes by Individual (CSFII)[15] showed that 64.6% of adolescent males ages 12 to 19 years consumed less than 100% of the 1989 RDA for calcium. Moreover, in 1997, the 1989 RDAs began to be replaced by new recommendations from the Food and Nutrition Board called Dietary Reference Intakes (DRIs). DRIs are designed to optimize health by minimizing the risk of major chronic diseases such as osteoporosis.[16] The latest recommended DRI for calcium, set highest for ages 9 through 18 at 1,300 mg per day, recognizes the importance of the adolescent and earlier years for optimizing peak bone mass.

Milk is a good source of calcium and one of the most bioavailable.[17] Milk supplies approximately 60-75% of the daily calcium intake in the American population.[18] However, since 1977-78, milk intakes have decreased by one-third among adolescent males, and in 1994-95 adolescent boys consumed 1-1/4 eight-oz cups (316 grams = 26.3% of RDA) of fluid milk per day.[15] With the goal to increase milk consumption among adolescents, it is important to understand the factors that influence its consumption. The main purpose of this study was to use the theory of planned behavior[19] as a framework to identify those factors that influence reduced-fat milk consumption among male adolescents.

THEORETICAL MODEL

This study utilized Ajzen's[20] theory of planned behavior to predict intention to drink reduced-fat milk. The predictive power of this theoretical model has been established in many social and health behavior studies.[21] The theory of planned behavior, a modified version of The Theory of Reasoned Action[22,23] is an expectancy-value model that addresses the problem of incomplete volitional control. Fishbein and Ajzen[22] and later Ajzen and Fishbein[23] emphasized the idea that behavior is best predicted by intention. Intention is in turn determined by attitude toward the behavior (favorable or unfavorable), subjective norm (perception of social pressures to perform or not perform the behavior) and perceived behavioral control (perception of ease or difficulty of performing the behavior). Perceived behavioral control is also assumed to have a direct link to behavior. Persons' beliefs about the outcomes of the behavior (salient behavioral beliefs) and their evaluation of those outcomes (outcome evaluations) influence their attitude. Persons' beliefs about what others who are important to them want them to do (normative beliefs) and the motivation to comply with what those others want influence their subjective norm. Persons' beliefs about the availability of resources and opportunities necessary to achieve the behavior (control beliefs) and how each of those resources and opportunities facilitate the behavior (perceived facilitation) influence their perceived behavioral control. In summary, Ajzen proposed "that individuals will intend to perform a behavior when they evaluate it positively, believe that important others think they should perform it and perceive it to be under their own control."[24]

METHOD

Participants

There are a total of six public high schools in the Antelope Valley Union High School District located in North Los Angeles County. Piloting of the final questionnaire was conducted in one public high school and the final questionnaire was administered at the other five. A total of 606 male adolescents, ages 13 to 18 years, were approached for participation in this study between February 1999 and March 1999.

Instrument

A questionnaire was developed using a two-stage process guided by the theory of planned behavior.[23] The first stage consisted of developing an initial open-ended questionnaire to obtain the salient beliefs underlying milk consumption. Utilizing nine open-ended questions, the participants were asked to list behavioral, normative, and control beliefs related to whole milk and reduced-fat milk (1% or 2%) consumption. This questionnaire was administered to students with characteristics similar to the target population (that is, students living in the same area, same age group, and attended a public high school in the same school district) until saturation was reached.[25] Saturation occurred when additional pretests resulted in no new information regarding the questions asked. A total of 31 public high school male students from four grade levels participated in the initial phase of the questionnaire development process. A content analysis was conducted. Based on the content analysis a set of questions was constructed about behavioral, normative and control beliefs regarding drinking milk and this set of questions was used in the final questionnaire.

The final questionnaire consisted of 66 items and was divided into three sections: (1) demographic characteristics of the survey respondents, four questions; (2) milk intake, 10 questions; (3) behavioral

intentions, attitudes, subjective norms, and perceived control related to daily reduced-fat milk consumption, 56 questions. Two types of scales were used for section three of the questionnaire: 1) semantic differential scales with bipolar adjective pairs (e.g., good—bad) and 2) Likert-type scales (e.g., not at all—very much).

Milk is an ingredient in many foods; however, this study concentrated on milk alone rather than milk and other dairy products due to the time that would be required to ascertain intake from different foods. We asked students about their consumption of all types of milk but we based the questions that were relevant to the theory of planned behavior on reduced-fat milk (1% and 2%) only. The theory of planned behavior requires that the beliefs assessed match the behavior. It seemed likely that the beliefs influencing whole milk consumption might be different than the beliefs influencing reduced-fat milk consumption. We chose reduced-fat milk consumption as the dependent variable based on two observations. First, results from a USDA 1994-96, 1998 survey, showed that out of the males ages 12 to 19 years who reported drinking milk, 51.5% chose low-fat milk, 37.9% chose whole milk and 11.7% chose skim milk. Second, results of a survey we conducted during the pre-testing phase showed that 68.75% adolescent participants reported that they drink reduced-fat milk and 31.25% reported that they drink whole milk. Thus, we chose the behavior of drinking low-fat milk, which occurred most frequently in our population.

The 66-item final questionnaire was piloted on 20 male students. Students were asked to record the time when they started and finished the survey and also to write comments or recommendations regarding the survey content or construction directly in the space provided on the survey instrument. The mean time of questionnaire completion was approximately 15 minutes. An item analysis of the reduced-fat milk final scales showed reliability coefficients (alpha) of .92 for intention, .92 for attitudes, .83 for subjective norms and .73 for perceived behavioral control.

Procedure

The Antelope Valley Union High School District and the Loma Linda University Institutional Review Board approved the study protocol. This study used an active parental consent protocol but a passive student assent protocol. Parents or guardians gave written approval for participation of their adolescent children, but the students were provided with a letter accompanying the final questionnaire that explained that they had the option not to answer the survey questions. To encourage students to return parental reply cards, students were offered free "Got Milk?" posters.

The final questionnaire was group-administered by the principal investigator to classes selected from among biology, chemistry, and healthful living classes in four (4) grade levels by teachers who chose to participate in the study. A total of 20 teachers, three to five from each of the five public high schools selected eight (8) to 12 classes in which to conduct the study. Choice of classes was based on having no time overlap of classes so that the principal investigator would be able to be present in all classes to administer the questionnaire rendering the sample a convenience sample. To assure representation from the four grade levels, two to three classes per grade level per public high school were selected. A total of 50 classes participated in this study. One 55-minute class period was devoted to completing the questionnaire. The survey was conducted on a voluntary and anonymous basis. Data were collected from both males and females during all phases of the study to avoid the disruption that would be inherent in separating the males from the females in a school setting.

To reduce inconsistencies of questionnaire administration, the principal investigator was present at all times during data collection using a standardized administration protocol. Upon completion of the survey, students were asked to place the response sheets into an envelope, seal it and hand it in to the principal investigator. Students who completed their questionnaire early were asked to work on attached puzzles and not to distract other students. Additionally, those students who did not wish to participate and those who were not given parental permission to participate as well as those who had filled out the survey in previous classes were asked to work on the puzzles as an alternative activity.

Instrument

Behavior

Participants indicated how frequently on average they drank reduced-fat milk (1% or 2%) during the past 12 months (never/less than 1 glass per month, 1 glass per week or less, 2-6 glasses per week, 1 glass per day, 2 glasses per day, 3 glasses per day, more than 3 glasses per day).

Behavioral Intention

Participants rated on an 8-point scale (0 = Strongly disagree, 7 = Strongly agree; 0 = Very unlikely, 7 = Very likely) three items: "I intend to drink reduced-fat milk daily," "How likely is it that you will drink reduced-fat milk daily?" and "If everything goes as I plan, I will drink reduced-fat milk daily."

Attitude

Participants rated on three 8-point bipolar adjective scales the following item: "When you think about drinking reduced-fat milk daily, how do you feel?" (0=Very bad, 7=Very good; 0=Very worthless, 7=Very valuable; 0=Very unpleasant, 7=Very pleasant).

Subjective Norm

Participants rated on an 8-point scale (0=Strongly disagree, 7=Strongly agree; 0=None at all, 7=A great deal) three items: "Most people who are important to me think I should drink reduced-fat milk daily," "Important people in my life say I ought to drink reduced-fat milk daily" and "How much pressure do you feel from other people to drink reduced-fat milk daily?"

Perceived Behavioral Control

Participants rated on an 8-point scale (0 = Very little, 7 = Complete control; 0 = Very difficult, 7 = Very easy; 0 = Strongly disagree, 7 = Strongly agree) each of these three items: "How much control do you have over drinking reduced-fat milk daily?"

"For me drinking reduced-fat milk daily would be:" and "If I chose to I would be able to drink reduced-fat milk daily."

The scale range for each item making up the intention, attitude, subjective norm, and perceived behavioral control constructs were measured on eight-point scales (0 through 7) and within each of these variables the responses across items were averaged. The beliefs underlying attitudes, subjective norm and perceived behavioral control were measured on eight-point scales (0 through 7). The labels for the scale are shown in table footnotes.

According to the theory of planned behavior attitude, subjective norm and perceived control are a function of the product of their underlying beliefs and values. Attitude is a function of the products of (1) the likelihood of each outcome times and (2) the value of that outcome to the individual; subjective norm is a function of (3) what each important other wants you to do times and (4) the motivation to comply with that other; and perceived control is a function of (5) the belief about the availability of a control resource/opportunity times and (6) the power of that resource/opportunity to increase or decrease the person's control. However, the numerical scale used for each of these six measures (0 to 7 in our case) is arbitrary. Because the product of two variables can be very different depending on the scale assigned to the variables it is necessary to have some logical reason for the scale chosen before creating the products which will be used in predicting the attitude, subjective norm and perceived control.

Given the verbal anchors underlying our questions we decided to rescale normative beliefs (number *3* in the list above) and control beliefs (number *5* in the list above) on a -3.5 to +3.5 scale (by subtracting 3.5 from the original value) before creating the products used in our regression analyses. Our logic for normative belief was that a belief that another did not want them to do something should produce a subjective norm that was increasingly negative as the motivation to comply increased. For perceived power we thought that a belief that a resource was not available should produce an increasingly negative perceived power as the power of that resource to control the outcome increased. We did not rescale either variable for attitude because the anchor used for evaluation (important-unimportant) did not lend itself to a concept of a negative attitude. For example, if we had rescaled the importance of an outcome to -3 to +3 then the product of a belief that an event was very likely (7) and that it was unimportant (-3) would result in a much more negative attitude (product = -21) than a belief that the event was unlikely (0) and unimportant (-3) (product = 0). The product terms were only used in the regression analysis and not in the examination of the individual belief responses where we retained the original scaling.

Data Analysis and Power

Using the Statistical Package for the Social Sciences (SPSS), simple descriptive statistics were calculated for the demographic data. Central tendency measurements and 95% confidence intervals were utilized to summarize the distribution of variables and their variability. Chi-square tests of independence were conducted to evaluate the differences between cases with complete data and cases with missing data. Pearson correlation and standardized regression coefficients were used to examine the associations among the variables of the theoretical model. A five-step hierarchical multiple regression analysis was performed to determine the predictors of participants' intention to consume reduced-fat milk. A *p*-value of .05 was considered significant for all statistical tests conducted. With the sample size we have there was 80% power to detect an effect size of .03 using 10 independent variables, which was the maximum number actually used in a regression analysis in this study.

RESULTS

Characteristics of Respondents

Of the 606 public high school male students who participated in this study, a total of 560 participants (92.4%) provided complete data. Results for this study relevant to the theory of planned behavior variables were based only on the 560 cases with the complete data. Missing data analysis was conducted to evaluate whether there were consistent differences between the cases with complete data and those cases with missing data. The results of chi-square tests indicated that there were no significant differences in the amount of missing data among individuals of different ethnic backgrounds [C^2 (5, N = 600)=4.48, p=.482] or of different ages [C^2 (4, N = 605)=4.04, p=.400]. The participants ranged in age from 13 to 18 years. The percentages in each age group starting with the 13 year olds and going up to the 18 year olds were 0.2% (n=1), 15.8%, 28.1%, 25.2%, 23.6% and 6.9%, respectively. The majority of participants were White/Anglo Americans 53.8% (n=323) followed by Hispanics or Latinos 18.5% (n=111), Other 9.7% (n=58), Asian/Pacific Islanders 8.8% (n=53), Black/African Americans 7.8% (n=47) and Native Americans 1.3% (n=8).

The response rate for this study was high. The typical classes ranged in size from approximately 25 to 30 students, and within a class no more than two or three students failed to return the reply cards. The high response rate may have been due to the "Got Milk?" posters that were promised as incentives for students to return the parental reply cards.

Patterns of Milk Consumption

The majority of participants 94.8% (n = 531) reported that they currently drank milk, while only 5.2% (n=29) reported that they did not. In response to an item asking students to indicate which type of milk they usually drank, 19.6% (n=110) chose whole milk, 46.1% (n=258) 2% milk, 11.4% (n=64) 1% milk, 10.7% (n = 60) skim/non-fat milk, 0.6% (n=2) soy milk and 6.6% (n=37) did not know what type of milk they usually drank. Table 1 shows patterns of various milk types consumed during the past year among public high school male participants. More students reported that they consumed reduced-fat milk than the

Table 1. Patterns of Milk Consumption during the Past Year among Public High School Male Students in The Antelope Valley Union High School District, 13-18 years old, 1999

Glasses of milk consumed	Whole milk		Reduced-fat milk		Skim/nonfat milk		Skim or whole chocolate milk	
	n	%	n	%	n	%	n	%
Never/less than 1 glass per month	299	53.4	146	26.1	380	67.9	290	51.8
1 glass per week or less	65	11.6	61	10.9	68	12.1	148	26.4
2-6 glasses per week or less	62	11.1	98	17.5	40	7.1	61	10.9
1 glass per day	48	8.6	76	13.6	28	5.0	26	4.6
2 glasses per day	35	6.3	85	15.2	16	2.9	15	2.7
3 glasses per day	24	4.3	42	7.5	8	1.4	9	1.6
More than 3 glasses per day	22	3.9	48	8.6	16	2.9	6	1.1
Missing	5	0.9	4	0.7	4	0.7	5	0.9

N=560

other types of milk.

We did not directly ask students about their total milk consumption. To obtain an estimate of total milk consumption per day we coded 1 or fewer glasses per week as 1/7th glass per day; 2 to 6 glasses per week as .5 glasses per day; 1, 2 and 3 glasses per day as 1, 2 or 3 glasses per day; and more than 3 glasses per day as 4 glasses per day. Then we summed these values across all six types of milk listed in Table 1. When these figures were used, approximately one third (36.1%) reported that they drank one or fewer glasses of milk per day during the past year. However, 31.8% reported that they drank three glasses of milk or more per day during the past year.

Constructs of the Theory of Planned Behavior

Figure 1 shows a path diagram representing the results of the five multiple regression analyses for predicting reduced-fat milk consumption. The diagram presents associations (simple correlations) of predictors with dependent variables (r's) and the independent association of each predictor with the dependent variables when other variables were held statistically constant (bs).

In predicting reduced-fat milk consumption among the male public high school participants, both intention and perceived behavioral control were positively associated with the behavior. However, intention alone was the only significant independent predictor of the behavior. These two predictors (R^2) explained 52% of the variance in reduced-fat milk consumption.

Intention as a Function of Attitude, Subjective Norm and Perceived/ Behavioral Control

Attitude, subjective norm and perceived behavioral control were each significant predictors of intention to drink reduced-fat milk and together (R^2) explained 62% of its variance. The strongest predictor was attitude, followed by perceived behavioral control and subjective norm. All three components also had moderate to high statistically significant positive associations with intention and these remained when the associations were assessed independently in a multiple regression.

Underlying Factors of Attitude/Subjective Norm, and Perceived Behavioral Control

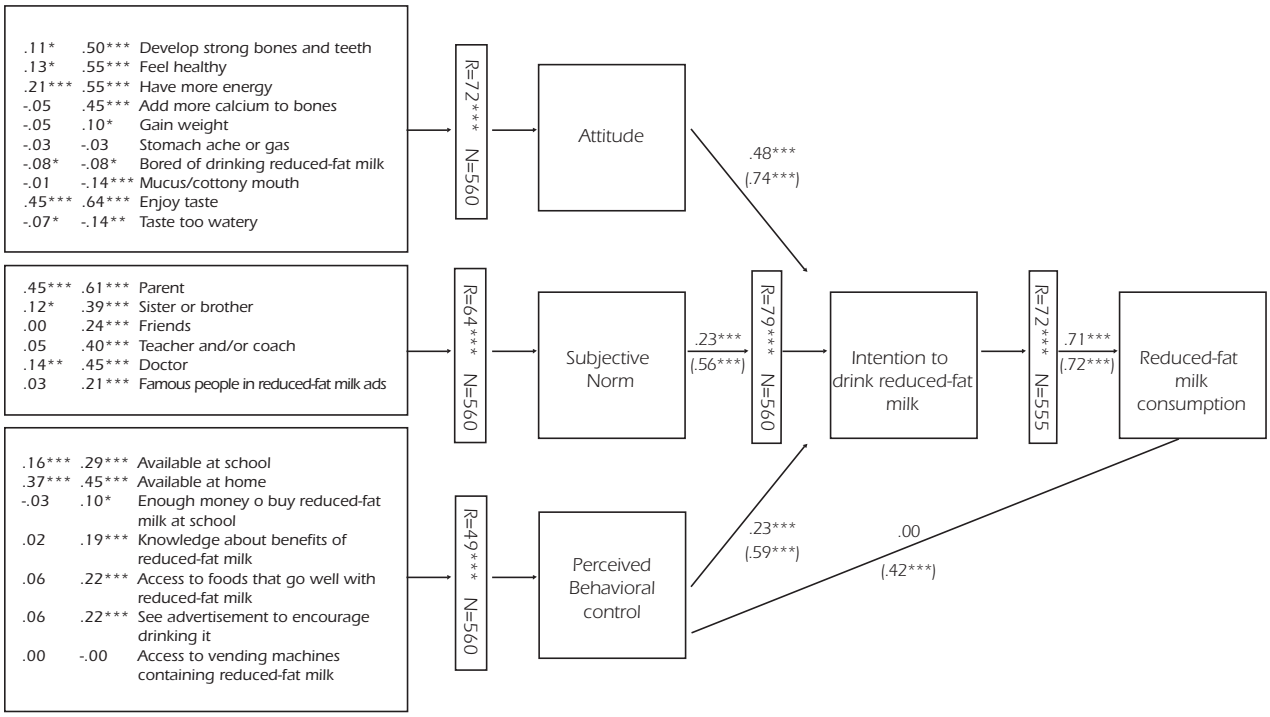
Attitude-Outcome Beliefs and Evaluation.

A regression (results shown in Figure 1) showed that the outcome products (R^2) explained 52% of the variance in attitude towards reduced-fat milk consumption. While all of the outcome variables measured were significantly associated with attitude except for stomachache or gas, there were six variables that had independent predictive power. The primary predictors were whether students enjoyed the taste and whether they thought drinking reduced-fat milk would make them have more energy. Weaker predictors were that drinking reduced-fat milk would help them develop strong bones and teeth and that they would feel healthy. Participants also felt that they would get bored of drinking reduced-fat milk daily and that it tastes too watery. Table 2 shows which beliefs were most strongly and least strongly accepted. It seems that students most strongly believed that drinking reduced-fat milk daily helps develop strong bones and teeth and drinking it will help add more calcium to the bones. The outcome evaluations that were rated most important were feeling healthy followed by developing strong bones and teeth, having more energy and adding more calcium to bones.

Subjective Norm-Normative Beliefs and Motivation to Comply.

A regression (Figure 1) showed that the referent products (R^2) explained 41% of the variance in subjective norm. While all the normative variables measured were positively associated with the subjective norm, there were only three that had independent predictive power. The primary predictor was parent. The referent predictors doctor and sister or brother were weaker predictors. Table 3 shows which beliefs were most strongly and least strongly accepted. It seems that students most strongly believed

Figure 1. Path Diagram for Prediction of Reduced-fat Milk (1% or 2%) Consumption*



*Based on the theory of planned behavior. Numbers in rotated boxes are Rs from multiple regression. Numbers in parentheses next to arrows are correlations, numbers not in parentheses are beta coefficients. *N* represents cases with complete data.
Note: $^{*}p \le .05$, $^{**}p \le .001$, $^{***}p \le .0001$.

Table 2. Means and 95% Confidence Intervals for Reduced-fat Milk Consumption Behavioral Beliefs and Outcome Evaluations

Outcome	Behavioral Beliefs		Outcome Evaluations	
	Mean	(95% CI)	Mean	(95% CI)
Add more calcium to bones	5.44	(5.27, 5.61)	6.22	(6.11, 6.33)
Develop strong bones and teeth	5.42	(5.26, 5.58)	6.30	(6.18, 6.42)
Feel healthy	4.70	(4.52, 4.88)	6.36	(6.21, 6.51)
Have more energy	4.25	(4.07, 4.43)	6.24	(6.12, 6.36)
Bored of drinking reduced-fat milk	3.36	(4.14, 3.58)	3.73	(3.53, 3.93)
Gain weight	3.00	(2.83, 3.17)	4.13	(3.91, 4.35)
Enjoy taste	2.84	(2.64, 3.04)	4.39	(4.19, 4.59)
Taste too watery	2.84	(2.64, 3.04)	4.49	(4.29, 4.69)
Mucus/cottony mouth	2.78	(2.58, 2.98)	5.18	(5.00, 5.36)
Stomachache or gas	1.79	(1.60, 1.98)	5.20	(5.02, 5.38)

Note: The behavioral beliefs scale ranged from 0 (very unlikely) to 7 (very likely). The outcome evaluations scale ranged from 0 (not important) to 7 (extremely important).
N=560

Table 3. Means and 95% Confidence Intervals for Reduced-fat Milk Consumption Normative Beliefs and Motivation to Comply

Referent	Normative Beliefs		Motivation to Comply	
	Mean	95% CI)	Mean	(95% CI)
Doctor	4.50	(4.31, 4.69)	4.62	(4.44, 4.80)
Parent	3.91	(3.71, 4.11)	4.22	(4.04, 4.40)
Teacher and/or coach	2.69	(2.49, 2.89)	3.24	(3.06, 3.42)
Famous people in reduced-fat milk ads	2.49	(2.29, 2.69)	1.82	(1.64, 2.00)
Sister or brother	2.01	(1.82, 2.20)	2.51	(2.33, 2.69)
Friends	1.53	(1.36, 1.70)	3.04	(2.87, 3.21)

Note: The beliefs about whether these people wanted them to drink reduced-fat milk (normative beliefs scale) ranged from 0 (not at all) to 7 (very much). The motivation to comply scale ranged from 0 (not at all) to 7 (very much).
N=560

Table 4. Means and 95% Confidence Intervals for Reduced-fat Milk Consumption Control Beliefs and Perceived Facilitation

Resource	Control Beliefs		Perceived Facilitation	
Mean	(95% CI)	Mean	(95% CI)	
Access to foods that go well with reduced-fat milk[a]	5.45	(5.30, 5.60)	4.76	(4.58, 4.94)
Enough money to buy reduced-fat milk at school[b]	5.41	(5.22, 5.60)	4.41	(4.21, 4.61)
Reduced-fat milk available at home[c]	5.19	(4.99, 5.39)	5.48	(5.31, 5.65)
Reduced-fat milk available at school[d]	4.94	(4.76, 5.12)	4.08	(3.88, 4.28)
See advertisement to encourage drinking it[e]	4.48	(4.31, 4.65)	2.57	(2.37, 2.77)
Knowledge about benefits of reduced-fat milk[f]	4.01	(3.83, 4.19)	4.67	(4.48, 4.86)
Access to vending machines containing reduced-fat milk[g]	1.34	(1.18, 1.50)	2.88	(2.68, 3.08)

Note: The degree to which this resource was believed to be available for items[a&g] ranged from 0 (none at all) to 7 (very much access); for items[b&f] ranged from 0 (not enough) to 7 (more than enough); for items[c&d] ranged from 0 (not available) to 7 (very much available); for item[e] ranged from 0 (not often) to 7 (very often)
N=560

doctors and parents wanted them to drink reduced-fat milk daily. Participants reported that they were motivated to comply the most with what their doctors wanted them to do followed by what their parents wanted them to do.

Perceived Behavioral Control—Control Beliefs and Perceived Facilitation

Five out of the seven resources were positively associated with perceived behavioral control (Figure 1). A regression showed that the resource products (R^2) explained 24% of the variance in perceived behavioral control. Out of the seven resources, two had independent predictive power. The primary predictor was availability of reduced-fat milk at home followed by availability of reduced-fat milk at school. Table 4 shows which resources students believed were most and least available. Students most strongly believed that access to foods that go well with reduced-fat milk and having enough money to buy it at school as well as availability of reduced-fat milk at home were the most available resources. However, students least strongly believed that they have access to vending machines containing reduced-fat milk. The resources that were rated most important were availability of reduced-fat milk at home followed by having access to foods that go well with it.

DISCUSSION

It is recommended that adolescents consume the equivalent of at least three servings of milk per day.[26] The results of this study indicated that almost all the participants reported that they drank milk. However, only one-third of the participants reported that they drank three glasses of milk or more per day during the past year. This indicates that male adolescents reported that they drank milk; however, they were not drinking the recommended amounts. Since the adolescent years represent a time of rapid gain in bone density, which is influenced by milk intake,[27] adolescents need to be encouraged to drink the recommended amounts of milk. On the other hand, 68.2% of the participants reported that they drank reduced-fat milk. This is encouraging because high-fat milk (whole milk) is a major dietary source of saturated fat (USDA, 2000).[28] Excess

consumption of dietary fat has been associated with increased risk of cardiovascular disease.[29] Lee, et al.,[30] using the data from the USDA 1989-1991 Continuing Survey of Food Intakes by Individual reported that total fat intake of reduced-fat milk drinkers was significantly lower than that of whole milk drinkers. Health professionals need to continue encouraging adolescents to drink reduced-fat milk.

Results of this study identified several behavioral beliefs that may be important in the formation of attitude toward drinking reduced fat milk. Those male adolescents with positive attitudes toward drinking reduced-fat milk were more likely to believe that they would develop strong bones and teeth, enjoy its taste and feel healthy and energetic. Taste enjoyment of reduced-fat milk was one of the most predictive expected outcomes of reduced-fat milk consumption among the male participants. The importance of taste enjoyment cannot be ignored and needs to be utilized by milk advertisers[31] and health educators. On the other hand, those with negative attitudes toward drinking reduced-fat milk were more likely to believe that they get bored of drinking it and that it tastes too watery, thus they tended to avoid it. These two factors need to be addressed when planning health promotion programs. Health educators may encourage adolescents to drink flavored reduced-fat milk. They may also suggest adding healthful ingredients to it such as fruits or reduced-sugar chocolate powder to make it less boring and less watery.

Male adolescents in this study were more influenced by their parents' opinions than those of others with regards to drinking reduced-fat milk. Findings of other studies also identified parental influence as an important factor in affecting dietary behavior among adolescents.[32,33] Health education programs in the areas of dietary behavior need to involve adolescents as well as their parents. Doctors and siblings had a statistically significant but weaker influence as well. Ford, et al.,[34] reported that adolescents are willing to communicate with their doctors when seeking routine health care especially when their confidentiality is assured. Moreover, Street, et al.,[35] reported that patients believed that it is the doctor's job to ask about health issues that affect quality of life, and adolescents showed a desire to interact with their doctors.[36] This indicates that doctors need to be involved in health promotion and education. The influence of siblings on male adolescents' consumption of reduced-fat milk was identified as an important factor. Backman, et al.,[37] found that siblings represent an important predictor of healthful dietary practices in adolescents. Therefore, siblings need also be involved in health programs promoting reduced-fat milk consumption among male adolescents.

Of the factors that were found to be significant predictors of perceived behavioral control, availability of reduced-fat milk at home was the strongest predictor. Male adolescents were more likely to drink reduced-fat milk if it was available at home and in schools. Participants reported that they have no access to vending machines that contained reduced-fat milk in school. This suggests that if vending machines containing reduced-fat milk were made more available, then this resource might facilitate reduced-fat milk drinking among adolescents. The failure of access to vending machines containing reduced-fat milk to predict behavioral control may be a function of the very low levels of availability of such vending machines to any student. Nevertheless, personnel in school districts need to be involved in promoting the health of their students by providing reduced-fat milk at schools in various locations and vending machines.

The use of self-report from the respondents may limit the generality of this study. Self-reports of dietary intakes and lifestyle behaviors may be influenced through researcher expectancies and social desirability.[38] Anonymity should have reduced this bias because the students were told that the researcher and the teacher would not know what the students wrote; therefore, the students should have had no particular reason to try to impress the experimenter or teacher. Another limitation of the study is potential selection bias. Teachers chose which classes participated in the study. Further, the high response rate might be explained, in part, by the fact that teachers may have selected classes they expected would be willing to participate. Generalizability of the study is limited by the sample of students who participated in the research, including their age, type of class they were enrolled in and region of the country. The ethnic composition of our sample limits the generalizability of our results, especially to the African-American population; only 7.8% of this study's participants were African-American. Patterns of milk consumption differ between races due to many factors, one of which is lactose intolerance. Studies have shown that the high prevalence of lactose maldigestion among African-Americans may be responsible for their low milk consumption.[39] Future research may study the Theory of Planned Behavior variables in relation to different races and ethnic groups.

The findings of this study may have important implications for health professionals. Health promotion interventions for male adolescents should reinforce the perception that reduced-fat milk is healthy, increases energy, assists in the development of strong bones and teeth and tastes good. Health educators may suggest to adolescents that they drink flavored reduced-fat milk or add healthy ingredients to it such as fruits to make it less boring and less watery. Efforts to increase reduced-fat milk consumption among male adolescents should include parents, siblings and doctors. Finally, it is important that milk be available to adolescents at home and in schools.

REFERENCES

1. Siddiqui NA, Shetty KR, Duthie EH. Osteoporosis in older men: discovering when and how to treat it. *Geriatrics*. 1999;54:20-22, 27-28, 30.

2. Rodriguez JG, Sattin RW, Waxweiler RJ. Incidence of hip fractures, United States, 1970-83. *Am J Prev Med*. 1989;5:175-181.

3. Bacon WE. Secular trends in hip fracture

occurrence and survival: age and sex differences. *J Aging Health*. 1996;8:538-53.

4. Poor G, Atkinson EJ, O'Fallon WM, Melton LJ. Determinants of reduced survival following hip fractures in men. *Clin Orthop*. 1995;19:260-5.

5. Eastell R, Boyle IT, Compston J, et al. Management of male osteoporosis: report of the UK Consensus Group. *Q J Med*. 1998;91:71-92.

6. Lu-Yao GL, Baron JA, Barrett JA, Fisher ES. Treatment and survival among elderly Americans with hip fractures: a population-based study. *Am J Public Health*. 1994;84:1287-91.

7. Center JR, Nguyen TV, Schneider D, Sambrook PN, Eisman JA. Mortality after all major types of osteoporotic fracture in men and women: An observational study. *BMJ*. 1999;353: 878-882.

8. Melton LJ III, Atkinson EJ, O'Connor MK, O'Fallon WM, Riggs BL. Bone density and fracture risk in men. *J Bone Miner Res*. 1998;13: 1915-23.

9. Vega E, Ghiringhelli G, Mautalen C, Rey Valzacchi G, Scaglia H, Zylberstein C. Bone mineral density and bone size in men with primary osteoporosis and vertebral fractures. *Calcif Tissue Int*. 1998;62:465-9.

10. National Institutes of Health Osteoporosis and Related Bone Diseases National Resource Center. Facts on ostroporosis. Available at: http://www.osteo.org/osteo.html. Accessed November 13, 2004.

11. National Osteoporosis Foundation. America's Bone Health: The state of osteoporosis and low bone mass. Available at: http://www.nof.org. Accessed November 11, 2004.

12. Anderson JJ. Development and maintenance of bone mass through the life cycle. In Anderson JJ & Garner SC, eds. *Calcium and phosphorus in health and disease*. Boca Raton, FL: CRC Press;1995:265-88.

13. Theintz G, Buchs B, Rizzoli R, et al. Longitudinal monitoring of bone mass accumulation in healthy adolescents: evidence for a marked reduction after 16 years of age at the levels of lumbar spine and femoral neck in female subjects. *J Clin Endocrinol Metab*. 1995;75:1060-65.

14. Ruiz JC, Mandel C, Garabedian M. Influence of spontaneous calcium intake and physical exercise on the vertebral and femoral bone mineral density of children and adolescents. *J Bone Miner Res*. 1995;10:675-82.

15. United States Department of Agriculture. *Continuing Survey of Food Intakes by Individuals*. Available at: http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm. Accessed November 11, 2004.

16. Institute of Medicine. Dietary reference intakes for calcium, phosphorus, magnesium, vitamin D, and fluoride. Standing committee on the scientific evaluation of dietary reference intakes. Food and Nutrition Board, Washington, D.C.: National Academy Press; 1997. Available at: http://www2.bas.edu/whatsnew/276a.html.

17. Lindsay R, Nieves J. Milk and Bones. *Br Med J*;1994:308:930-31.

18. Teegarden D, Lyle RM, Proulx WR, Johnston CC, Weaver CM. Previous milk consumption is associated with greater bone density in young women. *Am J Clin Nutr*. 1999;69: 1014-17.

19. Ajzen I. Attitude structure and behavior. In Pratkanis SJ Breckler & Greenwald AG, eds. *Attitude structure and function*. Hillsdale, NJ: Lawrence Erlbaum;1989:241-74.

20. Ajzen I. The theory of planned behavior. *Organization Behavior and Human Decision Processes*. 1991;50:179-211.

21. Godin G, Kok G. The theory of planned behavior: A review of its application to health-related behaviors. *Am J Health Promot*. 1996;11: 87-98.

22. Fishbein M, Ajzen I. *Belief, attitude, intention, and behavior: an introduction to theory and research*. Reading, Mass.: Addison-Wesley Pub. Co.;1975.

23. Ajzen I, Fishbein M. *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall, Inc; 1980.

24. Courneya KS, McAuley E. Cognitive mediators of the social influence-exercise adherence relationship: A test of the theory of planned behavior. *J Behav Med*. 1995;18:499-515.

25. Strauss A, Corbin J. *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury, CA:SAGE;1990.

26. United States Department of Agriculture. *The Food Guide Pyramid (Home and Garden Bulletin No. 252)*. Washington, DC: US Government Printing Office;1996.

27. Cadogan J, Eastell R, Jones N & Baker ME. Milk intake and bone mineral acquisition in adolescent girls: randomized, controlled intervention trial. *Br Med J*. 1997;315:1255-60.

28. United States Department of Agriculture. *Dietary Guidelines for Americans: 2000*. Available at: http://www.usda.gov/cnpp/dietary_guidelines.html. Accessed November 11, 2004.

29. Nordoy A. Dietary fatty acids and coronary heart disease. *Lipids*. 1999;34:S19-22.

30. Lee HH, Gerrior SA, Smith JA. Energy, macronutrient, and food intakes in relation to energy compensation in consumers who drink different types of milk. *Am J Clin Nutr*. 1998; 67:616-23.

31. Barr SI. Association of social and demographic variables with calcium intakes of high school students. *J Am Diet Assoc*. 1994;94:260-67, 269.

32. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *J Am Diet Assoc*. 1999; 99:929-37.

33. De-Bourdeaudhij I, Van Oost P. Family members' influence on decision making about food: Differences in perception and relationship with healthy eating. *Am J Health Promot*. 1998; 13:73-81.

34. Ford CA, Millstein SG, Halpern-Felsher BL, Irwin CE Jr. Influence of physician confidentiality assurances on adolescents' willingness to disclose information and seek future health care. A randomized controlled trial. *JAMA*. 1997;278:1029-34.

35. Street RL, Cauthern D, Buchwald E, Wiprud R. Patients' predispositions to discuss health issues affecting quality of life. *Fam Med*. 1995;27:663-70.

36. Gilchrist V, Alexander E. Preventive health care for adolescents. *Prim Care*. 1994; 21: 759-79.

37. Backman DR, Haddad EH, Lee JW, Johnston PK, Hodgkin GE. Psychosocial predictors of healthful dietary behavior in adolescents. *J Nutr Educ Behav*. 2002;34:184-92.

38. Cook TD, Campbell DT. *Quasi-experimental design and analysis issues for field setting*. Boston: Houghton Mifflin Company;1979:67.

39. Wittenberg DF, Moosa A. Lactose maldigestion—age-specific prevalence in black and Indian children. *S Afr Med J*. 1990;78:470-72.