University of Groningen

Perceived social capital and binge drinking in older adults

Villalonga-Olives, E.; Almansa, J.; Shaya, F.; Kawachi, Ichiro

Published in:
Drug and Alcohol Dependence

DOI:
[10.1016/j.drugalcdep.2020.108099](https://doi.org/10.1016/j.drugalcdep.2020.108099)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2020

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Villalonga-Olives, E., Almansa, J., Shaya, F., & Kawachi, I. (2020). Perceived social capital and binge drinking in older adults: The Health and Retirement Study, US data from 2006-2014. *Drug and Alcohol Dependence*, 214, [108099]. <https://doi.org/10.1016/j.drugalcdep.2020.108099>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Full length article

Perceived social capital and binge drinking in older adults: The Health and Retirement Study, US data from 2006–2014

E. Villalonga-Olives^{a,*}, J. Almansa^b, F. Shaya^a, I. Kawachi^c^a Pharmaceutical Health Services Research Department, University of Maryland School of Pharmacy, Baltimore, MD, USA^b Department of Health Sciences, Community & Occupational Medicine, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands^c Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, MA, USA

ARTICLE INFO

Keywords:

Social epidemiology

Older adults

Social capital

Binge drinking

Multilevel structural equation modelling

ABSTRACT

Objective: Social capital has been described as having both positive influences as well as negative influences (“the dark side”) on health behaviors. We sought to test the association of perceived social capital on the risk of binge drinking among older adults, using a longitudinal design.

Methods: We used HRS (Health and Retirement Study) data, a nationally representative sample of US adults aged ≥ 50 years evaluated every two years (from 2006 to 2014). We investigated the relationship between perceived social capital (neighborhood social cohesion and neighborhood physical disorder, positive social support and negative social support) and binge drinking over time, with a multilevel structural equation modelling (MSEM) approach, modelling number of binge-drinking days as hurdle negative binomial. We used MSEM estimating the associations at person level (overall) and within waves.

Results: The sample included 19,140 individuals. At baseline mean age was 66.8 (SD 10.3). Over time, the number of binge drinking days decreased. Negative social support increased the average number of binge drinking days among those who drink, where one unit increase was associated with an increase of 37 % in the expected number of days binge drinking in the same wave. The association of positive social support on the number of binge drinking days was stronger for females (-0.59 (SE = 0.12)), while neighborhood social cohesion was significantly associated with binge drinking in females (-0.05 (SE = 0.01)), but not in males.

Conclusions: Negative social support favored binge drinking. Positive social support and neighborhood social cohesion are protective factors for binge drinking, especially for women.

1. Introduction

The influence of social capital on binge drinking has been investigated in recent research, with mixed results (Child et al., 2017; Koutra et al., 2014; Lorant and Nicaise, 2015). The results of some studies have indicated a protective association (Åslund and Nilsson, 2013; Weitzman and Chen, 2005; Weitzman and Kawachi, 2000), while others have suggested that stronger social connections may actually encourage more binge drinking (Seid et al., 2016; Takakura, 2015, 2011). These seemingly contradictory patterns underscore the point that network connections can be “agnostic” with respect to health outcomes; i.e., the norms that are maintained within a tightly-knit group can be both health-promoting (e.g., “don’t smoke in public spaces”) or health-damaging (“everyone loves to party after work in this workplace, and you are a spoil-sport for not joining us”).

In a systematic review related to the “dark side” of social capital, several studies reported an association between stronger social connections and increased risk of binge drinking (Villalonga-Olives and Kawachi, 2017). We identified behavioral social contagion as one mechanism whereby social capital may adversely affect health behavior. The social capital indicators that were associated with binge drinking included social support and trust, participation in social activities and friendship networks (Koutra et al., 2014; Lorant and Nicaise, 2015; Martins et al., 2017; Seid et al., 2016; Takakura, 2015, 2011; Theall et al., 2009). A common theme across these studies was that all of them focused on youth (with the exception of Said et al. that sampled a wider age range, from 15 to 79 years old).

The relationship between social capital and binge drinking may depend on the age of the populations under evaluation and their social context, and the indicators selected to measure social capital. For

* Corresponding author at: University of Maryland School of Pharmacy, Department of Pharmaceutical Health Services Research, 220 N Arch St, 12th floor, Baltimore, MD, USA.

E-mail address: ester.villalonga@gmail.com (E. Villalonga-Olives).

<https://doi.org/10.1016/j.drugalcdep.2020.108099>

Received 3 February 2020; Received in revised form 26 May 2020; Accepted 27 May 2020

Available online 29 June 2020

0376-8716/ © 2020 Elsevier B.V. All rights reserved.

example Takakura (2011, 2015) investigated school-aged youth and measured social capital based on participation in five types of organized activities, finding an association with more drinking (Takakura, 2015, 2011). Koutra et al. (2014) evaluated youths' participation in community activities, socializing with friends or acquaintances, and level of neighborhood connections, and found that these indicators were associated with more drinking (Koutra et al., 2014). Hence, these studies suggest that participation in extracurricular school activities and more cohesive groups may affect behavioral social contagion and increase peer pressure or adolescent rebellion.

The studies that have found protective relations between social capital and binge drinking used indicators of social capital such as volunteering and religious attendance and service (Åslund and Nilsson, 2013; Folland, 2006; Rasic et al., 2011; Weitzman and Chen, 2005; Weitzman and Kawachi, 2000). Åslund and Nilsson (2013) measured neighborhood social capital and trust evaluating help from neighbors, feeling afraid in the neighborhood and perceptions of safety (Åslund and Nilsson, 2013). In the case of volunteering, Weitzman and Kawachi (2000) investigated it as a "public good" element and expression of commitment to the group or collective. They analyzed the individuals' average daily time volunteering in the past month (Weitzman and Kawachi, 2000). Voluntarism is likely to be an indicator of pro-social behavior in general, and may thus point to a different mechanism than social contagion or peer influence.

Youth is a developmentally sensitive period of life when behavior is most likely to spread via peer pressure and social learning/behavioral modeling based on peer leaders. However, there are very few studies that examined this relationship in older ages to evaluate if this type of behavioral mechanism fades over the life course. In addition, at the societal level, the prevalence of binge drinking is not necessarily correlated with the average volume of alcohol consumption. For example, the United States is a "dry" culture from a cross-national comparative perspective (i.e., low levels of everyday alcohol consumption and quite restrictive policies regarding access to alcohol). Yet when drinking does occur, it is more likely to be lead to intoxication compared to "wet" countries. One recent study in the US estimated that over a tenth of older adults in the US are estimated to be current binge drinkers. Yet binge drinking in this demographic group remains under-studied. Using a longitudinal design, Child et al. (2017) studied whether social capital increased the risk of problem drinking over time and whether perceived control moderated this relationship over the life course among individuals aged 15–79 years in Canada. Interestingly, using three different indicators of social capital (network capital, social participation and trust) their findings highlighted complex associations. Network capital and trust predicted higher odds of binge drinking, whereas social participation had no association with problem drinking behaviors over the life course (Child et al., 2017). The results of this study underscore the importance of investigating different sources of social capital and their relationships with binge drinking, and the need to better understand this problem behavior in older adults, a segment of the population where binge drinking is still highly prevalent and potentially susceptible to peer influence (Bloomfield et al., 2003; Ritchie and Roser, 2018).

Based on the foregoing summary of the existing literature, we aimed to further investigate the relationship between social capital and binge drinking in older adults using different indicators of social capital with data from five different time points. We sought to investigate whether there is a decrease in the trend of binge drinking in older adults and if neighborhood social cohesion and positive social support act as protective influences, while neighborhood physical disorder and negative social support act as risk factors.

2. Methods

2.1. Data source and variables

The Health and Retirement Study (HRS) is a nationally representative panel study of U.S. adults aged ≥ 50 years (Sonnega et al., 2014). The HRS is sponsored by the National Institute on Aging and is conducted by the University of Michigan's Institute for Social Research. HRS provides extensive documentation about their protocol, instrumentation, and complex sampling strategy elsewhere (<http://hrsonline.isr.umich.edu/>). Enrollment was based on a multistage area probability sample of households. Response rates for the core interview are considerably high, with the baseline response rate ranging from 47.4 % and 81.3 % across study entry cohorts and an average of being 73.0 % and re-interview response rates ranging from 68.8%–92.3% (Sonnega et al., 2014). We used five waves of panel data from 2006 to 2014. Starting in 2006, a random 50 % sample of HRS respondents were selected to receive a Psychosocial and Lifestyle questionnaire which was administered every other wave (every 4 years). The remaining 50 % followed the same process but starting in 2008. Thus, two distinct cohorts were formed: the first cohort had three psychosocial and lifestyle assessments in the years 2006, 2010 and 2014, and the second cohort had two assessments in years 2008 and 2012. We combined both cohorts into one sample with 3 measurement waves: wave 1 includes measurements in years 2006 and 2008, wave 2 years 2010 and 2012, and wave 3 includes the first cohort measurements in year 2014 (Fig. 1). Respondents of the Psychosocial and Lifestyle questionnaire module have sample weights to account for the complex sample design of the study. The weights are a product of three factors: 1) nursing home weights for a given wave; 2) a non-response adjustment factor obtained from a propensity model predicting Psychosocial and Lifestyle responses; 3) a post-stratification adjustment to the weighted HRS sample. More information is available in the HRS website (Ofstedal et al., 2011). For the statistical analyses, weights were scaled to sum up the observed sample size at each wave. The final sample was 19,140 individuals. This number indicates the number of participants that had valid data in binge drinking or the social capital indicators in at least one wave. More details about the sample size per wave is given in the supplementary material that can be found by accessing the online version of this paper at <http://dx.doi.org> and by entering doi: 10.1016/j.drugalcdep.2020.108099 and Table 1. HRS was approved by University of Michigan Health Sciences/Behavioral Sciences IRB Protocol: HUM00061128. Informed consent was obtained from all HRS respondents.

2.2. Measures

2.2.1. Binge drinking

Binge drinking was measured with the question: In the last three months, on how many days have you had four or more drinks on one occasion? The respondents answered a number from 0 to 92.

2.2.2. Social capital

2.2.2.1. Neighborhood social cohesion. In some studies, neighborhood social cohesion and neighborhood physical disorder are examined at the aggregated neighborhood level using multilevel modeling. However, this requires a nested study design with many residents clustered in many neighborhoods, which was not available in this sample. Therefore, this study focuses on individual perceptions of neighborhood social cohesion and neighborhood physical disorder. Perceived neighborhood social cohesion was assessed using a four-item scale that was developed and tested for use in two nationally representative studies of older adults (HRS and the English Longitudinal Study of Aging) (Smith et al., 2013). The scale assesses the respondent's perceived level of social cohesion and social trust in his or her neighborhood. Using a 7-point Likert scale, respondents indicated the

Fig. 1. Multilevel structural equation model to test the longitudinal relationship between number of binge drinking days and social capital.

degree to which they endorsed items such as the following: *I really feel part of this area*. More information on each indicator of social capital (items content, validity and reliability and range of the variable) is available in the Supplementary material that can be found by accessing the online version of this paper at <http://dx.doi.org> and by entering doi: 10.1016/j.drugalcdep.2020.108099.

2.2.2.2. Neighborhood physical disorder. The four items of the neighborhood physical disorder are from the same scale as the one above and assess the respondent's perceived level of physical disorder in the neighborhood using a 7-point Likert scale. One item example is the following: *People would be afraid to walk alone in this area after dark*.

2.2.2.3. Positive social support. The HRS study evaluated positive social support with a series of questions assessing social integration (number of ties) and the quality of interaction with those social ties (Kim and Kawachi, 2017; Mendes de Leon et al., 2009; Stafford et al., 2003). Separate questions are asked about the family. Using a 4-point Likert scale (1 a lot, 4 not at all), respondents answer items such as: *How much do they really understand the way you feel about things?*

2.2.2.4. Negative social support. Negative social support was evaluated asking for too demanding relationships. Separate questions are asked about the family. Using a 4-point Likert scale (1 a lot, 4 not at all), respondents answer items such as: *How often do they make too many*

Table 1

Descriptive statistics of number of days binge drinking, social capital and demographic variables by wave. The Health and Retirement study, United States data from 2006 to 2014.

	Wave 1 (2006,2008)		Wave 2 (2010, 2012)		Wave 3 (2014)	
	N	% or mean (SD)	N	% or mean (SD)	N	% or mean (SD)
Age	13,527	66.8 (10.3)	14,191	61.4 (10.5)	6651	59.3 (9.5)
Gender						
Males	5617	45.1	5896	45.7	2719	45.8
Females	7910	54.9	8295	54.3	3931	54.2
US born	12,466	92.6	12,918	92.2	6016	91.5
Foreign born	1049	7.4	1262	7.8	633	8.5
Race/ethnicity						
White	10,692	82.7	10,474	81.0	4815	80.5
Hispanic	787	5.3	950	5.4	473	5.7
African American	1768	9.5	2355	10.4	1159	10.4
Other	280	2.4	412	3.2	204	3.4
Education						
No Degree	2600	16.9	2263	13.3	972	12.0
GED High school diploma	7479	54.1	7833	52.9	3678	52.4
College degree	2266	18.8	2828	22.3	1363	23.2
Master and Professional degrees	1227	10.2	1413	11.5	703	12.4
Binge drinking days	4520	4.0 (14.0)	5536	3.3 (12.2)	2642	2.9 (11.2)
Binge drinking days > 0	1340	34.2	1816	36.1	814	34.8
Neighborhood social cohesion	12,897	22.0 (5.3)	13,599	21.8 (5.4)	6396	21.7 (5.3)
Neighborhood physical disorder (r) *	12,871	10.1 (3.7)	13,599	10.3 (3.4)	6391	10.1 (3.3)
Positive social support (r)	13,520	3.1 (0.5)	14,334	3.1 (0.6)	6735	3.1 (0.6)
Negative social support (r)	13,512	1.7 (0.5)	14,325	1.7 (0.5)	6732	1.6 (0.5)

Note: *(r) Reversed scale. Higher scores indicate higher values of neighborhood physical disorder, positive social support and negative social support.

demands on you?

2.2.2.5. Sociodemographic variables. All covariates included were assessed in 2006. Sociodemographic factors included: age, gender (male, female) and educational attainment (no degree, high school diploma or general educational development (GED), two year college degree or four year college degree, Masters and Professional degrees). We created the race/ethnicity variable combining information from race (White, African American or other) and from Hispanic origin (Mexican, Hispanic or Other). Final categories were White, African American, Hispanic, and Other not specified. We included continuous age evaluated at the five different time points.

2.3. Statistical analysis

First, we quantitatively examined whether there were differences between the individuals from both cohorts across waves so that we could combine these data. We found no differences across the cohorts, so we proceeded with the longitudinal analysis. The results of this comparative analysis are available in the Appendix. Second, we performed descriptive statistics of the sample characteristics at baseline, and the longitudinal variables (binge drinking and social capital indicators) at every wave. Third, we investigated the relationship between social capital indicators (perceived neighborhood social cohesion and neighborhood physical disorder, positive social support and negative social support) and binge drinking over time, with a multilevel structural equation modelling (MSEM) approach. This technique has several strengths. First, all available data are used in the analysis: individuals without complete data on binge drinking or social capital indicators are kept in the analyses, assuming missing information to be missing at random. Second, MSEM allows the investigation of the within-person effects (at the ‘assessment level’) separated from the between-person effects (at the ‘person’ level) in the same model.

The within-person effects represent individual changes at each wave – e.g., the influence of individual variations of social capital at a specific wave on binge drinking at the same wave within the same individual. The between-person effects represent the extent to which these variables are related overall (i.e. not time dependent). For example, the between-person effects measure if those who report overall high levels of the social capital indicators differ in their overall levels of binge drinking, compared to people who report overall low levels on the social capital indicators. Separation of the between and within effects allows to explain if the observed effects are due to person characteristics or time-varying individual conditions.

Both, binge drinking and social capital indicators were modelled longitudinally over time, and related to each other. Binge drinking was modeled as a hurdle negative binomial (Buu et al., 2012; Hilbe, 2011; Hu et al., 2011). The hurdle negative binomial model has two parts: 1) a logistic regression that models the probability of having exactly zero days of binge drinking - this first part captures the individuals that do not binge drink-, and 2) a truncated negative binomial regression that models the number of days binge drinking for those who binge drink (values equal or larger than 1). The negative binomial distribution includes a dispersion parameter that allows to adjust its variance independently of its mean. Both parts included a random intercept at the person level to account for the person characteristics that do not change over time, and both random intercepts were allowed to correlate. Both regression parts were adjusted for baseline covariates (age, gender, educational attainment and race/ethnicity). The social capital indicators were modelled as a normal longitudinal regression with a random intercept. At within level (wave), the social capital indicators predicted both the probability of having exactly zero drinks and the number of binge drinks, at each wave. At person (between) level, the random intercept of social capital was allowed to correlate with the two random intercepts from the binge drinking model. In all models, time was modelled as categorical, thus, without assuming any pre-specified

trend shape over time. The social capital indicators were introduced in the model one at a time, thus, there is one model per social capital indicator. For sensitivity analysis, we run the models stratifying for gender.

Let be Y_{ij} the number of days binge drinking for person i at wave j , X_{ij} a social capital variable, and Z_i the person-level covariates. μ_{ij} indicates the expected value of the number of drinks for those who drink, following a truncated negative binomial distribution ($\mu_{ij} \geq 1$). Time trend is modelled as categorical, including dummy variables for waves 2 and 3 (W2 and W3), thus wave 1 is the reference category. Regression parameters with superscript l refer to the logistic regression part, superscript n to the negative binomial regression, and s for the social capital model, with random intercepts are u_i^l , u_i^n and u_i^s , respectively, and e_{ij}^s refers to the within residuals of the social capital indicator. The applied MSEM model is expressed as follows:

$$X_{ij} = \beta_0^s + \beta_2^s W2 + \beta_3^s W3 + \beta_4^s Z_i + u_i^s + e_{ij}^s$$

$$\log it(P(Y_{ij} = 0)) = \beta_0^l + \beta_1^l X_{ij} + \beta_2^l W2 + \beta_3^l W3 + \beta_4^l Z_i + u_i^l$$

$$\log(\mu_{ij}|Y_{ij} \geq 1) = \beta_0^n + \beta_1^n X_{ij} + \beta_2^n W2 + \beta_3^n W3 + \beta_4^n Z_i + u_i^n$$

$$(u_i^l, u_i^n, u_i^s) \sim N \left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_l^2 & \sigma_{ln} & \sigma_{ls} \\ & \sigma_n^2 & \sigma_{ns} \\ & & \sigma_s^2 \end{bmatrix} \right)$$

The complex sampling design was taken into account in all the analyses, in order to obtain more reliable standard deviations and standard errors, using the Taylor series linearization method (Särndal et al., 1992). The individuals were clustered within primary stage units defined by U.S. Metropolitan Statistical Areas. Descriptive statistics were calculated using the Survey Procedures in SAS version 9.4, and the MSEM model was fitted using Mplus version 8 (Muthén and Muthén, 1998).

3. Results

Table 1 shows the descriptive statistics for the main variables of the study. The majority of participants were White. The most frequent educational degree was ‘GED High school diploma’, achieved by nearly the half of the sample. Over time, the average number of binge drinking days showed a decreasing trend from 4.0 (SD 14.0) to 2.9 days per month (SD 11.2). All the social capital indicators remained stable.

Table 2 shows the results for the longitudinal MSEM models. The fixed effects for the probability of “days binge drinking = 0” evaluates the factors that contribute to the probability of having zero days of binge drinking. The exponentiation of these β coefficients are interpreted as the OR of having zero days of binge drinking (thus, negative values in β coefficients indicate a risk effect and positive values indicate protective effects). The fixed effects for number of days binge drinking evaluates the factors that contribute to number of days binge drinking among those who drink. In this part, the exponentiation of these β coefficients indicates the factor that multiplies the expected number of days binge drinking (thus, negative values in β coefficients results in a factor lower than 1, indicating a protective effect, and positive values results in a factor higher than 1, increasing the number of days with binge drinking).

We observed that binge drinking decreases over time: the probability of zero days binge-drinking increases per wave, and the amount of binge-drinking days is also lower in waves 2 and 3 compared to wave 1. Being male was associated with a lower probability of having zero days binge drinking. In addition, comparing males and females with binge drinking, males had a higher number of days with binge drinking compared to females. Age and higher level of education were protective factors, since the higher the age and level of education the higher the probability of having zero days binge drinking. The amount of days

Table 2
Results from the multilevel structural equation modelling approach with the longitudinal hurdle negative-binomial models for the association of social capital indicators and number of days binge drinking. The Health and Retirement study, United States data from 2006 to 2014.

	Neighborhood social cohesion			Neighborhood physical disorder (r)			Positive social support (r)			Negative social support (r)		
	Estimate (SE)	p-value	Exp(B)	Estimate (SE)	p-value	Exp(B)	Estimate (SE)	p-value	Exp(B)	Estimate (SE)	p-value	Exp(B)
Fixed effects for												
Prob (Binge drinking days = 0)												
Intercept	-7.63 (0.59)	<0.01		-8.35 (0.81)	<0.01		-10.04 (1.37)	<0.01		-8.33 (0.88)	<0.01	
Wave 1 (Ref)												
Wave 2	0.45 (0.11)	<0.01	1.57	0.47 (0.11)	<0.01	1.60	0.50 (0.11)	<0.01	1.65	0.45 (0.11)	<0.01	1.57
Wave 3	0.85 (0.13)	<0.01	2.34	0.88 (0.13)	<0.01	2.42	0.92 (0.14)	<0.01	2.50	0.85 (0.14)	<0.01	2.35
Age (<i>baseline</i>)	0.16 (0.01)	<0.01	1.17	0.17 (0.01)	<0.01	1.18	0.18 (0.01)	<0.01	1.20	0.17 (0.01)	<0.01	1.19
Females (Ref)												
Males	-2.59 (0.14)	<0.01	0.08	-2.63 (0.15)	<0.01	0.07	-2.62 (0.16)	<0.01	0.07	-2.66 (0.14)	<0.01	0.07
Whites (Ref)												
Hispanics	0.00 (0.25)	0.99	1.00	0.70 (0.25)	0.78	1.07	0.12 (0.22)	0.58	1.13	0.13 (0.25)	0.60	1.14
African Americans	0.22 (0.19)	0.243	1.24	0.31 (0.19)	0.11	1.36	0.42 (0.21)	0.05	1.52	0.44 (0.18)	0.01	1.55
Other	-0.38 (0.36)	0.291	0.69	-0.31 (0.36)	0.40	0.74	0.18 (0.40)	0.96	1.02	-0.00 (0.37)	0.99	1.00
No degree (Ref)												
GED High school diploma	0.67 (0.18)	<0.01	1.96	0.83 (0.21)	<0.01	2.30	1.05 (0.26)	<0.01	2.84	0.846 (0.21)	<0.01	2.33
College degree	1.48 (0.24)	<0.01	4.39	1.69 (0.28)	<0.01	5.40	1.93 (0.35)	<0.01	6.87	1.71 (0.24)	<0.01	5.55
Master and Professional degrees	2.02 (0.24)	<0.01	7.55	2.22 (0.28)	<0.01	9.23	2.48 (0.33)	<0.01	11.98	2.27 (0.27)	<0.01	9.67
Social capital indicator*	-0.01 (0.02)	0.72	0.99	-0.01 (0.03)	0.66	0.99	0.15 (0.17)	0.40	1.16	-0.28 (0.25)	0.26	0.76
Fixed effects for number of binge drinking days												
Intercept	0.82 (0.23)	<0.01		0.80 (0.51)	0.11		1.82 (0.87)	0.04		2.08 (0.38)	<0.01	
Wave 1 (Ref)												
Wave 2	-0.26 (0.06)	<0.01	0.77	-0.26 (0.06)	<0.01	0.77	-0.30 (0.07)	<0.01	0.74	-0.30 (0.09)	<0.01	0.74
Wave 3	-0.38 (0.08)	<0.01	0.68	-0.36 (0.07)	<0.01	0.70	-0.42 (0.07)	<0.01	0.65	-0.42 (0.08)	<0.01	0.66
Age	-0.00 (0.00)	0.30	0.99	-0.00 (0.01)	0.63	1.00	-0.02 (0.01)	0.05	0.99	-0.03 (0.00)	<0.01	0.97
Females (Ref)												
Males	0.99 (0.10)	<0.01	2.69	1.05 (0.90)	<0.01	2.85	1.04 (0.10)	<0.01	2.82	1.00 (0.09)	<0.01	2.71
Whites (Ref)												
Hispanics	-0.49 (0.13)	0.01	0.62	-0.40 (0.14)	<0.01	0.67	-0.48 (0.16)	<0.01	0.62	-0.64 (0.15)	<0.01	0.53
African Americans	-0.20 (0.10)	0.05	0.82	-0.17 (0.11)	0.14	0.85	-0.21 (0.10)	0.04	0.81	-0.31 (0.10)	<0.01	0.73
Other	0.20 (0.24)	0.41	1.22	0.23 (0.26)	0.38	1.26	0.18 (0.26)	0.48	1.20	0.05 (0.27)	0.86	1.05
No degree (Ref)												
GED High school diploma	-0.42 (0.12)	<0.01	0.66	-0.32 (0.15)	0.03	0.72	-0.48 (0.15)	<0.01	0.62	-0.71 (0.12)	<0.01	0.49
College degree	-0.75 (0.12)	<0.01	0.47	-0.61 (0.17)	<0.01	0.54	-0.82 (0.17)	<0.01	0.44	-1.04 (0.13)	<0.01	0.35
Master and Professional degrees	-1.13 (0.14)	<0.01	0.32	-1.01 (0.16)	<0.01	0.36	-1.19 (0.16)	<0.01	0.30	-1.38 (0.14)	<0.01	0.25
Social capital indicator	0.01 (0.01)	0.59	1.01	-0.03 (0.01)	0.05	0.97	-0.13 (0.13)	0.31	0.88	0.32 (0.15)	0.03	1.37
Dispersion parameter (neg. binomial)	0.57 (0.06)			0.56 (0.06)			0.58 (0.06)			0.56 (0.06)		
Fixed effects for social capital indicator												
Intercept	21.88 (0.10)	<0.01		10.18 (0.06)	<0.01		3.13 (0.01)	<0.01		1.68 (0.01)	<0.01	
Wave 1 (Ref)												
Wave 2	-0.13 (0.06)	0.02		0.30 (0.06)	<0.01		0.01 (0.01)	0.38		-0.03 (0.01)	<0.01	
Wave 3	-0.31 (0.08)	<0.01		0.12 (0.06)	0.05		-0.01 (0.01)	0.42		-0.08 (0.01)	<0.01	
Random effects	13.84 (0.38)			6.97 (0.20)			0.11 (0.00)			0.08 (0.00)		
Residual variance for social capital indicator												
VP: Variance random intercept P (binge = zero)	11.91 (0.84)			12.45 (0.85)			12.80 (1.08)			12.49 (0.74)		

(continued on next page)

Table 2 (continued)

	Neighborhood social cohesion			Neighborhood physical disorder (r)			Positive social support (r)			Negative social support (r)		
	Estimate (SE)	p-value	Exp(B)	Estimate (SE)	p-value	Exp(B)	Estimate (SE)	p-value	Exp(B)	Estimate (SE)	p-value	Exp(B)
VN: Variance random intercept number of binge drinking days	2.37 (0.12)			2.40 (0.13)			2.41 (0.15)			2.42 (0.12)		
VS: Variance random intercept social capital indicator	14.33 (0.40)			5.06 (0.19)			0.18 (0.00)			0.14 (0.00)		
Correlation random intercepts												
VP with VN	-0.54 (0.05)	0.00		-0.55 (0.04)	<0.01		-0.57 (0.06)	<0.01		-0.56 (0.04)	<0.01	
VS with VP	0.03 (0.03)	0.37		0.01 (0.03)	0.81		0.00 (0.03)	0.99		-0.01 (0.03)	0.81	
VS with VN	-0.06 (0.04)	0.14		0.11 (0.04)	0.01		0.03 (0.04)	0.43		-0.08 (0.05)	0.09	

Note: (r) Reversed scale. Higher scores indicate higher values of neighborhood physical disorder, positive social support and negative social support.

*Each model examines the relation of the social capital indicator indicated up in each column with binge drinking days.

binge drinking for those who drink also decreased with higher education. Hispanic participants that binge drunk showed lower number of days binge drinking, compared to Whites and African Americans.

At the within-person level, negative social support was associated with higher number of days binge drinking among those who drink. A one unit of increase on negative social support was associated with an increase of 37 % in the expected number of days binge drinking in the same wave. Positive social support and neighborhood social cohesion were not associated with binge drinking. At the person level, the correlation between the random intercepts for probability of zero days binge drinking and the amount of days binge drinking were large and negative (between -0.54 and -0.57), meaning that individuals who tend to binge-drink (low probability of zero days binge drinking) will have also higher expected amount of days binge drinking. No relevant correlations between binge drinking and the social capital indicators were found at person level. Thus, overall levels of social capital were not related with overall levels of binge drinking. When stratifying for gender, the association of positive social support on the number of binge drinking days (within effect) was stronger for females (-0.59 (SE = 0.12)) compared to males (-0.37 (SE = 0.13)), while negative social support and neighborhood social cohesion were significantly associated with binge drinking in females (0.40 (SE = 0.18) and -0.05 (SE = 0.01), respectively), but not in males.

4. Discussion

We examined the association between social capital and binge drinking among older adults in a representative sample of the US population. We selected four different social capital indicators related to social support and perceived neighborhood social environment. In older adults, social capital indicators were associated with the number of days binge drinking, especially in women. Within-person effects (at the 'assessment level'), showed that positive social support and neighborhood social cohesion were associated with the number of days binge drinking in females and acted as protective factors, while negative social support was a risk factor for males and females. Thus, we only partially confirmed our hypotheses. In addition, we confirmed a decreasing time trend of binge drinking in older adults. Both, prevalence of binge drinking, and the amount of binge-drinking days for those who binge drink, decreased over time.

Negative social support favored binge drinking. This was expected since the social capital indicators used to create this variable are related to the perception that the circle of family and friends is too demanding, critical, lets the participant down and gets on his/her nerves. In contrast to evidence from the literature in younger age groups, positive social support did not promote binge drinking (via behavioral social contagion). Positive social support was a protective factor for females. This was expected since the information collected to create this variable is related to positive support such as relying on family members and friends, being understood by family members and friends and receiving support from them to talk about worries. Hence, this finding is not related to behavioral social contagion and we cannot confirm that this sample of older adults has certain bonds that can be too demanding and, consequently, have a negative relationship with binge drinking. Also, our sample does not report excessive demands on group members with negative effects (Portes, 2014) compared to other studies with younger adults (Koutra et al., 2014; Lorant and Nicaise, 2015; Martins et al., 2017; Takakura, 2015).

To understand the different effects of the social capital indicators it is crucial to take into account the difference in the effects of social capital according to the stage of the life course, as well as the difference according to whether the activity is altruistic (like volunteering) versus self-regarding (hanging out and having a good time with peers). In fact, what we observe in previous studies in younger ages is that the relationship of social capital and binge drinking is highly dependent on the indicator of social capital adopted. What we observed previously

was that participation in extracurricular school activities and belonging to more cohesive groups were risk factors. By contrast, involvement in pro-social activities such as volunteering as well as religious service attendance were protective (Åslund and Nilsson, 2013; Folland, 2006; Rasic et al., 2011; Weitzman and Chen, 2005; Weitzman and Kawachi, 2000).

Binge drinking is specially performed socially and in groups. While this association has been established in youth, the association was less clear in older adults (Child et al., 2017). Our results confirm the complexity of the phenomenon. Our study suggests that, at older ages, binge drinking decreases and that social influence does not increase the propensity for the spread of harmful behaviors. On the contrary, positive social support and neighborhood social cohesion should be promoted to positively affect females, whereas strategies that target the protection against negative social support, as well as personal resources for coping with too demanding relationships are in need for both males and females. In addition, being male and lower socioeconomic levels in terms of income and education were the factors that made older adults more vulnerable to binge drink. Because of residential segregation, being less wealthy and having less education are associated with residence in disadvantaged neighborhoods, which may lead to greater exposure to alcohol advertisements (e.g. outdoor billboards), as well as higher density of bars (McKinney et al., 2012).

This study has several limitations. It is difficult to compare our results with the results of other studies with different indicators of social capital and different study designs. Moreover, there is debate about whether social support is considered a part of social capital. However, according to the commonly accepted definition of social capital – i.e., resources available through social networks (Moore and Kawachi, 2017)– social support could be considered to be an aspect of social capital. Other indicators of social capital such as trust should be included in future studies to observe its relationship with social capital in the neighborhoods. In addition, we did not use measures such as volunteering as an indicator of social capital because we wanted to avoid confounding the concept of social capital with pro-social and altruistic acts (which have separate connotations for the prevention of “deviant” behaviors such as binge drinking). This study also has a number of considerable strengths. The data used came from a large and richly characterized cohort, which is prospective, and nationally representative of U.S. adults aged ≥ 50 years. We have incorporated the data of five different waves to get a longitudinal perspective of the variables under study and we have evaluated associations at person level (overall) and within waves.

Positive social support and neighborhood social cohesion are protective factors for binge drinking, especially for women, while males seem less influenced by these forces. Our study extends existing research on social capital and binge drinking, using a representative sample of older adults. Our findings add evidence to the body of knowledge about the importance of addressing social isolation and loneliness in this population, a growing public health issue in the United States, as recently reported by the National Academies of Sciences, Engineering, and Medicine (The National Academies of Sciences, Engineering, Medicine, 2020). To increase positive social support and neighborhood social cohesion and avoid social isolation, it is important to consider interventions such as the one developed by Coll-Planas et al. targeting older adults. The authors developed a successful co-ordinated action to build a network of community assets and a group-based program to promote support for older adults in Spain and fight against social isolation (Coll-Planas, 2015). More research is needed to evaluate differences in the types of social capital, such as bonding and bridging social capital and their relationship with binge drinking.

Contributors

EVO conceived and wrote the manuscript, JA analyzed the data and

made critical revisions to the manuscript, FS made critical revisions to the manuscript, IK wrote the manuscript.

Role of funding source

None declared.

All authors have read and approved the final manuscript.

Declaration of Competing Interest

None declared.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.drugalcdep.2020.108099>.

References

- Åslund, C., Nilsson, K.W., 2013. Social capital in relation to alcohol consumption, smoking, and illicit drug use among adolescents: a cross-sectional study in Sweden. *Int. J. Equity Health* 12, 33. <https://doi.org/10.1186/1475-9276-12-33>.
- Bloomfield, K., Stockwell, T., Gmel, G., Rehn, N., 2003. International comparisons of alcohol consumption. *Alcohol Res. Health* 27, 95–109.
- Buu, A., Li, R., Tan, X., Zucker, R.A., 2012. Statistical models for longitudinal zero-inflated count data with applications to the substance abuse field. *Stat. Med.* 31, 4074–4086. <https://doi.org/10.1002/sim.5510>.
- Child, S., Stewart, S., Moore, S., 2017. Perceived control moderates the relationship between social capital and binge drinking: longitudinal findings from the Montreal Neighborhood Networks and Health Aging (MoNNET-HA) panel. *Ann. Epidemiol.* 27, 128–134. <https://doi.org/10.1016/j.annepidem.2016.11.010>.
- Promoting social capital to alleviate loneliness and improve health among older people in Spain Laura Coll-Planas MD Gabriela del Valle Gómez MSc Petra Bonilla MSW Teresa Masat MD Teresa Puig MD PhD Rosa Monteserín MD PhD First published: 01 October 2015 <https://doi.org/10.1111/hsc.12284>.
- Folland, S., 2006. Smoking, Binge Drinking and the Social Capital of Marriage and Children (SSRN Scholarly Paper No. ID 899457). Social Science Research Network, Rochester, NY.
- Hilbe, Joseph M., 2011. Negative Binomial Regression by Joseph M. Hilbe. Cambridge University Press. <https://www.cambridge.org/core/books/negative-binomial-regression/12D6281A46B9A980DC6021080C9419E7>.
- Hu, M.C., Pavlicova, M., Nunes, E.V., 2011. Zero-inflated and hurdle models of count data with extra Zeros: examples from an HIV-Risk reduction intervention trial. *Am. J. Drug Alcohol Abuse* 37, 367–375. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3238139/>.
- Kim, E.S., Kawachi, I., 2017. Perceived neighborhood social cohesion and preventive healthcare use. *Am. J. Prev. Med.* 53, e35–e40. <https://doi.org/10.1016/j.amepre.2017.01.007>.
- Koutra, K., Kritsotakis, G., Orfanos, P., Ratsika, N., Kokkevi, A., Philalithis, A., 2014. Social capital and regular alcohol use and binge drinking in adolescence: a cross-sectional study in Greece. *Drugs Educ. Prev. Policy* 21, 299–309. <https://doi.org/10.3109/09687637.2014.899994>.
- Lorant, V., Nicaise, P., 2015. Binge drinking at University: a social network study in Belgium. *Health Promot. Int.* 30, 675–683. <https://doi.org/10.1093/heapro/dau007>.
- Martins, J.G., Paiva, H.Nde, Paiva, P.C.P., Ferreira, R.C., Pordeus, I.A., Zarzar, P.M., Kawachi, I., 2017. New evidence about the “dark side” of social cohesion in promoting binge drinking among adolescents. *PLoS One* 12, e0178652. <https://doi.org/10.1371/journal.pone.0178652>.
- McKinney, C.M., Chartier, K.G., Caetano, R., Harris, T.R., 2012. Alcohol availability and neighborhood poverty and their relationship to binge drinking and related problems among drinkers in committed relationships. *J. Interpers. Violence* 27, 2703–2727. <https://doi.org/10.1177/0886260512436396>.
- Mendes de Leon, C.F., Cagney, K.A., Bienias, J.L., Barnes, L.L., Skarupski, K.A., Scherr, P.A., Evans, D.A., 2009. Neighborhood social cohesion and disorder in relation to walking in community-dwelling older adults: a multilevel analysis. *J. Aging Health* 21, 155–171. <https://doi.org/10.1177/0898264308328650>.
- Moore, S., Kawachi, I., 2017. Twenty years of social capital and health research: a glossary. *J. Epidemiol. Community Health* 71, 513–517. <https://doi.org/10.1136/jech-2016-208313>.
- Muthén, L.K., Muthén, B.O., 1998. *Mplus User's Guide*, seventh edition. Muthén & Muthén, Los Angeles, CA.
- The National Academies of Sciences, Engineering, Medicine, 2020. The Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults | National Academies. <https://www.nationalacademies.org/our-work/the-health-and-medical-dimensions-of-social-isolation-and-loneliness-in-older-adults>.
- Ofstedal, M.B., Weir, D., Chen, K.-T., 2011. Updates to HRS Sample Weights. Survey Research Center, Institute for Social Research, University of Michigan <https://doi.org/10.7826/ISR-UM.06.585031.001.05.0025.2011>.

- Portes, A., 2014. Downsides of social capital. *Proc. Natl. Acad. Sci. U. S. A.* 111, 18407–18408. <https://doi.org/10.1073/pnas.1421888112>.
- Rasic, D., Kisely, S., Langille, D.B., 2011. Protective associations of importance of religion and frequency of service attendance with depression risk, suicidal behaviours and substance use in adolescents in Nova Scotia, Canada. *J. Affect. Disord.* 132, 389–395. <https://doi.org/10.1016/j.jad.2011.03.007>.
- Ritchie, H., Roser, M., 2018. Alcohol Consumption. Our World Data. University of Oxford. *Springer Series in Statistics*. Springer-Verlag, New York.
- Seid, Ak., Hesse, M., Bloomfield, K., 2016. 'Make it another for me and my mates': does social capital encourage risky drinking among the Danish general population? *Scand. J. Public Health* 44, 240–248. <https://doi.org/10.1177/1403494815619536>.
- Smith, J., Fisher, G., Ryan, L., Clarke, P., House, J., Weir, D., 2013. Psychosocial and lifestyle questionnaire. *Surv. Res. Cent. Inst. Soc. Res.*
- Sonnega, A., Faul, J.D., Ofstedal, M.B., Langa, K.M., Phillips, J.W.R., Weir, D.R., 2014. Cohort profile: the health and retirement study (HRS). *Int. J. Epidemiol.* 43, 576–585. <https://doi.org/10.1093/ije/dyu067>.
- Stafford, M., Bartley, M., Sacker, A., Marmot, M., Wilkinson, R., Boreham, R., Thomas, R., 2003. Measuring the social environment: social cohesion and material deprivation in English and Scottish neighbourhoods. *Environ. Plan. A* 35, 1459–1475. <https://doi.org/10.1068/a35257>.
- Takakura, M., 2011. Does social trust at school affect students' smoking and drinking behavior in Japan? *Soc. Sci. Med. (Phila)* 72, 299–306. <https://doi.org/10.1016/j.socscimed.2010.11.003>.
- Takakura, M., 2015. Relations of participation in organized activities to smoking and drinking among Japanese youth: contextual effects of structural social capital in high school. *Int. J. Public Health* 60, 679–689. <https://doi.org/10.1007/s00038-015-0697-4>.
- Theall, K.P., DeJong, W., Scribner, R., Mason, K., Schneider, S.K., Simonsen, N., 2009. Social capital in the college setting: the impact of participation in campus activities on drinking and alcohol-related harms. *J. Am. Coll. Health* 58, 15–23. <https://doi.org/10.3200/JACH.58.1.15-25>.
- Villalonga-Olives, E., Kawachi, I., 2017. The dark side of social capital: a systematic review of the negative health effects of social capital. *Soc. Sci. Med.* 194, 105–127. <https://doi.org/10.1016/j.socscimed.2017.10.020>.
- Weitzman, E., Chen, Y., 2005. Risk modifying effect of social capital on measures of heavy alcohol consumption, alcohol abuse, harms, and secondhand effects: national survey findings. *J. Epidemiol. Community Health* 59, 303–309. <https://doi.org/10.1136/jech.2004.024711>.
- Weitzman, E.R., Kawachi, I., 2000. Giving means receiving: the protective effect of social capital on binge drinking on college campuses. *Am. J. Public Health* 90, 1936–1939.