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Psychological Resources as Mediators of the Association between Social Class and Health: Comparative Findings from Japan and the U.S

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Abstract

Purpose—This study investigated mediating effects of selected psychological resources (sense of control, self-esteem, optimism, and neuroticism) on the association of social class(education and subjective social status [SSS]) with current health status (self-rated health and the number of chronic conditions).

Method—This sample consisted of 1805 Americans (818 males and 987 females) from the Midlife in the United States (MIDUS) survey, 2004–2006 and 1027 Japanese (505 males and 522 females) from the Midlife in Japan (MIDJA) survey in Tokyo, Japan, 2008–2010. Information on social class, psychological resources, and health status was obtained using telephone interviews or written questionnaires.

Results—A mediation analysis was conducted separately for males and females in Japan and the U.S. Neuroticism significantly mediated the association of education and SSS with self-rated health and chronic conditions among males and females in both countries, with one exception (not for chronic conditions among Japanese females). Sense of control significantly mediated the association of education and SSS with self-rated health among males and females in both countries. As hypothesized, self-esteem significantly mediated almost all of the associations of education and SSS with self-rated health and chronic conditions among men and women in the

U.S., but very few such associations in Japan. Optimism significantly mediated most associations of social class and health status in both countries, but only among females.

Conclusions—Overall the findings underscore important culture- and gender-specificity in the ways in which psychosocial resources mediate the links between social class and health.

Introduction

A large number of studies have shown that social class or socioeconomic status (SES), indexed by constructs such as education and income level, is an important predictor of health (e.g.,(1)). Individuals with lower education or lower income tend to have more health problems, a pattern seen consistently among men and women, and across countries including in North America (2), European countries (3), and Japan (4), although the strength of the associations vary. In addition, subjective social status (SSS), i.e., a person's perception of his/her own social status, has been found to be a strong predictor of health. Low SSS has been shown to be associated with health problems (5–7) in both Japan and the U.S. (8). These effects tend to hold for men and women.

Researchers have proposed that psychological resources might mediate the association between social class and health problems. Five studies conducted in the U.S. indicated that social class influences health through self-esteem (9), sense of control (10, 11), and via other positive personal characteristics, such as (lack of) neuroticism and optimism (9, 12, 13). Recently, the Reserve Capacity Model (14, 15) was proposed to highlight psychosocial resources as important factors linking SES with health. Individuals of lower social class were theorized to have fewer psychological resources (i.e., smaller Reserve Capacity), including lower self-esteem, lower perceived control, and fewer positive personal characteristics to cope with health problems as compared to their higher SES counterparts (16).

Self-esteem, one of these psychological resources, refers to a person's perception of his/her own worth or value (17). Schnittker (9) reported that the association between SES (education and income) and health (self-rated health and chronic conditions) was slightly attenuated after adjusting for self-esteem, suggesting that self-esteem partially mediates the link between social class and health.

Sense of control, another psychological resource, refers to the belief in one's own ability to control the surrounding environment (e.g.,(18)). Studies have found a positive association between SES and sense of control, while also showing that sense of control is an important predictor of health. For example, Bosma and colleagues (10) found that lower education predicted higher mortality risk in Germany. However, adjustment for sense of control (measured as the combination of mastery and self-efficacy) significantly reduced the association between education and mortality. Similarly, Bosma, Van Jaarsveld (11) showed that sense of control (measured as the combination of mastery and self-efficacy) played a mediating role between SES and heart disease in the Netherlands.

Neuroticism refers to a personality trait that leads individuals to focus on negative aspects of themselves and to frequently experience negative emotions (e.g.,(19)). Schnittker (9) found that higher income and education were associated with better self-rated health and a smaller number of chronic conditions in the U.S.. However, after adjusting for neuroticism, the association was substantially reduced, suggesting that neuroticism mediates the association between SES and health. It was also reported that neuroticism reduced the associations more than did mastery (a measure of sense of control) and self-esteem.

Finally, optimism has been considered as a mediator of the association between SES and health. Optimism, or its opposite dimension, pessimism, refers to a positive or negative stance toward the future, including beliefs in one's ability to impact the course of events (20). Gallo, de los Monteros (12) found that a psychological resource that combined optimism/pessimism, sense of control, self-esteem, and social support significantly mediated the effect of SES on waist circumference, one component of the Metabolic Syndrome, among Mexican-American women. Similarly, another study using optimism/pessimism as a component of composite psychological resources factor showed that it was a significant mediator in a model connecting SES, negative emotion, and the Metabolic Syndrome among women in the U.S. (13). Another study reported that optimism/pessimism mediated the association between parental SES and perceptions of stress among adolescents in the U.S. (21).

Of the above studies on the mediating role of psychological resources linking social class and health, the vast majority have been conducted not in Japan, but in the U.S. or European countries. The mediating roles may vary by country, however, given the differing meanings of the psychological resources in difference parts of the world. For example, in Western cultural contexts the most effective psychological resources may be those with more of an emphasis on individualistic characteristics (e.g.,(22)). Self-esteem, for example, may be a more important construct for people living in an individualist country, such as the U.S. than for people living in an interdependent, or collectivistic, society such as Japan (23). In fact, previous research indicated that self-esteem correlated with life satisfaction more closely in the U.S. than in Japan (24). Similarly, sense of control showed stronger associations with health and well-being in the U.S. than in Japan (25). Thus, we predicted that self-esteem and sense of control would be stronger mediators between social class and health in the U.S. than in Japan. In addition, we hypothesized that the mediation effects of psychological resources may vary by gender, given previous findings on gender differences in the linkage of social class with health (8) and the gender-specific health effects of optimism/pessimism. Finally, previous studies have focused almost exclusively on objective indicators of SES. Little is known about mediating effects of psychological resources on the association between subjective social status(SSS) and health, even though increasing attention is paid to SSS in the health inequalities literature (8). Thus, we included both a measure of subjective social status and of SES (education) and in our analyses.

In summary, this study aimed to investigate the mediating effects of four select psychological resources on the association of social class (indexed by education and SSS) with current health status (indexed by overall self-rated health and the number of chronic conditions) in population-based samples in Japan and the U.S.. We hypothesized that self-esteem and sense of control would be more strongly evident as mediators among Americans than Japanese respondents. No specific hypotheses guided our investigation for the other two mediators (neuroticism and optimism). We were also interested in whether mediation effects would vary by gender, but had no *a priori* hypotheses about such effects.

Method

Samples

The data for these analyses were generated from two large-scale cross-sectional studies, one conducted in the U.S. and the other conducted in Japan. The U.S. sample was from the second wave of the Midlife in the United States (MIDUS) survey, conducted in 2004–2005. MIDUS was representative random-digit-dial sample of non-institutionalized, English-speaking adults, selected from working telephone banks in the 48 contiguous states in the U.S.. We included 1805 adults (818 men and 987 women; age range = 34 to 84 years) from the total MIDUS second wave sample. Japanese samples were from the Midlife in Japan

(MIDJA) survey, conducted in 2008–2010. MIDJA data were collected from the total of 1027 adults (505 men and 522 women; age range = 30 to 79 years) from Japan's 23 wards of Tokyo. All Japanese and the U.S. respondents completed a self-administered questionnaire. Table 1 (for the U.S.) and Table 2 (for Japan) show the demographic characteristics of two linked samples.

Measures

Measures were selected from extensive surveys that were carried out with both samples. As described in detail below, we focused on education (to index SES), SSS, health indicators, and selected psychological resources.

SES as indexed by education—Education was assessed by asking for the highest grade of school completed. The twelve MIDUS categorical response options were as follows: no school/some grade school, eighth grade/junior high school, some high school, general educational development (GED), graduated from high school, 1–2 years college, 3 years of college, graduated 2 years college, graduated 4 or 5 years college, some graduate school, master's degree, doctor degree or other professional degree. The eight MIDJA categorical response options were as follows: 9th junior high school, some high school, graduated from high school, vocational high school, graduated 2 years college, some college, bachelors degree, masters or doctor degree. In order to make the education data from both surveys comparable, we assigned the following number of years of schooling to each category: no school/some grade school=6, eighth grade/junior high school=8, 9th junior high school=9, some high school=10, GED and graduated from high school=12, 1–2 years college=13, 3 years of college and some college=15, graduated 2 years college and vocational school =14, graduated 4 or 5 years college=16, some graduate school=17, masters degree, doctor degree or other professional degree=18.

Subjective social status (SSS—SSS was assessed using a measure developed by Adler, Epel, Castellazzo, & Ickovics (26) with a picture of a ladder with ten rungs. The respondents were asked, "Think of this ladder as representing where people stand in their communities. People define community in different ways; please define it in whatever way is most meaningful to you. At the top of the ladder are the people who have the highest standing in their community. At the bottom are the people who have the lowest standing in their community. Where would you place yourself on this ladder? Please check the box next to the rung on the ladder where you think you stand at this time in your life, relative to other people in the community with which you most identify."

Self-rated health and the number of chronic conditions—For self-rated health, respondents rated their health on a scale from 0 to 10, where 0 was the worst possible health and 10 was the best possible health. The number of chronic conditions was scored on the basis of whether the respondents reported having experienced or been treated for any of 31 possible chronic health problems during the previous 12 months. Examples of these conditions are asthma, tuberculosis, diabetes or high blood sugar, ulcers, migraine headaches, and thyroid disease.

Psychological resources—The selected measures of psychological resources were self-esteem, sense of control, optimism, and neuroticism. Self-esteem was measured by using a scale consisting of seven items taken from the Rosenberg's self-esteem scales (17)(e.g., "I am able to do things as well as most people"). A response to each item was scored on a seven-point scale ranging from 1 (agree strongly) to 7 (disagree strongly). In this study sample, the internal consistency reliability of the scale (Cronbach's alpha) for men and women was: 76 and .76, respectively, in the U.S.; 63 and .69, respectively, in Japan.

Sense of control was measured with a sum of two scales(which past studies have shown to strongly correlate with each other (36)): a four-item personal mastery scale (e.g., “I can do just about anything I really set my mind to”) and an eight-item perceived constraints scale(reverse-coded) (e.g., “There is little I can do to change the important things in my life”)(27). For each scale, a seven-point response option for each item ranged from 1 (agree strongly) to 7 (disagree strongly).The reliability and validity for the U.S. version of the combined scale were demonstrated in previous studies, with Cronbach’s alpha coefficient of .85 (36). In this study sample, the internal consistency reliability of the combined scale for men and women were as follows: .87 and .87, respectively, in the U.S.; .80 and .82, respectively, in Japan.

Neuroticism was measured by a scale consisting of four items (moody, worrying, nervous, [not] calm) that were concordant to the neuroticism construct of the Big Five personality attributes (28), with a four-point response option ranging from 1 (not at all) to 4 (a lot). In past research, Lachman and Weaver (37) showed that the internal consistency reliability (Cronbach’s alpha) of this scale was .75 in the U.S.. In this study sample, the internal reliabilities of the scale for men and women was as follows: .71 and .76, respectively, in the U.S.; .49 and .53, respectively, in Japan.

Optimism was measured by a three-item scale (e.g., “I'm always optimistic about my future”)(20), with a five-point response option ranging from 1 (disagree a lot) to 4 (agree a lot). These three items comprised a subset of the longer eight-item version of the commonly used Life Orientation Test (LOT) (38). Because of space constraints on the questionnaire in MIDJA study, the longer version was not used. The internal consistency reliability (Cronbach’s alpha was .82)and construct discriminant validity of the eight item LOT scale were reported to be acceptable in past research with U.S. samples (38). Due to space constraints, the MIDJA survey only allowed for three LOT items, resulting in less good internal consistency. The internal consistency of the three-item scale used in the present analysis for men and women was as follows: .67 and .70, respectively, in the U.S.; .57 and . 60, respectively, in Japan.

Unfortunately, for the neuroticism and optimism scales, the internal consistency reliability was moderate or low, particularly in the sample in Japan. For neuroticism, a further investigation of the inter-item and item-total correlations for these scales revealed that the one positively-worded item (“calm”) of the neuroticism scale behaved differently in the sample in Japan. Cronbach’s alpha coefficients for men and women remained similar (.72 and .76, respectively) in the U.S., but increased (.62 and .62., respectively) in Japan, for a three-item neuroticism scale after excluding this item. For the optimism scale, the inter-item correlations were only modest among the items (r=.26–.49) in the sample in Japan. None of possible two-item scales showed better internal consistency reliability than the three-item scale.

Statistical analysis

Mediation analyses were used to estimate the associations among social class, psychological resources and health outcomes. In particular, we tested whether psychological resources would mediate the associations between social class indicators and health outcomes using the multiple mediation analysis procedure (29, 30) in Japan and the U.S., examined separately by gender in each country. The multiple mediation analysis strategy requires that researchers make distinctions between various effects and their corresponding parameters. Figure 1 presents a graphic representation of the model with four mediators (M1 though M4). Preacher and Hayes (30) explained that the total effect (path c) of the independent variable (X) on the dependent variable (Y) is composed of the direct effect (c') of X on Y and the total indirect effects (c-c’) of X on Y through putative mediators. The total indirect

effect for a model including the mediators is simply the sum of the specific indirect effects. That is, $f=c-c'=a_1b_1+ a_2b_2+ a_3b_3+ a_4b_4(i=1,2,3,4)$, where a_i is a path coefficient from X on $M_i$and b_i is one from M_i on Y. Education and SSS were entered as the independent variables; sense of control, self-esteem, optimism, and neuroticism were entered as the meditational variables; self-rated health and number of chronic conditions were the dependent variables. We adjusted for age and marital status as covariates. A SPSS macro was used to conduct the multiple mediation analysis, with a bootstrap technique to estimate standard errors (SEs) for the path coefficients (30). We applied 5000 bootstrap samplings to obtain stable estimates. A significant association between X and Y is often seen as one of requirements of identifying a mediation effect. However, MacKinnon, Lockwood (31) have argued that, while a significant product of a_i and b_i is necessary for identifying a mediation effect, a significant association between X and Y is not always necessary, particularly when the direct and mediation paths have opposite signs and may cancel each other out. Thus, in the present study, we tested a mediation effect even when an association between social class and health (c) was not significant.

Considering the moderate or low reliability of the neuroticism and optimism scales, we further performed two sensitivity analyses using different scaling of these constructs. First, we reran the same mediation analysis using a three-item scale of neuroticism excluding an item asking “calm.” Second, we conducted the same mediation analysis using each item score of the three-item optimism scale separately.

Results

Sample characteristics

The demographic, psychological and average health characteristics of the sample in Japan and the U.S. are shown in Table 1 and 2, respectively. Because of missing responses, mediation analyses using education were conducted among 800 men and 951 women in the U.S.. Similarly, mediation analyses using SSS were conducted among 794 men and 935 women in the U.S.. Mediation analyses using education were conducted for 482 men and 506 women in Japan, and mediation analyses using SSS were conducted among 469 men and 487 women in Japan. Although neuroticism was comparable between Japan and the U.S., U.S. respondents on average reported being older, with more years of education, having better self-rated health, and more chronic conditions than did their counterparts in Japan. They also reported higher scores on sense of control, self-esteem, and optimism than adults in Japan.

Total effects of social class on health

For the total effect (c coefficient), education was significantly and positively correlated with self-rated health and negatively associated with the number of chronic conditions among both men and women in the U.S. (Table 3). SSS also significantly and positively correlated with was self-rated health among both men and women in the U.S.. SSS significantly and negatively correlated with number of chronic conditions among women, but not men, in the U.S.. In contrast, education did not correlate significantly with self-rated health or the number of chronic conditions among men or women in Japan (Table 4). SSS was significantly and positively correlated with self-rated health for both men and women in Japan. In addition, SSS was significantly and negatively correlated with chronic conditions men but not women in Japan.

Mediation effects of psychological resources

Most total mediation effects of the four psychological resources on the associations between social class and health status were significant and in the expected direction for both men and

women in Japan and the U.S. (Table 3 and 4). One exception was that the total mediation effect was not significant for the association between education and the number of chronic conditions among women in Japan.

Focusing on more specific mediation effects, self-esteem significantly mediated the association of education and SSS with self-rated health among both men and women in the U.S. Its mediation effect was also significant for the association between education and the number of chronic conditions among women in the U.S. and for the association between SSS and the number of chronic conditions among both men and women in the U.S.. Self-esteem significantly mediated the association of education and SSS with self-rated health among men in Japan. Sense of control significantly mediated the association of education and SSS with self-rated health among men and women in the U.S. and among both men and women in Japan. However, sense of control did not significantly mediate the association between education or SSS and the number of chronic conditions among men or women in either country. Optimism significantly mediated the association of education and SSS with self-rated health, and mediated the association of SSS with the number of chronic conditions among women in both countries.

Neuroticism significantly mediated the association of education and SSS with self-rated health and the number of chronic conditions among both men and women in the U.S. (Table 3) and among men in Japan (Table 4). The mediation coefficients were positive and negative for self-rated health and the number of chronic conditions, respectively. Neuroticism also significantly mediated the association of SSS with self-rated health and number of chronic conditions among women in Japan. The positive coefficient for the mediation effects of neuroticism for self-rated health (and also the negative one for the number of chronic conditions) was a product of the negative correlation coefficient for the path from social class to neuroticism and the negative correlation coefficient for the path from neuroticism to self-rated health (or the positive one for the path from neuroticism to number of chronic conditions). Thus, all significant associations were in the expected directions.

In general, the observed mediation effects of the psychosocial resources were stronger for self-rated health than for chronic conditions, with some exceptions: mediations of neuroticism and optimism for education and SSS among men and women in both countries, and that of self-esteem among women in Japan.

Direct effects of social class on health

After adjusting for mediations, the direct effects of social class on health status were smaller than the total effects. The direct effect coefficients were reduced substantially in the U.S. (by 36–73%) and in Japan (by 2–56%) of the total coefficients, with the two exceptions of the association of SSS with chronic conditions among men in the U.S. and the association of education with chronic conditions among men in Japan.

Sensitivity analyses

Using the three-item scale of neuroticism excluding an item of “calm” did not change the results of these mediation analyses (data available upon request). Neuroticism significantly mediated the association of SSS with self-rated health and the number of chronic conditions among both men and women in the U.S. and Japan. Its mediation effect was also significant for the association between education with self-rated health and the number of chronic conditions only among both men and women in the U.S. In contrast, the mediation effects were found to be inconsistent among the items of optimism (data available upon request).The item 1 (“In uncertain times, I usually expect the best”) significantly mediated paths between SSS and self-rated health/number of chronic conditions among women and a

few paths among men in the U.S., but did not mediate any path among men or women in Japan. The item 2 “I'm always optimistic about my future”) significantly mediated all paths from education/SSS to self-rated health/number of chronic conditions among men in Japan and among men and women in the U.S. The item 3 (“I expect more good things to happen to me than bad”) mediated all paths from education/SSS to self-rated health/ number of chronic conditions only among women in Japan and the U.S.

Discussion

Overall, each of the psychological resources mediated the associations between social class and health for at least some of the groups examined, but the specific pattern of the mediation varied. In terms of our key predictions, we found the expected cultural difference in mediation effects for self-esteem, but not for sense of control. As predicted, self-esteem proved to be a significant mediator of the associations of education and SSS with self-rated health and chronic conditions among both men and women in the U.S., with the one exception of the link between education and chronic conditions among men. Such mediation was largely absent in the Japanese findings, where only an effect between SSS and self-rated health was evident among men. These findings are consistent with previous results suggesting that self-esteem accounts for the relationship between education and self-rated health in the U.S. (9). In the U.S., higher education may increase people’s self-esteem, which in turn, may predict better health. A possible explanation is that education may be more strongly associated with self-esteem in the U.S. than Japan because individuals are encouraged to increase their self-esteem at school, whereas schools in Japan are more likely to foster self-criticism (23). Self-esteem may thus be a culture-specific mediator between social class and health. Further cross-culture comparisons are needed to test whether the mediating role of self-esteem on the association between social class and health varies by different education policies. Furthermore, the cross-sectional nature of the study limits the interpretation of the direction of causality. For instance, self-esteem may increase the chances of succeeding in entry to college, or success in studies. It is also possible that better health may lead to higher education and self-esteem. The possibility of other causal pathways also may be considered in other psychological resources such as sense of control, neuroticism, and optimism. A crucial concern is whether the psychological resources were developed or possibly influenced by education. If it is a case, the findings may indicate that psychological resources are a common predisposing factor for having less education and poor health.

Although we hypothesized that sense of control would be a significant mediator primarily in the U.S., sense of control significantly mediated the association between education and SSS and self-rated health in both countries, with a similar pattern among both men and women. These results are consistent with previous research in the U.S. on the mediation effects of sense of control in the link between SES and mortality (10) and heart disease(11).

Neuroticism significantly mediated the association between both the education and SSS and both self-rated health and chronic conditions among men and women in the U.S. and among men in Japan. A similar pattern was observed for women in Japan, but only for SSS. The findings were replicated when a three-item scale of neuroticism with greater internal consistency reliability was used. These findings are consistent with previous work showing that neuroticism accounted for the relationship between education and self-rated health in among women in the U.S. (9). Our results suggest that in general neuroticism is a common mediator between social class and health in both countries and both genders. However, we did not observe a significant mediation effect of neuroticism on the association between education and both self-rated health and number of chronic conditions among women in Japan.

When the three-item scale was used, optimism significantly mediated the association of education and SSS with self-rated health, as well as the association between SSS and number of chronic conditions in Japan and the U.S., but only among women. Previous studies showed that optimism/pessimism mediated the association between SES and health (9) or feelings of stress (21) in combined samples of men and women in the U.S.. Optimism/pessimism was associated with health among women in Japan (32). However, little research has been done on the gender difference in the association between social class and optimism, or optimism and health. One study reported that the association between optimism and psychological distress was stronger for women than for men (33). Another reported that optimism was associated with support from a partner which is known to be associated with health among women who are more relationship-oriented (34). The latter may partially explain a greater association between optimism and health among women. When each item of the optimism items was used separately for the analysis, the item 3 about expecting more good things showed a similar pattern to that resulting from running the analyses with the three item scale. However, the item 2 about optimism about the future showed a pattern similar to that observed for neuroticism. The item 1 about expecting the best showed a limited mediating pattern which was only clearly seen among women in the U.S.. These aspects of optimism may have a different function in mediating the association between social class and health in the two countries. Further research is needed to replicate these patterns with an established multidimensional scale.

Overall, the selected psychological resources were found to mediate certain parts of the association between social class (education and SSS) and health. Neuroticism and sense of control both tended to have similar influences on the health outcomes in Japan and U.S., whereas self-esteem was a stronger mediator in the U.S., and optimism was a more effective mediator for women.

Several limitations should be noted. First, the sampling frame work was different between the two countries. In the U.S., sampling was based on the 48 contiguous states. In the Japanese sample, individuals from Tokyo's 23 wards were contacted. These differentials may be part of the obtained effects. Also non-respondents may bias the findings; for instance, people in a low SES group with health problems were less likely to participate in the study. Second, using an early-life indicator of social class, such as parental SES, may help clarify these results. Longitudinal studies will also help clarify the causal pathways linking social class, psychological resources, and health. Finally, unmeasured confounding variables, such as childhood adversities and genetic dispositions, may interplay in the association among social class, psychological resources, and health (35).

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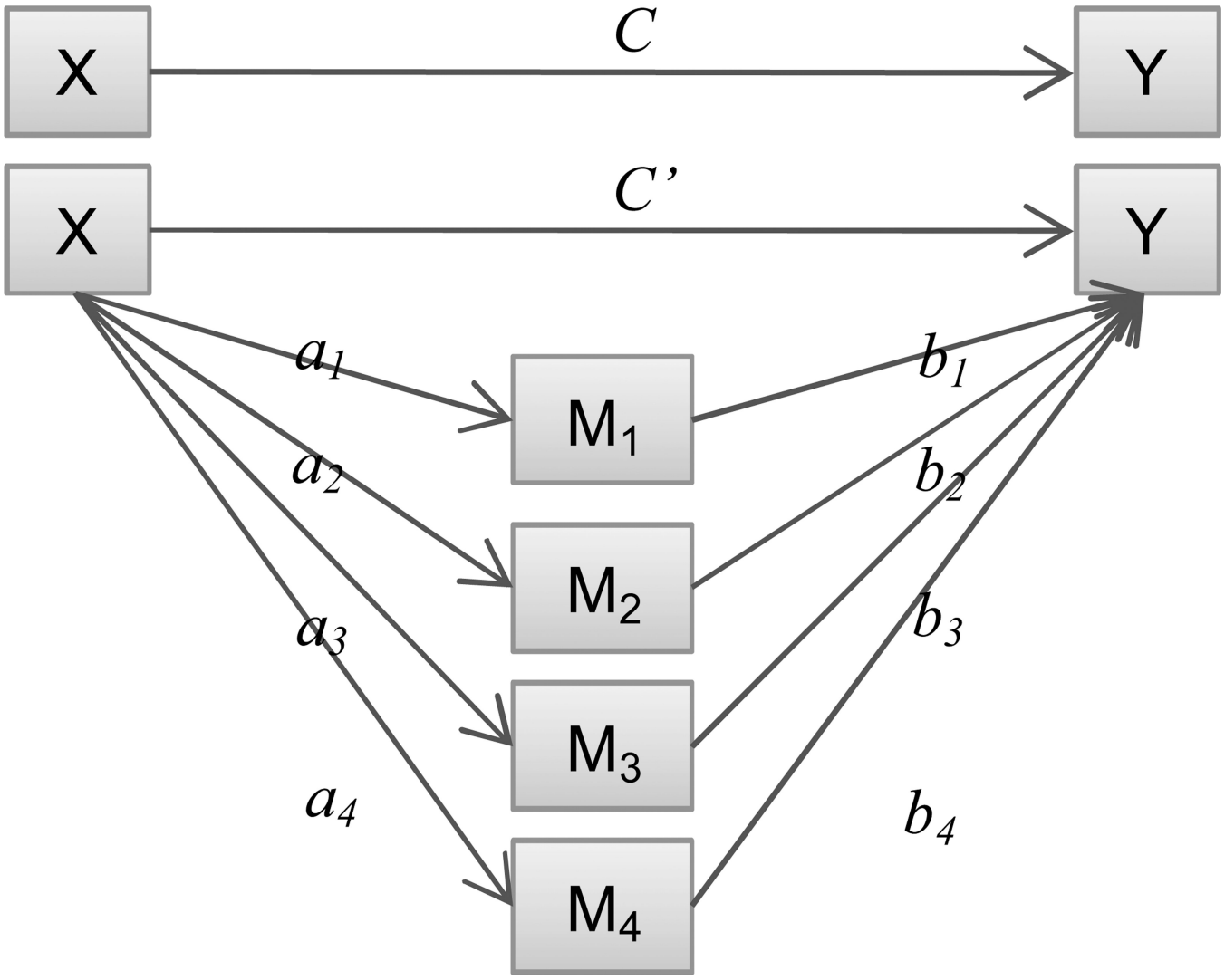

Figure 1.
Illustration of a multiple mediation model
X: Predictor (social class)
Y: Outcome (health status)
M1-M4: Mediators (psychological resources)

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Table 1

Sample Characteristics of respondents in the U.S.*

	Education-Psychological resources-Health				Subjective social status-Psychological resources-Health			
	Men (N=800)		Women (N=951)		Men (N=794)		Women (N=935)	
	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)
Demographic variables								
Age (years)	56.97 (12.56)		56.41 (12.51)		56.91 (12.53)		56.43 (12.49)	
Marital status								
Married		615 (77)		577 (61)		610 (77)		571 (61)
Separated, Divorced, or Widowed		123 (15)		307 (32)		122 (15)		302 (32)
Never Married		62 (08)		67 (07)		62 (08)		62 (07)
Social class								
Education (years)	14.35 (2.60)		13.86 (2.43)		14.36 (2.60)		13.85 (2.43)	
Subjective social status	6.78 (1.73)		6.26 (1.92)		6.78 (1.73)		6.26 (1.92)	
Health status								
Self-rated health	7.29 (1.53)		7.25 (1.74)		7.29 (1.53)		7.24 (1.74)	
Chronic conditions	2.25 (2.45)		2.78 (2.70)		2.24 (2.45)		2.77 (2.57)	
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Psychological resources								
Self-esteem	38.44 (6.95)		36.76 (7.62)		38.46 (6.95)		36.78 (7.61)	
Sense of control	5.32 (1.31)		5.06 (1.38)		5.32 (1.31)		5.05 (1.39)	
Neuroticism	1.99 (.60)		2.18 (.65)		1.99 (.59)		2.18 (.65)	
Optimism	11.87 (2.34)		11.77 (2.55)		11.87 (2.35)		11.76 (2.55)	

*The sample for the analysis of subjective social status (SSS) was a subset of the sample for the analysis of education, because of missing responses in SSS.

Table 2

Sample Characteristics of respondents in Japan*

	Education-Psychological resources-Health				Subjective social status-Psychological resources-Health			
	Male (N=482)		Female (N=506)		Male (N=469)		Female (N=487)	
	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)
Demographic variables								
Age (years)	54.21 (14.18)		53.87 (13.79)		54.09 (14.22)		53.41 (13.60)	
Marital status								
Married		352 (73)		333 (66)		340 (72)		323 (66)
Separated, Divorced, or Widowed		46 (10)		96 (19)		46 (10)		90 (18)
Never Married		84 (17)		77 (15)		83 (18)		74 (15)
Social class								
Education (years)	13.97 (2.52)		13.14 (2.03)		13.97 (2.51)		13.16 (2.01)	
Subjective social status	6.24 (2.22)		5.84 (2.00)		6.24 (2.22)		5.84 (2.00)	
Health status								
Self-rated health	6.05 (2.05)		6.38 (1.88)		6.06 (2.04)		6.39 (1.87)	
Chronic conditions	2.16 (2.01)		2.41 (1.94)		2.14 (2.01)		2.39 (1.95)	
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Psychological resources								
Self-esteem	31.10 (5.53)		31.01 (5.65)		31.04 (5.49)		31.02 (5.64)	
Sense of control	4.60 (.80)		4.74 (.81)		4.60 (.79)		4.75 (.81)	
Neuroticism	2.15 (.56)		2.06 (.55)		2.15 (.55)		2.06 (.55)	
Optimism	9.90 (2.20)		10.11 (2.27)		9.88 (2.19)		10.13 (2.27)	

*The sample for the analysis of subjective social status (SSS) was a subset of the sample for the analysis of education, because of missing responses in SSS.

Table 3

Mediation effects of psychological resources for the association between social class and health status in the U.S.

		Men		Women	
		Self-rated health	**Chronic conditions**	**Self-rated health**	**Chronic conditions**
Education	Total effect (*c* coefficient)	**0.204** (0.136, 0.271)	**−0.083** (−0.150, −0.016)	**0.194** (0.130, 0.258)	**−0.190** (−0.253, −0.127)
(800 males and 951 females)	Direct effect (*c′* coefficient)	**0.149** (0.083, 0.214)	−0.045 (−0.112, 0.021)	**0.123** (0.063, 0.183)	**−0.133** (−0.193, −0.072)
	Total mediation effect (*c*–*c′*)	**0.055** (0.033, 0.082)	**−0.038** (−0.061, −0.020)	**0.071** (0.043, 0.099)	**−0.058** (−0.088, −0.034)
	Specific mediation effect				
	Self-esteem	**0.033** (0.017, 0.056)	−0.012 (−0.030, 0.002)	**0.036** (0.018, 0.059)	**−0.023** (−0.042, −0.011)
	Sense of control	**0.005** (0.000, 0.017)	−0.004 (−0.013, 0.000)	**0.011** (0.003, 0.023)	−0.006 (−0.017, 0.000)
	Neuroticism	**0.019** (0.007, 0.038)	**−0.018** (−0.036, −0.008)	**0.011** (0.003, 0.026)	**−0.022** (−0.045, −0.009)
	Optimism	−0.002 (−0.013, 0.008)	−0.004 (−0.017, 0.006)	**0.013** (0.004, 0.028)	−0.006 (−0.019, 0.001)
Subjective social status	Total effect (*c* coefficient)	**0.182** (0.112, 0.251)	−0.040 (−0.109, 0.028)	**0.259** (0.196, 0.323)	**−0.222** (−0.286, −0.159)
(794 males and 935 females)	Direct effect (*c′* coefficient)	0.066 (−0.006, 0.139)	0.044 (−0.029, 0.117)	**0.090** (0.022, 0.158)	**−0.086** (−0.155, −0.018)
	Total mediation effect (*c*–*c′*)	**0.116** (0.079, 0.162)	**−0.085** (−0.125, −0.046)	**0.170** (0.129, 0.212)	**−0.136** (−0.182, −0.095)
	Specific mediation effect				
	Self-esteem	**0.079** (0.043, 0.125)	**−0.036** (−0.074, −0.003)	**0.080** (0.042, 0.125)	**−0.054** (−0.088, −0.021)
	Sense of Control	**0.012** (0.001, 0.031)	−0.009 (−0.025, 0.000)	**0.017** (0.005, 0.034)	−0.009 (−0.023, 0.002)
	Neuroticism	**0.030** (0.014, 0.055)	**−0.027** (−0.051, −0.012)	**0.029** (0.010, 0.052)	**−0.045** (−0.073, −0.024)
	Optimism	−0.006 (−0.031, 0.021)	−0.013 (−0.039, 0.012)	**0.043** (0.015, 0.075)	**−0.028** (−0.059, −0.002)

Note. Adjusting for age, and marital status. Using bias corrected and accelerated; 5000 bootstrap sampling. A bold figure indicated a significant mediation effect.

Table 4

Mediation effects of psychological resources for the association between social class and health status in Japan

		Men		Women	
		Self-rated health	**Chronic Conditions**	**Self-rated health**	**Chronic Conditions**
Education	Total effect (*c* coefficient)	0.058 (−0.035, 0.150)	−0.002 (−0.094, 0.091)	0.089 (−0.006, 0.185)	−0.063 (−0.160, 0.034)
(482 males and 506 females)	Direct effect (*c′* coefficient)	−0.026 (−0.118, 0.066)	0.058 (−0.035, 0.151)	0.038 (−0.051, 0.127)	−0.035 (−0.129, 0.059)
	Total mediation effect (*c*–*c′*)	**0.083** (0.048, 0.125)	**−0.059** (−0.104, −0.025)	**0.051** (0.009, 0.098)	−0.028 (−0.065, 0.005)
	Specific mediation effect				
	Self-esteem	**0.035** (0.007, 0.070)	−0.009 (−0.049, 0.029)	0.004 (−0.013, 0.024)	0.005 (−0.011, 0.028)
	Sense of Control	**0.027** (0.008, 0.055)	**−0.022** (−0.056, −0.003)	**0.024** (0.002, 0.055)	−0.010 (−0.031, 0.000)
	Neuroticism	**0.014** (0.001, 0.035)	**−0.018** (−0.044, −0.003)	0.013 (−0.004, 0.037)	−0.015 (−0.041, 0.005)
	Optimism	0.007 (−0.006, 0.028)	−0.011 (−0.032, 0.004)	**0.010** (0.000, 0.035)	−0.009 (−0.031, 0.000)
Subjective social status	Total effect (*c* coefficient)	**0.232** (0.142, 0.322)	**−0.129** (−0.220, −0.037)	**0.167** (0.079, 0.254)	−0.086 (−0.175, 0.002)
(469 males and 487 females)	Direct effect (*c′* coefficient)	**0.129** (0.033, 0.225)	−0.049 (−0.147, 0.049)	0.003 (−0.091, 0.097)	0.011 (−0.088, 0.110)
	Total mediation effect (*c*–*c′*)	**0.103** (0.056, 0.158)	**−0.079** (−0.134, −0.037)	**0.164** (0.112, 0.221)	**−0.097** (−0.165, −0.040)
	Specific mediation effect				
	Self-esteem	**0.038** (0.003, 0.078)	−0.007 (−0.056, 0.045)	0.014 (−0.040, 0.067)	0.014 (−0.045, 0.076)
	Sense of Control	**0.036** (0.001, 0.083)	−0.031 (−0.077, 0.007)	**0.080** (0.043, 0.128)	−0.034 (−0.075, 0.001)
	Neuroticism	**0.021** (0.003, 0.049)	**−0.028** (−0.055, −0.011)	**0.048** (0.022, 0.084)	**−0.054** (−0.095, −0.027)
	Optimism	0.008 (−0.013, 0.032)	−0.014 (−0.041, 0.008)	**0.023** (0.000, 0.055)	**−0.023** (−0.055, −0.001)

Note. Adjusting for age, and marital status. Using bias corrected and accelerated; 5000 bootstrap sampling. A bold figure indicated a significant mediation effect.

Appendix 1

Peason's partial correlation coefficients adjusted for age and marital status among social class, psychological resources, and health outcome variables by gender among respondents in Japan and the U.S.

For education (482 men and 506 women in Japan and 800 men and 951 women in the U.S.)

	Education		Self-esteem		Sense of control		Neuroticism		Optimism		Self-rated health		Chronic conditions	
	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.
Education	–		.261 ***	.155 ***	.190 ***	.067 n.s.	−107 *	−135 ***	.148 ***	.131 ***	.056 n.s.	.204 ***	−001 n.s.	−086 *
Self-esteem	52 **	.182 ***	–		.545 ***	.331 ***	−299 ***	−465 ***	.388 ***	.483 ***	.256 ***	.319 ***	−156 **	−188 ***
Sense of control	97 *	.129 ***	.556 ***	.364 ***	–		−205 ***	−162 ***	.275 ***	.221 ***	.244 ***	.177 ***	−172 ***	−114 **
Neuroticism	−.061 n.s.	−116 ***	−363 ***	−512 ***	−303 ***	−224 ***	–		−286 ***	−395 ***	−204 ***	−264 ***	.208 ***	.207 ***
Optimism	.094 *	.099 **	.433 ***	.495 ***	.442 ***	.285 ***	−308 ***	−396 ***	–		.169 ***	.181 ***	−153 **	−146 ***
Self-rated health	.081 n.s.	.190 ***	.267 ***	.357 ***	.343 ***	.226 ***	−303 ***	−278 ***	.272 ***	.298 ***	–		−310 ***	−432 ***
Chronic conditions	−.057 n.s.	−.189 ***	−.140 **	−.295 ***	−.184 ***	−.170 ***	.263 ***	.303 ***	−.187 ***	−227 ***	−368 ***	−412 ***	–	

For subjective social status (469 men and 487 women in Japan and 794 men and 935 women in the U.S.)

	Subjective social status		Self-esteem		Sense of control		Neuroticism		Optimism		Self-rated health		Chronic conditions	
	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.	Japan	the U.S.
Subjective social status	–		.335 ***	.381 ***	.342 ***	.157 ***	−.174 ***	−.192 ***	.212 ***	.308 ***	.227 ***	.179 ***	−.126 **	−.041 n.s.
Self-esteem	.486 ***	.431 ***	–		.531 ***	.328 ***	−.288 ***	−.463 ***	.379 ***	.484 ***	.257 ***	.318 ***	−.153 **	−.185 ***
Sense of control	.348 ***	.202 ***	.571 ***	.362 ***	–		−.186 ***	−.158 ***	.255 ***	.219 ***	.237 ***	.175 ***	−.161 ***	−.112 **
Optimism	−.263 ***	−.272 ***	−.386 ***	−.507 ***	−.304 ***	−.220 ***	–		−.281 ***	−.399 ***	−.202 ***	−.266 ***	.206 ***	.205 ***
Neuroticism	.242 ***	.374 ***	.441 ***	.495 ***	.453 ***	.285 ***	−.319 ***	−.394 ***	–		.165 ***	.180 ***	−.151 **	−.144 ***
Self-rated health	.167 ***	.253 ***	.272 ***	.359 ***	.344 ***	.223 ***	−.294 ***	−.283 ***	.269 ***	.300 ***	–		−.302 ***	−.432 ***
Chronic conditions	−.086 n.s.	−.220 ***	−.143 **	−.296 ***	−.183 ***	−.164 ***	.251 ***	.289 ***	−.190 ***	−.245 ***	−.365 ***	−.441 ***	–	

* $p < .05$,

** $p < .01$,

*** $p < .001$

Note: The upper diagonal is the results of men and the lower diagonal is the results of women adjusted for age and marital status.

* $p < .05$,

** $p < .01$,

*** $p < .001$

Note: The upper diagonal is the results of men and the lower diagonal is the results of women adjusted for age and marital status. The number of respondents decreased because of missing responses for subjective social class.

Appendix 2

Inter-item correlation coefficients for neuroticism adjusted for age and marital status by gender among respondents inJapan and the U.S. (Item 1:Adjectives, Item 2: Moody, Item 3: Nervous, Item 4:Calm (Reverse item)

For education

	Item 1		Item 2		Item 3		Item 4	
	Japan	**the U.S.**	**Japan**	**the U.S.**	**Japan**	**the U.S.**	**Japan**	**the U.S.**
Item 1	–		.275 ***	.426 ***	.256 ***	.339 ***	.033 n.s.	.271 ***
Item 2	.243 ***	.441 ***	–		.467 ***	.588 ***	−.001 n.s.	.272 ***
Item 3	.168 ***	.462 ***	.446 ***	.619 ***	–		−.061 n.s.	.347 ***
Item 4	.174 ***	.288 ***	.033 n.s.	.363 ***	.018 n.s.	.399 ***	–	

For subjective social status

	Item 1		Item 2		Item 3		Item 4	
	Japan	**the U.S.**	**Japan**	**the U.S.**	**Japan**	**the U.S.**	**Japan**	**the U.S.**
Item 1	–		.282 ***	.431 ***	.254 ***	.336 ***	.022 n.s.	.265 ***
Item 2	.441 ***	.439 ***	–		.462 ***	.588 ***	−.002 n.s.	.278 ***
Item 3	.462 ***	.461 ***	.619 ***	.614 ***	–		−.070 n.s.	.346 ***
Item 4	.288 ***	.287 ***	.363 ***	.366 ***	.399 ***	.404 ***	–	

*** $p < .001$

Note: The upper diagonal is the results of men and the lower diagonal is the results of women adjusted for age and marital status.

*** $p < .001$

Note: The upper diagonal is the results of men and the lower diagonal is the results of women adjusted for age and marital status.

Appendix 3

Inter-item correlation coefficients for optimism adjusted for age and marital status by gender among respondents in Japan and the U.S. (Item 1:In uncertain times, I usually expect the best. Item 2: I'm always optimistic about my future. Item 3: I expect more good things to happen to me than bad.)

For education

	Item 1		Item 2		Item 3	
	Japan	**the U.S.**	**Japan**	**the U.S.**	**Japan**	**the U.S.**
Item 1	–		.282 ***	.454 ***	.263 ***	.378 ***
Item 2	.266 ***	.493 ***	–		.373 ***	.359 ***
Item 3	.252 ***	.346 ***	.465 ***	.456 ***	–	

For subjective social status

	Item 1		Item 2		Item 3	
	Japan	**the U.S.**	**Japan**	**the U.S.**	**Japan**	**the U.S.**
Item 1	–		.281 ***	.456 ***	.259 ***	.386 ***
Item 2	.493 ***	.494 ***	–		.365 ***	.365 ***
Item 3	.346 ***	.351 ***	.456 ***	.453 ***	–	

*** $p < .001$

Note: The upper diagonal is the results of men and the lower diagonal is the results of women adjusted for age and marital status.

*** $p < .001$

Note: The upper diagonal is the results of men and the lower diagonal is the results of women adjusted for age and marital status.

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Appendix 4

Mediation effects of social class on health status through neuroticism which consisted of three items or each item of optimism among the U.S.

		Men		Women	
		Self-rated health	**Chronic Conditions**	**Self-rated health**	**Chronic Conditions**
Education	Specific mediation effect				
	Neuroticism [a]	**0.028** (0.012, 0.049)	**−0.024** (−0.042, −0.011)	**0.029** (0.014, 0.051)	**−0.034** (−0.060, −0.016)
	Optimis item 1	**0.004** (0.000, 0.015)	−0.005 (−0.016, 0.000)	0.004 (−0.009, 0.018)	−0.003 (−0.014, 0.006)
	Optimis item 2	**0.017** (0.005, 0.033)	**−0.015** (−0.031, −0.005)	**0.026** (0.011, 0.046)	**−0.019** (−0.035, −0.008)
	Optimis item 3	**0.018** (0.006, 0.036)	−0.010 (−0.025, 0.000)	**0.025** (0.010, 0.045)	**−0.020** (−0.038, −0.007)
Subjective social status	Specific mediation effect				
	Neuroticism [a]	**0.033** (0.016, 0.056)	**−0.029** (−0.052, −0.014)	**0.053** (0.033, 0.080)	**−0.061** (−0.092, −0.040)
	Optimis item 1	0.010 (−0.003, 0.027)	**−0.018** (−0.036, −0.004)	**0.042** (0.022, 0.067)	**−0.028** (−0.053, −0.010)
	Optimis item 2	**0.042** (0.023, 0.068)	**−0.044** (−0.071, −0.024)	**0.063** (0.041, 0.092)	**−0.047** (−0.076, −0.025)
	Optimis item 3	**0.028** (0.010, 0.051)	−0.017 (−0.038, 0.000)	**0.059** (0.065, 0.091)	**−0.053** (−0.085, −0.028)

Note. Adjusting for age, and marital status. Using bias corrected and accelerated; 5000 bootstrap sampling. A bold figure indicated a significant mediation effect.

[a]The three-item scale of neuroticism excluding an item of "calm" was used.

Appendix 5

Mediation effects of social class on health status through neuroticism which consisted of three items or each item of optimism in Japan

		Men		Women	
		Self-rated health	**Chronic Conditions**	**Self-rated health**	**Chronic Conditions**
Education	Specific mediation effect				
	Neuroticism [a]	0.010 (−0.005, 0.033)	−0.012 (−0.036, 0.005)	0.011 (−0.017, 0.040)	−0.011 (−0.043, 0.015)
	Optimis item 1	0.002 (−0.002, 0.015)	−0.001 (−0.012, 0.003)	0.002 (−0.006, 0.016)	−0.001 (−0.015, 0.005)
	Optimis item 2	**0.014** (0.002, 0.035)	**−0.023** (−0.047, −0.007)	0.018 (−0.008, 0.050)	−0.012 (−0.038, 0.004)
	Optimis item 3	**0.038** (0.017, 0.069)	**−0.021** (−0.050, −0.004)	**0.033** (0.011, 0.065)	**−0.023** (−0.051, −0.007)
Subjective social status	Specific mediation effect				
	Neuroticism [a]	**0.018** (0.002, 0.045)	**−0.022** (−0.050, −0.005)	**0.052** (0.028, 0.089)	**−0.055** (−0.091, −0.028)
	Optimis item 1	0.002 (−0.011, 0.017)	−0.001 (−0.015, 0.011)	0.009 (−0.001, 0.030)	−0.007 (−0.028, 0.002)
	Optimis item 2	**0.011** (0.001, 0.032)	**−0.021** (−0.045, −0.005)	**0.051** (0.027, 0.083)	**−0.036** (−0.069, −0.016)
	Optimis item 3	**0.035** (0.013, 0.066)	**−0.018** (−0.045, 0.003)	**0.044** (0.022, 0.077)	**−0.032** (−0.063, −0.012)

Note. Adjusting for age, and marital status. Using bias corrected and accelerated; 5000 bootstrap sampling. A bold figure indicated a significant mediation effect.

[a] The three-item scale of neuroticism excluding an item of "calm" was used.