

Article

Comparing the association between social capital and self-rated health in poor and affluent nations

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ABSTRACT

Country context has been shown to influence the association between social capital and health; however, few studies have examined how the level of societal affluence affects the relationship between social capital and health. Drawing on the study of individual-level socioeconomic variation in the returns to social capital by Uphoff and colleagues (2013), we examine two possible explanations about the differential impact of social capital on health based on country-level socioeconomic variation. The buffer hypothesis posits that social capital will have a greater benefit for poorer (versus more affluent) nations, whereas the dependency hypothesis suggests that social capital will be more beneficial in more affluent (versus poorer) nations. Using Waves 5 and 6 of the World Values Survey, we employed multilevel ordered logistic regression to examine whether national wealth moderates the association between social capital—as measured by particularized and generalized trust—and self-rated health across 72 countries. We also assessed five potential explanations for the moderating role of economic context based on the buffer and dependency hypotheses: institutional effectiveness, economic inequality, coverage of health services, human capital, and access to clean water and sanitation services. In support of the dependency hypothesis, we found that both particularized and generalized trust were associated with self-rated health to a greater extent in more affluent countries than in poorer countries; however, none of the potential explanations that we tested accounted for this pattern. Further, we found that particularized trust was more strongly associated with self-rated health compared to generalized trust across all countries. Future research should focus on the mechanisms by which economic context modifies the relationship between social capital and self-rated health.

1. Introduction

Social capital continues to be one of the most popular sociological concepts to be studied in population health. The body of evidence linking social capital to lower levels of mortality and better self-rated health continues to grow (e.g., Elgar et al., 2011; Islam, Merlo, Kawachi, Lindström, & Gerdtam, 2006; Kim, Subramanian, & Kawachi, 2008). However, few studies on social capital and health focus on low- and middle-income countries (LMIC) (Agampodi, Agampodi, Glozier, & Siribaddana, 2015; Story, 2013), and those that include LMICs rarely examine the differential association between social capital and health outcomes in low- versus high-income countries.

Social capital is generally defined as the benefits that accrue to individuals and groups through their social relationships. The theoretical origins of social capital are typically attributed to Bourdieu, Coleman,

and Putnam. Bourdieu (1986) defined social capital as “the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition” (p. 248), which emphasized individual gains through one’s social networks. Coleman’s (1988) conceptualization of social capital focused on the exchange of information, norms, and reciprocity within one’s social network, which provides both individual and collective benefits. Putnam brought even greater focus to the collective attributes of social capital that can benefit the whole community. He argued that communities with greater “stocks” of social capital are more likely to experience positive economic, political, and social outcomes (Putnam, 1993). The majority of population health research draws on Putnam’s definition of social capital, which focuses on the norms of reciprocity and trustworthiness that arise from individuals’ social networks (Putnam, 2000). Conceptualizations of social capital are

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typically dichotomized into two forms: structural and cognitive (Harp- ham, Grant; Thomas, 2002). Structural social capital pertains to social networks and the resources embedded within these networks, whereas cognitive social capital encompasses the trust and reciprocity shared between individuals in a social group. In the present study, we assess the role of individual-level cognitive social capital, namely trust.

Interpersonal trust can be further divided into particularized trust and generalized trust. Particularized trust focuses on trust in persons known by an individual (e.g., family, friends, and neighbors) (Rotter, 1971), whereas generalized trust focuses on trust in persons that are unknown to an individual (i.e., strangers) (Yamagishi & Yamagishi, 1994). Generalized trust has received more attention in the public health literature (Giordano, Björk, & Lindström, 2012); however, some have argued that generalized trust is not a valid measure of social capital because it is merely measuring “one’s perception or belief about her/his social world (Carpiano, 2014, p. 204).” Others have found that trust in known others (i.e., particularized trust) is more strongly related to self-rated health compared to generalized trust (Carpiano & Fitterer, 2014; Glanville & Story, 2018; Meng & Chen, 2014). By distinguishing between particularized and generalized trust, we are better able to understand the relationship between these aspects of social capital and self-rated health.

Social capital has been shown to influence health through social support, informal social control, collective action, and diffusion of information (Carpiano, 2006; Kawachi, 2010). These mechanisms of action go beyond social support theory, which demonstrates that supportive relationships are associated with lower rates of morbidity and mortality (Berkman, 2000). According to Berkman (2000), “relationships are important to health in ways beyond their capacity to provide support (p. 9).” Social capital theory posits that the resources embedded within trusting social relationships—including, but not limited to, social support, economic opportunities, new knowledge, and material goods—can influence health behaviors and health outcomes (Szreter & Woolcock, 2004). For example, one’s trust in those who are familiar can improve health through the benefits of social integration and the strengthening of social support when one faces stressful life events (Cohen & Wills, 1985), by enforcing social norms to promote positive health behaviors (Giordano & Lindström, 2011), and by motivating collective action to create a healthy physical and social environment (Bisung et al., 2014). Similarly, one’s trust in those who are unknown (i.e., generalized trust) can benefit health by improving one’s sense of social integration and control, facilitating collective action and reciprocity, and reducing psychosocial stress and anxiety (Giordano, Mewes, & Miething, 2019; Giordano et al., 2012; Moore et al., 2011).

The effect of country-level economic status on the relationship between individual-level social capital and health is rarely studied (Islam et al., 2006). Drawing from the literature on individual-level socioeconomic variation in the returns to social capital (Carpiano, Link, & Phe- lan, 2008; Moore, Stewart, & Teixeira, 2014), we posit two possible hypotheses about the differential impact of social capital on health based on the wealth of a nation: the *buffer hypothesis* and the *dependency hypothesis*. According to Uphoff, Pickett, Cabieses, Small, and Wright (2013), the buffer hypothesis posits that social capital will be more advantageous to poorer (versus more affluent) households, whereas the dependency hypothesis suggests that social capital will have a greater benefit for more affluent (versus poorer) households. We apply these individual-level theories to country-level variations in socioeconomic status. Pursuant to the buffer hypothesis, we posit that social capital will have a stronger association with health in poorer (versus more affluent) nations due to its importance in compensating for lower levels of economic, cultural, and other forms of capital that wealthier nations possess and thereby need to depend less on social capital for pursuing specific actions to improve health (Story & Carpiano, 2017; Warren, Thompson, & Saegert, 2001). For example, in poorer societies, social capital may compensate for a number of systemic deficiencies, including (1) a lack of effective institutions, (2) economic inequality, or (3) lower levels of

human capital. Conversely, in line with the dependency hypothesis, we posit that social capital will have a stronger association with self-rated health in more affluent (versus poorer) nations because the former are better able to take advantage of existing social capital and its opportunities for promoting better health due to their higher stock of other forms of capital (e.g., human, economic, cultural capital) that can be used in tandem with social capital to maximize its benefits (Hamamura, Li, & Chan, 2017; Story & Carpiano, 2017). According to the dependency hypothesis, the benefits of social capital might be enhanced by (1) more effective institutions, (2) better coverage of health-related resources, or (3) higher levels of human capital. A fourth potential mechanism in support of the dependency hypothesis would demonstrate a stronger connection between social capital and self-rated health in more affluent societies because poorer countries may simply be more dependent on environmental factors, such as clean water and sanitation, which overshadows social factors (Chan, Hamamura, Li, & Zhang, 2017). We elaborate on these potential mechanisms that explain the buffer and dependency hypotheses below.

In line with the buffer hypothesis, the first potential explanation is that in low-income countries social capital might compensate for the generally less effective government institutions when individuals can draw upon interpersonal resources (e.g., particularized trust) that can serve as alternatives to effective institutions. Second, when considering economic inequality, income disparities are generally higher in poorer nations. It has been suggested that social capital has a greater effect on health in countries where inequality is higher (Islam et al., 2006) because there are fewer safety nets, which increases the relevance of social capital (Kawachi, Subramanian, & Kim, 2008). Social capital might also play a more trivial role in explaining health variations in wealthier nations because the state is able to protect its citizens from poor health more equitably (Islam et al., 2006). Third, from a human capital perspective, education leads to greater knowledge about health and healthy behaviors, which leads to better self-rated health (von dem Knesebeck, Verde, & Dragano, 2006). Therefore, if social capital is more effective in low-income countries, it might be because it compensates for lower levels of human capital.

In line with the dependency hypothesis, the first possible explanation is that effective public institutions in more affluent countries (e.g., law enforcement or health care) might mitigate the risk of misplaced trust, making interpersonal trust more beneficial where effective institutions exist (Chan et al., 2017; Hamamura et al., 2017).¹ Second, when considering the coverage of health-related resources, citizens with better access to health care resources through their social networks are likely to have better health outcomes because there are more resources embedded within their trusting social relationships. Therefore, in countries with greater health care coverage, social capital may have a stronger association with health compared to countries with lower health care coverage. Third, from a human capital perspective, trust might be more beneficial in high-income countries because educated adults practice healthier behaviors and have more linkages to social networks that make health care more accessible. Fourth, access to water and adequate sanitation facilities are basic human needs, but they are not readily available in poorer countries. Therefore, the relationship between social capital and health may be weaker in countries without basic access to water and sanitation because social factors are less important for health than these basic resources.

In light of the abundant reasons that social capital—as measured by individual-level particularized and generalized trust—might be differentially beneficial across national economic context, the first aim of this study is to assess whether national wealth (as measured by gross

¹ Effective institutions also facilitate higher levels of generalized trust because when institutions are perceived as effective and fair and that the law and voluntary contracts are enforceable, there is less need for concern about the malfeasance of strangers (Rothstein, 2005).

domestic product [GDP] per capita) moderates the association between social capital and self-rated health. Assuming it does, the second aim is to explore the potential pathways through which GDP affects the association between social capital and self-rated health.

2. Methods

The analyses were based on data from Waves 5 and 6 (collected from 2005 to 2012) of the World Values Survey (WVS). Details of the WVS have been described elsewhere (Inglehart et al., 2018). For countries included in both waves, we utilized the most recent wave. After excluding countries that were missing a key variable for the analysis, there were 72 countries in our analytic sample. The number of observations in our analytic sample was reduced by 8.7% (from 103,513 to 94,472) from the exclusion of individuals that had missing data on any of the variables included in the analysis.

2.1. Measures

2.1.1. Self-rated health

We assessed health status using the following WVS survey question: "All in all, how would you describe your state of health these days? Would you say that your health is very good, good, fair, poor, or very poor?" Since a small proportion of respondents rated their health as "very poor" or "poor" (about 6%), we combined these categories with "fair" to create three categories: "poor" or "fair" (= 0), "good" (= 1), and "very good" (= 2). Although this is a proxy measure of actual health, self-rated health has been shown to be a reliable and valid predictor of mortality and morbidity (Idler & Benyamini, 1997).

2.1.2. Particularized and generalized trust

Particularized trust is an index that includes trust in family, neighbors, and people "you know personally" (polychoric alpha = .69). Respondents were asked whether they trust these groups "not at all," "not very much," "somewhat," or "completely." As is common practice (Delhey, Newton, & Welzel, 2011), we combined these items into a single variable to measure particularized trust by taking an average across the three items. Because so few respondents indicated "not at all" on average across the three items (less than 2% of the sample), we combined "not at all" with "not very much."

Rather than measuring generalized trust with the standard question asking about "trust in most people," we used trust in people respondents "meet for the first time" because recent research raises concerns about the validity of the standard question for gauging generalized trust (Delhey et al., 2011; Miller & Mitamura, 2003; Sturgis & Smith, 2010; Torpe & Lolle, 2011). In particular, the referent of "most people" is unclear and the evidence suggests that the standard question conflates particularized and generalized trust (Delhey et al., 2011; Sturgis & Smith, 2010). For example, many respondents consider people they know personally (such as friends, family members, and neighbors), rather than most people or abstract others (Sturgis & Smith, 2010). In addition, other research has demonstrated that there are important cross-cultural differences in the interpretation of the standard question (Delhey et al., 2011). Indeed, the correlation between the two measures ranges from <0.01 to 0.47 across the different countries in our sample. Trust in strangers has excellent face validity as a measure of generalized trust since it pertains to persons about whom one has no prior information and therefore captures trust toward abstract others (Torpe & Lolle, 2011). Respondents were asked whether they trust strangers "not at all," "not very much," "somewhat," or "completely." Because so few respondents indicated "complete" trust in strangers, we collapsed this response with "somewhat."

2.1.3. Country-level measures

All of the country-level variables in the analysis were measured in the year of the survey. Per capita GDP came from the World Bank's

World Development Indicators database for the year of the WVS survey and was measured in constant (2005) U.S. dollars, divided by 1000 and then logged due to a high degree of skewness (World Bank, 2019).

We measured institutional effectiveness with the rule of law index from the Varieties of Democracy Dataset (Coppedge et al., 2018). This index combined measures of independence and accountability of the judiciary, rigorous and impartial public administration, transparent laws with predictable enforcement, access to justice, and absence of corruption in various branches of government. Economic inequality was measured with the Gini index, a standard measure of income inequality that ranges from 0 to 1 with higher values indicating greater inequality. To enhance comparability across countries, we obtained this measure from Solt (2016). For coverage of health services, we used immunization coverage based on the World Health Organization's estimate of the percentage of the population vaccinated for diphtheria, tetanus, and pertussis (DTP) (WHO, 2018). Receipt of all three doses of DTP is a common proxy indicator for the performance of a health system (Gavi the Vaccine Alliance, 2018). We measured human capital using the mean years of schooling for adults aged 25 and older from the Human Development Report (UNDP, 2016). Finally, basic water and sanitation was a combination of the percent of the population with access to at least basic drinking water and sanitation services (alpha = .86) (WHO, 2018).

2.1.4. Control variables

The analyses control for age (in years), gender, marital status, income, education, and unemployment at the individual level. Income was measured with the respondent's estimate of the income decile in their country to which their household belongs. In the WVS respondent's education was measured as the age at which they completed their education. Thus, each one-unit increase approximately corresponds to a one-year increase in education. We truncated this variable so that 12 and 26 are the lower and upper bounds (corresponding to approximately 6 and 20 years of education).

2.2. Analytic strategy

Our main models assessed whether the association between trust and self-rated health varied by a country's GDP per capita. Due to the nested structure of the data and our interest in cross-level interactions between individual trust and national GDP, we employed multilevel models. Thus, the clustering of standard errors for respondents within the same country was corrected and the models incorporated country-level fixed effects. After assessing whether the associations between trust and self-rated health varied by GDP, we assessed whether those cross-level variations could be attributed to the potential explanations presented above. We did so by incorporating the measure for each potential explanation as a main effect and in interaction with trust, then we assessed whether the addition of the new cross-level interactions made a difference to the cross-level interactions between trust and GDP. In other words, the slopes for particularized and generalized trust were the dependent variables for the level-two equations. We assessed whether GDP predicted the slopes and then assessed whether adding the potential explanation to the GDP prediction reduced the degree to which GDP predicted the slopes (Aguinis, Gottfredson, & Culpepper, 2013).

The models were estimated using multilevel ordered logistic regression. The results are unchanged when the dependent variable is coded as dichotomous and logistic regression is used (available upon request), and the Brant test indicated that the proportional odds assumption was not violated for the coefficients of interest. For ease of interpretation, the variables involved in the interaction terms were mean-centered, meaning that the "main effect" coefficients reflected the predicted effects when the other variable in the interaction was at its mean.

Because interactions in nonlinear models cannot be evaluated by examining the sign, magnitude, or statistical significance of the odds ratio (Ai & Norton, 2003), we also computed marginal effects and

Table 1
Descriptive statistics.

	Mean or Proportion	Std. Dev.	Minimum	Maximum
Self-Rated Health	0.96	0.75	0	2
'Poor' or 'fair'	0.30			
'Good'	0.44			
'Very good'	0.26			
Particularized Trust	1.23	0.51	0	2
Generalized Trust	0.95	0.75	0	2
Age	41.70	16.46	15	99
Female (reference = male)	0.52	0.50	0	1
Married (reference = not married)	0.62	0.48	0	1
Income	4.90	2.15	1	10
Education	18.68	4.33	12	26
Unemployed (reference = not unemployed)	0.10	0.30	0	1
GDP (logged)	1.64	1.49	-1.658	4.235

Table 2
Coefficients and odds ratios for multilevel models predicting self-rated health.

	Model 1		Model 2	
	b	OR	b	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Particularized Trust	0.353*** (0.290–0.417)	1.424*** (1.336–1.517)	0.352*** (0.294–0.410)	1.422*** (1.342–1.507)
Generalized Trust	0.022 (-0.021 - 0.065)	1.023 (0.979–1.068)	0.021 (-0.019 - 0.061)	1.021 (0.982–1.063)
GDP	0.108* (0.021–0.194)	1.114* (1.021–1.214)	0.106* (0.019–0.192)	1.112* (1.019–1.212)
Particularized Trust x GDP			0.072*** (0.034–0.111)	1.075*** (1.034–1.117)
Generalized Trust x GDP			0.046*** (0.019–0.072)	1.047*** (1.019–1.075)
Age	-0.038*** (-0.038 to -0.037)	0.963*** (0.962–0.964)	-0.038*** (-0.038 to -0.037)	0.963*** (0.962–0.964)
Female	-0.197*** (-0.222 to -0.172)	0.821*** (0.801–0.842)	-0.197*** (-0.222 to -0.172)	0.821*** (0.801–0.842)
Married	0.099*** (0.072–0.126)	1.104*** (1.074–1.134)	0.098*** (0.071–0.126)	1.103*** (1.074–1.134)
Income	0.131*** (0.124–0.137)	1.139*** (1.132–1.147)	0.130*** (0.124–0.137)	1.139*** (1.132–1.147)
Education	0.023*** (0.019–0.026)	1.023*** (1.020–1.027)	0.023*** (0.019–0.026)	1.023*** (1.020–1.026)
Unemployed	-0.182*** (-0.226 to -0.138)	0.834*** (0.798–0.871)	-0.182*** (-0.226 to -0.138)	0.833*** (0.798–0.871)
Variance Components				
Slope Variance, Particularized Trust	0.059 (0.034–0.083)		0.046 (0.026–0.066)	
Slope Variance, Generalized Trust	0.027 (0.016–0.039)		0.022 (0.013–0.032)	
Intercept Variance	0.316 (0.212–0.421)		0.315 (0.211–0.420)	
Wald χ^2	10433		10469	
AIC	180220		180199	
Observations	94,472		94,472	
Number of countries	72		72	

***p < 0.001, **p < 0.01, *p < 0.05.

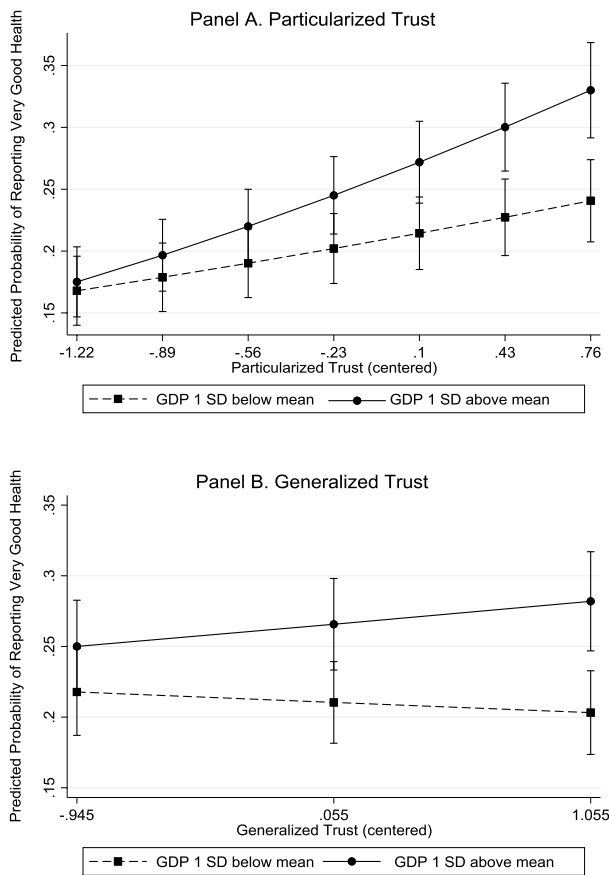
predicted probabilities to evaluate the interaction between trust and GDP and how this interaction was impacted with the addition of each potential explanation for this cross-level interaction. We also assessed the interactions using linear probability models as recommended by Mood (2010), and in additional analyses, we removed both outliers and influential cases from our models. We found no substantive differences in these auxiliary analyses (available upon request).

3. Results

Descriptive statistics are summarized in Table 1. Table 2 summarizes the main multivariate results.² Model 1 estimated unconditional predicted effects, incorporating random slopes for particularized and generalized trust. The coefficients for the control variables followed expected patterns with being older, female, and unemployed predicting lower self-rated health, while being married, having higher levels of income and education, and living in a wealthier nation predicting better self-rated health. Particularized trust was strongly associated with self-rated health. A one-unit increase in particularized trust was associated with a 42% increase in the odds of being in a higher self-rated health category when all other variables were held constant. In contrast, generalized trust was not a significant predictor self-rated health, net of particularized trust and the control variables. However, particularized and generalized trust are somewhat correlated ($r = 0.37$), and if particularized trust is omitted from the model, generalized trust is a statistically significant predictor.

In Model 2 we added the cross-level interactions between both forms of trust and GDP. The likelihood ratio tests showed that adding the cross-level interactions significantly improved model fit ($\chi^2 = 24.94$,

² In the empty model the intra-class correlation (ICC) for self-rated health is 0.106. Adding the individual-level variables and GDP in Model 1 reduces the ICC to 0.087.



Notes: Bars represent 95% confidence intervals.

Fig. 1. Conditional effects of trust on self-rated health. Notes: Bars represent 95% confidence intervals.

$p < 0.001$). In addition, GDP accounted for a notable amount of the variance in the slopes for particularized trust (22%) and generalized trust (19%).

To evaluate the interaction results, we calculated predicted probabilities and selected average marginal effects that respondents would report “very good health” at various levels of trust and GDP. As demonstrated in Panel A of Fig. 1, for respondents residing in a country at one standard deviation below the mean of GDP, the predicted probability of very good health was 0.17 for respondents with the lowest level of particularized trust and it was 0.24 for respondents who expressed the highest level of particularized trust. In contrast, for respondents residing in a country at one standard deviation above the mean of GDP, the predicted probability increased from 0.18 to 0.33 for respondents at the low and high ends of particularized trust. Panel B corresponds to the conditional predicted effects of generalized trust. For respondents in a country at one standard deviation above the mean of GDP, the predicted probability of very good health was 0.25 for respondents who do not trust strangers at all, whereas it was 0.28 for respondents who trust strangers at least somewhat. In contrast, for respondents residing in a country at one standard deviation below the GDP, the predicted probability of very good health slightly declined at higher levels of generalized trust, although the slope of generalized trust at this level of GDP was not statistically significant.

To further assess the interactions, Table 3 summarizes selected marginal effects that represent how one-unit increases in particularized and generalized trust are associated with different predicted probabilities of very good health at various levels of GDP. The first set of results in the table pertain to the main analysis that examined cross-level

interactions with GDP only. Viewing the marginal effects, it is notable that a one-unit increase in particularized trust is associated with a statistically significantly higher probability of reporting very good health in countries that were one standard deviation below the mean (0.037), but this change in predicted probability was substantially smaller than the predicted change at one standard deviation above the GDP mean (0.079). The marginal effects for generalized trust in this table continue to suggest that, in comparison to particularized trust, the predicted association between self-rated health and generalized trust was smaller in high-income countries. While the coefficients were negative at lower levels of GDP, it was only for countries substantially lower than one standard deviation below the median where the coefficient became significant.

To examine the second aim of our study, we assessed what might explain the variation in the associations between trust and self-rated health across countries with different levels of GDP per capita. As described earlier, the literature provides several potential explanations for the moderating role of economic context based on the buffer and dependency hypotheses: institutional effectiveness, economic inequality, coverage of health services (i.e., immunization), human capital (i.e., adult schooling), and access to clean water and sanitation services. The remainder of Table 3 summarizes what happens to the predicted marginal effects of trust when each of the potential explanations was considered by adding the potential explanation as an additional cross-level interaction to the model. Table 3 shows that the same basic pattern of results for the trust by GDP interactions were obtained even when these potential explanations were taken into account. Adding each additional cross-level interaction resulted in virtually no reduction of the variance in the slopes for particularized and generalized trust. Given this, it is unsurprising that these additional cross-level interactions were not statistically significant predictors of self-rated health (results available upon request). Furthermore, the pattern of marginal effects for particularized and generalized trust remained largely unchanged. Although some of the coefficients were statistically significant at various levels of GDP in each of the models, the marginal effects were generally within one standard error of their counterparts across all of the models, meaning that these differences were not statistically significant.

4. Discussion

Prior literature suggests that country context might influence the association between social capital and self-rated health (Hamamura et al., 2017; Islam et al., 2006). This is likely due to the availability of material and social resources embedded within national systems (both civil society and government) and might differ based on the economic status of a country (Olafsdottir, Bakhtiari, & Barman, 2014). The first aim of our study was to assess whether national wealth moderated the association between social capital and self-rated health. Drawing from Uphoff and colleagues’ theories about individual-level socioeconomic variations in the association between social capital and health (2013), we proposed two mechanisms by which country-level GDP per capita might affect the relationship between individual-level social capital and self-rated health: the buffer hypothesis and the dependency hypothesis. We found that particularized and generalized trust are more strongly associated with self-rated health in more affluent nations compared to poorer nations, which supports the dependency hypothesis. As described earlier, this might be due to the increased benefits of social capital in wealthier countries where there might be more effective institutions, better coverage of health-related resources, or higher levels of human capital. Additionally, this might be attributable to the dependence of population health outcomes on basic water and sanitation in poorer countries (compared to more affluent countries), such that social capital is not a strong predictor of health in these contexts (Chan et al., 2017).

The dependency hypothesis has also been supported by previous cross-country studies, which found that the human development index (HDI) significantly moderated the association between generalized trust

Table 3
Average marginal effects specific and generalized trust at various levels of GDP.

	Main Model		With Institutional Effectiveness		With Economic Inequality ^a		With Immunization		With Adult Schooling		With Water and Sanitation	
	dy/dx	SE	dy/dx	SE	dy/dx	SE	dy/dx	SE	dy/dx	SE	dy/dx	SE
Panel A: Specific Trust												
GDP at minimum	0.016	0.010	0.029	0.014*	0.009	0.010	0.015	0.010	0.007	0.009	0.007	0.010
GDP at -1 SD of mean	0.037	0.006***	0.044	0.008***	0.032	0.007***	0.037	0.007***	0.031	0.006***	0.030	0.007***
GDP at mean	0.057	0.005***	0.057	0.005***	0.057	0.005***	0.057	0.005***	0.057	0.005***	0.057	0.005***
GDP at +1 SD of mean	0.079	0.008***	0.071	0.008***	0.085	0.009***	0.080	0.008***	0.088	0.009***	0.089	0.010***
GDP at maximum	0.096	0.011***	0.081	0.013***	0.106	0.013***	0.097	0.012***	0.111	0.015***	0.113	0.017***
Panel B: Generalized Trust												
GDP at minimum	-0.018	0.007*	-0.015	0.010	-0.018	0.007**	-0.018	0.007*	-0.008	0.006	-0.015	0.007*
GDP at -1 SD of mean	-0.007	0.004	-0.005	0.005	-0.007	0.004	-0.007	0.004	-0.004	0.004	-0.007	0.005
GDP at mean	0.003	0.003	0.003	0.003	0.005	0.004	0.003	0.003	0.002	0.003	0.004	0.003
GDP at +1 SD of mean	0.015	0.005**	0.012	0.005*	0.020	0.006***	0.015	0.005**	0.010	0.006	0.018	0.007*
GDP at maximum	0.025	0.007**	0.019	0.008*	0.033	0.009***	0.025	0.008**	0.017	0.010	0.030	0.011**
Variance Components												
Slope Variance, Specific Trust	0.046	0.010	0.044	0.010	0.046	0.011	0.046	0.010	0.045	0.010	0.045	0.010
Slope Variance, Generalized Trust	0.022	0.005	0.022	0.005	0.023	0.005	0.022	0.005	0.021	0.005	0.022	0.005
Intercept Variance	0.315	0.053	0.295	0.050	0.264	0.048	0.314	0.053	0.259	0.040	0.268	0.045
Model Fit												
Wald χ^2	10469		10478		9278		10469		10489		10483	
AIC	180199		180198		153911		18205		180188		180193	
LR test against main model	NA		7.3 (3)		11.1 (3)*		0.3 (3)		17.2 (3)***		12.3 (3)**	
Observations	94,472		94,472		81,068		94,472		94,472		94,472	
Number of countries	72		72		61		72		72		72	

***p < 0.001, **p < 0.01, *p < 0.05 (two-tailed tests).

^a The Gini coefficient was missing for several countries. Accordingly, the model fit statistics differ substantially for this model. The LR comparison pertains to the main model estimated on the same sample of countries.

and self-rated health (Chan et al., 2017; Hamamura et al., 2017). These two studies found that generalized trust was more strongly associated with self-rated health in more developed societies compared to developing societies. There are two primary differences between these prior studies and our study: (1) they used HDI as the moderating variable and we used GDP per capita and (2) they only examined generalized trust, whereas we examined both particularized and generalized trust. First, HDI is composed of life expectancy at birth, mean years of schooling, and GDP per capita (UNDP, 2016). In auxiliary analyses, we decomposed HDI and found that GDP per capita was the main factor driving the interaction with social capital and not years of schooling or life expectancy. Therefore, we specifically explored the wealth of a nation rather than its level of development. Second, we examined various forms of trust that were available in the WVS to better understand the relationship between social capital and self-rated health. The two prior studies used the standard question, "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?", to measure generalized trust. However, this question conflates generalized and particularized trust (Delhey et al., 2011; Sturgis & Smith, 2010) making it impossible to know which form of trust is associated with self-rated health across country contexts. By separating particularized trust from generalized trust, we discovered that particularized trust has a stronger association with self-rated health than generalized trust. This finding has been observed by a small number of recent studies that examined both forms of trust in Canada (Carpiano & Fitterer, 2014), China (Meng & Chen, 2014), and across multiple countries (Glanville & Story, 2018). Each of these studies found that trust in those who are known to an actor has a stronger relationship with self-rated health compared to trust in generalized others or strangers. The strong and persistent relationship between particularized trust and self-rated health across multiple countries suggests that one's trust in those who are familiar might improve health by strengthening social support when dealing with stress (Cohen & Wills, 1985), enforcing

health-promoting social norms (Giordano & Lindström, 2011), and motivating collective action to create healthy living conditions (Bisung et al., 2014).

Given that the relationship between social capital and self-rated health is stronger in more affluent versus poorer countries, the second aim of our study was to explore the potential pathways through which GDP might affect this association. We examined five potential explanations (Table 3), all of which were relevant to the dependency hypothesis that our findings supported, except for economic inequality (which was a potential explanation for the buffer hypothesis only). However, none of the potential mechanisms that we empirically tested accounted for the moderating effect of GDP on the relationship between social capital and self-rated health. There are three possible reasons for these null results. First, the moderating effect of GDP per capita might be best explained by an alternative mechanism beyond the five described in this study. Unfortunately, the availability of country-level indicators for each of the countries included in our study is limited. For example, when using the Gini index, the number of countries included in our analysis was reduced to 61 (down from 72). We attempted to account for additional explanations or mechanisms, such as the availability of health care professionals, access to health insurance, and health care infrastructure, but data for these indicators were not available for the majority of the countries in our study. Second, it is possible that the country-level measures that we used to assess the five potential explanations were not valid and/or reliable measures of the proposed mechanisms across all country contexts. Although the measures we used have been used across country contexts in previous studies (Pemstein et al., 2018; Solt, 2016), they have not been used to explain the potential role of GDP in the relationship between social capital and self-rated health. In auxiliary analyses, we found that the potential explanations were not so highly correlated with GDP to result in multicollinearity, but they may not be reliable indicators of the explanations we proposed to explore. Third, although the country-level measures of the potential

explanations were not useful for explaining the GDP relationship, they might be more helpful if they were assessed at a meso- or micro-level. Unfortunately, we do not have data below the country level for these potential explanations. Future research should focus on measuring these indicators at a meso-level, so that we can explore the role of each pathway in the social capital and self-rated health relationship in a more meaningful way.

Beyond these limitations, two other limitations are also noteworthy. First, the WVS does not provide good indicators of the structural, or social network, form of social capital. It is quite possible that, like trust, social connections may impact health differently across affluent and poor settings. To more fully understand how social capital operates across settings, it will be crucial to measure the structural form of social capital. The second limitation stems from the cross-sectional nature of our data. Social capital theory suggests that trust impacts health, but health may also influence trust. Prior longitudinal research based on data from the U.K. suggests that trust affects subsequent health (Giordano et al., 2012), but additional research across different settings is warranted.

In conclusion, we found that social capital—as measured by particularized and generalized trust—is more strongly associated with self-rated health in more affluent countries compared to poorer countries. Further, we found that particularized trust is more strongly related to self-rated health than generalized trust across all countries. Although we were not able to explain why the relationship between social capital and self-rated health varied by national wealth, our study put forth (and tested) new hypotheses about the pathways through which social capital operates in these different country contexts. Future research is needed to explore these (and other) potential mechanisms at multiple levels (e.g., village/neighborhood, county, and/or district) in diverse socioeconomic contexts, especially in resource poor nations.

Ethics approval

The following study did not require ethical approval because it utilized a publicly available, de-identified, secondary data.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2019.100508>.

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