

# Who Are the Users of Vitamin–Mineral and Herbal Preparations among Community-Living Older Adults?\*

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## RÉSUMÉ

Il y a peu de renseignements sur les caractéristiques des personnes âgées qui utilisent les compléments. Nous avons recruté un échantillon de commodité de personnes âgées ( $n = 128$ ) vivant à l'intérieur de dix sites communautaires afin d'identifier les facteurs associés à l'utilisation de compléments (vitamines-minéraux et / ou préparations à base d'herbes). Les données des variables nutritives, des antécédents de santé et de l'utilisation de compléments, ont été recueillies par l'entremise d'un questionnaire-entrevue. Nous avons développé une échelle de propension à l'utilisation des compléments qui a été associée à la majoration de l'utilisation de compléments à base d'herbes. Au niveau de l'analyse bivariée, très peu de caractéristiques séparent les utilisateurs des non-utilisateurs. Toutefois, l'analyse multifactorielle révèle que l'échelle de propension et un indice de masse corporelle inférieur sont des facteurs reliés au nombre total de compléments utilisés. Lorsque l'on fait l'analyse des facteurs individuels de l'échelle au niveau bivarié, la disponibilité alimentaire, les croyances au sujet de la santé et le rôle davantage proactif à sa propre santé correspondent à l'augmentation de l'utilisation de compléments. Les premiers résultats suggèrent que les attitudes des personnes âgées envers les compléments peuvent contribuer à leur décision d'ajouter ces derniers à leur alimentation. Des recherches ultérieures sont nécessaires au sein d'une population canadienne de personnes âgées, choisi au hasard et diversifiée.

## ABSTRACT

Information on the characteristics of seniors who use supplements is lacking. A convenience sample of community-living seniors ( $n = 128$ ) was recruited from 10 sites to identify factors associated with supplement use (vitamin–mineral and/or herbal preparations). Data on nutritional variables, health history, and supplement use were collected with an interview-administered questionnaire. A *Propensity to Use Supplements* scale was developed and was associated with increased use of herbal supplements. At the bivariate level, few characteristics distinguished users and non-users. Multivariate modelling revealed the Propensity scale and a low Body Mass Index to be factors related to the total number of supplements used. When individual scale items were examined at the bivariate level, food supply concerns, health beliefs, and a proactive role in one's own health were associated with increased supplement use. Initial results suggest seniors' attitudes towards supplements may be an important factor contributing to their decision to use supplements. Further work is required in a more diverse, randomly selected, older Canadian population.

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## Introduction

Use of self-prescribed vitamin–mineral and herbal preparations among the older, community-dwelling population is increasing; vitamin–mineral use ranges from 26 to 80 per cent in this age group (Gray, Paganini-Hill, & Ross, 1983; Betts & Rezek, 1989; Payette & Gray-Donald, 1991; Bender, Levy, Schucker, & Yetley, 1992; Gray, Hanlon, Fillenbaum, Wall, & Bales, 1996; McKenzie & Keller, 2001) and herbal use is exploding (Angus Reid, 1997; Radimer, Subar, & Thompson, 2000; Eisenberg et al., 1998). Research on the characteristics of older adults in the United States who use vitamin–mineral preparations is extensive, yet inconclusive. In comparison, research on the use of complementary health care, such as herbal remedies, is in its infancy (Verhoef, Russell, & Love, 1994; Millar, 1997; Montbriand, 2000; Fries & Menzies, 2000).

Those who have specifically examined the characteristics of older (> 65 years of age) vitamin–mineral users have not found significant associations between use and age, gender, marital status (Ranno, Wardlaw, & Gieger, 1988; Oakland & Thomsen, 1990), living arrangements (Oakland & Thomsen), socio-economic status (Oakland & Thomsen; Ranno et al.), or health characteristics (Ranno et al.; Oakland & Thomsen; Stoehr, Gaguli, Seaberg, Echment, & Belle, 1997). Canadian research on the characteristics of supplement users in the senior population is limited. While factors such as health, exercise, education, and income may be noted in these studies, they have not been identified as factors associated with use (Donald, Tapan, Hargreaves, Thompson, Overton, Peterson, & Chao, 1992; Payette & Gray-Donald, 1991; Blais, Maiga, & Aboubacar, 1997; Radimer et al., 2000). Ultimately, it remains unclear which older adults are more likely to use vitamin–mineral and/or herbal preparations. With a national health care system, it is anticipated that factors associated with use by Canadian seniors may be different from those observed in the American population.

It is suspected that seniors who use a few or no supplements may be quite different in their attitudes towards supplements from those who use many. As supplements can react with each other and with traditional medications, it is important to be able to identify seniors who are potentially heavy users of supplements. Additionally, research needs to explore other covariates, outside of basic demographics, to determine the profile of these seniors. This study is an initial step towards understanding and characterizing these users. The purpose of this study was to examine the independent association among a wide variety of specific participant factors (e.g., perceived health status, nutritional status, attitudes towards supplement

use) and the number of vitamin–mineral and/or herbal preparations used. It is hypothesized that those seniors who use several supplements will be different from those who use few or none.

## Methods

### Study Participants

This study was a subsection of a larger study, involving the validation of a nutrition-risk screening tool (SCREEN© – Seniors In the Community Risk Evaluation for Eating and Nutrition) (Keller, McKenzie, & Goy, 2001). Individuals participating in the SCREEN study comprised the sample for this survey (Keller et al.). Ten different sites were involved in the project, including a day hospital and rehabilitation centre, three seniors' apartment buildings, four supportive housing units, and a seniors' recreation centre. Participants were recruited by supportive housing workers, mail, or advertisements, or during nutrition information seminars. Eligible individuals were those aged 55 years and over, living in the community, who consented to a comprehensive nutritional assessment. A sample of 137 older adults was recruited and 128 completed the study.

### Data Collection

As there has been little research on supplement use by seniors, three focus groups were held, to determine current supplement issues among community-living older adults. These focus groups helped to identify the important issues for inclusion in a structured, interviewer-administered questionnaire. Focus group questions were reviewed by nine dietitians for content validity and included current and past supplement use, purchase point, source of information, money spent on supplements, and reasons for use and non-use. Eight themes emerged from the focus group discussions, which led to the development of a 16-item *Propensity to Use Supplements* scale (Figure 1). These themes were food supply concerns, health beliefs, a perceived need for supplements, cost, a preference for "natural" treatments, confusion about what to use, a distrust of Western medicine, and a proactive role in one's own health. All eight themes were addressed at some point by the statements in the 16-item questionnaire, but the number of statements addressing a particular theme was based on the emphasis placed on that theme during the focus group discussions. This score was an attempt to try to reflect participant attitudes toward supplement use; a higher score would indicate a more positive attitude towards supplement use. To ensure content validity and understandability of items, the *Propensity to Use Supplements* questions were reviewed by nine dietitians and piloted with 11 seniors before actual use. Items were then reworded as necessary.

**Figure 1: Questions from the Propensity to Use Supplements scale<sup>a</sup>**

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- a. I am concerned about the quality of our food supply\*
  - b. The more expensive the supplement, the better it is
  - c. Consulting a physician or other health care professional is important before using vitamin–mineral supplements or herbal remedies
  - d. Most seniors do not need vitamin–mineral supplements
  - e. Products in a health food store or better for you than products from a regular grocery store
  - f. Herbs and food supplements are useful in preventing diseases
  - g. My body functions well without taking herbs and food supplements
  - h. Herbal remedies and food supplements are more natural than prescription medications
  - i. My health is like the weather, there is not much I can do about it\*
  - j. I would supplement with more supplements and herbal remedies if they were not so expensive
  - k. Today's health messages and supplement information are easy to read and understand
  - l. If I wasn't feeling well, I would experiment with different things to see if they made me feel better\*
  - m. If my doctor recommended that I take vitamin–mineral supplements or herbal remedies I would take them
  - n. If you eat a well-balanced diet, you do not need to use vitamin–mineral supplements
  - o. I have no one to talk to about whether I should use supplements or herbal remedies
  - p. I am in control of my own health\*
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\*  $p < 0.05$  in bivariate comparison with total supplement use

a Questions were answered *agree*, *disagree*, or *no opinion*

The interviewer-administered supplement-use questionnaire was included in a medical history interview. Because of the larger study's purpose, increasing use of supplements could be compared to other variables not typically collected in survey research. These variables included a detailed medical and nutritional history, anthropometric measurements, a diet history (7-day), and a dietitian's rating of nutritional status. The medical history included such factors as number and type of medications, surgeries, history of chronic disease, and other reported health problems. The nutritional history allowed for the examination of many of the risk factors associated with poor dietary intake, including special diets, dentition, use of nutritional supplements (e.g., Ensure), and grocery shopping/cooking independence. Knee height, weight and weight history, skin folds (subscapular, triceps), and circumference of the wrist, calf, and arm were the anthropometric measurements taken (Gibson, 1990). A diet history was completed by a trained dietitian at a separate appointment (Keller et al., 2001). The rating of nutritional status was based on the clinical judgement of the dietitian who completed the diet history and reviewed the medical/nutritional information. Further detail on the gathering of these data has been reported elsewhere (Keller et al.).

#### Statistical Analyses

SPSS (version 7.5) was used for all statistical analyses. Bivariate associations were examined between variables of interest and use of vitamin–mineral and/or herbal preparations, using *t*-test,  $\chi^2$ , and ANOVA. Cronbach's alpha ( $\alpha$ ) was also used, to perform an

internal reliability analysis of the Propensity to Use Supplements scale. Results produced a low Cronbach's alpha ( $\alpha = 0.30$ ), indicating poor internal reliability. Removing items based on low, corrected, item–total correlations ( $r < 0.20$ ) did not produce a more desirable  $\alpha$ ; for the remaining five items,  $\alpha = 0.34$  (a, e, j, l, o; see Figure 1) (Streiner & Norman, 1995).

Multiple linear regression modelling was used to determine if participant characteristics were associated with number of total supplements used (vitamin–mineral and/or herbal preparations). The entire Propensity to Use Supplements scale was used in this analysis, despite the low Cronbach's alpha. Additionally, a separate regression analysis was completed to determine those items on the Propensity to Use Supplements scale that best predicted increasing use of total supplements, as well as a bivariate analysis to determine individual items associated with use.

A conceptual model guided the process of initial variable selection for the full model to be assessed (Figure 2) (Kleinbaum, 1994). Sixteen variables were modelled, based on information from the literature and focus group discussions. Collinearity in the variables was not evident (tolerance levels  $> 0.1$ ). A generous *p* value ( $p < 0.25$ ) was used to ensure that all conceptual model variables modestly associated with the outcome were included in the initial full model (Kleinbaum). This strategy was used to reduce potential covariates, as the sample size was modest (Kleinbaum). A total of eight variables from the conceptual model fell below the designated significance level ( $p < 0.25$ ) using Pearson correlation and independent

*t*-tests (Figure 2). Included in these eight variables was the Propensity to Use Supplements score. The initial 8-variable full model had an  $R^2$  of 0.34 ( $F = 7.8$ ;  $p < 0.01$ ). Standard regression was then used to reduce the initial full model in a sequential fashion, removing the nuisance variables in a step-wise approach based on their significance level, to achieve the final model (Kleinbaum). A significant change in  $R^2$  was used to identify when a sequential selection of these variables should be stopped to maintain model stability.

**Figure 2: Conceptual model**

| VARIABLES  | → | ASSOCIATION | → | OUTCOME  |  |
|--|---|-------------|---|--|--|
| Demographic  |   |             |   |  |  |
| Age (yrs)*   |   |             |   | Total number of supplements used (vitamin–mineral supplements <i>and/or</i> herbal remedies) |  |
| Education (high school graduate or not)                    |   |             |   |  |  |
| Marital status (married/not married)                       |   |             |   |  |  |
| Gender (male/female)                                       |   |             |   |  |  |
| Living situation (alone/with others)                       |   |             |   |  |  |
| Health   |   |             |   |  |  |
| Self–Rated Health (good/excellent vs. fair/poor)*          |   |             |   |  |  |
| No. of of Medications*                                     |   |             |   |  |  |
| No. of of Reported Health Problems                         |   |             |   |  |  |
| Special Diet (yes/no)                                      |   |             |   |  |  |
| Weight Change (yes/no)*                                    |   |             |   |  |  |
| Dietitian’s Rating of Nutritional Risk (1–10)*             |   |             |   |  |  |
| BMI *  |   |             |   |  |  |
| Smoke (yes/no)   |   |             |   |  |  |
| Other  |   |             |   |  |  |
| Past Use of Vitamins and/or Minerals (yes/no)              |   |             |   |  |  |
| Money Spent on Groceries/Week (greater or less than \$50)* |   |             |   |  |  |
| Propensity to Use Supplements Score (1–16)*                |   |             |   |  |  |

\*  $p < 0.25$  was used to define the initial full model; original list of potential covariates taken from conceptual model

## Results

### Demographic Characteristics

A total of 128 community-living seniors participated in the study (73.4% female). The average age of the sample was 76.1 years ( $SD = 9.1$ , range: 50–94 yrs). “Widowed” was the most common marital status (43.7%) and 64.1 per cent of the participants lived alone. Two-thirds (66.7%) had obtained a high school diploma, and of these high school graduates, 46 per cent had completed some type of post-secondary program. Smokers were not common among the participants, with only 7 per cent currently smoking at the time of interview (Table 1). The majority reported a little (36%) or a great deal (29%) of difficulty in completing every day tasks, due to their health, although 83 per cent believed their health was good to excellent compared to that of others their own age. Subjects reported an average of 5.2 medical problems ( $SD = 2.8$ ) and took an average of 4.3 prescription medications ( $SD = 3.5$ ) and 1 over-the-counter medication ( $SD = 1.1$ ) (Table 2).

The majority of subjects (71%) self-rated their appetite as normal to good, and 29 per cent were following a special diet, with diabetic, low salt, low fat, vegetarian, and renal diets reported most frequently. Participants typically spent less than CAN\$50 per week on groceries, with the average reported expenditure between \$20 and \$30 per person per week. The majority of participants (60.9%) had maintained their weight in the past year. Using Body Mass Index (BMI) (Health and Welfare Canada, 1988) categories, the majority of participants were within the ideal body weight for height category ( $BMI = 20–25$ ; 37.5%) or were above this ideal range ( $BMI \geq 27$ ; 36.7%). The dietitians' rating of nutrition risk averaged 4.8 ( $SD = 2.4$ ) on a 10-point risk scale (1 = *low risk*, 10 = *high risk*), yet almost half of the participants (47.7%) were classified in the *moderate* (rating 5–7) or *high* (rating 8–10) nutrition risk categories.

### Supplement Use

More than three quarters of the participants (80%) used one or more vitamin–mineral and/or herbal preparation(s). Total supplement use averaged 2.4 ( $SD = 2.4$ , range: 1–13).

Individually, 72% were users of vitamin–minerals and 46% used herbal preparations. With a total of 17 different vitamin–mineral preparations reported, the most common were vitamin E, multivitamin–minerals, vitamin C, and calcium. The average number of individual vitamin–mineral preparations taken was 2.3 ( $SD = 1.6$ ), ranging from 1 through 8.

**Table 1: Selected demographic characteristics of the sample population by supplement use (n = 128)**

| Users                  | Vit-Min <sup>a</sup> Users<br>(n = 92) % | Vit-Min <sup>a</sup> Non-Users<br>(n = 36) % | Herb Users<br>(n = 59) % | Herb Non-Users<br>(n = 69) % |
|------------------------|--|--|--------------------------|------------------------------|
| Gender                 |  |  |                          |                              |
| Female                 | 73.9                                     | 72.2   | 72.9                     | 73.9                         |
| Marital Status         |  |  |                          |                              |
| Widowed                | 44.6                                     | 41.7   | 28.8**                   | 56.5                         |
| Married                | 30.4                                     | 38.9   | 39.0                     | 27.5                         |
| Divorced               | 17.4                                     | 16.7   | 27.1                     | 8.7                          |
| Single                 | 7.6                                      | 2.7  | 5.1                      | 7.2                          |
| Live Alone             | 67.4                                     | 55.6   | 64.4                     | 63.8                         |
| Education <sup>b</sup> |  |  |                          |                              |
| Less than High School  | 32.9                                     | 35.0   | 29.2                     | 37.6                         |
| High school            | 67.1                                     | 65.0   | 70.8                     | 63.4                         |
| Graduate               |  |  |                          |                              |
| Smoker                 | 8.3                                      | 6.5  | 5.1                      | 8.7                          |

\*\*( $p < 0.01$ ) between users and non-users

a Vitamin–mineral users

b Education information is based on  $n = 93$

**Table 2: Selected nutrition and health characteristics of the sample population by supplement use (n = 128).**

| Characteristic   | Vit.-Min. <sup>a</sup> Users<br>(n = 92) | Vit.-Min. <sup>a</sup> Non-Users<br>(n = 36) | Herb Users<br>(n = 59) | Herb Non-Users<br>(n = 69) |
|--|--|--|------------------------|----------------------------|
| BMI (%)  |  |  |                        |                            |
| < 20   | 7.6**                                    | 13.9   | 5.1                    | 13.0                       |
| 20–25  | 43.5                                     | 22.2   | 44.1                   | 31.9                       |
| 25.1–27  | 9.6                                      | 8.3  | 20.3                   | 13.0                       |
| > 27   | 29.3                                     | 55.6   | 30.5                   | 42.0                       |
| Weight Change  | 40.2                                     | 36.1   | 61.0                   | 61.0                       |
| % Ideal Body Weight                                      | 106.9                                    | 115.4  | 106.8**                | 111.9                      |
| Avg. No. of Reported Medical Problems                    | 5.2<br>[2.7]                             | 5.2<br>[2.9]                                 | 5.4<br>[2.9]           | 5.0<br>[2.6]               |
| Avg. No. of Prescription Medications                     | 4.4<br>[3.7]                             | 4.2<br>[2.7]                                 | 4.0<br>[3.4]           | 4.6<br>[3.5]               |
| No. of OTC <sup>b</sup> Medications                      | 1.1<br>[1.2]                             | 0.92<br>[0.94]                               | 1.2<br>[1.3]           | 0.88<br>[0.89]             |
| Money Spent on Groceries (%)                             |  |  |                        |                            |
| < \$50   | 63.0                                     | 65.0   | 59.0                   | 68.0                       |
| > \$50   | 37.0                                     | 35.0   | 41.0                   | 32.0                       |
| Special Diet (%)   | 25.0                                     | 39.0   | 25.0                   | 32.0                       |
| Past Vitamin–Mineral Use (%)                             | 20.0                                     | 39.0   | 25.0                   | 26.0                       |
| Average Nutrition Risk Rating                            | 4.6<br>[2.5]                             | 5.1<br>[2.3]                                 | 4.5<br>[2.4]           | 4.9<br>[2.5]               |
| Average Propensity to Use Supplements Score <sup>c</sup> | 8.4<br>[2.6]                             | 6.6<br>[2.2]                                 | 9.3*<br>[2.4]          | 6.6<br>[2.0]               |

\* ( $p < 0.05$ ) between users and non-users; \*\*( $p < 0.01$ ) between users and non-users

a Vitamin–mineral users

b OTC = Over the Counter

c Range 2–14, maximum score possible: 16

Of the 26 herbs reported, herbal teas, garlic pills, Echinacea, and cod liver oil were the most prevalent (McKenzie & Keller, 2001). Herbal teas were classified under herbal preparations, based on their ingredient list (e.g., chamomile, dandelion, rosehip), as was done previously in the NHANES III investigation (Radimer et al., 2000). On average, participants used 1.7 herbal preparations ( $SD = 1.13$ , range: 1–6).

Characteristics of the users varied, depending on the supplement category (vitamin–mineral or herbal preparation), but few were found to be significant in the bivariate analyses (Tables 1 and 2). Vitamin–mineral users had a significantly lower BMI ( $\chi^2 = 11.0$ ,  $p = 0.01$ ) than non-users. Herbal remedy users were significantly younger ( $t = 2.3$ ;  $p < 0.05$ ) were more likely to be married ( $\chi^2 = 13.4$ ,  $p < 0.01$ ), and were likely to weigh a lower percentage of ideal body weight (current weight/ideal weight  $\times 100$ ) ( $F = 7.7$ ,  $p < 0.01$ ). Participants who used herbal remedies had a higher Propensity to Use Supplements score than non-users of these remedies ( $F = 4.0$ ,  $p < 0.05$ ), unlike vitamin–mineral users, whose score was higher, yet not significantly different.

During model development, a total of eight variables from the conceptual model (Figure 2) fell below the designated significance level ( $p < 0.25$ ). The following are the variables, their coefficients, and their signifi-

cance values: age ( $-0.16$ ,  $p = 0.08$ ); self-rated health ( $5.1$ ,  $p = 0.03$ ); number of medications ( $-0.19$ ,  $p = 0.04$ ); weight change ( $2.1$ ,  $p = 0.15$ ); dietitian rating of nutrition risk ( $-0.12$ ,  $p = 0.19$ ); BMI ( $-0.16$ ,  $p = 0.08$ ); money spent on groceries ( $5.4$ ,  $p = 0.02$ ); and Propensity to Use Supplements Scale ( $0.54$ ,  $p = 0.00$ ).

Multivariate statistics produced a final significant model, which revealed two factors to be independently and significantly associated with the increasing use of supplements ( $F = 22.6$ ,  $p < 0.01$ ,  $R^2 = 0.34$ ); a higher Propensity to Use Supplements score ( $\beta = 0.54$ ) and a lower BMI ( $\beta = -0.15$ ). With removal of each non-significant covariate individually, the final reduced model contained only these two variables and retained an  $R^2 = 0.34$ . Further examination of the 16 items within the Propensity to Use Supplements scale with regression analysis identified only 1 item, “I have no one to talk to about whether I should use supplements or herbal remedies”, to be predictive of increasing supplement use. However, bivariate analyses revealed four questions to be significantly associated with increasing supplement use (Figure 1). These items reflected three of the eight themes found within the scale and included food supply safety concerns, health beliefs, and a proactive role in one’s own health.

**Table 3. Initial and final model covariates describing total supplement use in older adults ( $n = 128$ ).**

| Covariates                          | Initial Full Model <sup>a</sup><br>( $R^2 = 0.34$ , $F = 7.8$ ) |       |       | Reduced Final Model <sup>a</sup><br>( $R^2 = 0.34$ , $F = 22.6$ ) |       |        |
|-------------------------------------|---|-------|-------|---|-------|--------|
|                                     | $\beta$   | CI    |       | $\beta$   | CI    |        |
|                                     |   | Lower | Upper |   | Lower | Upper  |
| Age                                 | -0.10   | -3.7  | 6.83  | —   | —     | —      |
| Perceived Health Status             | 0.11  | -0.48 | 1.98  | —   | —     | —      |
| No. of Medications                  | -0.11   | -0.22 | 0.06  | —   | —     | —      |
| Weight Change                       | 0.03  | -0.72 | 1.04  | —   | —     | —      |
| Dietitian Rating of Nutrition Risk  | 0.05  | -0.15 | 0.26  | —   | —     | —      |
| BMI                                 | -0.13   | -0.15 | 0.16  | -0.15*  | -0.14 | -0.003 |
| Money Spent on Groceries            | 0.01  | -0.81 | 0.92  | —   | —     | —      |
| Propensity to Use Supplements Score | 0.52**  | 0.36  | 0.70  | 0.54**  | 0.38  | 0.65   |

\*  $p < 0.05$ ; \*\*  $p < 0.01$

a collinearity was not evident

## Discussion

### *Vitamin–Mineral Users*

Previous work has produced conflicting results when describing seniors who use vitamin–mineral preparations. Bivariate analysis in the present study found that most demographic, health, and socio-economic characteristics were not useful in differentiating vitamin–mineral supplement use from non-use (Tables 1 and 2). BMI was the exception: vitamin–mineral users had the highest proportion of those within the BMI of 20 to 25, whereas non-users were more likely to be overweight or underweight.

Previous work has also found a relationship between BMI and vitamin–mineral use. Data from a population-based cohort study of 2,152 middle- to older-age American adults found that supplement use was more prevalent among individuals with a lower BMI (Lyle, Mares-Perlman, Klein, & Greger, 1998). In fact, the use of vitamin and minerals by those with a lower body weight has been interpreted as beneficial, especially if those individuals are not getting adequate nutrition from dietary sources (Gray et al., 1996). However, the majority of users in this study had a BMI ranging from 20 to 25, which is considered the “ideal” and is associated, for most people, with the lowest risk of illness (Health and Welfare Canada, 1988). Also, participants from the present study were unlikely to have low nutrient intakes (McKenzie, 1999).

### *Herbal Remedy Users*

Population surveys investigating the prevalence of complementary and alternative medicine (CAM) reveal CAM users to be typically white, female, affluent, middle-aged, and well-educated (Verhoef et al., 1994; Blais et al., 1997; Millar 1997). Yet specific examination of herbal remedy users is required and the characteristics associated with being an herbal remedy user are unknown. Research among low-income American populations has shown that this low-income group uses herbs, yet there were no significant relationships relating herb use to gender, income, education level, or race (Planta, Gundersen, & Petitt, 2000; Wolsko et al., 2000). To date, limited research has focused specifically on older Canadian adults and their use of herbal preparations. In the present study, in the bivariate analyses, there were few characteristics where herb users varied significantly from non-users; being younger, being married, and weighing a lower percentage of ideal body weight characterized herb users. NHANES III, in the United States, also identified herb users as being younger (55–74 years) (Radimer et al., 2000).

Ideal body weight (IBW) has not been examined in previous supplement literature, but this association

may suggest that seniors who are more “health conscious” in terms of maintaining an ideal body weight also are more likely to use herbal preparations. While, in the present study, users of herbal preparations were at a lower percentage IBW than non-users, generalizations should be made with caution. In the present study, further examination of other weight variables, such as weight change and BMI, revealed no differences between users and non-users. Contrary to popular beliefs, the majority of herbal remedy users are not “naturalists” who are against synthetic chemicals or are dissatisfied with traditional medicine but are people who incorporate herbal therapies into their total health care. This seems consistent with the findings of Foster, Philips, Hamel, & Eisenberg (2000), who found that of the users of alternative therapies aged 65 years and over, 95% had seen a physician in the past year.

### *Propensity to Use Supplements Scale*

Scaling analyses suggest that this tool requires further development, although elimination of items due to low item–total correlation did not improve results, a fact which suggests that multiple attributes of “use” are being measured, rather than a uni-dimensional scale. Despite the lack of internal consistency in this 16-item scale, it demonstrated validity, in that users of herbal remedies had significantly higher Propensity to Use Supplements scores than non-users. Additionally, users of vitamin–mineral preparations also had higher scores (8.4 vs. 6.6) than non-users, although this difference was not significant. Key questions may be those found to be significantly associated with total supplement use in the bivariate analyses. The literature suggests that there is some basis for the Propensity to Use Supplements scale: concern with the safety of the food supply, being proactive about one’s health, and seeing health from a holistic perspective have been reported in the literature describing older adult users of supplements (Ipsos-Reid, 2001; Powell, 2002; Astin, 1998; Kaptchuk & Eisenberg, 1998; Rajendran, Thompson, & Reich, 2001; Cassileth, 1999).

At present there is no clear profile of those seniors who use several vitamin–mineral or herbal preparations. Due to the small sample size in this study, only eight variables identified in the conceptual framework were multivariately modelled in an attempt to identify this profile. This is the first known report to model a variety of nutrition risk factors, in addition to demographic factor, on vitamin–mineral and/or herbal remedy use in older Canadian adults. The two retained variables, lower BMI and higher Propensity to Use Supplements score, suggest that high users of supplements may be health conscious and proactive about their health.

Multivariate analyses have been completed by both Gray et al. (1996) and Astin (1998) yet were different, in that their sole focus was on either vitamin–mineral preparations or alternative health care. Examining predictors of vitamin–mineral use among study participants aged 65 years and older in the United States, Gray et al. (1996) identified users as white women, with a higher education, a lower BMI, greater use of prescription drugs, frequent use of a health care provider, and supplemental health insurance. However, BMI was the only variable consistent with the present study findings. Greater use of prescription drugs and health care providers in Gray et al.'s work may indicate access issues that are different between Canada and the United States.

Astin (1998) used multiple regression analyses to develop a theoretical model to account for the increasing use of alternative forms of health care. Satisfaction, need, and philosophical values were predictors of alternative health care. This study identified "health philosophy" as an important concept in the use of alternative care and paralleled the Propensity to Use Supplements concept of the present study. Further examination of the 16 items within the actual Propensity scale revealed that only 1 question was significant in the multiple regression analysis. This 1 question suggests that seniors who have no one they trust to talk to about supplements are more likely to use these products. This suggests a potential gap in traditional health care: seniors are interested in and concerned about the use of supplements and are likely to try them. Further work, perhaps qualitative, should explore the decision-making process of seniors when choosing to use supplements.

Although this study provides some interesting insights into supplement use by older adults, it has limitations. As a small convenience sample was used, generalizations to other seniors are not possible. As well, despite seniors having been recruited from 10 diverse settings, there was some homogeneity in supplement use, as almost three quarters were taking some kind of supplement. This homogeneity led to decisions about defining the dependent variable (total supplement use as compared to the use/non-use described in previous work) and may have influenced the multivariate model results. Caution is warranted when interpreting this finding, as statistical models are limited by the sample on which they are based and the variables selected for modelling. However, this study provided the opportunity to explore, in a more thorough manner, factors associated with supplement use that have not previously been investigated. Specifically, a scale that examines the attitudes towards supplement use was developed. Although this scale

requires further development and validation, it is apparent that attitudes towards health, our food supply, and traditional and complementary therapies are important factors in determining use of supplements, and further work on this initial version of the Propensity to Use Supplements scale is warranted. Additionally, examining health and nutrition covariates, as was begun in this work, should be continued for more diverse, randomly selected, older Canadian populations.

## Conclusion

Previous work led to conflicting results when supplement use was examined at the bivariate level. The use of a multivariate approach sheds light on some new and interesting associations, which help to characterize the user better, and when specifically examined, reveal that a Propensity to Use Supplements scale offers some interesting concepts to be considered in future supplement research among older Canadian adults. Given that supplement use will likely continue to increase, further Canadian research is needed to understand which seniors are self-prescribing supplements and why they are doing so.

## References

- Angus Reid. (1997, August 22–24). *Use and dangers of alternative medicines and practices* [Poll]. Retrieved January 23, 1998, from <http://www.angusreid.com/pressrel/alternat.htm>
- Astin, J.A. (1998). Why patients use alternative medicine: Results of a national study. *Journal of the American Medical Association*, 279(19), 1548–1553.
- Bender, M., Levy, A., Schucker, R., & YeE. (1992). Trends in prevalence and magnitude of vitamin and mineral supplement usage and correlation with health status. *Journal of the American Dietetic Association*, 92(9), 1096–1101.
- Betts, N., & Rezek, J. (1989). Attitudes of rural and urban elderly concerning supplement use. *Journal of Nutrition for the Elderly*, 8(3/4), 67–77.
- Blais, R., Maiga, A., & Aboubacar, A. (1997). How different are users and non-users of alternative medicine. *Canadian Journal of Public Health*, 88(3), 159–162.
- Cassileth, B. (1999). Complementary therapies: Overview and state of the art. *Cancer Nursing*, 22(1), 85–90.
- Donald, E., Tapan, K., Hargreaves, J.A., Thompson, G., Overton, T., Peterson, R.D., & Chao, E. (1992). Dietary intake and biochemical status of a selected group of older Albertans taking or not taking micronutrient supplements. *Journal of the Canadian Dietetic Association*, 53(1), 39–43.
- Eisenberg, D.M., Davis, R.B., Ettner, S.L., Appel, S., Wilkey, S., Van Rompay, M., & Kessler, R.C. (1998). Trends in alternative medicine use in the United States, 1990–1997. *Journal of the American Medical Association*, 280(18), 1569–1575.

- Foster, D., Philips, R., Hamel, M., & Eisenberg, D. (2000). Alternative medicine use in older adults. *Journal of the American Geriatrics Society*, 48(12).
- Fries, C.J., & Menzies, K.S. (2000). Gullible fools or desperate pragmatists? A profile of people who use rejected alternative health care providers. *The Canadian Journal of Public Health*, 91(3), 217–219.
- Gibson, R (1990). *Principles of nutritional assessment*. New York: Oxford University Press.
- Gray, G., Paganini-Hill, A., & Ross, R. (1983). Dietary intake and nutrient supplement use in a southern California retirement community. *The American Journal of Clinical Nutrition*, 38, 122–128.
- Gray, S.L., Hanlon, J.T., Fillenbaum, G.G., Wall, W.E., & Bales, C. (1996). Predictors of nutritional supplement use by the elderly. *Pharmacotherapy*, 16(4), 715–720.
- Health and Welfare Canada. (1988). *Promoting healthy weights: A discussion paper*. Ottawa, ON: Minister of Supply and Services.
- Ipsos-Reid. (2001, October 9). *Canadians and food safety*. Retrieved November 25, 2002, from [http://www.ipsos-reid.com/media/dsp\\_displaypr\\_cdn.cfm?id\\_to\\_view=1324](http://www.ipsos-reid.com/media/dsp_displaypr_cdn.cfm?id_to_view=1324)
- Kaptchuk, T.J., & Eisenberg, D.M. (1998). The persuasive appeal of alternative medicine. *Annals of Internal Medicine*, 129, 1061–1065.
- Keller, H.H., McKenzie, J.D., & Goy, R.E. (2001). Construct validation and test-retest reliability of SCREEN Seniors in the Community: Risk Evaluation for Eating and Nutrition. *Journal of Gerontology, Medical Sciences*, 56A(9):M552-M558.
- Kleinbaum, D. (1994). *Logistic regression: A self-learning text*. New York: Springer.
- Lyle, B.J., Mares-Perlman, J.A., Klein, B.E., Klein, R., & Greger, J.L. (1998). Supplement users differ from nonusers in demographic, lifestyle, dietary and health characteristics. *Journal of Nutrition*, 128, 2355–2362.
- McKenzie, J.D. (1999). *Vitamin–mineral supplement and herbal remedy use in community-living older adults*. Unpublished master's thesis, Department of Family Relations and Applied Nutrition, University of Guelph, Guelph, ON.
- McKenzie, J.D., & Keller, H.H. (2001). Use of vitamin–mineral supplements and herbal remedies among community-living older adults. *Canadian Journal of Public Health*, 92(4), 286–289.
- Millar, J. (1997). Use of alternative health care practitioners by Canadians. *Canadian Journal of Public Health*, 88(3), 154–158.
- Montbriand, M.J. (2000). Senior and health-professionals' perceptions and communication about prescription and alternative therapies. *Canadian Journal of Aging*, 19(1), 35–56.
- Oakland, M.J., & Thomsen, P.A. (1990). Beliefs about and usage of vitamin/mineral supplements by the elderly participants of rural congregate meal programs in central Iowa. *Journal of the American Dietetic Association*, 90(5), 715–716.
- Payette, H., & Gray-Donald, K. (1991). Do vitamin and mineral supplements improve the dietary intake of elderly Canadians? *Canadian Journal of Public Health*, 82, 58–59.
- Planta, M., Gundersen, B., & Petitt, J. (2000). Prevalence of the use of herbal products in a low-income population. *Family Medicine*, 32(4), 252–257.
- Powell, D. (2002). Food safety: A scientific perspective. *Canadian Journal of Dietetic Practice and Research* 63(1).
- Radimer, K.L., Subar, A.F., & Thompson, F.E. (2000). Nonvitamin, nonmineral dietary supplements: Issues and findings from NHANES III. *Journal of the American Dietetic Association*, 100, 447–454.
- Rajendran, P., Thompson, R., & Reich, S. (2001). The use of alternative therapies by patients with Parkinson's disease. *Neurology*, 57(5), 790–794.
- Ranno, B., Wardlaw, G., & Gieger, C. (1988). What characterizes elderly women who overuse vitamin and mineral supplements? *Journal of the American Dietetic Association*, 88(3), 347–348.
- Stoehr, G.P., Gaguli, M., Seaberg, E.C., Echement, D.A., & Belle, S. (1997). Over-the-counter medication use in an older rural community: The movies project. *Journal of the American Geriatrics Society*, 45(2), 158–165.
- Streiner, D., Norman, F. (1995). *Health measurement scales—A practical guide to their development and use* (2nd ed.). New York: Oxford University Press.
- Verhoef, M., Russell, M., & Love, E. (1994). Alternative medicine use in rural Alberta. *Canadian Journal of Public Health*, 85(5), 308–309.
- Wolsko, P., Ware, L., Kutner, J., Lin, C., Albertson, G., Cyran, L., Schilling, L., & Anderson, R. (2000). Alternative/complementary medicine: Wider usage than generally appreciated. *The Journal of Alternative and Complementary Medicine*, 6(4), 321–326.