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Relative Deprivation in Context: How Contextual Status Homogeneity Shapes the Relationship between Disadvantaged Social Status and Health

Resubmitted to *Social Science Research*

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Relative Deprivation in Context: How Contextual Status Homogeneity Shapes the Relationship between Disadvantaged Social Status and Health

Abstract

We examine the relationship between disadvantaged social status and adverse health outcomes within a context-contingent thesis of relative deprivation. We argue that the health effect of low relative status depends on contextual status homogeneity, which is measured as income inequality and group diversity. Applying mixed effect modeling to the pooled 2011-2013 Chinese General Social Survey and exploring the cross-level interactions, we found that 1) people in the bottom socioeconomic quartile report significantly better health when contextual income inequality is lower; 2) racial-ethnic minorities report significantly better health when contextual ethnic diversity is higher; and 3) religious minorities also report significantly better health when contextual religious diversity is higher. Ethnic minorities and Muslims even report better health than the majorities in highly diverse contexts. Thus, contextual status homogeneity can modify or even eliminate the health disparities caused by relative deprivation. The context-level moderation of relative deprivation may be explained by the processes of social comparison, institutional resources, and social capital formation. Our findings suggest that health disparities are an interactive product of contextual homogeneity and individual's relative deprivation, and underscore the importance of the nature of the social environment where relative deprivation occurs. In this way, we contribute to knowledge about reducing health disparities along the social gradient.

Key words: health disparities, relative deprivation, diversity, inequality, minority health

Introduction

The relationship between social status and health has been subjected to extensive study with rekindled interest (Elo, 2009; Mirowsky & Ross, 2003). A wealth of studies have demonstrated that relative deprivation is the key mechanism that produces social gradients in health, and it is social status difference that exerts detrimental effects on health (Deaton, 2015; Kawachi & Kennedy, 1999; Scambler & Higgs, 1999; Wilkinson, 2002; Wilkinson & Pickett, 2006). Relative deprivation theory contends that relative deprivation in social statuses is itself a stressor because it fosters an increased risk of psychological distress, at-risk health behaviors, injuries, and mortality (Marmot, 2004; Wilkinson, 2005). The focal implication of the theory is that "low status is a stressor in itself" (Wilkinson, 2005, p. 75). Wilkinson(2005) also argues for relative deprivation's harmful effect on health with the evidence that a median-income person in an affluent country does not have better health than a median-income person in a poorer country, because both individuals suffer from the same level of relative deprivation.

Nevertheless, some links in the process of relative deprivation's health effects are unclarified and this missing leaves room for contention. Not all studies have replicated the central claim of the theory (Wilkinson & Pickett, 2006), and the "median income" person living in some places does have better health than another "median income" person living in another context (Mellor & Milyo, 2001; Walsh, Bendel, Jones, & Hanlon, 2010). Link, Carpiano, and Weden (2013) questioned if two individuals' health outcomes always diverge when their social positions diverge. Their main finding challenges the claim that the "losers" in a hierarchy always have higher mortality than the winners. Schieman and colleagues (Koltai & Schieman, 2015; Schieman, Glavin, & Milkie, 2009) also described a constellations of factors behind the paradox of "higher-status stress". Collectively, these studies suggest that lower social position is not inherently detrimental to health and we should "focus less on the relative status difference and to place more emphasis on the life circumstances

produced by different status positions" (Link et al., 2013, p. 210) as well as "an interaction between contextual inequality and individual position" beyond individuals' relative deprivation (Eibner & Evans, 2004, p. 456).

The alternative findings represented above reflects an issue lurked in the assumption implicitly made by relative deprivation theory and several conditions may have to be met before the health mechanisms of relative deprivation get activated. For individuals with lower social statuses must perceive the contrasting gap in the statuses between themselves and others; then, a set of significantly adverse emotions and environmental cues must arise from such a status gap; finally, the distribution of health goods (material and informational) must be partially or fully blocked by such relative deprivation (McLeod, 2013). To test these conditions requires the work of more than a single project, but an important first step towards that is to show that certain contextual conditions may actually weaken or even reverse the health process of relative deprivation.

In this study, we propose contextual status homogeneity as a modifier of the association between relative deprivation and adverse health outcomes. Contextual status homogeneity refers to the overall extent of the similarity in a specific criterion for all people living in that context. When that criterion is economic, its contextual status homogeneity reflects income equality; when it is collective identity, the corresponding contextual status homogeneity reflects racial or cultural diversity. At the micro-level, social comparison theory implies that mental stress and cognitive incongruence can become milder if the affected individuals frequently interact with others with similar social status(Schieman & Pearlin, 2006; Young & Wheaton, 2013). At the structural level, contextual homogeneity may change the power relationship between low- and high-status individuals, affect the fair distribution of public goods, and facilitate social capital formation (Blau, 1994; Sampson, Morenoff, & Gannon-Rowley, 2002). Thus, in contrast to relative deprivation

theory which would expect a person at the *k*th rank of social status to have *k* levels of worse health compared to a person at the first rank, contextual status homogeneity would modify this health gradient so that the health disparity between the first and *k*th ranks is greater or smaller than *k* levels.

An individual's relative deprivation is contingent on contextual status homogeneity to exert certain health effects. Despite the rich scholarship on the independent health effects of income inequality or racial diversity (Wilkinson, 2002; Wilkinson & Pickett, 2006), dated back to as early as the 1980s in the Black Report (Gray, 1982), few studies have investigated the interactive potential between relative deprivation and contextual status homogeneity for health disparities. To address this gap in the literature, we examine the question of how contextual homogeneity moderates the health disadvantages among people with relative deprivation. We examine this for three specific context-individual contingencies: 1) The ways context-level income inequality modifies the association between disadvantaged socioeconomic status and health; 2) The ways that context-level racial/ethnic diversity modifies the association between minority race/ethnic status and health; and 3) The ways that context religious diversity modifies the association between religious minority status and health.

Theoretical Framework

Relative Deprivation and Health

Relative deprivation theory posits that the relative position of a person in the social hierarchy, rather than any absolute measure of social status, ultimately determines his health outcomes (Eibner & Evans, 2004; Wilkinson, 2002). Relative deprivation is defined as the extent to which an individual feels deprived of desirable things relative to another person, group, ideal, or

other reference categories (Runciman, 1966). Studies have found that relative status difference has a stronger impact on psychological distress, at-risk health behaviors, and physical health compared to absolute deprivation (Eibner & Evans, 2004; Marmot, 2004; Subramanyam, Kawachi, Berkman, & Subramanian, 2009; Sun et al., 2012). Relative deprivation can happen at both individual and group levels, and one may be deprived by his/her group identity as well as by individual social status.

When relative deprivation is based on collective social identities, people possessing such identities may experience stress, lower self-efficacy, and need to compensate the felt loss by at-risk health behaviors such as smoking and excessive drinking (Abrams & Grant, 2012; Barnett, Moon, & Kearns, 2004; Smith, Pettigrew, Pippin, & Bialosiewicz, 2012). Racial minorities are more likely to develop mental health problems associated with diminished self-esteem and repressed anger (Brown, 2003; Dressler, Oths, & Gravlee, 2005) and have worse physical health due to a disrupted allostatic load (Massey, 2004). Religious minorities whose values and visible behaviors diverge from local norms tend to experience greater exposure to stressors and social exclusion (Dengah, 2017; Sheldon, 1980). Because of such dissonance, religious minorities are found to have higher levels of cardiovascular diseases and mental stress (Dressler, 1996). Therefore, relative deprivation manifests in both deprivation by relative socioeconomic statuses and that by collective identities. Taken together, we expect that relative deprivation is associated with adverse health outcomes. In particular, *lower income, lower social class, being a racial/ethnic minority, and being a religious minority are associated with worse physical and mental health outcomes (H1).*

Relative Deprivation in Context

Relative deprivation may not be a sufficient cause for health deterioration, contextual status homogeneity is such a structural factor that changes the life circumstances for individuals with

relative deprivation. For the example of income, the contextual homogeneity for income is reflected by the income (in)equality of a neighborhood or a larger space. Income inequality changes the pattern of power relationships, resource distribution, and reference groups for social comparison (Blau, 1977, 1994; Sampson, 1984). A low-income person in a more egalitarian context may face less dramatic contrast in power relationships, find more affordable health care, and endure less stress exposure. Schieman and colleagues found income homogeneity in a neighborhood weakened the association between stress and material deprivation (Schieman, Pearlin, & Meersman, 2006). Thus, an individual's relative deprivation in income creates distress and deteriorates health only in a place highly heterogenous in income.

While many studies restrictively use contextual status homogeneity as a conceptual inducement of measuring socioeconomic inequality, other important social statuses receive less attention. As some have noted (Adjaye-Gbewonyo & Kawachi, 2012; Barnett et al., 2004), many studies failed to evaluate relative deprivation based on collective identities such as race. For example, a minority member in a more racially diverse community may encounter lower level of discrimination and receive greater social and emotional support during hardship. To demonstrate the potential moderation of contextual homogeneity, Young and Wheaton (2013) showed that couples living in a more homogenous neighborhood with more socially similar neighbors are less subjected to the mental health damage of work-family conflicts. The share of minorities in a neighborhood context diminishes the hardships and discrimination experienced by minorities, directing scholarly attention to the role of racial/ethnic homogeneity in minority health (English, Lambert, Evans, & Zonderman, 2014; Hunt, Wise, Jipguep, Cozier, & Rosenberg, 2007).

Therefore, we extend relative deprivation theory by proposing that worse health outcomes are not induced by relative deprivation alone, instead, worse health outcomes come as an interactive

product of individual and contextual factors. The individual-level factor is relative deprivation, operationalized as *low income, low social class, being an ethnic minority,* and *being a religious minority*. The contextual factor is contextual status homogeneity, reflecting the variation of relative status in a given spatial context. We operationalize contextual homogeneity with measures of *income inequality, racial/ethnic diversity,* and *religious diversity*.

Contextual Status Homogeneity

Greater contextual homogeneity in terms of SES implies lower level of income inequality, a condition that may buffer the harmful health outcomes associated with relative deprivation in SES; however, greater contextual homogeneity in terms of group membership produces lower level of diversity and stronger dominance of the majorities, a condition that might *exacerbate* the harmful health outcomes associated with relative deprivation linked to ethnic and religious identities. Nevertheless, we contend that both income inequality and group diversity affect the health outcomes of the relatively deprived through similar mechanisms including social comparison, institutional resources, and social capital.

Economic inequality disproportionately penalizes the health of individuals with lower SES (Ansell, 2017). First, social comparison theory posits that individuals experience greater stress when comparing themselves to others with higher status. The contrast in status is more pronounced and dramatic under high income inequality (Festinger, 1954; Glavin & Young, 2017; Schieman & Pearlin, 2006; Wilkinson & Pickett, 2006). Second, institutional resources that serve the poor tend to be lacking in unequal economies. Resource substitution theory describes the process how the lack in one resource makes people more reliant on other resources (Ross & Mirowsky, 2010). The low-SES individuals are more unfavorably affected by poor institutional resources, but they can obtain health

information from those similar in SES (Kirby, 2008) and afford primary care in economically equal places (Shi & Starfield, 2001). Third, high inequality hinders the formation of social capital and decreases collective efficacy (Browning, Burrington, Leventhal, & Brooks-Gunn, 2008; DiMaggio & Garip, 2012; Wen, Browning, & Cagney, 2003). The loss of social capital affects all populations, but its impact is more pronounced among low SES individuals who rely heavily on informal and non-monetary means to acquire health care. Taken together, we hypothesize that economic inequality will amplify the association between SES-based relative deprivation and health problems. *Specifically, for adverse mental and physical health outcomes, there should be a negative interaction between low relative SES and contextual economic equality (H2).*

For individuals subjected to relative deprivation based on collective identities, a context with greater diversity features a larger share of their fellow minorities and weaker dominance by the majority group. First, greater diversity may alleviate some minorities' feeling of frustration and dissonance that originates from social comparison. Scholars found that living in a majority white neighborhood is associated with a higher level of perceived discrimination and mental disorder among non-white minority residents (English et al., 2014; Tweed et al., 1990). Alternatively, racial diversity in the community is associated with lower level of stress among blacks (Hunt et al., 2007) and lower level of hospitalization among Latinos (Bloom, 1975). Second, minorities in a more diverse community tend to have richer institutional resources. Institutional resources are particularly important for minorities because these means are often otherwise monopolized by the majorities in a self-organizing and voluntary environment. When institutional resources such as housing benefits and labor support are lacking, Maori smoking rate rose faster than that of Europeans (Barnett, Moon, Pearce, Thompson, & Twigg, 2017).Alternatively, even without changes in group characteristics, power and opportunities for minority group members will increase as the share of a single majority group in the population decreases (Blau, 1964; Cheng & Xie, 2013). Racial diversity

in network connections prevents health risk behaviors and enriches the source of health capital for non-white immigrants (Kimbro, 2009; Xiaozhao Y. Yang & Yang, 2017). The lack of diversity in social networks is also found responsible for marginalizing the disadvantaged minorities and immigrants to health-risk subcultures (X.Y. Yang & Yang, 2018). Therefore, we propose that contextual ethnic diversity should diminish the association between relative deprivation and health problems, and *there is a negative interaction between minority ethnic status and contextual ethnic diversity in predicting adverse physical and mental health outcomes (H3),*

We expect similar findings for the health outcomes of religious minorities. A context with greater religious pluralism may alleviate religious minorities' health disadvantages by surrounding them with others who share similar sociopsychological experience and by distributing public resources more equally. First, through social comparison, some religious minorities may experience a cultural and identity dissonance (Dengah, 2017). Scholars found the mental health impact of the dissonance diminishes when religious minorities are less outnumbered by those following the majority religion (Huijts & Kraaykamp, 2011; Stavrova, Fetchenhauer, & Schlösser, 2013). Second, religious minorities receive more institutional resources including health care in context with greater religious diversity, especially when they require accommodation for religious-specific care and treatment (Cohen, Gabriel, & Terrell, 2002). Third, religious diversity is associated with greater social capital, particularly bridging social capital that promote the health wellbeing of minorities. A wealth of literature demonstrates the positive impact of religious diversity on building social capital and public goods (see (Borgonovi, 2008; Stark & Finke, 2000). Therefore, we expect context-level religious diversity to attenuate the health disadvantages among religious minorities. This leads to our last hypothesis: *for adverse physical and mental health outcomes, there should be a negative interaction between minority religious status and contextual religious diversity (H4).*

Methodology

Dataset and sample

The current study utilizes the 2013 wave of the Chinese General Social Survey (CGSS) pooled with the 2011 CGSS for religious minorities oversample. The CGSS is a Chinese counterpart to the General Social Survey in the United States. As a country that has gone through tremendous social and economic experiments throughout the 20th century, how the changes in China affect the its population health has become increasingly intriguing. Once supposed to be a class-less society during the continuing Communist revolution well into the end of 1970s, the gigantic income gap in contemporary China and its sweeping influence on the health of its marginalized populace is understudied. There is also a surprisingly unrecognized significance of religious and racial-ethnic identities and their impact on health in the context of China, which is naively assumed to be religion-free and ethnically homogeneous. The uniqueness of the Chinese context in addition to the theoretical attraction of the idea of context-contingent relative deprivation has motivated us to choose CGSS as our sample.

The CGSS is conducted using multistage random sampling among the adult population (>16 years). The primary sampling unit (PSU) includes 100 municipal counties and the five largest metropolises. The secondary sampling unit (SSU) is the neighborhood committee in urban areas and the village committee in rural areas. Four SSU were sampled from each PSU county, and 80 neighborhood committees were sampled from the five metropolises. Lastly, 25 households were sampled from each SSU, and one household member was randomly selected using KISH. The CGSS is a well-designed nation-wide survey with good representativeness that has been widely used

to study a variety of social themes in China. The final CGSS sample used for this study contains 12,000 respondents.

Measurement

Physical and Mental Health: physical and mental health outcomes are measured respectively with two items: "In the last month, how often has your health condition kept you from conducting daily activities"; "In the last month, how often have you been bothered by depression?" Response choices for both questions are 1=never, 2=rarely, 3=sometimes, 4=often, 5=always. Self-reported health status has been widely acknowledged as a reliable predictor of mortality and morbidity; it even excels physicians' evaluation in some cases (Ferraro & Farmer, 1999). Single-item self-reported depression has also shown good validity in a variety of settings, especially when not used for diagnostic purposes (Abdel-Khalek, 2006; St John & Montgomery, 2009). We are further confident about the validity of this item because it closely correlates ($r=.52$, $p<.001$; $r=.51$, $p<.001$) with two questions on depression symptoms asked in a small random subsample of CGSS: "I cannot accomplish routine job or daily tasks due to emotional problems" and "I cannot keep focused due to emotional problems."

Relative Deprivation: At the individual level, we designate relative deprivation to be reflected by relative income, relative subjective social class, religious identity, and ethnic identity. The CGSS dataset has a total income variable combining salary with personal assets, wealth, and miscellaneous income. To measure relative SES, we then constructed each respondent's ranking of income in his/her province, with higher ranking indicating higher relative status in income. Subjective social class is assessed with a 10-level sketch graph: "a society is generally divided into classes. If there are ten classes in our society, which one do you think you most closely belong to?" As a sensitivity test, we also present in the Appendix the results using group-mean-centered income and social class as

indicators of relative deprivation. As discussed earlier, minorities may collectively experience relative deprivation irrespective of individual social status (Smith et al., 2012). For relative deprivation based on race-ethnicity, we designate non-Han individuals as the minority status; for religious identity, we designate Christians and Muslims as the minority status[1].

Contextual Status Homogeneity: As we explained earlier, income inequality expresses the degree of contextual SES homogeneity, while ethnic and religious diversities express the degree of contextual group homogeneity. To measure provincial income inequality, we adopted the commonly used Gini coefficient: $G = 1 - 2\sum_1^n \frac{(n+1-i)X_i}{n\sum_1^n x_i}$, where X_i is the income of the ith person out of a population of n people. The Gini coefficient ranges from complete homogeneity (0) to absolute inequality (1). Racial/ethnic diversity and religious diversity are measured by the Herfindahl interaction index, which numerically expresses the likelihood that a random person will meet a person from a different group within a space, as in $I = \sum_1^m \pi_m(1 - \pi_m)$, where π_m is the population proportion of the *mth* group. Herfindahl index ranges from the absolute homogeneity of 0 to complete diversity of 1. Seven racial-ethnic groups (Han, Mongol, Manchu, Hui, Tibetan, Zhuang, and other) are used to calculate the province-level racial-ethnic diversity and segregation. Eleven existing religious groups in China (Buddhism, Daoism, folk religion, Islam, Catholicism, Protestantism, Orthodox, other Christianity, Judaism, Hinduism, and other) are used to calculate religious diversity and segregation.

Control variables: We include several provincial-level covariates whose information in year 2013 was obtained from the National Bureau of Statistics (2014): urban-rural status, GDP per capita, population size, ratio of the tertiary industry, and a Sen's welfare index obtained from Wu and Wang (2016) that measures the prosperity of institutional resources such as water sanitation, provision of

[1] For vivid discussions of the oppressions these minority groups have gone through in modern China, see (Gladney, 1998; F. Yang, 2011).

health care, public infrastructure rating, etc. Individual-level control variables are gender, age, education, political affiliation, Body Mass Index, and four family process variables including number of children, marital status, family size, and proportion of families living in one's household. To avoid the "checkerboard paradox" in which people living in a diverse place still cannot easily meet others of a different status because the diverse place can be highly segregated, we controlled for a segregation index when testing the effects of racial and religious homogeneity. In a context with j sampling sites, the multi-group segregation index for m groups is $H = \sum_{m=1}^{M}\sum_{j=1}^{M}\frac{\frac{t_j}{TE}\ln\pi_{jm}}{\pi_m}$, with 0 indicating random distribution of all groups and 1 indicating only one group in each site.

Analytical strategies

The CGSS utilized multi-stage clustered sampling to recruit respondents. We apply multilevel regression modeling as the main analytical tool to examine our hypotheses; multilevel regression allows a unique intercept for each higher-level unit (e.g. province) and derives more accurate estimates of variance by partial pooling (Raudenbush & Bryk, 2002). Another advantage of multilevel regression is that we can easily conduct cross-level interactions of random effects, where an individual-level variable not only interacts with a provincial variable but its coefficient also freely varies at the province-level. By doing so, the results will be less vulnerable to the idiosyncratic influence of outlier estimates and avoid the problems associated with using pooled data (Gelman, 2006). The formal expression of the final cross-level random effect model is:

$$y_{ij} = \alpha + \beta_{01}Ind_{ij} + \delta_{10}Prov_j + \pi_{11}Ind_{ij} \times Prov_j + \boldsymbol{\gamma_{01}Cov_{ij}} + \boldsymbol{\gamma_{10}Cov_j} + \epsilon_{ij} + \sigma_j$$

where β are the coefficients for individual-level variables, δ are the coefficients for province-level variables, π represent the coefficients of their cross-level interactions, and ε and σ respectively

denote variance at individual- and province-level. $\boldsymbol{Cov_{ij}}$ and $\boldsymbol{Cov_j}$ is a vector of covariates at individual level and province-level, respectively. The sampling weight is given in the survey dataset, representing the inversion of the inclusion probability. Analyses were conducted in Stata 13.

Results

A brief exploration of the descriptive information in table 1 shows that the average frequency of feeling depressed is 2.08, slightly above "rarely". Frequency of having health troubles is 2.3, between "rarely" and "sometimes". People on average have a total annual income from all sources of 23,500 Yuan (approx. $3800) and report a score of 4.3 on the 10-class ladder. A total of 8.38% of the population are ethnic minorities of various origins. A majority (86.9%) of the population does not have a religious affiliation, 6.8% follow a traditional eastern religion, 4.24% are Christians, and 2.05% are Muslims. Close to half of the sample are male and 85.2% have no affiliation with the Communist Party. The average age is 48.7, average level of education is 4.9 (close to high school diploma), and average Body Mass Index is 22.56. Mean family size registers 2.5 persons and about 52% of the family members live together. Province-level variable information is also displayed in the lower panel of the table.

<insert table 1>

Table 2 presents the results of multilevel regression models. For the depression model, we found that higher social class (-.07, p<.001) and income rank (-.004, p<.001) are negatively associated with depression, and Christian minorities report a higher level of depression (.21, p<.001) compared to religious nones, after adjusting for all demographic covariates. Followers of traditional eastern religions also show slightly higher depression level (.09, p<.05). However, depression

frequency does not differ across ethnic identities. When province-level variables are introduced in model 2, the above findings still hold. Among these province-level covariates, the only two with direct and significant associations with depression are religious diversity (.66, p<.01) and Sen's Welfare Index (-.11, p<.01). The introduced province-level variables have explained 70% of the variation across provinces[2]. Combining all individual- and province-level variables, model 2 has explained 74% of the between-province variation and 7% of the variation between all individuals.

<table 2>

For physical health troubles, we found that income rank (-.001, p<.01) and social class (-.08, p<.001) are inversely associated with health trouble frequency. Christian minorities report more health troubles (.27, p<.001), but ethnic minorities have fewer health troubles (-.11, p<.01). Although we observe some slight changes in magnitude, these estimates remain the same after province-level covariates are introduced in model 2. Only religious segregation (-1.22, p<.05) and ethnic diversity (.40, p<.05) are significantly associated with health trouble frequency. Model 2 has explained 65% of the inter-province variation and 20% of the individual-level variation in physical health troubles. Considering the results from the model 2 for both physical and mental health, H1 is largely confirmed with an exception for racial/ethnic minority status.

The fact that some relatively deprived statuses are not associated with worse health fuels our suspicion of the context-contingency of relative deprivation. Table 3 features cross-level random interactions between individual social statuses and contextual homogeneity variables. The dependent variable here is the reported frequency of depressed mood; all main fixed effects were specified as in the previous table but not shown to save space. Hypothesis 2 on the context-contingency of relative deprivation is partly supported: there is a significant and negative interaction between province-level

[2] $PRE = \frac{\pi_1 - \pi_2}{\pi_1}$, where π_i is the residual from model i.

inequality and social class (-.21, p<.05) after controlling for all fixed effect variables, indicating the class-gradient of health is amplified at higher levels of inequality. Alternatively, lower social class individuals report less depressed mood when living in a low-inequality social context[3]. Contextual income homogeneity buffers against the effects of individual level SES disadvantage measured by social class.

<table 3 about here>

Figure 1 helps visualize the interactions between relative SES and context-level inequality: When the income distribution is highly homogenous with a Gini score only of .28 (i.e., the purple lines), the differences in the predicted depression frequency between the third and sixth social class levels are not significantly different from zero. This null finding indicates that we observed no health disparities under SES-based contextual homogeneity even when relative deprivation exists. By comparison, under high levels of income inequality (i.e., Green line for Gini=.77), subtracting the predicted depression frequency of a lower relative status from a higher relative status results in significant negative values, indicating that the health penalty on relative deprivation emerges **only** under high inequality.

Turning now to the effects of religion, we find support for Hypothesis 4 such that religious minorities living in a more religiously diverse province reported lower level of depression. Both Christians' (-.76, p<.05) and Muslims' (-1.49, p<.05) depressive mood decreases with greater religious diversity. Figure 1 shows that Christian minorities have higher level of depression than religious nones (i.e., a smaller-than-zero contrast) when there is low religious diversity, but they report a level of depression similar to atheists in religiously diverse contexts. For Chinese Muslims,

[3] These findings were replicated in the sensitivity test in the appendix where measurement of relative SES is constructed by group-mean centering.

compared to atheists, they report greater depression in low diversity contexts, but much lower depression frequency in high diversity contexts.

Focusing now on ethnicity, which had no independent effect on depression in the main effect model, we observe a significant interaction between ethnic identity and province-level ethnic diversity in table 3 (-.39, p<.01). This evidence shows that racial-ethnic identity itself does not affect mental health—but rather that it is contingent upon the ethnic homogeneity where minorities reside. Hypothesis 3 can be supported because ethnic minorities living in a more ethnically diverse province report less depression. Figure 1 illustrates that when ethnic diversity is extremely low (i.e., the cyan lines), minorities report higher level of depression than the Han majority. However, if a province has high diversity (a Herfindahl index of .74), subtracting the predicted depression frequency of the minorities from that of majorities yields positive scores, indicating that minorities now report a lower level of depression than Han majorities.

<figure 1 about here>

Findings for physical health problems in table 4 largely replicate the patterns we identified in the depression models. Confirming hypothesis 2, the cross-level interactions between inequality and income rank, and that between inequality and social class are both significantly negative. People of lower SES report fewer health troubles if their province is economically equal, but more health troubles if their province is economically unequal[4]. One can see this contrast under differential conditions of contextual homogeneity in figure 2, which shows that worse physical health problem among the lower ranked individuals emerge **only** under high inequality (green lines and Gini=.64).

[4] These findings were also replicated in the sensitivity test where relative SES is constructed by group-mean centering.

Christians as a religious minority reported worse physical health in table 2, but this health disadvantage does not disappear as religious diversity increases, that is, no significant interaction between Christians and religious diversity was found in table 4. However, physical health problem is significantly contingent on contextual religious diversity for Muslims, another minority group defined as having relative deprivation. Muslims report fewer physical health problems as religious diversity increases (-2.02, p<.01). As shown in figure 2, the predicted frequency of physical health troubles is lower among Muslims compared to the atheist majority when context-level religious diversity is high (the red line with a Herfindahl index of .64), but it becomes higher when religious diversity is low (the cyan line and Herfindahl index=0). These patterns partially support H4—that contextual religious diversity moderates relative deprivation associated with religious minority status.

According to the ethnicity model, minority racial-ethnic identity significantly interacts with ethnic diversity (-.71, p<.01), leading to the support for H3. Although ethnic minorities have less health troubles compared to Han as shown in table 2, such advantage is not universal. Ethnic minorities report fewer physical troubles than the Han majority under high ethnic diversity (Herfindahl index=.74 in the red line of figure 2), but they have slightly more physical health troubles when the context is Han-dominated and has little diversity (Herfindahl index=0 in the cyan line of figure 2)

<table 4 about here>

<figure 2 here>

Discussion

In this article, we elaborated upon relative deprivation theory with a context-contingent relative deprivation perspective. We argued that a lower social status might not be harmful under certain contextual conditions. Hence, we proposed that the detrimental effects of relative deprivation on well-being occur in conjunction with contextual status homogeneity, which refers to income inequality for SES and group diversity for ethnic and religious identities. Using the 2013 Chinese General Social Survey, we demonstrated support for our hypotheses. First, lower income rank and lower social class are more strongly associated with adverse physical and mental health outcomes when province-level income inequality is higher. Second, racial-ethnic minorities report better mental and physical health when the context-level ethnic diversity increases. Third, when context-level religious diversity increases, religious minorities report less frequent depression and physical health troubles. Context status homogeneity thus has substantive impacts on health outcomes, through the possible mechanisms of discrimination, power allocation, intergroup conflicts, and comparative self-evaluation.

These findings point back to some important theoretical considerations and underscore important directions for future investigation. First, the results from our main-effect regression models indicate that relative deprivation of many types elevate the risk of worse health. We agree that relative deprivation is a particularly important concept for understanding the social gradient in health (Muntaner, Ng, Vanroelen, Christ, & Eaton, 2012; Neckerman & Torche, 2007). Such findings about relative deprivation also applies to racial and religious minorities. Indeed, the original scholarship on relative deprivation defined the concept by both individual and collective identities, but studies often forget the latter dimension of the concept. Relative deprivation based on collective identities is a significant predictor of mental wellbeing and health behaviors, irrespective of individual SES (Abrams & Grant, 2012; Smith et al., 2012). People holding certain identities may experience more stressors and physical hardships due to cultural dissonance (Dengah, 2017; Dressler

et al., 2005), discrimination (Padela & Heisler, 2010; Viruell-Fuentes, Miranda, & Abdulrahim, 2012), and the majority's monopoly over resources (McDonald, 2011). In this study, Chinese Christians consistently reported worse physical and mental health compared to atheists. Chinese Christians may particularly suffer greater discrimination, both formally and informally, by identifying with a western religion.

Second, we elaborate the rationale of relative deprivation theory by situating relative status differences in context. If as relative deprivation theory claims—"lower relative status is a stressor in itself"(Wilkinson, 2005), we would have seen individuals in the bottom quartile consistently having worse health than those in the top quartile. However, our findings showed that the health gradient does not always appear after a social gradient. For example, when a local context is economically egalitarian, we found no significant difference in physical and mental health between lower and higher social classes. The same pattern is also found for relative deprivation based on collective identities, i.e. being an ethnic or religious minority. A few scholars have urged studies to pay attention to the life circumstances resulted from status difference, rather than relative status difference itself (Link et al., 2013). The current study furthers this line of thought by arguing that the effects of relative deprivation are contingent on contextual status homogeneity.

What mechanisms may operate behind relative deprivation's contingency on contextual status homogeneity? The explanations may lie in the different ways that a person's self-esteem, access to medical care and health information, exposure to stressors, and power relationship can be affected by contextual status homogeneity, i.e. how similar is one to his/her peers in the same social space.

When there is greater income homogeneity and a lower level of inequality, a community may experience a boom in the provision of institutional resources (Sampson et al., 2002). Income

homogeneity promotes the purchasing power of the poor and their accessibility to public goods. Public goods such as the affordable health care and accessible health education tend to benefit people with lower relative SES more than the rich (Coburn, 2000; Stuckler & Basu, 2013). Alternatively, inequality creates an environment where the lower relative status individuals are more likely to have negative appraisal of their own statuses through social comparison (Festinger, 1954; Glavin & Young, 2017; Taylor, Buunk, & Aspinwall, 1990; Young & Wheaton, 2013), the sense of despair and stagnation leads to at-risk health behaviors and declined psychological wellbeing (Ansell, 2017; Keyes, 1998). Scholars found that people refrain from building a cohesive community and investing in social capital when inequality is rampant(Browning et al., 2008; Sampson et al., 2002). Because individuals with lower SES and minority status tend to rely heavily on informal interpersonal connections to access to health care and support, a context lacking social capital will exert greater damage on the health of these people.

Unlike individuals with lower SES who constitute the majority of a population according to the power law, ethnic or religious minorities are by definition numerically overpowered. Accordingly, contextual homogeneity that shapes the power-relationship in favor of the lower-SES individuals actually harms minorities. Instead, minorities are very marginal in a highly homogenous context. Blau (1964, 1977, 1994) was among the first to describe how homogeneity and heterogeneity can change the relative power of minority groups without affecting the groups' characteristics per se. When their local context is more homogenous, minority members are more likely to experience cultural dissonance (Stavrova et al., 2013), feel distrust (Wilkes & Wu, 2018), and discrimination incidence (English et al., 2014; Hunt et al., 2007; Syed & Juan, 2012), while their share of control over different resources diminishes (Cheng & Xie, 2013; McDonald, 2011). Following this vein, this study has shown that racial-ethnic minorities (i.e., non-Han) and religious minorities (i.e., Christians and Muslims) report worse health in provinces with very low level of diversity but report

significantly improved health when province-level diversity increases. This pattern is still robust after considering the degree of segregation in provinces. More importantly, ethnic minority identity did not show a negative impact on physical and mental health before taking account of the local ethnic diversity, strengthening our argument that relatively deprived collective identities have a context-contingent impact on health outcomes.

To place our observations in the broader Chinese context, our study provides a dynamic picture of the social marginalization among the relatively deprived populace. China is experiencing a dramatic widening of income inequality unfit with the socialist blueprint, a rapid revivalism or emergence of religious behaviors, and a strenuous ethnic relationship in many aspects. Our study demonstrates that marginalization disproportionately harms the physical and mental health of people with relative deprivation in SES, minority religious and ethnic identities. To alleviate the health disadvantages resulted from an increasing level of relative deprivations among a significant portion of the population, this study suggests strategies focusing on the context of living, such as facilitating a pluralistic and integrative race/ethnic policy, channeling the economic structure to also benefit low-income workers, and loosening some of the existing regulations of religious activities.

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Appendix A: Sensitivity test of table 3 and table 4. Income and class constructed by centering around group-means. Showing only interaction effects, all other parameters are specified as in table 3 and 4 but not shown.

Depression frequency	Coefficient	S.E.
Inequality X income	-.009*	.001
Inequality X class	-.20*	.09
Log likelihood, degree of freedom	-13336, 32	
AIC, BIC	26738, 26969	
Individual variance	.78	
Group variance	.015	
Health trouble frequency		
Inequality X income	-.01**	.004
Inequality X class	-.22**	.08
Log likelihood, degree of freedom	-14003, 32	
AIC, BIC	28070, 28301	
Individual variance	.88	
Group variance	.021	

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Individual level (n=11700)	Min, Max	Mean	Standard deviation[1]

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Table 1 Descriptive statistics of individual and provincial level variables without centering and scaling

Frequency of feeling depressed	1,5	2.08	.95
Frequency of health troubles	1,5	2.30	1.09
Total annual income (thousand RMB)	0,1000	23.54	36.52
Subjective social class	1,10	4.30	1.69
Ethnicity minority	0,1	8.38%	.3%
Religion	0,1		
-religious none		86.87%	.3%
-eastern religions		6.83%	.2%
-Christians		4.24%	.2%
-Muslims		2.05%	.1%
Gender (1=male)	0,1	50.1%	.5%
Age	17,97	48.7	16.4
Education	1,14	4.88	3.05
Body Mass Index	10.12, 142.40	22.56	3.67
Number of child	0,10	1.71	1.29
Urban	0,1	60.29%	.5%
Political affiliation (1=no affiliation)	0,1	85.2%	.3%
Marital status	0,1		
-unmarried		10.13%	.3%
-married or cohabited		79.08%	.3%
-widowed or divorced		10.79%	.3%
Family size	0, 6	2.59	1.48
Proportion coliving	0, .86	.52	.25
Provincial level (n=28)			
Herfindahl index for religious diversity	.04, .64	.20	.14
Theil index for religious segregation	0, .40	.13	.09
Herfindahl index for ethnic diversity	0, .74	.13	.18
Theil index for ethnic segregation	0, .66	.14	.09
Gini coefficient for income inequality	.28, .77	.53	.09
GDP per capita (thousand RMB)	4, 97.6	49.1	22.7
Population (10 thousand)	578, 10644	5237.63	2610.12
Percentage of tertiary industry	32, 76.9	42.43	10.37
Sen's welfare index	-1.76, 3.85	.67	1.50

[1] Standard deviation for proportion is $\sqrt{\frac{p(1-p)}{n}}$.

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Table 2 Multilevel linear regressions on depression frequency and health trouble frequency

	Depression frequency				Health trouble frequency			
	Model 1 (n_i=10285, n_j=28)		Model 2 (n_i=10283, n_j=28)		Model 1 (n_i=10285, n_j=28)		Model 2 (n_i=10283, n_j=28)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Income rank	-.004***	.001	-.001***	.00	-.001***	.00	-.001***	.00
Social class	-.07***	.01	-.07***	.01	-.08***	.01	-.08***	.01
Ethnic minority	-.05	.04	-.06	.04	-.11*	.04	-.13**	.04
Religion								
-eastern religions	.09*	.04	.09*	.04	.07	.04	.07	.04
-Christians	.21***	.05	.18**	.06	.27***	.05	.21***	.05
-Muslims	-.07	.09	-.05	.08	-.01	.09	.02	.09
Female	.02	.02	.01	.02	.04	.02	.04	.02
Age	.004***	.001	.004***	.001	.02***	.001	.02***	.001
Education	-.01*	.004	-.01*	.004	-.01	.005	-.01	.005
Body Mass Index	.001**	.00	.001**	.00	.003***	.001	.003***	.001
Number of child	-.01	.01	-.01	.01	.01	.01	.01	.01
Party affiliation (1=no)	.08**	.03	.08**	.03	.04	.03	.04	.03
Marital status								
-in union	-.04	.04	-.04	.04	-.05	.04	-.05	.04
-widowed or divorced	.14**	.05	.13**	.05	-.06	.05	-.06	.05
Family size	-.01*	.01	-.01	.01	-.01	.01	-.01	.01
Proportion coliving	-.12**	.04	-.13**	.04	-.14**	.04	-.14**	.04
Religious diversity			.66**	.20			.52	.22
Religious segregation			-.82	.55			-1.22*	.53
Ethnic diversity			.18	.17			.40*	.17
Ethnic segregation			.24	.46			.66	.40
Income inequality			-.22	.39			.43	.39
Urban			.03	.02			-.03	.02
GDP per capita			.003	.004			-.01	.005
Population (10 thousand)			-.00	.00			-.00	.00
Percentage of tertiary industry			-.001	.005			.01	.005
Sen's welfare index			-.11**	.03			-.04	.03
Log likelihood, degree of freedom	-13354, 19		-13331, 29		-13997, 19		-13981,29	
AIC, BIC	26747, 26884		26721, 26931		28033, 28171		28021, 28231	
Individual variance	.78		.78		.88		.88	
Group variance	.053		.019		.046		.021	

*p<.05, **p<.01, ***p<.001. Random effects for the intercept-only model for depression: individual residual: .84, group residual: .065. Random effects for the intercept-only model for health trouble: individual residual: 1.11, group residual: .068.

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Table 3 Cross-level random effect (interactions) model for mental health. Fixed effects remain as previously specified.

Depression frequency	Socioeconomic model (n=10268)		Religion model (n=10268)		Ethnicity model (n=10268)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Inequality X income	-.002	.001				
Inequality X class	-.21*	.09				
Religious diversity X religious identity						
-eastern religions			.15	.22		
-Christians			-.76*	.38		
-Muslims			-1.49*	.70		
Ethnic diversity X ethnicity					-.39**	.15
Log likelihood, degree of freedom	-13309, 34		-13324, 33		-13328, 32	
AIC, BIC	26687, 26933		26713, 26952		26720, 26952	
Individual variance	.78		.78		.78	
Group variance	.014		.011		.019	

Table 4 Cross-level random effect (interactions) model for physical health. Fixed effects remain as previously specified.

Health issue frequency	Socioeconomic model (n=10283, m=28)		Religion model (n=10283, m=28)		Ethnicity model (n=10283, m=28)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Inequality X income	-.004***	.001				
Inequality X class	-.22**	.08				
Religious diversity X religious identity						
-eastern religions			.37	.23		
-Christians			.23	.40		
-Muslims			-2.02**	.73		
Ethnic diversity X ethnicity					-.71**	.21
Log likelihood, degree of freedom	-13953, 34		-13973, 33		-13969, 32	
AIC, BIC	27974, 28220		28012, 28251		28003, 28235	
Individual variance	.88		.88		.88	
Group variance	.016		.015		.021	

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Figure 1 Contrast of predicted health problem by contextual homogeneity (religious diversity =.04 vs .64; ethnic diversity= 0 vs .74; inequality=.28 vs .77). Negative contrasts indicate higher predicted health problem in the group with relative deprivation; Vertical dash line denotes zero difference.

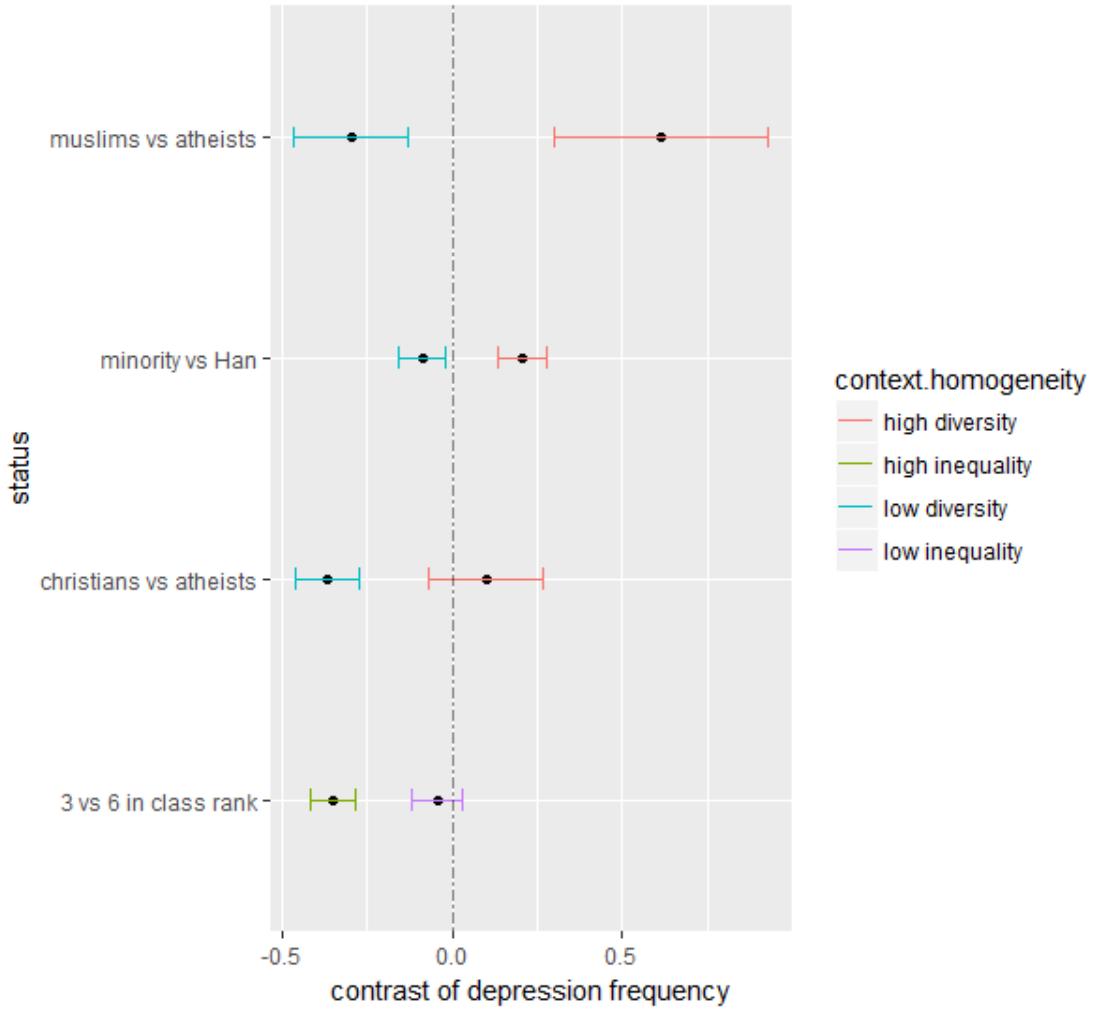
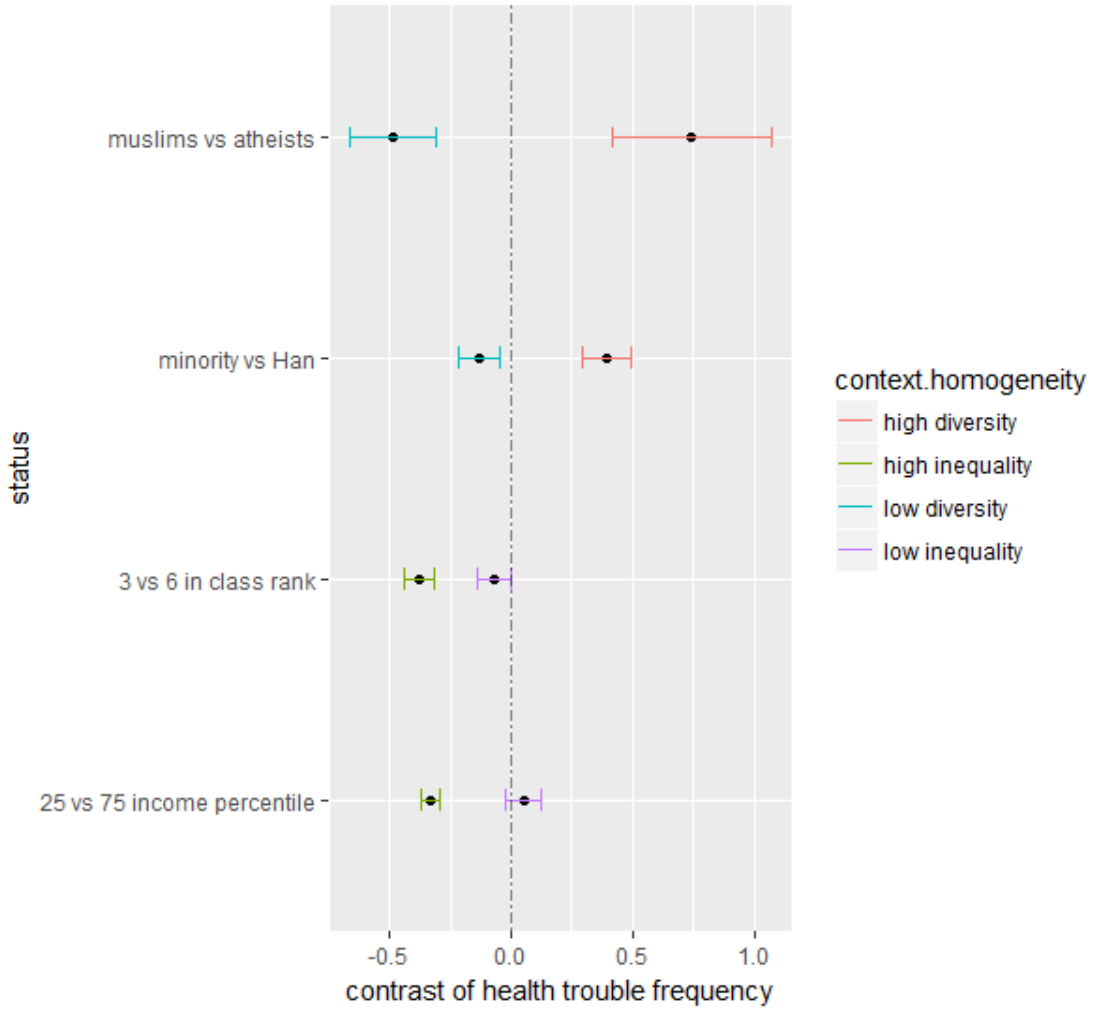
Figure 2 Contrast of predicted health problem by contextual homogeneity (religious diversity =.04 vs .64; ethnic diversity= 0 vs .74; high inequality=.28 vs .77). Negative contrasts indicate higher predicted health problem in the group with relative deprivation; Vertical dash line denotes zero difference.