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Associations between social capital and depression: A study of adult twins

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ABSTRACT

Social capital is associated with depression independently of individual-level risk factors. We used a sample of 1586 same-sex twin pairs to test the association between seven measures of social capital and two related measures of neighborhood characteristics with depressive symptoms accounting for uncontrolled selection factors (i.e., genetics and shared environment). All measures of cognitive social capital and neighborhood characteristics were associated with less depressive symptoms in between-twin analysis. However, only measures of cognitive social capital were significantly associated with less depressive symptoms within-pairs. These results demonstrate that cognitive social capital is associated with depressive symptoms free of confounding from genetic and environmental factors shared within twins.

1. Introduction

Depression is predicted to be among the top three contributors to the global burden of disease by 2020 (Murray and Lopez, 1997). During 2009–2012, roughly 8% of Americans aged 12 and over had moderate or severe depressive symptoms in the past 2 weeks (Pratt and Brody, 2014). Furthermore, between 1995 and 2005, outpatient visits for depression increased by 48% (Middleton et al., 2007). Identifying risk factors for depression has thus become increasingly important in public health.

One measure that has been studied extensively in the public health literature over the past twenty years is social capital (Moore and Kawachi, 2017), broadly defined as the emotional, economic, and informational resources available to individuals and groups through their social networks. However, the use of social capital in research poses methodological challenges for several reasons; chief among them is that it has no universally accepted definition. Rather, it is a broad concept that is composed of several domains which can be measured at either the individual- or group-level. This poses problems when trying to compare results across studies. Further, although social capital has been linked to various health outcomes (Fujiwara and Kawachi, 2008b, 2008a; Kawachi et al., 1997; Kouvonen et al., 2008; Sundquist et al., 2006), there is little consensus on which domains are most essential for health (Murayama et al., 2012).

Presently, social capital is often divided into cognitive and structural domains. Cognitive social capital refers to perceptions, such as the sense of belonging to a community, while structural social capital refers to behaviors and activities, such as participation in organizations and volunteerism (Harpham et al., 2002; Uphoff et al., 2013). Social capital can additionally be divided into bonding, bridging, and linking capital (Szreter and Woolcock, 2004). Bonding social capital connects people of similar attributes or social identities, bridging social capital connects people that differ in their characteristics, and linking social capital connects people along an explicitly vertical power structure (Putnam, 2004; Szreter and Woolcock, 2004; Whitley and Mckenzie, 2005).

Although findings are mixed, there is greater evidence for an association between depression and cognitive, as compared to structural, social capital. A 2005 literature review found that seven of eleven studies investigating associations between individual-level cognitive social capital – including neighborhood attachment, sense of community, and trust – and common mental disorders such as depression and anxiety found significant inverse associations, while the remaining four

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had null results (De Silva et al., 2005). The same review found more varied results among individual-level structural social capital; of the 11 studies included, three showed significant inverse associations (primarily with social participation), seven showed null associations, and one showed a positive association (with group membership). Further, none of the studies included measures of bridging or linking social capital, and less research has been devoted to understanding the differences in the bonding, bridging, and linking domains (De Silva et al., 2005).

Despite the observed associations between social capital and depression in the literature, causal inferences from these studies are limited because the reported relationships may be confounded by genetic and shared environmental factors that affect both social capital and depression. It might be, for example, that genetic predispositions to greater social capital also effect depression, inducing a statistical association in the absence of a causal effect. Similarly, shared environmental variables such as social support and peer groups could affect both social capital and depression.

Twin designs address these limitations by inherently controlling for confounding due to genetic and childhood environment factors shared between twins within a pair (Turkheimer and Harden, 2014). However, only one previous study has used a twin design to overcome the above limitations in exploring the association between social capital and depression, and its findings were mixed (Fujiwara and Kawachi, 2008b). In that study, an inverse association between depression and sense of belonging, social trust, and community participation was reported among fraternal but not identical twins, whereas there was no association between volunteerism and depression.

This study addresses these gaps in the literature by examining the association between different domains of social capital and depressive symptoms, controlling for confounding due to genetic and childhood environment factors shared between twins within a pair. We hypothesize that higher levels of social capital will be associated with less depressive symptoms both between and within-pairs of twins.

2. Materials and methods

2.1. Study population

We conducted a cross-sectional analysis using data from a community-based registry of adult twins raised together. Construction of the registry is described elsewhere (Strachan et. al., 2013). Briefly, twins are initially identified by the [Washington State Department of Licensing], and are then sent a recruitment (and subsequently follow-up) survey providing information on sociodemographics, lifestyle behaviors, and health outcomes. All twins in the present study were from same-sex pairs. Twins were categorized as either identical (monozygotic, MZ) or fraternal (dizygotic, DZ) using standard questions about childhood similarity that have been shown to have greater than 90% accuracy at identifying zygosity when compared to DNA-based methods (Eisen et al., 1989; Spitz et al., 1996).

Twins enrolled in the registry received electronic or paper surveys asking about their social capital and the presence of depressive symptoms in 2015. Twins contacted electronically received three email reminders about the study; twins contacted by mail received one follow-up mailing. Because respondents were included in the analysis only if both twins in the pair completed the survey, non-responders whose co-twin had completed the survey may have also received a follow-up phone call. Of the 8130 individuals contacted, 2561 (31.5%) completed and returned the survey; 1586 (19.5%) were members of a complete pair.

Monozygotic twins comprised approximately 76% of the analytic sample. Most twins lived in Washington State (68%); however, twins lived in the District of Columbia and 44 other states. All procedures were reviewed and approved by the local institutional review board.

2.2. Measures

2.2.1. Exposures

We measured several domains of social capital in this study; all domains were derived from self-report and conceptualized at the individual-level.

2.2.2. Social capital

2.2.2.1. Cognitive social capital. We included four domains of cognitive social capital: sense of belonging, neighborhood social cohesion, workplace connections, and trust. These domains are described individually below with supporting citations. For sense of belonging, neighborhood social cohesion, and vertical workplace connections, respondents were asked to rate their agreement (1 Strongly disagree; 2 Disagree; 3 Neutral; 4 Agree; 5 Strongly agree) with several statements. For each domain, responses to the statements were averaged to create an overall score; the internal consistency of each scale was measured by Cronbach's α.

Sense of belonging was assessed through three statements: I don't feel I belong to anything I'd call a community; I feel close to other people in my community; My community is a source of comfort. The response to the first statement was reverse-coded before averaging. This measure has been previously used in studies linking sense of belonging to depression (Fujiwara and Kawachi, 2008b, 2008a; Lochner et al., 1999). The internal consistency (Cronbach's α) of the scale in our sample was 0.84.

Neighborhood social cohesion used the following five statements (Sampson et al., 1997): People in this neighborhood can be trusted; This is a close-knit neighborhood; People around here are willing to help their neighbors; People in this neighborhood generally don't get along with each other; People in this neighborhood do not share the same values. The last two statements were reverse-coded before averaging. This is one of the most commonly used measures of social cohesion in public health research (Harpham et al., 2002). The Cronbach's α for the scale in our sample was 0.83.

The vertical workplace connections domain was assessed by the following three statements: We can trust our supervisor; Our supervisor treats us with kindness and consideration; Our supervisor shows concern for our rights as employees. We include this as a measure of cognitive social capital and not structural social capital because it refers to an individual's perceptions of their work relationships. These questions have been linked to depression and antidepressant use in previous research (Kouvonen et al., 2008; Oksanen et al., 2010). The Cronbach's α for the scale in our sample was 0.93.

We used two individual measures to conceptualize the broad category of trust; a question about general trust (What percentage of people can be trusted?) and a question about political or governmental trust (To what degree do you trust the local/city government?) (Engstrom et al., 2008). For governmental trust, respondents could indicate five options: very high, high, not particularly high, and not at all.

Because communities and neighborhoods are often homogenous in terms of residents' characteristics, sense of belonging and neighborhood social cohesion are thought to capture measures of bonding social capital (Szreter and Woolcock, 2004). In contrast, the vertical workplace connections domain explicitly asks about relations in a hierarchical power structure, making it a measure of linking social capital (Kouvonen et al., 2008; Oksanen et al., 2010). General trust is not easily placed into a bonding or bridging category, while governmental trust captures linking social capital by asking about the respondent's perception of a political hierarchy.

2.2.2.2. Structural social capital. Structural social capital was measured through questions about volunteerism, community

participation, and social interaction (Fujiwara and Kawachi, 2008b, 2008a; Putnam, 1993). Respondents were asked to indicate the number of hours per month they volunteered in a healthcare setting, at a youth-related activity, for a political organization or cause, or in any other local organization. For community participation, respondents were asked to indicate the number of hours per month they spent at religious services or meetings of religious groups, union or professional meetings, sports or social gatherings, and other groups. For both volunteering and community participation, responses were summed to create a measure of total hours per month. These questions capture a mix of bonding and bridging social capital, depending on the membership of the organizations (Szreter and Woolcock, 2004).

Social interaction was assessed through two questions (Sampson and Raudenbush, 2004): respondents were asked to indicate how often (1 Never; 2 Rarely; 3 Sometimes; 4 Often) people in their neighborhood had parties or get-togethers; and how often people in their neighborhood ask each other for advice about personal matters such as child-rearing or job openings. Each question was included separately in the analysis. As mentioned above, neighborhoods are frequently homogenous in terms of residents' characteristics; thus social interaction is considered a measure of bonding social capital (Szreter and Woolcock, 2004).

2.2.3. Neighborhood characteristics

We also measured informal social control and perceptions of safety as neighborhood characteristics associated with social capital. To assess informal social control, respondents were asked to rate their agreement with the statement: Neighbors could be counted on to intervene if children were spray-painting graffiti on a local building (Sampson et al., 1997). To assess perceptions of neighborhood safety, respondents were asked to rate their agreement with a single statement (My neighborhood is safe from the threat of crime). Both questions used the same 5-point Likert scale described above.

2.2.4. Outcome

The presence of depressive symptoms was measured by the 2-item Patient Health Questionnaire (PHQ-2), a subset of the longer 9-item scale (PHQ-9). The PHQ-2 measures self-reported depression through questions about the cardinal symptoms from the PHQ-9: depressed mood and the inability to experience pleasure. Respondents were asked how often in the last 4 weeks they had been bothered by either symptom (0 Not at all; 1 Several days; 2 More than half the days; 3 Nearly every day). Answers to the two questions were then summed to create a scale ranging from 0 to 6. The measure has been validated in other populations using the DSM-IV as the gold standard; predictive validity was measured as rater agreement with a mental health professional interview ($\kappa = 0.62$) (Kroenke et al., 2003). The PHQ-2 has also shown acceptable validity compared to the longer scale (sensitivity 91%, specificity 78%) (Carey et al., 2016).

2.2.5. Covariates

Traditional confounders of age, sex, and race/ethnicity were not included in the analysis because they are inherently controlled for in the twin model. We decided *a priori* to include income, education, and marital status because these factors can influence both social capital and depression (Clark and Ledwith, 2007; Reiss, 2013; Turner and Lloyd, 1999; Inaba et al., 2005; Bierman, 2009), and are also factors that can vary within-twins.

2.3. Statistical analysis

The analysis employed a multi-level random intercept model, with the outcome assumed to follow a Poisson distribution. The random intercept accounts for the correlation between twins within a pair. To estimate the within-pair effects that inherently adjust for shared genetic and childhood environmental characteristics, we used the following Poisson model (Carlin et al., 2005):

$$\log(\lambda_{ij}) = \beta_0 + \beta_B * x_i + \beta_W * (x_{ij} - x_i) + \mu_I,$$

where λ_{ij} represents the risk of depressive symptoms for twin j in pair i as a function of the mean social capital of twin-pair i, x_i, and each individual twin's deviation from their twin-pair mean, $(x_{ij} - x_i)$. Finally, μ_i represents the random intercept for twin pair i.

Due to the nature of the twin model, the within-pair effect (β_W) is not subject to confounding by shared genetic or childhood environment factors. When exponentiated, it can be interpreted as the ratio of depressive symptoms associated with a one-unit difference in social capital within a twin pair, conditional on the mean social capital of the twin-pair. The between-pair effect, β_B, while not intuitively interpretable, represents the extra variation in depressive symptoms due to differences between twin pairs (Carlin et al., 2005).

Because β_W is only subject to confounding due to factors that differ between twins within a pair, and β_B is subject to confounding due to all factors not included as covariates in the model, a comparison of the two coefficients can give a suggestion of the relative contribution of the within- and between-pair effects to the variation in depressive symptoms. If the two coefficients are similar, the difference in depressive symptoms associated with a one-unit difference in social capital would be the same for twins within a pair as for unrelated individuals, indicating that the observed association is not confounded by characteristics that differ between pairs (e.g. childhood environment and upbringing). By contrast, a significant difference between the coefficients, for example assessed by the likelihood ratio test, would suggest the presence of confounders operating between pairs (Carlin et al., 2005).

Because MZ twins share all their genes but DZ twins share only half their genes, we conducted a sensitivity analysis assessing the within-pair association between each social capital measure and depressive symptoms, stratified by zygosity. We did this by testing the statistical significance of an interaction term between the within-pair difference in social capital and zygosity. A statistically significant interaction term would suggest the presence of genetic confounding in the observed within-pair association.

We first regressed depressive symptoms on each social capital variable (unadjusted, Model A), then added the individual-level covariates of income, education, and marital status into the model (Model B). All probability values were 2-sided, and the significance level was set at 0.05. The analysis was done in STATA Release 13 (StataCorp, College Station, TX).

3. Results

Table 1 gives select characteristics of twins who received the social capital survey, stratified by pair completeness. If both twins within a pair completed the survey, they are included in the columns labelled complete pairs; individuals who completed the survey while their co-twins did not are in the columns labelled incomplete pairs. Individuals who did not return the survey are in the columns labelled non-responders. There are a few differences between the groups. Of note, complete pairs were slightly more likely to be female, monozygotic, and living as married, and to have higher incomes and educational attainment than incomplete pairs and non-responders. Age was similar across the three groups (48.9 ± 16.8, 45.8 ± 16.8, and 39.6 ± 17.3, respectively).

3.1. Cognitive social capital

Sense of belonging, neighborhood cohesion, workplace connections, and both measures of trust all showed significant unadjusted between

Table 1
Select characteristics of adult twins from a community-based twin registry, 2015.

	Complete Pairs		Incomplete Pairs		Non-responders	
	N = 1586		N = 975		N = 5569	
	N	%	N	%	N	%
Male	428	27.0	332	34.1	2047	36.8
White	1503	94.8	914	93.7	5071	91.1
Hispanic	42	2.7	41	4.2	233	4.2
MZ twins	1200	75.7	653	67.0	3894	69.9
Income						
< $60,000	603	38.0	420	43.1	2619	47.0
> $60,000	983	62.0	555	56.9	2950	53.0
Education						
Less than HS	20	1.3	16	1.6	187	3.4
HS grad	163	10.3	125	12.8	1002	18.0
Some college	466	29.4	324	33.2	2065	37.1
Bachelors or more	933	58.8	507	52.0	2281	41.0
Marital status						
Single	302	19.0	259	26.6	2001	35.9
Living as married	1051	66.3	602	61.7	2840	51.0
Previously married	196	12.4	106	10.9	660	11.9

Data shown as the sample size and percentage (note, percentages include missing values).

Table 2
Associations between depression and cognitive social capital among adult twins from a community based twin registry, 2015.

	Unadjusted model		Adjusted model[a]	
	exp(β)	95% CI	exp(β)	95% CI
Sense of belonging				
Between-pair	0.56	0.49, 0.65	0.57	0.50, 0.66
Within-pair	0.79	0.69, 0.91	0.80	0.69, 0.92
Neighborhood cohesion				
Between-pair	0.43	0.36, 0.53	0.48	0.39, 0.57
Within-pair	0.76	0.63, 0.92	0.82	0.67, 0.99
Workplace connections				
Between-pair	0.70	0.61, 0.79	0.69	0.60, 0.78
Within-pair	0.74	0.65, 0.84	0.76	0.67, 0.86
Trust				
General				
Between-pair	0.84	0.79, 0.89	0.85	0.81, 0.90
Within-pair	0.90	0.85, 0.96	0.92	0.87, 0.98
Government				
Between-pair	0.69	0.57, 0.84	0.76	0.62, 0.93
Within-pair	0.64	0.54, 0.78	0.70	0.58, 0.85

CI, confidence interval.
[a] Adjusted for individual-level income, education, and marital status.

and within-pair associations with depressive symptoms (Table 2). The inclusion of other covariates did not substantially change the magnitude or statistical significance of the within-pair coefficients. Adjusted for sociodemographic characteristics, a one-unit difference in sense of belonging was associated with 20 percent less depressive symptoms within twins, a one-unit difference in neighborhood social cohesion was associated with 18 percent less depressive symptoms within-twins, and a one-unit difference in workplace connections was associated with 24 percent less depressive symptoms within-twins.

We used the likelihood ratio test to compare the adjusted within- and between-pair coefficients. There was a non-significant difference for sense of belonging ($p = 0.074$) and for neighborhood social cohesion ($p = 0.050$), suggesting the presence of confounding factors operating between pairs (e.g. differences in childhood environment). The adjusted within- and between-pair associations were not significantly different ($p = 0.780$) for workplace connections, suggesting that the associations between workplace connections and depressive symptoms were not influenced by factors differing between pairs.

General trust and governmental trust showed significant within-pair associations in both the unadjusted and adjusted models, with higher scores for both forms of trust associated with fewer depressive symptoms (8% fewer with general trust and 30% fewer with governmental trust) (Table 2). Governmental trust did not show significant differences in the magnitudes of the adjusted within- and between-pair effects ($p = 0.238$), suggesting the observed association was not confounded by factors operating between pairs.

3.2. Structural social capital

There were no significant within-pair associations for community participation, volunteerism, or social interaction and depressive symptoms (data not shown).

3.3. Informal social control and perceptions of safety

There were no significant adjusted within-pair effects for neighbors' willingness to intervene if children were spray-painting graffiti or perceptions of safety and depressive symptoms (data not shown).

The interaction term between zygosity and the within-pair difference in social capital was not significant in any model.

4. Discussion

4.1. Social capital and depressive symptoms

The results of this study suggest that lower cognitive social capital is associated with greater depressive symptoms. Greater levels of sense of belonging, neighborhood social cohesion, workplace connections, and both general and government trust were associated with less depressive symptoms, independent of individual-level sociodemographic, genetic, or shared childhood environment factors. By contrast, the study does not provide evidence of an association between structural social capital, operationalized as community participation, volunteerism, and social interaction, and depressive symptoms.

Cognitive and structural social capital are hypothesized to affect mental health through different pathways. Cognitive social capital lends itself more readily to the social support and inequality mechanisms, both of which focus on psychosocial factors. The social support mechanism builds on theories of social isolation and depression (Berkman and Glass, 2000), and defines social capital as the extent

of social networks and the norms of support and reciprocity within those networks. The inequality mechanism posits that widening economic inequalities lead to decreased social capital in the form of decreased sense of civic fairness and justice (Harpham et al., 2002; Uphoff et al., 2013). This leads to increased depression due to stress and anxiety resulting from a perceived loss of autonomy and helplessness in the face of obstacles, as well as discrimination and victimization (Szreter and Woolcock, 2004; Wilkinson, 1996).

In contrast to the above mechanisms, linking structural social capital to health often relies on the political economy approach, which argues that social capital can affect access to resources. Groups or individuals with higher social capital can protect themselves from budget cuts, address governmental or workplace policies, acquire resources from those in positions of power, or offset other financial concerns (Lynch et al., 2000; Muntaner et al., 2001).

Our finding that cognitive social capital was more strongly associated with depressive symptoms is in agreement with much of the previous literature (De Silva et al., 2005), and provides support for the hypothesized social support and inequality mechanisms. This suggests that public health efforts to address the burden depression places on individuals and society may do well to focus on promoting policies that build social support and combat economic inequality.

A related possible explanation for the stronger inverse association between depressive symptoms and cognitive social capital suggests that cognitive social capital and depression are more strongly related because they both involve psychosocial processes (Whitley and Mckenzie, 2005). It could be that the perceptions of relationships, and not the objective interactions, matter most for depression risk (Cruwys et al., 2014). Thus, while the quantitative amount of social interactions within a community may reflect an individual's actual experience, it is the psychological sense of belonging to that community that would most affect depression risk. This hypothesis has some support in the literature; indicators such as perceived social isolation and perceived sense of belonging have been consistently more strongly linked to depression than social interaction (Cruwys et al., 2014). This suggests that public health efforts to facilitate building social cohesion among communities may want to focus on supporting the quality, and not the quantity, of social connections.

Although studies of social capital and health have become increasingly prevalent over the past fifteen years, methodological limitations, including confounding and selection bias, remain (Kim, 2008). Only one previous study has used a twin design to investigate the association between social capital and depression (Fujiwara and Kawachi, 2008b). Fujiwara and Kawachi used a twin-differences model among 944 twin pairs. Their model regressed the within-pair difference in outcome on the within-pair difference in exposure, and estimated a within-pair, but not a between-pair, association. The authors reported an inverse association between measures of depressive symptoms and sense of belonging, social trust, and community participation among DZ but not MZ twins, and no association between volunteerism and depressive symptoms.

Our results may differ from Fujiwara and Kawachi's for several reasons. First, the measures used differed between studies. They measured depressive symptoms by the Composite International Diagnostic Interview Short Form (CIDI-SF). The CIDI-SF is a more comprehensive measure than the PHQ-2; in addition to depressed mood and anhedonia, the CIDI-SF assesses feeling tired, loss of appetite, trouble sleeping, trouble concentrating, and suicidal ideation. Further, although we used identical measures of sense of belonging, volunteerism, and community participation, this study employed a different measure of trust as compared to Fujiwara and Kawachi, and included other aspects of social capital as well.

Differences in the results may also have been due to differences in the study population. Although both studies had similar distributions of age and race, participants in our study were more likely to be female and to have a Bachelors degree or higher, and less likely to be married. Our sample also had a greater number and percentage of MZ twins; it is therefore possible that Fujiwara and Kawachi did not find any associations among MZ twins because of insufficient power (1200 MZ pairs (76%) in the present vs. 351 MZ pairs (37%) in Fujiwara and Kawachi).

Finally, our statistical analysis approach differed; the twin-differences model used by Fujiwara and Kawachi does not include the twin-pair mean in the equation. Inclusion of the twin-pair mean makes the interpretation of the within-pair effect conditional on the average social capital of the twin pair, and allows us to make inferences about the relative contributions of the within- and between-pair differences (Goldberg et al., 2009). The present study therefore builds on the groundwork laid by Fujiwara and Kawachi to further investigate the associations between social capital and mental health, and extends their study by employing enhanced twin analyses.

4.2. Strengths and limitations

A major strength of this study is the use of a large community-based sample of adult twins, which allows for the control of confounding by genetic and environmental factors shared between twins within a pair. Given that it is not feasible or ethical to randomize individuals to different social environments, a genetically-informed twin model best approximates an experimental design, often referred to as the "quasi-causal" design (Turkheimer and Harden, 2014). Further, the use of a community-based registry improves our ability to generalize to other populations. Although there was little racial or ethnic diversity in the sample, there was diversity of income, and twins in the registry are generally representative of the Washington State population.

However, a limitation of the study is the use of a cross-sectional design, which raises concerns about reverse causation. The cross-sectional design cannot ensure the necessary temporal order of events; specifically, that the exposure (i.e. social capital) precedes the outcome (i.e. depressive symptoms). Reverse causation is therefore possible: the presence of depressive symptoms may cause an individual to have decreased social capital. Alternatively, social capital and depression may influence each other, creating a feedback loop that cannot be accurately modeled in a cross-sectional design.

A second limitation of the study is related to common-method variance. Both social capital and depressive symptoms are self-reported through surveys, which could lead to correlation between responses. In particular, depression has been linked to more negative perceptions of others, suggesting that individuals experiencing depressive symptoms may also be more likely to report less social capital. Future studies could address this limitation by measuring social capital objectively, and not through self-reported measures.

There are additional limitations related to the choice of social capital variables. Because there is no agreed upon definition of social capital, there is disagreement in the literature about whether the domains frequently measured are in fact part of the construct. This is particularly relevant when considering the role of trust, which has been regarded not only as a domain of the construct, but as both an antecedent to, and a result of, social capital (Coleman, 1988; Portes, 1998; Bourdieu, 1986). A further critique of questions about trust is that it is unclear if they measure perceptions of trustworthiness or trustfulness, personality, past experience, or the predominant culture. Likewise, trustful attitudes do not necessarily coincide with trusting behavior (Abbott and Freeth, 2008).

In contrast to some previous studies, we have conceptualized social capital as an individual-level resource in the present study. Social capital exists in relationships between people and structures, and therefore requires a group in which to occur; however, it is a resource that can be drawn upon by an individual, and therefore can also be conceptualized at the individual level (Szreter and Woolcock, 2004; Kawachi et al., 2008).

Finally, some theorists criticize commonly used measures of social capital for not including the role of power dynamics, and for ignoring

the propagation of social inequity through differential access to social capital within a group and exclusion of those outside a group (Uphoff et al., 2013; Bourdieu, 1986). The inclusion of linking social capital addresses the first concern. That trust in government and vertical workplace connections showed inverse associations with depressive symptoms suggests the importance of explicitly addressing political and economic context when exploring associations between social environment and mental health. However, a single question still may not effectively enumerate the ways in which power differentials affect social capital (Muntaner, 2004). Future research should attempt to replicate our findings, and to expand the construct of linking social capital to encompass other ways in which individuals interact within a hierarchy.

To address the second critique, there is a growing consensus in public health research that social capital is not inherently beneficial. It can lead to coercion, inhibit individuality, and encourage norms of unhealthy behavior (Woolcock, 1998), and strong social capital within one group can exclude members of other groups, such as enforcing de facto residential racial segregation or preventing women from accessing resources necessary for employment advancement (Sampson and Raudenbush, 2004; Kawachi and Berkman, 2000). It can also lead to obligations that place stressful burdens on individuals through norms of behavior and reciprocity (Kawachi et al., 2008).

Additionally, it has been argued that emphasis on social capital might lead to poor public policy by allowing governments to underinvest in economic safety nets in favor of encouraging citizens to become more socially cohesive (Woolcock, 1998). It will be important that future research respond to these concerns, and use social capital theory to advocate for addressing inequities in power and wealth (Lomas, 1998).

5. Conclusion

This study provides evidence of an inverse association between cognitive social capital and depressive symptoms, but does not support the hypothesis that structural social capital is inversely associated with depressive symptoms. Future studies should use longitudinal designs to formerly assess the mechanisms that link social capital and depression and address concerns about reverse causation. Future research is also needed to further explore the domains of cognitive social capital most relevant to mental health, explore whether social capital should be conceptualized as a group- or individual-level resource, and understand how to better include power differentials into analyses.

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