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Commonalities and Differences in Psychological Adjustment to Chronic Illnesses Among Older Adults: a Comparative Study Based on the Stress and Coping Paradigm

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Abstract

Background This study aimed to validate the role of the stress and coping paradigm in the context of psychological adjustment to chronic illnesses among older adults by using the structural equation modeling technique, as well as investigating the differences in structural weights between older adults with arthritis and older adults with hypertension.

Method A cross-sectional study was conducted with 325 older adults with chronic illnesses (149 hypertension, 176 arthritis), aged 60–88 years, who completed questions on perceived social support, psychological resources, threat appraisal, self-efficacy, coping strategy, depressive symptoms, and anxiety.

Results The results revealed that older adults with arthritis experienced significantly higher anxiety ($t = 2.91$, $p < 0.01$) than those with hypertension, whereas no significant difference in their depressive symptoms was observed ($t = 1.61$, $p > 0.05$). Social support, psychological resources, threat appraisal, and self-efficacy had a significant direct relationship with psychological distress ($\beta = -0.15$, $\beta = -0.38$, $\beta = 0.19$, $\beta = -0.23$, respectively). Multi-group analyses showed significant differences in structural weights between older adults with hypertension and those with arthritis ($\Delta\chi^2 = 41.336$, $\Delta df = 18$, $p < 0.01$).

Conclusion The stress and coping paradigm appears to be applicable for adjustment to chronic illnesses by allowing direct paths from social support, psychological resources, threat appraisal, and self-efficacy to psychological distress. The differences in structural weights may offer an intervening angle for clinical practitioners to design targeted interventions for older adults with different types of chronic illnesses.

Keywords Older adults · Chronic illness · Psychological distress · Multi-group analyses

Introduction

Chronic illnesses, such as arthritis and hypertension, are disorders that persist for an extended period, having the potential to induce profound changes in a person's daily life. Typically, a diagnosis of chronic illness places individuals within a group that is potentially at risk of poor adjustment. Review of the literature [1, 2] showed that, compared with adults without chronic illnesses, individuals with chronic illnesses are more likely to suffer from psychological disorders such as anxiety and depressive symptoms. Furthermore, many chronic illnesses are known to disproportionally affect older adults; the coexistence of chronic illness and aging has been shown to pose unique challenges to older adults' quality of life and well-being [3].

A working model, derived from the stress and coping paradigm [4] and applied to chronic illnesses [5, 6], provides the framework for understanding the process of psychological adjustment to chronic conditions. Researchers have sought to identify multiple components (i.e., psychosocial resources, primary cognitive appraisal, secondary cognitive appraisal, and coping strategy) that predict adjustment to chronic illnesses [2]. However, there are important gaps in our understanding about the interrelationships of multiple components in influencing adjustment outcomes. First, a growing body of research has examined particular components of the model in isolation [2]; however, they should not be examined as predictors of adjustment in isolation from one another [7]. Nevertheless, a majority of

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research have utilized regression analyses instead of the structural equation modeling (SEM) that can test not only the direct effects but also the indirect effects among a large number of theoretically related variables. In addition, the stress and coping paradigm [5, 6] assumes that two mediation components (i.e., cognitive appraisal and coping strategy) fully mediate the effects of psychosocial resources on adjustment to chronic illnesses (i.e., the fully mediating model). However, we have limited knowledge on the direct effects of psychosocial resources (i.e., social support and psychological resources) and cognitive appraisal on the illness-related adjustment outcomes. As cautioned by Stanton and colleagues [8], these psychosocial resources and cognitive appraisal are likely to have an indirect effect mediated through cognitive appraisal and the coping process, as well as a direct effect, on adjustment to chronic illness. In this study, we will address this issue by allowing direct paths from psychosocial resources and cognitive appraisal to adjustment to chronic illnesses (i.e., partial mediating model) using the SEM.

Second, inspired by the stress and coping paradigm [4–6], previous studies have provided valuable insights into the ways individuals cope with their chronic illness. Most research, however, is primarily restricted to a single illness, resulting in a paucity of studies that address the commonalties and differences across different illnesses [6]. For instance, some chronic illnesses have been found to have a stronger impact on psychological status than other illnesses, and the employment of coping strategies for them also differs greatly due to the variability of these chronic illnesses in context of their controllability, predictability, and severity [9]. In this study, we selected older adults with either arthritis or hypertension, which are the two most prevalent chronic illnesses in older adults [3] and which provide a contrast in functional disability, controllability, and unpredictability [9, 10]. For example, studies showed that most individuals with hypertension were asymptomatic and have more opportunities for medical and personal control [11]. However, individuals with arthritis are known to suffer from much more pain, stiffness, fatigue, and physical impairments; moreover, the chance of medical cure for this illness is still not realistic for most [12], which makes the illness more uncontrollable and unpredictable than hypertension. It seems that the coping resources, coping attempts/behaviors, and the successfulness vary according to specific illness characteristics. Previous studies indicated that depressive symptoms and anxiety are prevalent both in individuals with arthritis and hypertension [13]. Nevertheless, few studies have addressed the differences between depressive symptoms and anxiety, as well as the differences in structural weights between individuals with arthritis and those with hypertension for multiple components in the stress and coping paradigm. Therefore, a study concerned with the commonalties and differences across different chronic conditions may contribute to identifying psychological interventions required for individuals with different chronic illnesses.

Psychosocial Resources and Adjustment to Chronic Illness

According to the stress and coping paradigm [4–6], cognitive appraisal and coping strategy are influenced by the characteristics of a person and his/her context. Social support and psychological resources have been widely considered as important coping resources. Social support has received the most attention [2], because many adaptive tasks, such as practical aid and emotional support, in chronic illnesses require help from others. Social support protects individuals against harmful stressors and promotes physical and emotional well-being [2, 6]. In addition, social support may also enable recipients to use effective coping strategies by helping them achieve a better understanding of the problem, increasing motivation to take instrumental action, and reducing emotional stress [2, 14].

Psychological resources are also critical positive factors used to cope with chronic illness. A set of positive psychological variables are captured under the umbrella-term "cognitive adaptation theory". According to the theory of cognitive adaptation [15], individuals successfully adjust to chronic illness by maintaining or retaining positive cognitions of optimism, self-esteem, and perceived control. Research has revealed that psychological resources may facilitate the adjustment to chronic illness and predict better adjustment outcomes [16]. In addition, psychological resources are likely to have both direct effects on adjustment to chronic illnesses and indirect effects through appraisal and coping processes [8]. In sum, we hypothesized that social support and psychological resources will have both direct and indirect effects on adjustment outcomes.

Threat Appraisal, Self-Efficacy, and Adjustment to Chronic Illness

Cognitive appraisals regarding a stressful situation, including primary and secondary appraisals, are assigned central importance in the stress and coping paradigm for determining subsequent coping processes [5, 6]. Primary appraisal refers to the degree to which an individual views a situation as a threat, harm/loss, or challenge. If the understanding of an individual's problem is relevant to their well-being, primary appraisal of the presence of a threat or challenge would lead to secondary appraisal of coping resources and available options. Secondary appraisal involves determining the use of stressful person-environment relationships and coping resources, especially when there has been a primary appraisal of the threat, harm, or challenge. Perceived threat is one part of the critical appraisal process that has received considerable empirical attention [2, 17]. Previous research has demonstrated that threat

appraisal affects adjustment to chronic illnesses directly and/or indirectly through coping strategies [8].

The best-known secondary appraisal is the construct of self-efficacy. Self-efficacy is part of a broader cognitive appraisal that takes place when encountering stress, which may be influenced by the psychosocial resources required when an individual is faced with external situations. Moreover, as a task-specific or behavior-specific construct, illness-specific self-efficacy can determine subsequent coping strategies and the degree of effort invested in problem solving, such as determining whether coping will be initiated, and if so, how long it will be sustained [6]. Importantly, the study by Kraaij, Garnefski, and Maes [18] indicated that the effects of self-efficacy on depressive symptoms act either directly or indirectly through coping strategy. We hypothesized that threat appraisal and illness-related self-efficacy may converge during adjustment directly and/or indirectly through coping strategies.

Coping Strategies and Adjustment to Chronic Illness

The process of appraisal catalyzes the initiation of coping strategies, and coping efforts may be directed at approaching or avoiding the demands of chronic illness. The extent to which individuals use approach- or avoidant-oriented coping strategies mainly depends on the personal significance of the encounter, that is, what is at stake for the person (primary appraisal) and the options for changing the person-environment relationship (secondary appraisal). In the context of chronic illnesses, the way individuals utilize coping strategies is likely to vary, given that different illnesses require different adaptive tasks. Typically, avoidant-oriented coping predicts maladjustment over time, while approach-oriented coping predicts adaptive outcomes; however, outcomes are complicated, as some coping strategies are not effective for a defined chronic illness or unmodifiable facets of the illness [8]. Coping-oriented problem-solving strategies may be ineffective, especially for certain conditions [19]. Given this evidence from the literature [2, 13, 20], it is reasonable to expect that coping strategies would mediate the relations between psychosocial resources, cognitive appraisal, and adjustment to chronic illness.

The Present Study

The present study examines the stress and coping paradigm of adjustment to chronic illnesses among older adults using SEM and further compares the model between different groups diagnosed with arthritis and hypertension. More specifically, the aim of the study was threefold. First, we aimed to compare the difference of adjustment level in older adults with arthritis and those with hypertension. As arthritis is characterized by unpredictable episodes of extreme pain and disability [12], we hypothesized that older adults with arthritis will report more anxiety (hypothesis 1a) and depressive symptoms (hypothesis 1b) than those with hypertension. Moreover, we hypothesized that, in addition to the indirect effects, social support, psychological resources, threat appraisal, and self-efficacy will have direct effects on adjustment to chronic illnesses (hypothesis 2). Finally, we aimed to examine the commonalities and differences in the hypothesized, partial mediating model, between hypertension and arthritis using multi-group analyses. Thus, we posited that illness type would moderate the relationship between multiple components of the stress and coping paradigm and adjustment (hypothesis 3).

Methods

Participants

The cross-sectional study was conducted using multicenter sampling. All participants were initially recruited from outpatient clinics of five community health service centers in Chongqing, China. The eligibility criteria were as follows: (1) participants should have been diagnosed with only one type of hypertension, rheumatoid arthritis, or osteoarthritis based on health records data; (2) they must be aged at least 60 years or above; and (3) they were required to provide their informed consent. Individuals having any one of the following conditions were excluded from participation: (1) another major physical illness; (2) major psychiatric illness; and (3) cognitive impairment, including dementia.

Based on the established inclusion criteria, a total of 342 older adults with arthritis or hypertension were recruited. Seventeen participants were excluded from the analyses as per the exclusion criteria and multivariate outliers (± 3 standard deviations). The final sample consisted of 325 older adults with chronic illnesses (149 hypertension, 176 arthritis), aged 60–88 years (202 women, 123 men, $M = 69.88$ years, $SD = 6.83$) (Fig. 1). Up to 64.6% of participants had a partner (married or lived as couples). The average time passed since diagnosis was 7.98 years ($SD = 6.75$). The average number of years of education was 4.86 ($SD = 3.53$). Prior to retirement, 78.2% of the participants were farmers, manual workers, or unemployed, while 9.2% were merchants, 4.9% were technicians, 6.2% were middle managers, and 1.5% were senior managerial staff. Self-rated health was assessed using a single question ("In general, would you say that your health is poor, fair, good, very good, or excellent?"). Of all the participants, 13.8%, 48.3%, 19.4%, 13.5%, and 4.9% indicated that their health was poor, fair, good, very good, and excellent, respectively.

Participants signed a consent form, which had been approved by the Institutional Review Board of the corresponding author's institution. Data were collected by primary investigators, and most of the participants were interviewed at community centers at prearranged times. During the one-on-one meetings with the trained investigator, all participants completed the multi-section questionnaire. The questionnaire was read aloud to participants who could not read or write. Participants were offered ¥30 (about 4.50 US Dollars) upon completion of the questionnaire.

Measures

Social Support The Chinese version of Medical Outcomes Study Social Support Survey [21] was used to assess perceived social support. This self-report questionnaire consists of four dimensions: emotional/informational support, tangible support, affectionate support, and positive social interaction. The survey included 19 items, with each item ranging from 1 (none of the time) to 5 (all of the time). In this study, the Cronbach's α was 0.92.

Psychological Resources The single Cognitive Adaptation Index was used as the indicator of psychological resources,[1] since composite indices are generally more reliable than single scales [16]. Optimism was assessed using the Chinese version of Revised Life Orientation Test (LOT-R) [22]. The LOT-R consists of 10 items (including 4 filler items) and participants were required to indicate their agreement with the items on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Self-esteem was assessed by using the Self-Esteem Scale (SES) [23]. The participants were required to indicate their agreement with the 10 items on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Perceived control was assessed by using the Self-Mastery Scale (SMS) [24]. The participants were required to indicate their agreement with the 10 items on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Principal components analysis of the three variables indicated that they all loaded on a single factor. A single cognitive adaptation index was composed by standardizing each of the three variables and summing them. The cognitive adaptation index reflects high optimism, high self-esteem, and high perceived control. In this study, the Cronbach's αs of the psychological resources, LOT-R, SES, and SMS were 0.85, 0.63, 0.82, and 0.73, respectively.

Threat Appraisal The Threat Appraisal subscale of the Cognitive Appraisal Questionnaire by Wang and colleagues [25] was used to assess the potential harm to variables such as important life goals and self-esteem. The questionnaire consists of six items, such as "losing your self-respect" and "harm to a loved one's emotional well-being." Participants rated threat appraisal items on a 7-point scale ranging from 1 (no harm) to 7 (extremely harmful). Higher scores indicated higher threat appraisal. In this study, the Cronbach's α was 0.83.

Self-Efficacy The Chinese version of the Self-efficacy for Managing Chronic Disease Scale (SECD) [26] was used to evaluate the confidence among individuals with chronic illness when performing certain activities. It covers several domains that are common across many chronic illnesses, including symptom control, role function, emotional functioning, and communicating with physicians. The measure consists of six items that are rated on a 10-point scale ranging from 1 (not at all confident) to 10 (totally confident). Higher scores indicated higher self-efficacy. In this study, the Cronbach's α was 0.91.

Coping Strategy The Ways of Coping Checklist-Revised (WCCL-R) [27] was used to assess cognitive and behavioral coping during specific situations. The WCCL-R consists of 5 subscales: problem solving, seeking social support, blaming self, wishful thinking, and avoidance. Participants responded to 41 items on a 5-point scale, indicating the degree to which they used each of the thoughts and behaviors to cope with their medical conditions. According to a prior study [28], these coping strategies were divided into two different categories: avoidant-oriented coping and approach-oriented coping. In this study, the Cronbach's αs of avoidant-oriented coping and approach-oriented coping were 0.79 and 0.88, respectively.

Psychological Distress Depressive symptoms and anxiety were assessed considering psychological distress as a latent factor. The Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D) [29] was used to evaluate depressive symptoms. The CES-D consists of 20 items covering affective, psychological, and somatic symptoms. Participants responded to the items on a 4-point scale ranging from 1 (a little of the time) to 4 (most of time). The suggested clinical cutoff score was 16 or above, indicating significant depressive symptoms. In this study, the Cronbach's α was 0.89. The Chinese version of the Self-Rating Anxiety Scale (SAS) was used to evaluate anxiety [30]. The SAS consists of 20 items (e.g., "I feel more nervous and anxious than usual").

[1] In this study, we used the single Cognitive Adaptation Index as the indicator of psychological resources instead of building a latent variable; the main reason is that this index can comprehensively reflect a series of mildly positive self-relevant distortions and can successfully promote the adjustment to chronic illness (Taylor 1983; Stanton, Revenson, Tennen 2007). Helgeson (1999, 2003) created the single index by standardizing each of the three variables and confirmed this composite index is generally more reliable than single scales. In addition, we also created and tested a latent modeling, in which optimism, perceived control, and self-esteem as endogenous latent variables for psychological resources. However, the fit indices for the SEM model were unsatisfactory in this study.

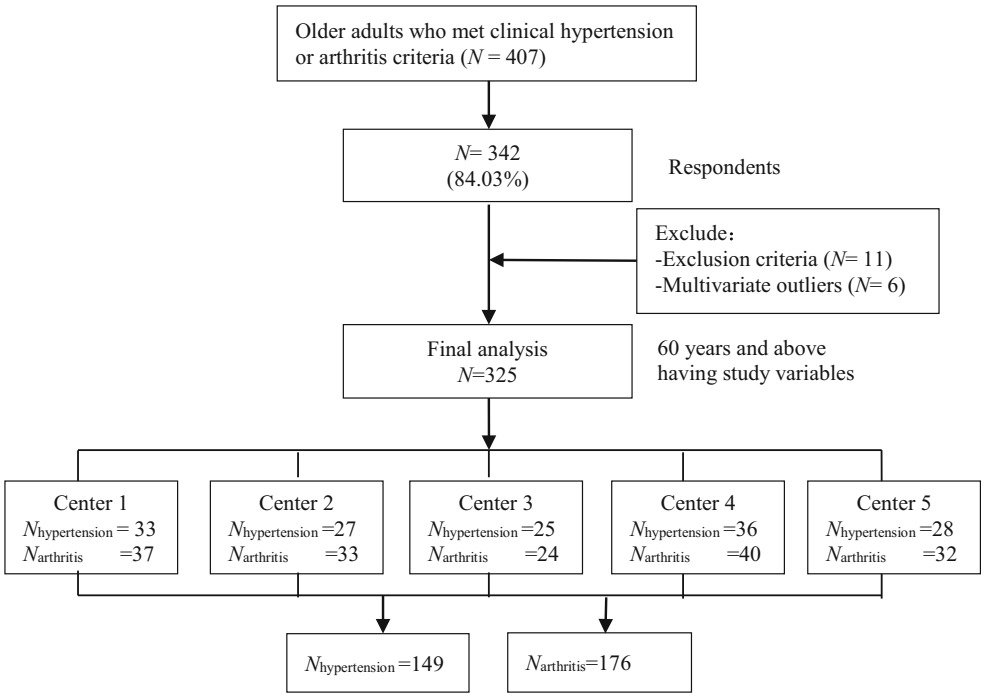

Fig. 1 The process of study sample extraction

Participants responded to the items on a 4-point scale ranging from 1 (a little of the time) to 4 (most of the time). The suggested clinical standard score was 50 or above, indicating significant anxiety. Higher scores indicated higher anxiety. In this study, the Cronbach's α was 0.86.

Covariates Self-reported demographic covariates were age, gender (coded "0" for male and "1" for female), marital status (coded "0" for single and "1" for married), socioeconomic status (SES), time passed since diagnosis, and illness type (coded "0" for hypertension and "1" for arthritis) [9, 13]. Following a prior study [31], we synthesized an index of SES using principal component analysis of participants' education, vocation, and disposable income. Higher scores indicated a higher SES.

Data Analysis

SPSS 22.0 and AMOS 22.0 were used for data analysis. Missing data were regression imputed in SPSS using all analyzed variables. We first presented descriptive statistics and bivariate correlations for variables of interest and control variables. Next, SEM was used to examine the application of hypothesized partial mediating model in the process of adjustment to chronic illness. Social support and psychological resources were included in the model as the exogenous variables and the antecedent variables, whereas cognitive appraisal (threat appraisal and self-efficacy) and coping strategy (avoidant-oriented coping and approach-oriented coping) were included as the exogenous variables and the mediating variables. The following indices were used to evaluate the overall model fit: χ^2 goodness-of-fit statistic, goodness-of-fit index (GFI), adjusted GFI (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). According to Wu [32], a structural model is acceptable when the following standards are satisfied: $1 < \chi^2/df < 3$, GFI, AGFI, and CFI more than 0.90, RMSEA < 0.08. MacCallum, Browne, and Sugawara [33] also suggested the values of RMSEA between the ranges of 0.08 to 0.10 indicate mediocre fit. The bootstrapping method produces 95% bias-corrected confidence intervals of these effects from 5000 resamples of the data (sample size = 325) to evaluate statistical significance of the effect. Furthermore, multi-group analysis, which involves a set of procedures developed to evaluate the equivalence through SEM between groups, was used to test for differences in structural weights of multiple components of the stress and coping paradigm across different chronic illnesses. Specifically, model 1 (M_1) was the reference model, model 2 (M_2) restricted equal measurement coefficients based on M_1, and model 3 (M_3) restricted multi-group equal path coefficients in the structural model based on M_2.

Results

Preliminary Analyses

Table 1 shows an overview of the relevant variables describing the 325 participants. The independent samples' t test showed that older adults with arthritis (38.22 ± 8.64) exhibited significantly higher anxiety compared with older adults with hypertension (35.28 ± 9.46), $t = 2.91$, $p < 0.01$, supporting

Table 1 Means, standard deviations, and partial correlation matrix ($n = 325$)

	M	SD	1	2	3	4	5	6	7	8
1. Social support	66.07	15.95	1							
2. CAI	0.08	2.29	0.44**	1						
3. Threat	21.50	6.99	− 0.28**	− 0.43**	1					
4. Self-efficacy	33.66	10.83	0.23**	0.53**	− 0.45**	1				
5. Approach-oriented	47.09	10.59	0.29**	0.48**	− 0.23**	0.38**	1			
6. Avoidant-oriented	34.67	8.83	− 0.09	− 0.11*	− 0.12*	0.03	0.44**	1		
7. Depressive symptoms	14.96	9.93	− 0.42**	− 0.58**	− 0.43**	− 0.46**	− 0.28**	0.17**	1	
8. Anxiety	36.87	9.13	− 0.36**	− 0.60**	− 0.49**	− 0.50**	− 0.30**	0.17**	0.77**	1

Age, gender (coded "0" for male and "1" for female), marital status (coded "0" for single and "1" for married), SES, time since diagnosis, and disease type (coded as 0 for "hypertension" and 1 for "arthritis") as covariates, but for clarity, these correlations are not presented

*$p < 0.05$, **$p < 0.01$

hypothesis 1a. However, no significant difference was observed in depressive symptoms between participants with arthritis (15.78 ± 9.68) and those with hypertension (13.99 ± 10.16), $t = 1.61$, $p > 0.05$, which was not in line with hypothesis 1b. In addition, except for a nonsignificant correlation between social support and avoidant-oriented coping, and self-efficacy and avoidant-oriented coping (these two paths will not be examined in the following model validation), all other variables of interest in the stress and coping paradigm were significantly correlated with each other.

Validation of the Stress and Coping Paradigm in Adjustment to Chronic Illness

Based on the results of Pearson's correlation analysis, a multivariate model was created, in which depressive symptoms and anxieties were included as the indicators of latent psychological distress. The SEM testing revealed that the fit indices for the fully mediating model were unsatisfactory: $\chi^2/df = 16.424$ ($\chi^2 = 180.659$, $df = 11$); GFI = 0.899; AGFI = 0.669; CFI = 0.841; RMSEA = 0.218. We then evaluated the partial mediating model based on the stress and coping paradigm, by adding four direct paths from social support, psychological resources, threat appraisals, and self-efficacy, to the variable of latent psychological distress. The fit indices for the partial mediating model were satisfactory [32]: $\chi^2/df = 2.314$ ($\chi^2 = 16.200$, $df = 7$); GFI = 0.988; AGFI = 0.937; CFI = 0.991; and RMSEA = 0.064. The standard path coefficient for the model is shown in Fig. 2. As the original model was nested within this partial mediating model, a likelihood ratio comparison was undertaken. The partial mediating model was found to have a significantly better fit to the data: $\Delta\chi^2 = 164.459$, $\Delta df = 4$, $p < 0.001$. Figure 2 and Table 2 indicated that social support ($\beta = -0.15$, $p < 0.01$), psychological resources ($\beta = -0.38$, $p < 0.001$), threat appraisal ($\beta = 0.19$, $p < 0.001$), and self-efficacy ($\beta = -0.23$, $p < 0.001$) were directly associated with psychological distress, which supported hypothesis 2. In addition, it was observed that social support and psychological resources were associated with psychological distress through threat appraisal and self-efficacy. The indirect effect of psychological resources and social support on psychological distress accounted for 30.07% and 20.00% of total effect, respectively.

Multi-group Analyses Across Different Types of Illness

The models were established for the hypertension and arthritis groups to allow free estimation. Acceptable fit indices (Table 3) were observed for the indirect effect models for both the hypertension group (Fig. 3) and the arthritis group (Fig. 4), demonstrating the feasibility of multi-group comparison of SEM with the mediating effects model. Thereafter, two types of samples (i.e., hypertension and arthritis) were generated for multi-group comparison in the SEM. All models yielded acceptable fit indices (Table 3) [32, 33]. Compared with M_1, the results regarding the measurement model, $\Delta\chi^2 = 0.153$, $\Delta df = 1$, $p > 0.05$, indicated that measurement weights were invariant between the hypertension and arthritis groups. Compared with M_2, the results regarding the structural model, $\Delta\chi^2 = 41.336$, $\Delta df = 18$, $p < 0.01$, indicated that there were significant differences in the structural weights between the hypertension and arthritis groups, which supported hypothesis 3.

Subsequent multi-group analyses were performed by pairing the group types to identify inter-group differences. The comparison of critical ratios (CRs) for differences in parameters revealed the presence of significant group differences for the relationships between psychological resources and threat appraisal (CR = 4.476, $p < 0.01$), approach-oriented coping and psychological distress (CR = 2.165, $p < 0.05$), threat and avoidant-oriented coping (CR = 2.075, $p < 0.05$), and self-efficacy and psychological distress (CR = − 2.953, $p < 0.01$). For participants with hypertension, psychological resources were negatively associated with threat appraisal,

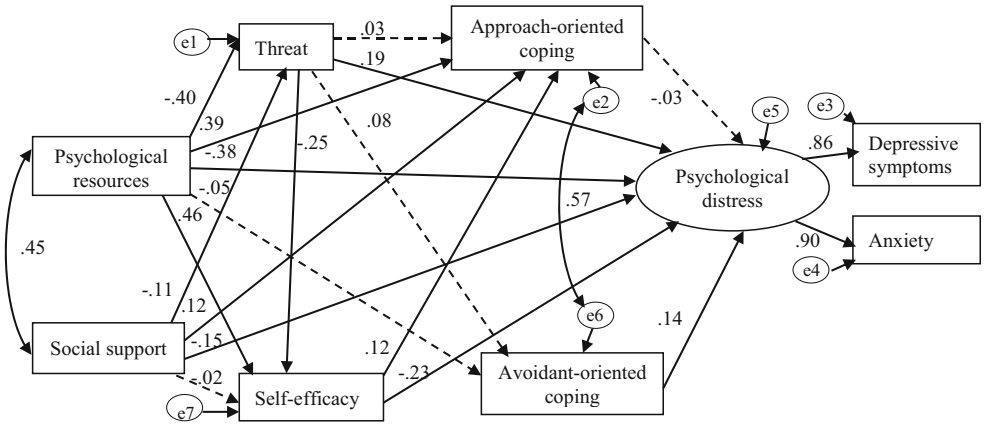

Fig. 2 Final structural equation model of stress and coping (n = 325). Addition of direct paths from social support, psychological resources, threat appraisal, and self-efficacy to psychological distress; standardized paths coefficients are presented, and dashed lines denote nonsignificant relationships

while approach-oriented coping was negatively associated with psychological distress. However, for participants with arthritis, threat appraisal was positively associated with avoidant-oriented coping, and self-efficacy was negatively associated with psychological distress. The results verified the moderating roles of illness types in the relationship between multiple components of the stress and coping paradigm and adjustment. Furthermore, there were significant differences in the four structural weights of older adults with hypertension and those with arthritis.

Discussion

Psychological Distress in Older Adults with Chronic Illness

The present study showed higher anxiety in older adults with arthritis than in those with hypertension. The possible explanation is that the illness-related demands and adaptive tasks originate from the severity and number of illness-related symptoms [8]. Compared with individuals with hypertension, individuals with arthritis have to endure much more pain, disability, and functional limitations over longer periods of time, without having any medical cure available to give them hope [12]; thus, older adults with arthritis are more likely to cope with pain, functional disability, treatment, and the uncertainty regarding the course of illness. In addition, it is noteworthy that there is no significant difference in depressive symptoms between older adults with hypertension and those with arthritis, which is inconsistent with our hypothesis. This may indicate that both hypertension and arthritis, as stressful life events, may increase the risk of depressive symptoms in individuals with these chronic illnesses [1], because chronic illnesses typically pose great challenges to many aspects of an older adult's life, including their physical, psychological, and social functioning.

The Direct Effect Paths for Adjustment to Chronic Illness

The cognitive-oriented theory of the stress and coping paradigm has been used extensively to guide the study on adjustment to a variety of chronic illnesses [8]. Our findings provided empirical support for the stress and coping paradigm of adjustment to chronic illnesses [8]. The mediating results confirmed the notion that cognitive appraisals are assigned central importance in the stress and coping paradigm [4, 8]. More importantly, it is worth noting that our study revealed that social support, psychological resources, threat appraisal, and

Table 2 The examination of indirect effects and bias-corrected 95% confidence intervals (95% CIs)

Indirect path	Standardized indirect effect (β)	95% CIs
1. Psychological resources→ Psychological distress (Total effects)	− 0.61	(− 0.69, − 0.52)
2. Social support→ Psychological distress (Total effects)	− 0.19	(− 0.28, − 0.09)
3. Psychological resources→ Threat→ Psychological distress	−0 .08	(− 0.15, − 0.05)
4. Psychological resources→ Self-efficacy→ Psychological distress	− 0.11	(− 0.15, − 0.04)
5. Psychological resources→ Threat→ Self-efficacy→ Psychological distress	− 0.03	(− 0.04, − 0.01)
6. Social support→ Threat→ Psychological distress	− 0.02	(− 0.12, − 0.04)
7. Social support→ Threat→ Self-efficacy→ Psychological distress	− 0.01	(− 0.07, − 0.02)

These nonsignificant pathways are not shown for clarity

Table 3 Invariance tests across types of illness

Model	X^2	*df*	X^2/df	GFI	AGFI	CFI	RMSEA	$\Delta\chi^2(\Delta df)$	*p*
$M_{Hypertension}$	9.493	7	1.356	0.984	0.918	0.996	0.049		
$M_{Arthritis}$	18.022	7	2.575	0.975	0.874	0.977	0.095		
$M_{1\ Unconstrained}$	27.512	14	1.965	0.979	0.894	0.987	0.055		
$M_{2\ Measurement\ weights}$	27.665	15	1.844	0.979	0.900	0.988	0.051	0.153(1)	0.696
$M_{3\ Structural\ weights}$	69.242	32	2.164	0.951	0.889	0.965	0.060	41.729(18)	0.001

GFI, goodness-of-fit index; *AGFI*, adjusted goodness-of-fit index; *CFI*, comparative fit index; *RMSEA*, root mean square error of approximation

illness-related self-efficacy also are associated with psychological distress [2, 8, 18]; although theorists suggest a fully mediated effect in the stress and coping paradigm. The improvement in our partial mediating model may help in explaining the complex relationships between psychosocial resources, cognitive appraisal, coping strategy, and adjustment to chronic illness. This direct link between appraisal (i.e., threat and self-efficacy) and psychological distress among older adults is consistent with the literature [8, 18], which has shown that cognitive appraisal has a significant direct relationship with psychological distress for older adults with chronic illness. Furthermore, social support and psychological resources may have indirect pathway through biological and psychological benefits, especially within the context of stress. Therefore, the partial mediating stress and coping paradigm may help to deepen our understanding of the complex relationships of these variables involved in the adjustment to chronic illnesses by allowing direct paths between them and the psychological distress variable.

The Differences in Structural Weights Between Hypertension and Arthritis Groups

Our findings revealed that there are both commonalities and differences in the mechanism of adjustment across chronic illnesses among older adults. We found a significant direct effect of psychological resources on threat appraisal for individuals with hypertension, and a positive association was found between threat appraisal and avoidant-oriented coping for individuals with arthritis. These results are consistent with prior studies [15, 16]. Different functional disabilities, symptoms, and illness-specific treatments may provide a possible explanation for our results; specifically, pain and progressive impairments are primary concerns for individuals with arthritis, but not for other individuals who have been diagnosed with hypertension. Furthermore, the coexistence of aging and arthritis may lead to more difficulties that are relatively unresponsive to approach-oriented efforts, making it more difficult for older adults to achieve and maintain quality of life through the aging process. Consequently, due to functional impairments and enduring pain, even older adults with arthritis who have high self-esteem, high perceived control, and high optimism are unlikely to reduce the perceived illness-related threat (i.e., hopelessness and uncertainty) as much as older adults with hypertension. Ultimately, these threat appraisals from individuals with arthritis, compared with individuals with hypertension, may make them more likely to employ avoidant-oriented coping strategies, such as wish-fulfillment fantasies [10].

In addition, we also found that approach-oriented coping was negatively associated with psychological distress among older adults with hypertension, whereas illness-related self-efficacy was negatively associated with psychological distress among older adults with arthritis. These findings related to

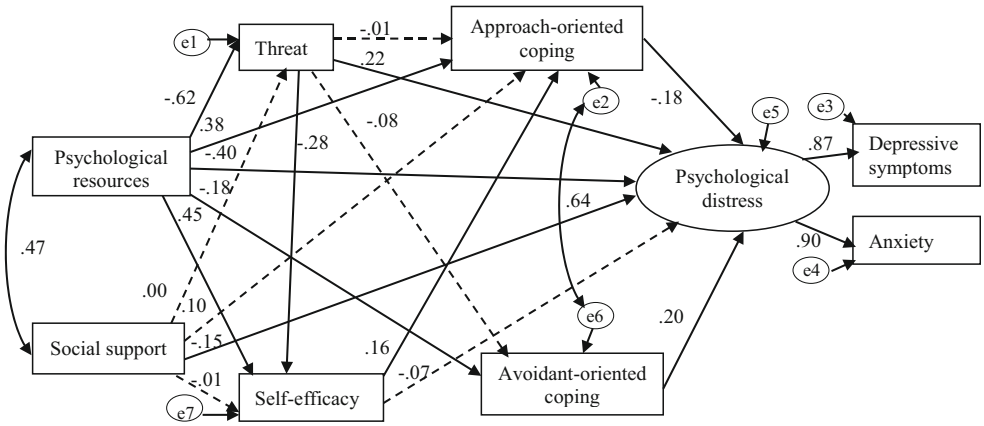

Fig. 3 Structural equation model of stress and coping (hypertension). Standardized paths coefficients are presented, and dashed lines denote nonsignificant relationships

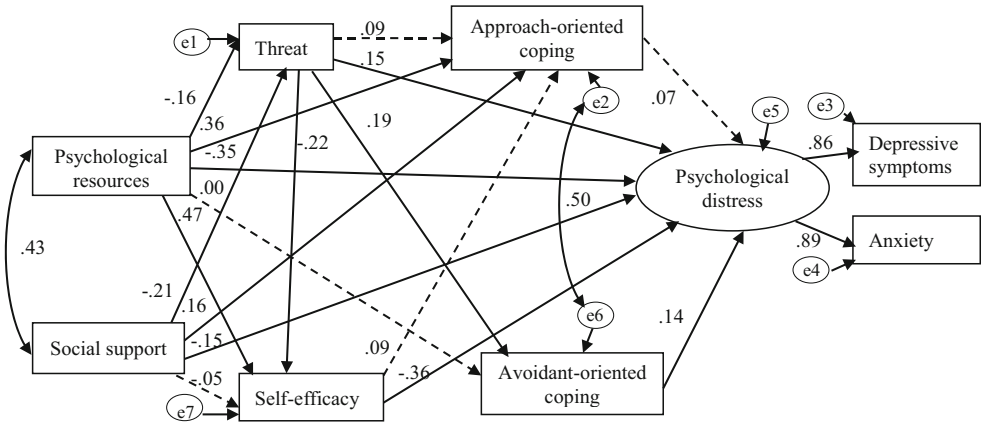

Fig. 4 Structural equation model of stress and coping (arthritis). Standardized paths coefficients are presented, and dashed lines denote nonsignificant relationships

coping strategy were consistent with a previous research [34]. Our study offered a complex picture of how the associations linking illness-related self-efficacy to adjustment outcomes are conditioned by different types of chronic illness. A possible explanation for the differences across illnesses is that the extent of illness controllability and the specific demands of chronic illnesses differ greatly. In contrast with hypertension, which is quite responsive to medication and self-administered diet, arthritis has few opportunities for medical and personal control. Lash [35] found that individuals used avoidant-oriented coping more often than approach-oriented coping to reduce emotional distress when faced with an uncontrollable health condition. Similarly, approach-oriented strategies may not be appropriate for individuals with arthritis, especially older adults, in coping with arthritis-related distress, whereas certain avoidant-oriented strategies may be more effective. This variability in appropriate coping strategies may also be the reason for a different effect mechanism of illness-related self-efficacy on the psychological outcomes between arthritis and hypertension. When compared with participants with arthritis, participants with hypertension have higher confidence and are more likely to use approach-oriented coping strategies in order to decrease depressive symptoms and anxiety.

Limitations

Several limitations, however, should be considered when evaluating the study findings. First, as a cross-sectional study, our results can only prove correlation, and therefore readers should be cautious in deriving causal inferences about the relationships between the multiple components of the stress and coping paradigm and psychological distress. Future research should use a longitudinal design to better identify and understand the potential mediation mechanisms involved in the process of adjustment to chronic illness. Second, on account of some participants having relatively fewer years of education, some of the surveys were administered via an oral interview. It is possible that the responses collected in the oral interviews may have been influenced by the social desirability of the participants, which limits the accuracy and generalizability of the results. Third, the main purpose of the present study was to examine type differences in adjustment to chronic illnesses; thus, illness-specific characteristics, such as prognosis, severity, and objective health, were not examined. However, illness characteristics, such as severity, symptoms, course, treatment, disability, and pain may have an important effect on older adults' adjustment to the chronic illness. Further studies should pinpoint the specific role of the illness- and treatment-related factors in the process of adjustment. In addition, the present study focused only on the comparison between two chronic illnesses among older adults. Further studies are needed to determine if the observed findings in the present study are applicable to diverse populations, such as older adults with life-threatening chronic illnesses (i.e., cancer, stroke, or cardiac disease).

Conclusions and Practical Implications

Despite these limitations, the present study provided additional empirical evidences on the stress and coping paradigm of psychological adjustment to chronic illnesses among older adults. Our study further elaborated the complex interrelationships of multiple components by adding four direct paths from psychosocial resources, threat appraisal, and self-efficacy to unfavorable adjustment outcomes. These findings suggest that these multiple components of the stress and coping paradigm are associated with psychological distress directly and indirectly through the mediating role of appraisal and coping. Moreover, a comparative study across different types of chronic illnesses would be useful in disentangling mechanisms for obtained effects [8]. In summary, the study addressed the critical issue of commonalties and differences in the mechanism of adjustment to different types of chronic illnesses, which may provide valuable insights for implementing interventions involving

adjustment to chronic illnesses among older adults. Specifically, our findings may pave the way for future interventions interested in targeting multiple components of the stress and coping paradigm in order to improve older adults' adjustment to chronic illnesses. It may also provide a potential pathway for clinical practitioners to design different psychological interventions for older adults with different types of chronic illnesses, considering the controllability, predictability, and severity of such illnesses.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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