Television Viewing and Obesity in Adult Females

Larry A. Tucker, PhD, and Marilyn Bagwell, RN, PhD

ABSTRACT

We measured the relation between time spent watching television per week and obesity in 4,771 adult females. After controlling for age, education, cigarette smoking, length of work week, and weekly duration of exercise, females who reported three to four hours of TV viewing per day showed almost twice the prevalence of obesity (body fat > 30 percent), and those who reported more than four hours of TV watching per day showed more than double the prevalence of obesity, compared to the reference group (<1 hr/day). Part of the TV/obesity association was a function of differences in exercise duration among the four TV viewing categories. (*Am J Public Health*. 1991;81:908–911)

Introduction

Lifestyle plays a key role in the development and prevention of a host of chronic diseases. Until recently, few have recognized television viewing as a significant lifestyle factor. Yet, next to sleep and work, watching TV consumes more time than any other activity in America.[1,2] Adolescents spend more time watching TV each year than they spend in school, and the typical adult averages nearly four hours of TV viewing per day.[1–3]

Research has determined that frequent television viewing may function as a risk factor in a number of disorders.[4–10] Health problems may result from many hours of daily TV watching due to the deceptive and inaccurate health-related messages which are regularly transmitted to viewers.[10,11] However, television's principal problem is probably more related to the physical passivity which accompanies TV viewing rather than the misleading micro-lessons it teaches.

TV has profoundly changed the use of leisure time in America.[2,12] While people watch TV, physical activity tends to be minimal and snacking is prevalent.[10,13,14] Conditions for hypokinetic ailments such as obesity and poor fitness dominate.

In 1986, Tucker[6] studied the connection between television viewing and multiple measures of physical fitness in adolescent males. Findings showed that high levels of TV watching were strongly associated with low scores on tests of fitness, (pullups, situps, sidestep, six-minute run, and pushups). Similarly, Dietz and Gortmaker[5] found that as TV viewing increased, obesity increased systematically in several thousand children aged 6–11 and 12–17. In 1989, Tucker and Friedman[8] showed that time spent watching TV was directly related to obesity levels in adult males. Men who watched more than three hours of TV per day had more than twice the prevalence of obesity compared to those who watched less than one hour per day. To date, the association between TV viewing and obesity in adult females has not been studied; hence, the present investigation was conducted. A secondary purpose was to ascertain the extent to which age, cigarette smoking, hours worked per week, and weekly exercise duration mediate the relation between TV viewing and obesity in women.

Methods

Subjects

Subjects were 4,771 females employed by over 30 different companies in the United States. All subjects worked for companies which paid to have their employees participate in a health promotion/disease prevention screening program offered by Health Advancement Services, Inc. Participants were distributed nearly equally across family income categories ranging from $10,000 to $60,000+. Median age of the sample was 35 years and approximately 83 percent of the females were White, 60 percent were married, 18 percent separated or divorced, and 50 percent reported some college education.

Instrumentation and Procedures

All data were gathered by registered nurses employed by Health Advancement Services as part of their ongoing screening program. Subjects completed an informed consent form and each was tested individually during a private 50-minute examination. A structured, written questionnaire was used to collect the demographic and lifestyle information, including TV viewing, exercise, and smoking habits. A Harpenden skinfold caliper was employed to assess subcutaneous fat at three body sites on each subject: *thigh*, vertical fold taken on the anterior aspect midway between the hip and the knee; *triceps,* vertical fold taken on the back of the arm midway between the shoulder and the elbow; *iliac crest,* diagonal fold taken 2.5 cm above the iliac crest. The sum of the skinfold measurements along with age were used to estimate the total body fat percentage of each subject.[15] Research shows that this three-site skinfold method of

Address reprint requests to Larry A. Tucker, PhD, Director of Health Promotion, 273 SFH, Brigham Young University, Provo, UT 84602. Dr. Bagwell is with Arizona State University, Tempe. This paper, submitted to the Journal June 11, 1990, was revised and accepted for publication January 23, 1991.

TABLE 1—Hours of Television Viewing, Body Fat, and Obesity According to the Control Variables

Control Variables	N	Hours of TV per Day (row %)				Body Fat Percentage (row %)			
		<1	1–2	3–4	>4	<18	18–23	24–29	30+*
Total Group	4,771	12.3	59.2	24.1	4.4	10.7	26.2	30.9	32.3
Age (years)									
19–29	1,541	10.4	56.5	26.8	6.3	20.9	36.5	25.8	16.8
30–39	1,350	13.5	62.3	21.2	3.0	8.9	29.4	32.7	29.0
40–49	997	17.0	60.1	20.3	2.6	3.1	18.6	35.5	42.8
50–59	654	9.3	62.5	25.5	2.7	2.4	12.4	30.9	54.3
60+	229	5.3	50.2	34.2	10.2	2.3	7.7	33.5	56.6
Highest Education									
elementary	71	11.6	37.7	37.7	13.0	6.1	21.2	25.7	47.0
high school	1,941	8.5	57.3	28.6	5.6	11.6	25.2	30.7	32.6
vocational	357	10.7	55.2	29.6	4.5	7.4	24.3	33.1	35.1
college	1,726	14.6	61.1	20.5	3.9	12.3	29.5	29.9	28.3
professional	676	18.3	63.8	16.4	1.5	6.5	22.5	33.4	37.6
Smoking Status									
never smoked	2,451	13.1	60.1	23.3	3.5	9.9	25.2	29.4	35.6
ex-smoker	881	13.5	60.2	22.5	3.9	8.3	24.5	32.5	34.7
1–20 daily	1,020	9.9	56.2	27.7	6.2	15.3	29.4	32.2	23.1
21+ daily	419	9.3	58.9	27.9	4.0	10.5	31.0	31.5	26.9
Weekly Exercise									
<30 minutes	2,735	10.5	57.5	26.7	5.2	9.9	24.4	29.8	35.9
31–60 min	421	13.2	61.4	22.0	3.4	11.4	27.5	31.7	29.4
61–100 min	426	15.0	59.7	22.0	3.4	7.6	28.4	35.9	28.1
101–200 min	655	14.2	61.0	21.3	3.5	11.4	29.3	33.4	25.9
201+ min	534	16.4	63.0	17.7	2.9	16.2	29.8	29.2	24.8
Work Week									
<20 hrs/wk	215	8.0	43.4	32.6	16.0	8.1	24.4	36.4	31.1
21–40 hrs/wk	2,953	11.0	58.6	26.0	4.4	11.7	27.4	29.7	31.2
41–50 hrs/wk	1,422	14.7	63.0	19.9	2.4	9.7	24.6	32.0	33.7
51+ hrs/wk	181	19.6	60.3	18.4	1.7	6.2	26.4	30.9	36.5

*Females with 30 percent or more body fat were labeled obese.

body fat assessment correlates well with hydrostatic weighing (r = .84).[15] Obesity was defined as 30 percent or more body fat.[16] Body fat, television viewing, and the control variables were categorized as depicted in Table 1. Indirect validation of the body fat,[8,17–20] TV,[4,6–8,19] and exercise duration[17–20] variables has been demonstrated previously.

The relation between duration of TV viewing and body fat was indexed by the Mantel-Haenszel chi-square statistic which shows the extent of the linear association between ordinal-level, categorical variables.[21,22] The relation between TV viewing and obesity was measured by the odds ratio[23] with subjects who reported less than one hour of TV watching per day used as the reference group. Cochran-Mantel-Haenszel summary risk estimates were used to assess the TV/obesity relation with the potential confounders controlled.[24]

Results

Almost 60 percent of the subjects reported watching one to two hours of TV per day, while approximately one in four indicated three–four hours of daily TV viewing (see Table 1). More than four hours of TV viewing per day was reported most often by subjects who were young or old, by the uneducated, by smokers, by non-exercisers, and by those with short work weeks. Obesity, measured in nearly one-third of the adult females, was more common among older subjects, the uneducated, never and ex-smokers, non-exercisers, and those with long work weeks.

Table 2 shows the estimated risk of obesity by TV viewing time without adjustment and with adjustment for the control variables displayed in Table 1. After adjustment for all of the potentially confounding variables, subjects who reported four+ hours of daily TV watching showed more than two times the prevalence of obesity, and subjects who reported three–four hours of daily viewing showed almost twice the prevalence of obesity compared to females who watched less than one hour of TV daily (see Table 2).

Age had the strongest confounding effect on the TV/obesity relation of any single control variable. After adjustment for age only, estimated risk of obesity was increased by an average of 15 percent for the three TV viewing groups compared to the reference group. Control of exercise duration, in addition to the other potentially confounding factors, also affected the TV/obesity association. Specifically, estimated risk of obesity was decreased by approximately 18 percent for the four+ hour/day viewers and 12 percent for the three–four hour/day viewers compared to the reference group.

Discussion

According to the results, adult females who watch four or more hours of TV per day tend to have more than double the prevalence of obesity compared to those who watch less than one hour daily, as in adult males[8] and children.[5] However, because of the correlational nature of this study, cause-and-effect conclusions are not warranted. Although excessive TV viewing may actually contribute to obesity in women, it is plausible that obesity leads to an abundance of TV watching. As with adult males,[8] females who are fat may be

TABLE 2—Estimated Risk of Obesity by Television Viewing Group

Daily TV Viewing	Variable Controlled	Obese* N	%	RR_{cmh}	95% CI
<1 hour (n = 585)	none	140	23.9	1.00*	—
1–2 hours (n = 2,825)	none	896	31.7	1.48	1.20, 1.81
	age, education, smoking, work week			1.46	1.15, 1.86
	above + exercise duration			1.29	0.99, 1.68
3–4 hours (n = 1,151)	none	402	34.9	1.71	1.36, 2.14
	age, education, smoking, work week			1.98	1.51, 2.61
	above + exercise duration			1.89	1.37, 2.61
>4 hours (n = 210)	none	73	34.8	1.69	1.20, 2.38
	age, education, smoking, work week			2.62	1.51, 4.53
	above + exercise duration			2.15	1.15, 4.01

Note: RR_{cmh} = Cochran-Mantel-Haenszel summary estimate of relative risk.
*Subjects who were found to have 30 percent or more body fat were labeled obese.

more inclined to watch TV as a primary source of recreation because of the minimal exertion required, whereas non-obese women may prefer other pastimes which demand greater physical involvement.

The strong association between TV watching and obesity in females could be the function of a "third variable" or confounding factor. Each of the control variables of the present study was strongly related to both TV viewing and obesity, except smoking, which was strongly associated with obesity only. Simultaneous adjustment for differences in age, education, length of work week, smoking, and weekly exercise duration substantially increased the estimated risk of obesity for the television watchers, especially the high-duration viewers.

Duration of weekly exercise had a meaningful impact on the TV/obesity relation. High-duration TV viewing was 80 percent more common and obesity was 45 percent more common among non-exercisers compared to those in the highest exercise group (see Table 1). Apparently, part of the reason women who watch a lot of TV tend to be more obese is because they tend to exercise less. If these women spent more time exercising, perhaps in place of some TV viewing time, risk of obesity would likely be decreased.

Other factors not measured in this investigation could confound the TV/obesity association. Diet is a good example. Because television watchers digest thousands of commercial and program messages which encourage consumption of non-nutritious foods,[25–30] and because snacking and eating foods which are advertised on TV are closely linked with television viewing,[10,13,14] it is possible that high-duration TV watchers are more obese than low-duration TV viewers because they consume more food, particularly more junk food, than their counterparts.

Perhaps the most cogent explanation of the association between TV viewing and obesity is based on a dynamic model: as TV viewing time increases, exercise tends to decrease and snacking tends to increase. As exercise decreases and snacking increases, obesity tends to increase. And as obesity increases, attraction to passive recreation, such as watching TV, tends to increase—a cycle of mutual interaction and reinforcement. Future research relative to the TV/obesity relation will need to consider the dietary intake of subjects as well as their physical activity levels. Furthermore, because subjects in this sample were mostly White and well-educated, generalization to other populations will require additional study.

Without question, watching television is a powerful and pervasive lifestyle factor in our society. Given the enormous amounts of time devoted to this idle pastime and the many subtle and distorted health-related messages conveyed by the medium, it is not surprising that children and adults are influenced by TV to a degree far surpassing earlier beliefs.[1–3] Greater effort needs to be directed toward the study of television's influence on health and its role as a precursor of disease. □

References

1. Comstock G, Chaffee S, Katzman N, McCombs M, Roberts D: Television and Human Behavior. New York: Columbia University Press, 1978.
2. Pearl D, Bouthilet L, Lazar J (eds): Television and Behavior: Ten Years of Scientific Progress and Implications for the Eighties (Vol. 2). Washington, DC: US Govt Printing Office, 1982.
3. Singer DG: A time to reexamine the role of television in our lives. Am Psychol 1983; 38:815–816.
4. Tucker LA: Television's role regarding alcohol use among teenagers. Adolescence 1985; 20:593–598.
5. Dietz WH, Gortmaker SL: Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. Pediatrics 1985; 75:807–812.
6. Tucker LA: The relationship of television viewing to physical fitness and obesity. Adolescence 1986; 21:797–806.
7. Tucker LA: Television, teenagers, and health. J Youth Adolesc 1987; 16:415–425.
8. Tucker LA, Friedman GM: Television viewing and obesity in adult males. Am J Public Health 1989; 79:516–518.
9. Singer JL, Singer DG: Psychologists look at television. Am Psychol 1983; 38:826–834.
10. Gerbner G, Morgan M, Signorielli N: Programming health portrayals: What viewers see, say, and do. *In:* Pearl D, Bouthilet L, Lazar J (eds): Television and Behavior: Ten Years of Scientific Progress and Implications for the Eighties (Vol. 2). Washington, DC: US Govt Printing Office, 1982.
11. Hamburg BA, Pierce CM: Television and health: Introductory comments. *In:* Pearl D, Bouthilet L, Lazar J (eds): Television and Behavior: Ten Years of Scientific Progress and Implications for the Eighties (Vol. 2). Washington, DC: US Govt Printing Office, 1982.
12. Comstock G: Television and American social institutions. *In:* Pearl D, Bouthilet L, Lazar J (eds): Television and Behavior: Ten Years of Scientific Progress and Implications for the Eighties (Vol. 2). Washington, DC: US Govt Printing Office, 1982.
13. Clancy-Hepburn K, Hickey A, Neville G: Children's behavior responses to TV food advertisements. J Nutr Educ 1974; 6:93–96.
14. Duesere S: The Effects of Television Advertising on Children's Eating Habits. Unpublished doctoral dissertation, University of Massachusetts, Amherst, 1976.
15. Pollock ML, Schmidt DH, Jackson AS: Measurement of cardiorespiratory fitness and body composition in the clinical setting. Comprehensive Ther 1980; 6:12–17.
16. Sharkey B: Physiology of Fitness. Champaign, IL: Human Kinetics, 1984.
17. Tucker LA, Friedman GM: Walking and serum cholesterol in adults. Am J Public Health 1990; 80:1111–1113.
18. Tucker LA, Aldana S, Friedman GM: Cardiovascular fitness and absenteeism in the workplace. Am J Health Promo 1990; 5:140–145.
19. Tucker LA: Television viewing and physical fitness in adults. Res Q Exerc Sport 1990; 61:315–320.
20. Tucker LA: Physical fitness and psychological distress. Int J Sport Psychol 1990; 21:185–201.
21. Mantel N: Chi-square tests with one degree

of freedom: Extensions of the Mantel-Haenszel procedure. J Am Stat Assoc 1963; 58:690–700.
22. Mantel N, Haenszel W: Statistical aspects of the analysis of data from retrospective studies of disease. JNCI 1959; 22:719–748.
23. Kelsey JL, Thompson WD, Evans AS: Methods in Observational Epidemiology. New York: Oxford University Press, 1986.
24. Landis RJ, Heyman ER, Koch GG: Average partial association in three-way contingency tables: A review and discussion of alternative tests. Int Stat Rev 1978; 46:237–254.
25. Mauro FJ, Feins RP: Kids, Food and Television: The Compelling Case for State Action. Report for the Office of Research and Analysis Program and Committee Staff. Albany: New York State Assembly, March 1977.
26. Masover L: Television Food Advertising: A Positive or Negative Contribution to Nutrition Education? Unpublished master's thesis, Northwestern University, Evanston, IL, 1977.
27. Barcus FE, McLaughlin L: Food Advertising on Children's Television: An Analysis of Appeals and Nutritional Content. Newtonville, MA: Action for Children's Television, 1978.
28. Choate RB: Statements before the Subcommittee on Communications of the Committee on Interstate and Foreign Commerce. Washington, DC: US House of Representatives, July 14, 1975.
29. Choate RB: Testimony before the Federal Trade Commission in the matter of a trade regulation rule on food nutrition advertising. Washington, DC: Council on Children, Media and Merchandising, 1976.
30. Kaufman L: Prime-time nutrition. J Communication 1980; 30:37–46.

Characteristics of a Random Sample of Emergency Food Program Users in New York: I. Food Pantries

Katherine L. Clancy, PhD, Jean Bowering, PhD, and Janet Poppendieck, PhD

ABSTRACT

Food pantry users throughout New York State were studied and many demographic differences found between New York City and Upstate New York respondents. Seven percent of households had no income and median income as percent of the poverty level was 59 percent. Slightly more than 40 percent were spending over 60 percent of their incomes on housing. The data from this survey, the first in New York State to employ a random sampling design, demonstrate a sizable gap between household needs and available resources. (*Am J Public Health*. 1991;81:911–914)

Introduction

Food pantries and soup kitchens have become symbols of hunger and poverty in the United States. Food drives are an accepted feature of life and the Emergency Feeding System (EFS), once regarded as a response to a temporary situation, has become institutionalized. As this occurs, government agencies, scholars, hunger activists, and emergency food providers have begun to question the advisability of expanding or even maintaining the system. Many issues are involved in the emerging debate, including the needs of those using the system, which was the focus of our studies.

New York is one of a few states that provides funding for the operation of its EFS which is composed of food pantries, soup kitchens, and food banks. In 1987 there were 414 pantries in New York City (NYC) serving 2.9 million people and 1,143 in upstate New York plus Long Island (Upstate) serving 2.4 million.[1] This and the following report[2] present data from a survey of persons utilizing the food pantry and soup kitchen components of the EFS throughout the state.

Methods

The food pantry survey was conducted from October 1988 to February 1989, at a random sample of sites drawn from the Bureau of Nutrition census.[1] At each site, selection of individual clients was as random as conditions permitted. The final sample included 311 clients from 29 pantries Upstate and 208 clients from 19 sites in NYC.

The interviewers, mainly students in social science and nutrition, were trained at Syracuse University or Hunter College. The 20-minute interview included primarily closed-ended questions about client demographics, sources and amounts of income, and participation in food and other assistance programs.

The census had shown that the numbers of people served per pantry ranged from a few to 128,000 per year. To verify that our random sampling procedure had preserved this diversity, we found no significant difference between the percentages of clients coming from larger or smaller sites in either Upstate ($\chi^2 = 0.547$, df = 1, $p > 0.3$), or NYC ($\chi^2 = 0.040$, df = 1, $p > 0.8$).

From the Department of Nutrition and Food Management, Syracuse University, Syracuse, NY (Clancy and Bowering); and the Department of Sociology, Hunter College, New York, NY (Poppendieck). Address reprint requests to Katherine L. Clancy, PhD, Department of Nutrition and Food Management, 034 Slocum Hall, Syracuse University, Syracuse, NY 13244. This paper, submitted to the Journal May 30, 1990, was revised and accepted for publication January 22, 1991.