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The Use of Daily Aspirin, Nutritional Supplements and Alternative Medications among Amish and non-Amish living in Ohio Appalachia

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Abstract

Background—The purpose of this study was to assess daily aspirin and supplement use among Amish and non-Amish adults living in Ohio Appalachia to understand their potential contribution to lower cancer incidence rates among the Amish.

Methods—A cross-sectional study was conducted with random samples of 134 Amish adults and 154 non-Amish adults. Face-to-face interviews about cancer-related behaviors included questions regarding aspirin and supplement use.

Results—Amish compared to non-Amish adults reported: 1) taking significantly ($p < 0.05$) more supplements (mean number of daily products by Amish men 3.5 ± 3.7 and women 5.2 ± 4.3 vs. non-Amish men 1.4 ± 1.3 and women 3.0 ± 3.2); 2) taking significantly ($p < 0.05$) more vitamins, minerals, fiber supplements (women only), and enzymes (women only); 3) taking significantly ($p < 0.01$) more herbal supplements (approximately 55% and 71% of Amish men and women vs. 17% and 23% of non-Amish men and women, respectively); and 4) taking significantly ($p < 0.05$) less aspirin on a regular basis.

Conclusion—Aspirin and supplement use among Amish and non-Amish adults show significant differences characteristic of their social and cultural norms. Future studies that clarify the impact of aspirin and supplement use among the Amish and their impacts upon the risk of certain cancers and other disease processes are warranted.

Keywords

Supplements; Aspirin; Amish; Appalachia

INTRODUCTION

The Amish represent a unique subpopulation in the United States (U.S.) and the largest Amish settlement in the world resides in Holmes County, Ohio [1–3]. The Amish maintain a religious-based lifestyle with specific cultural characteristics including a modest agrarian lifestyle, with limited use of modern technology, and a focus towards self-sufficiency [1–3]. Population-based research suggests that age-adjusted cancer incidence rates are approximately 40% lower among Amish adults compared to non-Amish adults living in the same geographic region [4]. Since reasons for the lower cancer incidence rates among the Amish are not completely understood, exploration of lifestyle practices, including the use of supplements, provides an opportunity to generate hypotheses for factors that may contribute to cancer risk [5]. Although the Amish will often seek the advice of conventional medical practitioners, they tend to favor alternative medical practices and consume complementary supplements and medications for health promotion and minor trauma [6, 7].

In the U.S., use of nutritional and non-nutrient dietary supplements has significantly increased over the past decade, and today over 50% of Americans report using of at least one supplement per day [8]. Supplements are consumed for a variety of perceived health benefits including primary cancer prevention, although there is very limited definitive evidence that supports consumption of specific supplements for this purpose [5, 9–11]. Unfortunately, in spite of many hypotheses, few prospective randomized studies have addressed the efficacy of nutritional and other dietary supplements with regards to chronic disease outcomes, such as cancer. Adding to the complexity of this issue, supplements can be produced and sold without the quality control regulations that are applied to pharmaceutical products, and bioavailability [12] as well as the optimal dosage, duration, and timeframe for intervention remain uncertain [13]. Despite the lack of evidence for supplements and the prevention of cancer, many individuals continue to use various supplements for cancer prevention. Additionally, the use of supplements is increased among cancer survivors compared to the general population in the U.S. [14].

The use of herbals, one specific type of dietary supplement, for health promotion or the treatment of a health condition has dramatically increased in the U.S. The reported intake increased from 2.5% of the population in 1990 to 19% in 2002 [15–17]. Despite this increase in herbal use, very few studies have documented the types and quantities of herbal products consumed. Several characteristics are associated with the use of nutritional and dietary supplement use and include being female, being 45–64 years of age, prescription or over-the-counter medication use, and living in a western state [18].

The daily use of aspirin is also becoming more pervasive as a preventive means in society. Low-dose aspirin is currently recommended for the prevention of cardiovascular events [19]. Aspirin has also been shown to reduce mortality due to colorectal cancer [20, 21], and prevents recurrence of colon polyps [22, 23].

The information currently available regarding dietary or nutritional supplements and aspirin use among the Amish community is scarce and largely based upon anecdotal reports. A population-based approach provides the opportunity to determine the amount and type of supplements being used and to assess differences among Amish and non-Amish adults. The objective of this study was to examine nutritional and dietary supplement use among Amish and non-Amish adults by documenting the use of daily aspirin, supplements, types and doses of supplements being used, most common herbals reported, and reasons why they were used. This information will help to explain the health-related practices that may be a contributing factor to the lower cancer incidence rates among this specific population group.

METHODS

Sample population

This cross-sectional study consisted of a random sample of Amish and non-Amish adults living in the Holmes County, Ohio Appalachia region. The Amish were derived from the sample used in a study by Westman and colleagues [4], and obtained from the 1996 Holmes County Amish Directory. The random sample of the non-Amish adults came from enumerating residents who owned land in Holmes County region. Nutritional and dietary supplement intake was one behavioral component collected as part of a larger study that focused on behavioral and lifestyle factors among Amish compared to non-Amish adults to understand factors that may be contributing to the lower cancer incidence rates among the Amish. Detailed recruitment and interviewing methods for the main study have been described previously [24], and are briefly described below.

The cancer-related behavioral study was introduced in a mailed letter to the random samples of Amish and non-Amish homes. After the letters were mailed, a member of the research team personally visited each residence to request participation in the study and arrange an interview time.

Interviews

The questionnaires were developed with input from members of the Amish community to assure that information was being asked in a culturally appropriate manner. The questionnaires were pilot tested and the interview took approximately 1.5 to 2 hours. Information obtained during the interviews focused on demographic characteristics and a variety of questions focusing on cancer-related behaviors (diet, physical activity, etc.). Usually, the eldest male and female from a household were interviewed at the same time during the study.

The supplement component of the main survey asked about the use of 23 specific supplements including: multivitamins, vitamin A, vitamin C, vitamin E, beta carotene, iron, aspirin (taken on a regular basis), zinc, calcium, lycopene, folic acid, fish oil or omega-3 fatty acids, fiber supplements, green tea extract, soy supplements, aloe vera, *Echinacea purpurea*, evening primrose oil, garlic, ginkgo biloba, ginseng, saw palmetto (males) and St. John's wort. If a participant reported using a supplement, the dose, frequency, and reason for use were obtained. All reasons for taking a supplement were classified into categories that emerged from the data. Participants were also asked if they took any other supplement that was not specifically asked during the interview. At that point, other nutritional or dietary supplements (name, ingredients, amount, frequency, and reason) were recorded. If available, the supplement's bottle and label were examined to determine the contents of the supplements and the company website was recorded as a resource for further information.

Supplements were initially classified according to the categories used by The National Health and Nutrition Examination Survey (NHANES) [25]. NHANES categorized supplements into five main categories: 1) vitamins; 2) minerals; 3) herbals; 4) other; and 5) amino acids. Based on the types of supplements used by the Amish and the non-Amish in this study, a disproportionate number of supplements would have been categorized as "other" using the NHANES categorization scheme. Therefore, to be more descriptive, we classified supplements into the following categories: 1) single vitamins; 2) single minerals; 3) vitamin and/or mineral mix; 4) protein/amino acids (AA) with or without vitamins/minerals; 5) fatty acid, fish oil, omega 3-fatty acids (FA); 6) fiber; 7) bone/joint health; 8) Coenzyme Q10 (CoQ10); 9) herbals; 10) enzymes; 11) bee-related products; and 12) other.

The bone/joint health category included any supplement containing glucosamine, chondroitin, Methylsulfonylmethane (MSM), or any combination of these as well as any product that was marketed for bone/joint health. The herbal category included a combination of both single herbs and herbal mixtures. CoQ10 and bee-related products were common enough to warrant their own categories. The “other” category included supplements that could not be categorized into the other eleven groups. We thought that the additional categories were important to accurately describe supplement use among this population.

Additional factors measured during the interviews and relevant to this study were physical activity (metabolic equivalents (METs) calculated from the International Physical Activity Questionnaire short version) [26] and body mass index calculated from measured height and weight of the participants. The Ohio State University’s Institutional Review Board approved this study.

Data Analysis

Intake of each nutritional supplement was examined as a binary variable; the respondent either used or did not use each nutritional supplement. Descriptive statistics were used to examine the frequency of supplement use among this sample. Multiple logistic regression was used to test for the difference between the Amish and non-Amish with respect to supplement use, controlling for age and physical activity. Age and physical activity were chosen as potential confounders because these variables differed between the Amish and non-Amish samples and may have an effect on nutritional supplement use [27, 28].

The supplement use variables were measured at the individual level, and therefore all analyses were stratified by gender to avoid any issues with correlations between individuals within the same household. All analyses were performed using SAS version 9.0 software and procedures (SAS Institute Inc., Cary, N.C.).

RESULTS

The response rate among the Amish was 67%, while the response rate among the non-Amish was 23%. We were able to contact residents from all Amish homes. The agreement rate, which is the percentage of individuals who completed the interview among households contacted, was 37% for the non-Amish. Face-to-face interviews were conducted with 134 Amish adults (men= 62 and women=72) by trained interviewers during the summer of 2004. During the following summer, a similar questionnaire was used during the interviews of 154 non-Amish adults (men=64 and women=90). Demographic characteristics for the participants are listed in Table 1. Amish men and women were more often married and had less formal education compared to non-Amish participants. Additionally, Amish adults reported more physical activity than non-Amish adults.

Male Participants

The number of daily supplements reported among the male participants ranged from none to 16 supplements reported by one Amish man. The mean daily number of supplements consumed and the percent of Amish and non-Amish males who reported taking each type of supplement are shown in Table 2, along with the p-values from the multiple logistic regression. The Amish (82%) males showed a significantly greater ($p<0.01$) consumption of at least one supplement per day compared to the non-Amish (64%). The mean number of daily supplements taken by Amish males was 3.52 (± 3.7) compared to a mean of 1.38 (± 1.3) supplements by non-Amish males. The Amish males reported taking significantly ($p<0.01$) more vitamins (44% vs. 22%), minerals (44% vs. 19%), and herbals (55% vs. 17%) compared to the non-Amish men. The most common vitamin supplement taken was vitamin

C (40% of Amish and 11% of non-Amish males), while calcium (37% of Amish and 17% of non-Amish males) was the mineral most often reported. The most commonly reported herbals among the men are shown in Figure 1, with *Echinacea purpurea* (24% of Amish vs. none of the non-Amish males) being the most frequently used. Additionally, Amish males reported taking significantly ($p<0.05$) less aspirin on a regular basis than the non-Amish males (11% compared to 39%).

The main reasons the Amish and non-Amish men reported taking the supplements were similar. Males reported consuming saw palmetto for prostate health and consuming fiber supplements for bowel health. Amish males report consuming a multivitamin, vitamin C, iron, aloe vera, soy, *Echinacea purpurea*, and garlic for a variety of non-specific health reasons (improving immune system, boosting energy, preventing fatigue, and to feel good).

Female Participants

Similar to the males, Amish females report consuming more supplements than non-Amish females. The number of daily supplements reported among the female participants ranged from none to 29 supplements reported by one Amish woman.

There was a significant ($p<0.05$) difference between the percentage of Amish (90%) and non-Amish (79%) females reporting taking at least one type of supplement. The mean number of daily supplements taken per day by Amish females was 5.21 (± 4.3) compared to a mean of 2.99 (± 3.2) supplements by the non-Amish females.

Amish females reported consuming significantly ($p<0.05$) more vitamins (65% vs. 40%), minerals (60% vs. 46%), and herbals (71% vs. 23%) compared to non-Amish females. The most common vitamin supplement taken was vitamin C (54% Amish and 23% non-Amish), while calcium (49% Amish and 44% non-Amish) was the mineral most often reported. The most commonly reported herbals among the women are shown in Figure 2, with *Echinacea purpurea* (38% Amish and 6% non-Amish) being the most frequently used. Similar to males, the Amish females (7%) reported consuming significantly ($p<0.05$) less aspirin on a regular basis than the non-Amish females (24%).

The main reasons for taking the various supplements were similar among the Amish and non-Amish females. For example, a large percent of the Amish and non-Amish women reported that they consume multivitamins, vitamins A and C, iron, and *Echinacea purpurea* to improve their health (including improving their immune system, boosting energy level, preventing fatigue, and to feel good). The Amish women reported taking soy, garlic, and beta carotene for general health reasons.

DISCUSSION

Our objective was to examine daily aspirin use, and the consumption of nutritional and dietary supplements among the Amish and the non-Amish living in rural Ohio Appalachia. This effort, combined with studies of cancer screening, tobacco use, dietary patterns and food processing may allow us to assess the relative contribution of these components to the reported lower cancer incidence rates among the Ohio Amish [4, 24, 29]. Nutritional and dietary supplement use was significantly higher among Amish males and females compared to the non-Amish adults. The Amish adults reported consuming a significantly greater number of products containing vitamins, minerals, fiber supplements (women only), herbals, and enzymes (women only). The results of this study support anecdotal observations that supplement use, particularly herbals, would be higher among Amish adults compared to non-Amish adults.

For all categories analyzed in this study, only regular aspirin use was reported by the non-Amish adults more than the Amish adults. Aspirin taken on a regular basis has been shown to have a protective effect on the risk for various types of cancer and cardiovascular disease [19–22]. Although aspirin is not a nutritional supplement, low-dose aspirin is used as an over-the-counter medication and preventive agent for many of the same reasons as other dietary and nutritional supplements.

Although there were significant differences among the two groups in this study, supplement use was higher in both the Amish and non-Amish participants when compared to current estimates reported for U.S. adults. For example, a recent study reports that approximately 52% of U.S. adults and 47% of older adults in a rural population used one or more nutritional supplements [8, 30]. We reported the prevalence of any kind of supplement as 82% and 64% among Amish and non-Amish males, respectively, and 90% and 79% among Amish and non-Amish females, respectively. The discrepancies may be unique to the populations being studied, the continued increase in use over time, under-reporting in past surveys, coupled with the greater effort taken in our study to precisely assess consumption of supplements, particularly the use of herbals which has not been the focus of past research.

Similarly, data from a national survey suggests that 35% of U.S. residents reported regular use of a multivitamin-multimineral nutritional supplement [28]. Reported use of a vitamin and/or mineral mix in this study was higher among Amish (39% of males and 56% of females) and non-Amish (48% of males and 57% females) participants. Results from this study are consistent with the high intake of supplements observed in a sample of males participating in a cancer prevention trial; 85% of these males reported regular use of at least one nutritional supplement [31]. Additionally, the results of this study are consistent with previous assessments of the Amish community [32].

Herbal supplement use was high among Amish males and females compared to a national survey completed in 2002 [18]. The herbs consumed most often in the national survey were *Echinacea purpurea* (41%), ginseng (25%), ginkgo biloba (22%), and garlic (20%). Of those who used herbs, 57% used the supplements for treatment of a specific health ailment [15]; the most common reason for taking herbs was for a head or chest cold (30%) [18]. Our study reports a wide range of herbal product consumption among the Amish, including *Echinacea purpurea*, ginkgo biloba, garlic, aloe vera, saw palmetto (men only), and hawthorn berries (men only).

These findings from the Ohio Amish are supported by a convenience sample of Amish individuals in Iowa (n=41) indicating that all of the respondents had knowledge of folk remedies and 95% of those sampled reported using these practices [33]. In that study, minor trauma, often associated with farming, was the condition most treated by folk remedies (43%). The application of aloe vera was reported to be used often for cuts, insect bites, and bee stings. Respiratory problems were most frequently treated by poho oil (made from peppermint oil) and several teas.

The American Institute for Cancer Research (AICR) guidelines, which were developed based on the current scientific literature, do not recommend nutritional supplements for cancer prevention in the general population, and state that nutritional needs to reduce risk of cancer should be met through diet alone [5]. Few nutritional supplements have been studied in human trials for cancer prevention, and the lack of such evidence, in spite of strong hypotheses from observational epidemiology and experimental studies leaves the public in a quandary regarding dietary and nutritional supplements. In addition, the nutritional epidemiology is complex, due to the fact that overall dietary patterns and multiple bioactive agents acting in concert may be responsible for the hypothesized benefits. It is thought the

Amish use herbal remedies because they are considered natural, a concept appealing to their cultural norms; however, this does not ensure safety [33]. The evidence supporting consumption of nutritional and herbal supplements is often misunderstood [30]. Research indicates that approximately 66% of herbals are marketed and used contrary to scientific evidence-based indications (except for *Echinacea purpurea* and ginseng) [15]. For example, the evidence-based research suggest the use of garlic to lower serum cholesterol, yet only 27% reported using it for this reason. Among those who report garlic use in our study, the most common justification is for immune health and cold prevention. Although not currently endorsed by expert organizations, many individuals use nutritional and dietary supplements and therefore research focusing upon consumption and outcomes, particularly with regards to safety and health outcomes, remains important.

Strengths of this study include that questionnaires were developed with input from Amish community members and the data were collected by trained interviewers. Limitations of the study include that it is cross-sectional, the modest sample size, and the low response rates among the non-Amish adults. The cross-sectional study design and limited number makes it impossible to examine associations between supplement use and cancer. Among the Amish, refusal to participate in the study was often due to the lack of time. In contrast, the non-Amish were often not home when a member of the research team stopped at the house to arrange an interview. We attempted to reach each household by stopping in person up to three times. Typical response rates hoped for in epidemiological studies are often around 60% [34, 35], but may vary greatly depending on the population.

The results of this study are not expected to definitively point to any nutritional or dietary supplement-cancer association that may be responsible for the overall lower cancer rates that have been found among the Ohio Amish, but rather help us define various hypotheses that will be examined in additional studies. However, we clearly document that the Amish community provides a unique pattern of supplement consumption that may impact the risk of certain cancers. Interestingly, the lower consumption of daily aspirin among the Amish may either reflect the differing social and cultural norms or indicate that health providers serving this community may be less supportive of the growing body of evidence linking daily aspirin use among aging men and women with a lower risk of cardiovascular disease and certain cancers. The data regarding supplement consumption, including complementary and alternative medication use, complement our documentation of cancer screening behaviors, tobacco use, food and nutrient consumption patterns, food processing techniques, exercise and lifestyle, and access to health care providers in our efforts to understand the differing rates for specific cancers among the Amish compared to non-Amish in the same geographic area [24, 29]. Studies of the Amish and their unique culture and lifestyle may be informative regarding the etiology of various cancers and support novel hypotheses relevant to prevention strategies for future investigation.

In conclusion, the present study is the most comprehensive examination of aspirin use, and dietary and nutritional supplement consumption among Amish and non-Amish adults living in the same rural geographic area. This information is important for healthcare providers who take care of individuals living in rural regions of the country and for individuals planning health promotion interventions. Future studies of nutrition and health practices should query about nutritional and dietary supplement use to obtain a comprehensive understanding of intake and potential impact on health and disease.

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References

1. Donnermeyer, JF.; Kreps, GM.; Kreps, MW. A Practical Approach to Daily Life from the Amish Community. Sugarcreek, Ohio: Carlisle Press; 1999. Lessons for Living.
2. Hostetler, JA. Amish Society. Vol. 1993. Baltimore: The Johns Hopkins University Press; 1993.
3. Kraybill, DB. The Riddle of Amish Culture. 2. Baltimore: The Johns Hopkins University Press; 2001.
4. Westman JA, Ferketich AK, Kauffman RM, MacEachern SN, Wilkins JR 3rd, Wilcox PP, et al. Low cancer incidence rates in Ohio Amish. *Cancer Causes Control*. 2010; 21:69–75. [PubMed: 19779840]
5. American Institute for Cancer Research. Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective. 2007. <http://www.dietandcancerreport.org/>
6. Brewer JA, Bonalumi NM. Health care beliefs and practices among the Pennsylvania Amish. *J Emerg Nurs*. 1995; 21:494–497. [PubMed: 8709456]
7. von Gruenigen VE, Showalter AL, Gil KM, Frasure HE, Hopkins MP, Jenison EL. Complementary and alternative medicine use in the Amish. *Complement Ther Med*. 2001; 9:232–233. [PubMed: 12184351]
8. Gahche, J.; Bailey, R.; Burt, V.; Hughes, J.; Yetley, E., et al. NCHS data brief. National Center for Health Statistics; Hyattsville, MD: 2011. Dietary supplement use among U.S. adults has increased since NHANES III (1988–1994).
9. Huang HY, Caballero B, Chang S, Alberg AJ, Semba RD, et al. The efficacy and safety of multivitamin and mineral supplement use to prevent cancer and chronic disease in adults: a systematic review for a National Institutes of Health state-of-the-science conference. *Ann Intern Med*. 2006; 145:372–385. [PubMed: 16880453]
10. Richardson MA, Sanders T, Palmer JL, Greisinger A, Singletary SE. Complementary/alternative medicine use in a comprehensive cancer center and the implications for oncology. *J Clin Oncol*. 2000; 18:2505–2514. [PubMed: 10893280]
11. Vohra S, Cohen MH. Ethics of complementary and alternative medicine use in children. *Pediatr Clin North Am*. 2007; 54:875–884. [PubMed: 18061781]
12. Key TJ, Schatzkin A, Willett WC, Allen NE, Spencer EA, et al. Diet, nutrition and the prevention of cancer. *Public Health Nutr*. 2004; 7:187–200. [PubMed: 14972060]
13. Fairfield K, Stampfer M. Vitamin and mineral supplements for cancer prevention: issues and evidence. *Am J Clin Nutr*. 2007; 85:289S–292S. [PubMed: 17209212]
14. Velicer CM, Ulrich CM. Vitamin and mineral supplement use among US adults after cancer diagnosis: a systematic review. *J Clin Oncol*. 2008; 26:665–673. [PubMed: 18235127]
15. Bardia A, Thompson CA, Podratz KC, Okuno SH. Use of herbs among adults based on evidence-based indications: findings from the National Health Interview Survey. *Mayo Clin Proc*. 2007; 82:561–566. [PubMed: 17493422]
16. Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, et al. Trends in alternative medicine use in the United States, 1990–1997: results of a follow-up national survey. *JAMA*. 1998; 280:1569–1575. [PubMed: 9820257]
17. Kelly JP, Kaufman DW, Kelley K, Rosenberg L, Anderson TE, et al. Recent trends in use of herbal and other natural products. *Arch Intern Med*. 2005; 165:281–286. [PubMed: 15710790]
18. Gardiner P, Kemper KJ, Legedza A, Phillips RS. Factors associated with herbal therapy use by adults in the United States. *Altern Ther Health Med*. 2007; 13:22–29. [PubMed: 17405675]
19. Wolff T, Miller T, Ko S. Aspirin for the primary prevention of cardiovascular events: an update of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2009; 150:405–410. [PubMed: 19293073]
20. Chan AT, Giovannucci EL, Meyerhardt JA, Schernhammer ES, Curhan GC, et al. Long-term use of aspirin and nonsteroidal anti-inflammatory drugs and risk of colorectal cancer. *JAMA*. 2005; 294:914–923. [PubMed: 16118381]
21. Flossmann E, Rothwell PM. Effect of aspirin on long-term risk of colorectal cancer: consistent evidence from randomised and observational studies. *Lancet*. 2007; 369:1603–1613. [PubMed: 17499602]

22. Baron JA, Cole BF, Sandler RS, Haile RW, Ahnen D, et al. A randomized trial of aspirin to prevent colorectal adenomas. *N Engl J Med.* 2003; 348:891–899. [PubMed: 12621133]
23. Sandler RS, Halabi S, Baron JA, Budinger S, Paskett E, et al. A randomized trial of aspirin to prevent colorectal adenomas in patients with previous colorectal cancer. *N Engl J Med.* 2003; 348:883–890. [PubMed: 12621132]
24. Ferketich AK, Katz ML, Kauffman RM, Paskett ED, Lemeshow S, et al. Tobacco use among the Amish in Holmes County, Ohio. *J Rural Health.* 2008; 24:84–90. [PubMed: 18257875]
25. National Health and Nutrition Examination Survey (NHANES). NHANES 2003–2004. Documentation, Codebook, and Frequencies. Dietary Supplement Questionnaire Data. 2007. <http://www.cdc.gov/nchs/nhanes.htm>
26. International Physical Activity Questionnaire (IPAQ), short format. 2002. <https://sites.google.com/site/theipaq/>
27. Radimer K, Bindewald B, Hughes J, Ervin B, Swanson C, et al. Dietary supplement use by US adults: data from the National Health and Nutrition Examination Survey, 1999–2000. *Am J Epidemiol.* 2004; 160:339–349. [PubMed: 15286019]
28. Rock CL. Multivitamin-multimineral supplements: who uses them? *Am J Clin Nutr.* 2007; 85:277S–279S. [PubMed: 17209209]
29. Cuyun Carter GB, Katz ML, Ferketich AK, Clinton SK, Grainger EM, et al. Dietary intake, food processing, and cooking methods among Amish and non-Amish adults living in Ohio Appalachia: Relevance to nutritional risk factors for cancer. *Nutrition and Cancer: An International Journal.* In Press.
30. Marinac JS, Buchinger CL, Godfrey LA, Wooten JM, Sun C, Willsie SK. Herbal products and dietary supplements: a survey of use, attitudes, and knowledge among older adults. *J Am Osteopath Assoc.* 2007; 107:13–20. [PubMed: 17299031]
31. Grainger EM, Kim HS, Monk JP, Lemeshow SA, Gong M, et al. Consumption of dietary supplements and over-the-counter and prescription medications in men participating in the Prostate Cancer Prevention Trial at an academic center. *Urol Oncol.* 2008; 26:125–132. [PubMed: 18312929]
32. Levinson RM, Fuchs JA, Stoddard RR, Jones DH, Mullet M. Behavioral risk factors in an Amish community. *Am J Prev Med.* 1989; 5:150–156. [PubMed: 2742796]
33. Gerdner LA, Tripp-Reimer T, Sorofman B. Health beliefs and practices: The Iowa old order Amish. *Journal of Multicultural Nursing and Health.* 2002; 8:65–71.
34. Asch DA, Jedrzejewski MK, Christakis NA. Response rates to mail surveys published in medical journals. *J Clin Epidemiol.* 1997; 50:1129–1136. [PubMed: 9368521]
35. Rogers A, Murtaugh MA, Edwards S, Slattery ML. Contacting controls: are we working harder for similar response rates, and does it make a difference? *Am J Epidemiol.* 2004; 160:85–90. [PubMed: 15229121]

Figure 1.
Common herbals taken by Amish and non-Amish men

Figure 2.
Common herbals taken by Amish and non-Amish women

Table 1

Demographic characteristics among Amish and non-Amish participants by gender.

	Males		Females	
	Amish (n=58)	Non-Amish (n=64)	Amish (n=66)	Non-Amish (n=90)
Age (years): Mean (SD)	52.4 (13.8)	58.8 (15.9) *	52.9 (15.1)	56.8 (15.3)
Education				
< High School	98.4%	12.5% **	100%	12.2% **
High School	1.6%	46.9%	0%	52.2%
> High School	0%	40.6%	0%	35.6%
Marital Status				
Never Married	3.2%	1.6%	0%	2.2%
Married	95.2%	82.5% **	93.1%	74.2% **
Divorced/Separated	0%	14.3%	0%	9.0%
Widowed	1.6%	1.6%	6.9%	14.6%
Physical Activity (METS) Mean (SD)	8737 (6123)	5176 (5290) **	5059 (4731)	3628 (3901) *
Body Mass Index: Mean (SD)	27.6 (4.6)	29.4 (7.0)	30.1 (6.0)	29.2 (6.0)

SD=standard deviation; METS=metabolic equivalents

*
p<0.05;**
p<0.01

Table 2

Nutritional or dietary supplements and aspirin use among Amish and non-Amish males

	Amish Males (n = 62)		Non-Amish Males (n = 64)	
	Mean/# day (± SD)	%	Mean/# day (± SD)	%
Any supplement	3.52 (3.7)	82	1.38 (1.3)	64 **
Vitamins	0.61 (0.8)	44	0.23 (0.5)	22 **
Minerals	0.55 (0.7)	44	0.20 (0.4)	19 **
Vitamin and/or mineral mix	0.44 (0.6)	39	0.50 (0.5)	48
Protein/AA with or without vitamin/mineral	0	0	0	0
FA/Fish oil/omega-3 FA	0.11 (0.3)	12	0.09 (0.3)	9
Fiber	0.10 (0.4)	8	0.09 (0.3)	9
Bone/joint supplement	0.10 (0.4)	8	0.05 (0.2)	5
CoQ10	0.05 (0.2)	5	0	0
Herbals	1.42 (2.0)	55	0.17 (0.4)	17 ***
Enzymes	0	0	0	0
Bee related products	0.07 (0.3)	7	0.02 (0.1)	2
Other	0.08 (0.3)	7	0.02 (0.1)	2
Aspirin taken regularly	0.11 (0.3)	11	0.39 (0.5)	39 *

*
p<0.05;**
p<0.01;***
p<0.001; Adjusted for physical activity (metabolic equivalents) and age

Table 3

Nutritional or dietary supplements and aspirin use among Amish and non-Amish females

	Amish Females (n = 72)		Non-Amish Females (n = 90)	
	Mean/#day (± SD)	%	Mean/#day (± SD)	%
Any Supplement	5.21 (4.3)	90	2.99 (3.2)	79 *
Vitamins	1.01 (1.0)	65	0.70 (1.3)	40 **
Minerals	0.85 (0.9)	60	0.63 (0.9)	46 *
Vitamin and/or mineral mix	0.74 (0.9)	56	0.60 (0.6)	57
Protein/AA with or without vit/min	0.04 (0.2)	4	0.04 (0.2)	4
FA/Fish oil/omega- 3 FA	0.14 (0.3)	14	0.18 (0.4)	18
Fiber	0.18 (0.4)	18	0.06 (0.2)	6 **
Bone/joint health	0.17 (0.5)	13	0.28 (0.6)	20
CoQ10	0.03 (0.2)	3	0.06 (0.2)	6
Herbals	1.82 (1.9)	71	0.33 (0.8)	23 ***
Enzymes	0.10 (0.3)	10	0.01 (0.1)	1 *
Bee related products	0.03 (0.2)	3	0.01 (0.1)	1
Other	0.11 (0.36)	10	0.09 (0.4)	7
Aspirin taken regularly	0.07 (0.3)	7	0.24 (0.4)	24 *

*
p<0.05;**
p<0.01;***
p<0.001; Adjusted for physical activity (metabolic equivalents) and age