Alcohol Consumption and Health of Older Adults in Mainland China

Abstract

This study focuses on the relationship between alcohol consumption and depression symptoms among older adults with different living arrangement in China. Participants included 7,601 aged 60 or older who participated in the 2011 China Health and Retirement Longitudinal Study (CHARLS), a nationally representative study of 17,708 persons aged 45 and older conducted in Mainland China. Hierarchical Generalized Linear Modeling (HGLM) was used to examine the relationship between personal characteristics, living arrangement, alcohol consumption, physical health and symptoms of depression. Results showed disparities of physical health and depressive symptoms among elderly drinkers and non-drinkers. The direct effect of alcohol consumption on depression symptoms was unclear because culture, education, physical abilities, and housing conditions also influenced alcohol consumption. The findings lay the groundwork for future studies on alcohol use among Chinese older adults and support the need for culturally based alcohol prevention programs that are sensitive to Chinese culture.

Keywords: Chinese older adults, alcohol consumption, health

**Introduction**

Although heavy alcohol consumption in late life is a growing concern worldwide (Benza e al., 2010; Balsa et al., 2008; Clapp et al., 2014; Sun e al., 2009), most available information about alcohol habits of older adults is based on studies of Western societies and cultures. Limited information is available about alcohol consumption among older adults in China. Alcohol consumption varies among different regions across China, and social drinking during spring festivals, family gatherings, or weddings, is a well-recognized and accepted feature of Chinese culture (Sun, 2009). Although alcohol use in China is considered relative low compared to most western countries, there are concerns that rates will rise as economic development continues and social norms shifts (Sun, 2009).

The goal of this study was to examine alcohol consumption among older adults in China. Three research questions were addressed: 1) What are the drinking patterns among older adults in China? 2) What are the relationships between alcohol use and participant demographics? 3) What are the effects of living environment and living arrangement on relationship between alcohol consumption and depressive symptoms among Chinese older adults? In order to answer these questions, quantitative analyses were conducted using an a nationally representative data set that included a substantial number of individuals older than 60 -- the 2011 China Health and Retirement Longitudinal Study (CHARLS). The results of this study may assist those developing and delivering alcohol health education and health promotion programs in China to focus on the relevant predisposing, reinforcing, and enabling factors influencing alcohol consumption.

**Background**

Older adults are especially sensitive to the effects of alcohol as a result of the changes associated with aging (Resnick et al., 2003). Tolerance to alcohol is lower in older adults compared to younger individuals due to the decreased body water and lowered metabolism system of aging body (Bakhish & While, 2014; Clapp et al., 2014). Moderate alcohol consumption (defined differently across studies, ranging from monthly or weekly drinking to 3 to 4 drinks per day) was associated with low risk of cardiovascular disease, stroke and mortality and high health-related quality of life, especially among older populations (Balsa et al., 2008; Hall, 2012; Kaplan et al., 2012; Sklar, Gilbertson, Boissoneault, Prather, & Nixon, 2012). Research conducted in Europe, the United States, and China found that moderate alcohol consumption was has been associated with better cognitive performance and a lower risk of developing dementia (Letenneur, 2007; Roizen, Fillmore, Chikritzhs, & Stockwell, 2013). However, heavy alcohol consumption (more than ten drinks per week; citation needed) can lead to various physical health problems among older adults, such as increase the risk of injuries, heart disease, hypertension, stroke, and liver disease. Psychological issues such as insomnia, memory loss, depression, anxiety, mood disorder also has been associated with alcohol misuse (Bakhish & While, 2014; Mann et al., 2012; Moos et al., 2010; Yeung et al., 2009). Heavy alcohol consumption is also a factor that contributes to cognitive changes and behavior problems including smoking, depression, and alcohol dependence history (Balsa et al., 2008; Sacco, Bucholz, & Spitznagel, 2009).

The use of multiple medications increases as people age (Hall, 2012; Immonen, Valvanne, & Pitkala, 2013) and many medications interact adversely with alcohol. Use of multiple prescription and nonprescription medications increases the risk of adverse drug reactions and the use of alcohol adds to this risk. For example, alcohol enhances the sedative effects of antidepressants, benzodiazepines and opioids, increasing the potential for adverse events such as falls, or cognitive decline or depression. Several medications can induce a disulfiram-like reaction when alcohol is consumed, which causes acetaldehyde to accumulate in the body, causing nausea, vomiting and other severe reaction symptoms. Slower metabolic system makes older adults more vulnerable towards drug and alcohol interactions (Immonen et al., 2013; Moore et al., 2007).

In most Western countries, alcohol consumption appears to be on the rise, particularly among women and older adults. Geels and colleagues (2013) presented data on alcohol consumption by age and sex using a large (N>16,000) population-based Dutch sample. Results indicated that alcohol consumption was high in the elderly Dutch population, especially among women. Satre and Knight (2001) examined age and sex differences in expectancies and alcohol consumption in a sample of 92 older and 83 younger adults. Compared to younger adults, they found lower quantities of alcohol consumption per occasion by older adults, but higher frequency of drinking occasions.

Previous research has shown differences between men and women in terms of alcohol consumption and drinking trajectories (Brennan et al., 2011; Chen & Hardy, 2009; Lemke, Schute, Brennan, & Moos, 2008). Problem-drinking women and men tend to be exposed to different social influences and stressors, but both men and women tend to respond to stress experiences with increased drinking (Lemke et al., 2008; Shaw, Agahi, & Krause, 2011). Platt, Sloan and Costanzo (2010) found that there were substantial differences in drinking trajectories at the individual level at mid- and late life. A problem-drinking history was predictive of alcohol consumption patterns in later life. Older persons whose alcohol consumption increased over time were more likely to be affluent, highly educated, male, White, unmarried, less religious, and in excellent to good health (Platt et al., 2010). Although both men and women tend to respond to stressful experiences with increased drinking (Lemke et al., 2008; Shaw, Agahi, & Krause, 2011), older men are more likely than older women to have alcohol-related problems (Gilson, Bryant, & Judd, 2014; SAMHSA, 2013).

Traditional Chinese culture has a profound influence on how Chinese people live their lives (Chen & Hardy, 2009) and men drinking alcohol is viewed as more acceptable practice than women (Sun, 2009). Because cultural norms dictate that it is less acceptable for women to drink, potentially problematic alcohol consumption among older women in China is invisible (Sun, 2009).

Living arrangements also influences alcohol consumption patterns among older men and women (Cassidy et al., 2004; Sun, 2009). In China, family expectations and norms are changing along with rapid economic development (Xu et al., 2009). Increasingly, more young adults are living independently from their parents. Thus, the number of older adults living alone or only with their spouse is rising (Xu et al., 2009). Few studies have examined alcohol misuse and health conditions of Chinese older adults, and little research has explored the association between alcohol consumption, living arrangement and health conditions among older adults in the changing society.

**Methods**

**Data**

The study sample was drawn from the China Health and Retirement Longitudinal Study (CHARLS). The CHARLS collected a nationally representative sample of Chinese people aged 45 and older using a multi-stage stratified, clustered sampling method. The baseline national CHARLS sample included approximately 10,000 households and 17,708 individuals in 150 counties and districts within 28 provinces, Municipalities, and Autonomous Regions in Mainland China (excluding Hong Kong, Macau and Taiwan), and covered 450 communities. As the population in Hainan, Ningxia and Tibet were too small for sampling, the data from these provinces were not included. The individual level data was collected using a structured survey questionnaire with eleven main sections, including demographic background, family, health status and functioning, economic status, and housing conditions. Community level interviews were conducted with community committee officers using a survey questionnaire with ten main sections, including infrastructure and public facilities, population, enterprise and wage, migration, health and insurance, social policy, community history, disease, production, income and price, and interviewers’ observations. The sample for the current analyses is 7,601 (42.9% of total) adults, aged 60 years and older. The average sample size in each community is 50.

**Individual Level Variables**

Because of its devastating consequences, late life depression is an important public health

problem. In this study, the dependent variable is depressive symptoms, which is binary. Independent variables include age, gender, marital status, education, living arrangement, self-reported health status, physical function (ADL &I ADL), housing condition and alcohol consumption.

**Depressive symptoms.** Depressive symptom was assessed using the 10-item Center for Epidemiological Studies Depression Scale (CES-D-10; Björgvinsson et al., 2013; Radloff, 1977). The reliability of the CES-D-10 in terms of internal consistency was satisfactory with Cronbach alpha= 0.78-0.79. It has showed comparable accuracy to the original CES-D in classifying cases with depressive symptoms among Chinese older adults (Kappa = 0.84, p < 0.01) (Boey, 1999). Participants reported their experiences during the week prior to interview, rating their feelings and experiences on a scale from 0 to 3. Responses were summed and scored: higher values suggest depressive symptomology. The total depression score ranged from 0 to 30, with a mean of 9.1 (SD=6.5). Participants with a score of 10 or greater were identified as experiencing depressive symptoms. As shown in Table 1, about 37% (n=2,910) older adults 60 and older reported experiencing depressive symptoms.

**Demographic characters***.* Background information about the participants included age, gender, marital status, urban/rural residency and education level. As shown in Table 1, the sample evenly divided between males (n=3,808, 50.13%) and females (n=3,788, 49.87%). About 80% (n=5,949) of the individuals in the sample were married or cohabiting, and about 20% (n=1,652) of them were single (widowed, divorced, or never married). About 95% (n=7,208) of the older participants had completed high school diploma or less; about 5% (n=380) held college degrees.

**Living arrangement.** We coded living arrangement as: live with people other than spouse, live with spouse only and live alone. As shown in Table 1, approximately 53% (n=4,003) of older adults live with people other than spouse, 38.4% (n=2,919) lived only with spouse, and 8.93% (n=679) older adults lived alone.

**Self-reported health status.** Self-reported health was used as an index of physical health. Respondents were asked, *“How would you rate your health status?* Responses ranged from 1 (very good) to 5 (very poor). As shown in Table 1, 65.30% (n=4,954) of the older adults reported being in good or fair health condition, about 5% (n=415) indicated being in excellent health condition and about 30% (n=2,217) reported being in poor health condition.

**Physical functioning.** Participants reported on their abilities to complete activities of daily living (ADL) and instrumental activities of daily living (IADL). ADL items covered abilities in dressing, bathing or showering, eating, getting into or out of bed, using the toilet, and controlling urination/defecation. IADL items focused on completing household chores, preparing meals, shopping for groceries, managing money and taking medications. For each item, respondents reported their abilities on a 4-point scale extending from no difficulty (0) to absolutely cannot do it (4). Overall difficulty with ADLs and IADLs was represented by the sum of all values. The total scale ranged from 11 to 44, with a mean of 13.5 (SD=5.3). Based on their overall score, participants were identified has having: no difficulty (11-13), minor difficulty (14-18), some difficulty (19-25) and severe difficulty (26-44).

**Housing condition.**Housing quality affects the living environment and residential satisfaction of older adults, which may have indirect influences on mental health (Lawton, 1980). Housing condition was measured by basic housing infrastructure, which included electricity, water, gas supply, heating, telephone, and internet. The house infrastructure was coded as a categorical variable with zero standing for no facilities available and 7 for all the facilities included. The score was divided into three categories: excellent (7), good (6), fair (4-5) and poor conditions (0-3). Among all the participants 60 and older, 77.66% (n=5,594) of the participants indicated that they lived in poor housing condition, about 7.00% (n=532) of them lived in fair or good housing condition, and 19.33% (n=1,468) of the older adults lived in houses with all facilities available.

**Alcohol consumption.** Participants responded to a series of questions about their alcohol consumption and drinking status. *Did you drink any alcoholic beverages, such as beer, wine, or liquor in the past year? How often?* Respondents who drank any kind of alcoholic beverage over the past 12 months before the survey were defined as current drinkers (n=2,216, 29.91%) and were asked further questions on drinking frequency, types and quantity consumed in a typical day and annual number of binge drinking episodes. According to the Dietary Guidelines for Chinese Residents (Chinese Nutrition Society, 2007), the annual drinking frequency was defined as: once per month, 2–3 times per month, once a week, 2–3 days per week, 4–6 days per week, once a day and more than twice a day. Drinking twice a day or more than twice a day was considered heavy drinking. Three types of alcohol consumptions were identified: heavy drinking (n=381, 5.37%), current non-heavy drinking (n=1,379, 19.44%) and none drinking (n=5,333, 75.19%). Older adults who did not drink any kind of alcoholic beverage over the past 12 months were asked, *Did you ever drink alcoholic beverages in the past? How often?* Those who answered yes to this question were defined as past drinkers (n=845, 11.41%). Abstainers (n=4,348, 58.69%) were defined as those who never drink alcoholic beverages (e.g., beer, wine, liquor).

**Community Level Variables**

**Community type.** The following questions were asked in the community questionnaire to measure community type. *Is this office a community office or a village committee office?* Communities were categorized into three types: Rural community (referred as *village office* in the questionnaire), urban community (referred as *community office* in the questionnaire) and suburban community (referred as *both village committee office and community office* in the questionnaire). As shown in Table 5, the majority of the communities (66.3%) were rural communities, while 32.2% were urban communities, and 1.3% of the communities were suburban communities.

**Social economic status (SES).** Social economic status of the communities was measured using a 1 to 7 Likert-like scale, with 1 means very poor and 7 means very rich. As shown in Table 5, about 37% of the communities were scored below 4, which was the middle level SES. About 30% were in the middle, and 11% of the communities were identified as rich or very rich.

**Statistical Analysis**

Due to the nested data structure of different characteristics of individual participant within communities, Hierarchical Generalized Linear Modeling (HGLM) was conducted using HLM 7 software The Level-1 units were the individual participants. The Level-2 units in this analysis were the communities. Before conducting logistic HGLM, tests for outliers were run, and outliers were removed. Interviews conducted with the absence of the selected participants were also removed (questions were answered by other people in the household). In the end, 6,523 out of 7,601 observations were analyzed. In addition, there are linear relationships among all pairs of dependent variables (p<0.001), the dependent variables exhibit equal levels of variance across the range of predictor variables. Descriptive analysis was conducted using SAS Freq (categorical predictor) and SAS Summary (continuous predictor) to examine the prevalence of alcohol consumption and personal characteristics of the selected sample. Univariate relations were tested with chi-square for categorical variables (See Table 4).

**Results**

**General Alcohol Consumption Pattern**

Table 1 shows the descriptive statistics by drinking types. Seventy percent of the total population 60 years and older in China were not current drinkers in 2010. Table 3 presents weighted baseline descriptive characteristics for older adults in the total sample and participants who are heavy drinkers. Among older adults who did drink, the majority (n= 7,192, 94.62%) were not considered heavy drinkers; that is more than X drinks per day. Although only about 5% (n= 409) of the older adults in the CHARLS sample drank heavy amounts of alcohol, as the total number of aging population in China is large, and increasing, the estimated weighted number of heavy alcohol drinkers is 10,478,430. Current drinkers were more likely to be married or cohabiting (n=1,874, 84.57%) compared to past drinkers (n=691, 81.78%) and abstainers (n=3,242, 74.48%). Current drinkers also were more likely to be slightly younger (M=67.59) than past drinkers (M=68.87) and abstainers (M=68.71).

**Gender Differences in Alcohol Consumption and Depressive Symptoms**

The majority of current drinkers (n=1,801, 81.27%) and past drinkers (n=625, 73.96%) were male, and the majority of abstainers (n=3,061, 70.04%) were female. As shown in Table 3, the percentage of heavy alcohol use is higher among male older adults (n= 354, 92.91%) than female older adults; only 7.09% (n=27) of the female older adults drink alcohol more than once a month. The result of the logistic hierarchical linear regression was shown in Table 6. Male participants were less likely to experience depressive symptoms compared to female participants. More specifically, being males decreases the risk of experiencing depressive symptoms by 47% in odds (OR=0.53, p<0.01) when controlling other independent variables.

**Living Environment,** **Alcohol Consumption and Depressive Symptoms**

As shown in table 1, higher percentage of current drinkers (n=1,746, 78.83%) were living in rural areas compared to past drinkers (n= 659, 77.99%) and abstainers (n=3,294, 75.67%). A higher percentage of heavy drinkers (n= 323, 84.78%) were living in rural areas compared to the percentage of participants (5,837, 76.11%) living in rural areas. Older adults living in rural areas were 39% more likely to experience depressive symptoms (OR=1.39, p<0.01) than those living in urban communities, controlling for other independent variables. Participants living in communities with higher SES were less likely to experience depressive symptoms (OR=0.90, p<0.01) compared to those living in communities with lower SES. In addition, older adults living in poor housing condition were more likely to experience depressive symptoms than those living in good housing conditions (Table 6). Compared to living in excellent housing conditions, living in poor housing conditions increase the risk of experiencing depressive symptoms by 79% in odds (OR=1.79, p<0.01), controlling other independent variables.

**Living Arrangement, Alcohol Consumption and Depressive Symptoms**

As shown in table 1, compared to the percentage of all participants 60 and older living with spouse only (n=2,919, 38.40%), the percentage for of current drinkers was higher (n= 909, 41.02%). In addition, higher percentage of past drinkers were living with people other than spouse (n=451, 53.37%) compared to current drinkers (n=1,141, 51.49%) and abstainers (n=2,297, 52.77%). Higher percentage of abstainers (n=443, 10.18%) were living alone compared to current drinkers (n=166, 7.49%) and past drinkers (n=61, 7.22%). Among the heavy drinkers (see Table 3), higher percentage of older adults were living only with spouse (n=188, 49.91%) compared to older adults living with people other than spouse (n=165, 43.31%) and older adults living alone (n=28, 7.35%). As shown in Table 6, people living only with spouse were less likely to experience depressive symptoms (OR=0.77, p<0.1) compared to people living alone.

**Physical and Mental Health Disparities**

Past drinkers were more likely to have poorer physical functions than current drinkers and abstainers (Table 1). Past drinkers (n= 397, 47.04%) were more likely to report poor health compared to current drinkers (n=565, 25.50%) and abstainers (n=1,711, 39.32%). As shown in Table 6, older adults with good self-reported physical health status were less likely to experience depressive symptoms (OR=0.45, p<0.01) than those in poor health conditions controlling other independent variables. As shown in table 2, the score of overall difficulty with ADLs and IADLs was higher among past drinkers (14.42) than current drinkers (12.46) and abstainers (13.63). In addition, as shown in table 6, participants with higher ADL and IADL limitations were more likely to experience depressive symptoms (OR=1.10, P<0.01) than those with lower physical limitations.

**Discussion**

This study explored the relationship between alcohol consumption and health conditions among older adults with different living arrangement in China and investigated the relationship between personal characteristics, living arrangement, alcohol consumption, physical health, and symptoms of depression using data from the 2011 CHARLS. Results indicated interaction among gender, living arrangement and alcohol consumption on depressive symptoms and physical health. Male older adults living in rural regions were more likely to drink alcohol and report more depressive symptoms than their urban peers. Respondents who lived with their spouses only and were heavy alcohol drinkers scored high on the depressive symptomology. The direct effect of alcohol consumption on depression symptoms was unclear because culture, education, physical abilities, and housing conditions also influenced alcohol consumption.

The findings lay the groundwork for future studies on alcohol use among Chinese older adults and support the need for alcohol prevention programs that are sensitive to Chinese culture. However, the study is not without its limitations. First, this is a cross-sectional study so generalizability is limited. Second, the amount of alcohol consumption is based on self-report; there might be older adults with heavy alcohol consumption who did not acknowledge it, especially among the female population. Previous research reported later onset of problem drinking among women. Third, only 7% of the older women reported drinking alcohol more than once a month, which may be underreported. Future studies are needed to explore the drinking patterns among female older adults in China.

**Implications for Health Education/Health Promotion and Public Health**

The findings of this research contributes new knowledge about alcohol consumption and depressive symptoms among older adults in China. The findings have important implications for health education/health promotion focused on primary, secondary and tertiary prevention of alcohol misuse among older population in mainland China. For primary prevention, comprehensive health education efforts directed at increasing knowledge regarding alcohol use among older adults. Public health and social service agencies are encouraged to develop and implement education programs based on successful evidence-based primary prevention strategies. For secondary prevention, integration of early detection of alcohol-related health problems into the medical care delivery can help to identify those whose alcohol behaviors are already related to physical, mental, and social problems. For those older adults who have experienced alcohol-related morbidities, implementation of tertiary prevention strategies, such as robust rehabilitation programs, would enhance the public health response to the problem.

In addition to addressing alcohol use among the elderly in China through prevention efforts, it is important that the issue is embedded in the core responsibilities (assessment, policy development and assurance) in public health.Heavy drinking in late life is an under-identified issue. Older people who have retired may be less likely to be around others on a daily basis who may recognize that they are experiencing alcohol-related problems (Moore et al., 2007). Older adults are also less likely to receive diagnosis of alcoholism than are younger adults, perhaps due to the bias hold by the society that older adults are less likely to be heavy drinkers (SAMHSA, 2013; Steunenberg, Yagmur, & Cuijers, 2008). To that end, particular attention is needed to preparing health providers to be able to adequately address the needs of the elderly. Recognizing and assessing problems may require special skills and tools not used for the general population (Cunningham, Kypri, & McCambridge, 2011).

It is important that these approaches are integrated into the primary healthcare system, and that professionals are sensitive to the changing needs of an aging population. In addition, attention is needed to follow-up care for older patients treated for alcohol abuse. Funding is needed to improve equipment to meet the specific needs of the elderly, such as the ability to address the limited mobility and access to transportation among patients. In general, funding is needed to provide effective alcohol interventions that are integrated into primary care for the elderly especially in the communities with low SES and rural communities.

Screening tools for the general population may not be sensitive enough to detect alcohol problems in diverse population; specially designed tools for Chinese elders that acknowledges cultural influences may prove to be a more effective means of identifying signs of heavy drinking. Brief interventions may be particularly effective among this population as previous research has indicated that appropriate patient-provider educational intervention can reduce alcohol consumption and at-risk drinking among older adults (Poznyak, Fleischmann, Rekve, Rylett, Rehm, & Gmel, 2013).

Finally, it is important to build a clinically and culturally competent workforce through education and training of providers, increasing the supply of competent providers, especially those who are bilingual and culturally competent, and using older adults in peer-to-peer service roles more extensively. For instance, internet and computer based screeners and intervention programs can be applied in a wide range of settings (Cunningham et al., 2011). These technologies provide new ways for people to communicate with each other and can be used to deliver help to heavy drinkers in remote or rural areas in China where face to face interventions are not available. Just as screening for problems among older Chinese individuals requires careful tailoring to their needs, so does treatment. Treatment facilities should be designed with older adults’ need in mind.

References

Almeida, V. D., Davidson, K., De Morais, C., Marshall, H., Bofill, S., Grunert, K. G., Lumbers, M. (2005). Alcohol consumption in elderly people across European countries: Results from the food in later life project. *Ageing International, 30*(4), 377-395. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=20917957&scope=site>

Bakhshi, S., & While, A., E. (2014). Older people and alcohol use. *British Journal of Community Nursing, 19*(8), 370-374. doi:10.12968/bjcn.2014.19.8.370

Balsa, A. I., Homer, J. F., Fleming, M. F., & French, M. T. (2008). Alcohol consumption and health among elders. *Gerontologist, 48*(5), 622-636. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=35628341&scope=site>

Benza, A. T., Calvert, S., & McQuown, C. B. (2010). Prevention BINGO: Reducing medication and alcohol use risks for older adults. *Aging & Mental Health, 14*(8), 1008-1014. doi:10.1080/13607863.2010.501067

Boey, K. W. (1999). Cross-validation of a short form of the CES-D in Chinese elderly. *International Journal of Geriatric Psychiatry, 14*(8). 608-617. doi: 10.1002/(SICI)1099-1166(199908)14:83.0.CO;2-Z

Brennan, P. L., Schutte, K. K., Moos, B. S., & Moos, R. H. (2011). Twenty-year alcohol-consumption and drinking-problem trajectories of older men and women. *Journal of Studies on Alcohol & Drugs, 72*(2), 308-321. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=59689028&scope=site>

Cassidy, K., Kotynia-English, R., Acres, J., Flicker, L., Lautenschlager, N. T., & Almeida, O. P. (2004). Association between lifestyle factors and mental health measures among community-dwelling older women. *Australian & New Zealand Journal of Psychiatry, 38*(11), 940-947. doi:10.1111/j.1440-1614.2004.01485.x

Chen, L. Y., & Hardy, C. L. (2009). Alcohol consumption and health status in older adults: A longitudinal analysis. *Journal of Aging & Health, 21*(6), 824-847. doi:10.1177/0898264309340688

Clapp, J. D., Reed, M. B., Martel, B., Gonzalez, M. C., & Ruderman, D. (2014). Drinking behavior among low-income older adults: A multimethod approach to estimating alcohol use. *Alcoholism: Clinical & Experimental Research, 38*(11), 2862-2868. doi:10.1111/acer.12550

Cunningham, J. A., Kypri, K., & McCambridge, J. (2011). The use of emerging technologies in alcohol treatment. *Alcohol Research & Health, 33*(4), 320-326. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=60362931&scope=site>

Chinese Nutrition Society (2007). *Dietary Guidelines for Chinese Residents.* Lhasa: The Tibet People’s Publishing House; [in Chinese].

Geels, L. M., Vink, J. M., van Beek, Jenny H. D. A., Bartels, M., Willemsen, G., & Boomsma, D. I. (2013). Increases in alcohol consumption in women and elderly groups: Evidence from an epidemiological study. *BMC Public Health, 13*(1), 1-13. doi:10.1186/1471-2458-13-207

Gilson, K., Bryant, C., & Judd, F. (2014). Exploring risky drinking and knowledge of safe drinking guidelines in older adults. *Substance Use & Misuse, 49*(11), 1473-1479. doi:10.3109/10826084.2014.912233

Hall, W. (2012). What place, if any, does information on putative cardio protective effects of moderate alcohol use have in safer drinking guidelines? *Drug & Alcohol Review, 31*(2), 194-197. doi:10.1111/j.1465-3362.2011.00345.x

Immonen, S., Valvanne, J., & Pitkäl, K. H. (2013). The prevalence of potential alcohol-drug interactions in older adults. *Scandinavian Journal of Primary Health Care, 31*(2), 73-78. doi:10.3109/02813432.2013.788272

Kaplan, M. S., Huguet, N., Feeny, D., McFarland, B. H., Caetano, R., Bernier, J., Ross, N. (2012). Alcohol use patterns and trajectories of health-related quality of life in middle-aged and older adults: A 14-year population-based study. *Journal of Studies on Alcohol & Drugs, 73*(4), 581-590. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=77850041&scope=site>

Lawton, M. (1980). Housing the elderly: Residential quality and residential satisfaction. *Research on Aging, 2,* 309-328. doi:10.1177/016402758023002

Lemke, S., Schute, K. K., Brennan, P. L., & Moos, R. H. (2008). Gender differences in social influences and stressors linked to increased drinking. *Journal of Studies on Alcohol & Drugs, 69*(5), 695-702. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=34491778&scope=site>

Letenneur, L. (2007). Moderate alcohol consumption and risk of developing dementia in the elderly: The contribution of prospective studies. *Annals of Epidemiology, 17*, S43-S45. doi:10.1016/j.annepidem.2007.01.010

Moos, R. H., Brennan, P. L., Schutte, K. K., & Moos, B. S. (2010). Older adults’ health and late-life drinking patterns: A 20-year perspective. *Aging & Mental Health, 14*(1), 33-43. doi:10.1080/13607860902918264

National Institute on Alcohol Abuse and Alcoholism. (2000).*10th Special Report to the U.S. Congress on Alcohol and Health. Rockville,* MD: NIAAA. Retrieved from http://niaaa.nih.gov

Platt, A., Sloan, F. A., & Costanzo, P. (2010). Alcohol-consumption trajectories and associated characteristics among adults older than age 50. *Journal of Studies on Alcohol & Drugs, 71*(2), 169-179. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=48945505&scope=site>

Poznyak, V., Fleischmann, A., Rekve, D., Rylett, M., Rehm, J., & Gmel, G. (2013). The world health organization's global monitoring system on alcohol and health. *Alcohol Research: Current Reviews, 35*(2), 244-249. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=94840005&scope=site>

Resnick, B., Perry, D., Applebaum, G., Armstrong, L., Cotterman, M., Dillman, S., Parrish, J. H. (2003). The impact of alcohol use in community-dwelling older adults. *Journal of Community Health Nursing, 20*(3), 135-145. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=2003156252&scope=site>

Roizen, R., Fillmore, K., Chikritzhs, T., & Stockwell, T. (2013). Light-to-moderate drinking and dementia risk: The former drinkers problem re-visited. *Addiction Research & Theory, 21*(3), 181-193. doi:10.3109/16066359.2012.706343

Sacco, P., Bucholz, K. K., & Spitznagel, E. L. (2009). Alcohol use among older adults in the national epidemiologic survey on alcohol and related conditions: A latent class analysis. *Journal of Studies on Alcohol & Drugs, 70*(6), 829-838. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=45619581&scope=site>

Shaw, B. A., Agahi, N., & Krause, N. (2011). Are changes in financial strain associated with changes in alcohol use and smoking among older adults? *Journal of Studies on Alcohol & Drugs, 72*(6), 917-925. Retrieved from <http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=67412204&scope=site>

Sklar, A. L., Gilbertson, R., Boissoneault, J., Prather, R., & Nixon, S. J. (2012). Differential effects of moderate alcohol consumption on performance among older and younger adults. *Alcoholism: Clinical & Experimental Research, 36*(12), 2150-2156. doi:10.1111/j.1530-0277.2012.01833.x

Steunenberg, B., Yagmur, S., & Cuijpers, P. (2008). Depression and alcohol use among the Dutch residential home elderly: Is there a shared vulnerability? *Addiction Research & Theory, 16*(5), 514-525. doi:10.1080/16066350802041356

Sun, W., Schooling, C. M., Chan, W. M., Ho, K. S., Lam, T. H., & Leung, G. M. (2009). Moderate alcohol use, health status, and mortality in a prospective Chinese elderly cohort*.* *Annals of Epidemiology, 19,* 396-403. doi:10.1016/j.annepidem.2009.01.011

Tredal, I., Soares, J. J. F., Sundin, Ö., Viitasara, E., Melchiorre, M. G., Torres-Gonzales, F., Barros, H. (2013). Alcohol use among abused and non-abused older persons aged 60-84 years: An European study. *Drugs: Education, Prevention & Policy, 20*(2), 96-109. doi:10.3109/09687637.2012.751087

World Health Organization (2010). Global strategy to reduce the harmful use of alcohol. Geneva, Switzerland: WHO, 2010. Retrieve from: http://www.who.int/substance\_abuse/msbalcstragegy.pdf