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Physical Symptoms and Sleep Disturbances Activate Coping Strategies among HIV-infected Asian Americans: A Pathway Analysis

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Abstract

How to activate adaptive coping strategies has an important and practical meaning for the quality of life of people living with HIV (PLHIV); however, few studies have focused on the effects of sleep disturbances and HIV-related physical symptoms on coping strategies. The specific relationships among coping strategies, sleep disturbances and HIV-related physical symptoms were unknown. We performed a path analysis to examine the proposed model of relationships among sleep disturbances, physical symptoms, and coping strategies. A convenience sample of 69 HIV-positive Asian Americans in San Francisco, Los Angeles, and New York City were recruited and data were collected on demographics, sleep disturbances, HIV-related physical symptoms, and coping strategies. Sleep disturbances directly affect maladaptive coping ($\beta = 0.34$), and physical symptoms directly affect adaptive coping ($\beta = 0.30$) and maladaptive coping ($\beta = 0.24$). Interventions designed to decrease sleep disturbances and physical symptoms should be developed to enhance adaptive coping and reduce maladaptive coping among Asian Americans with HIV.

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Keywords

HIV; symptoms; sleep disturbance; coping strategies; Asian Americans

Introduction

Asians American is the rapidly growing population in the United States (U.S.) (Budiman, Cilluffo, & Ruiz, 2019), which California accounts for more than ¼ of the population (26.57%), and Asian Americans accounts for 7.6% of the New York state population in 2018 census (U.S. Census Bureau, 2019). Among different ethnic groups in the U.S., Asian Americans are the only ethnic group present a continuous increase in HIV infection which increase from 4.9 per 100,000 people in 2011 to 5.5 per 100,000 people in 2016 (Kim & Aronowitz T, 2019). From the most recent report on Asian Americans living with HIV in the United States in 2018, Asian Americans living with HIV/AIDS accounted for approximately 2% of the people living with HIV (PLHIV) in the US and dependent areas (Centers for Disease Control and Prevention). HIV-infected Asian Americans are the most understudied ethnic minority group in the United States (Kim & Aronowitz, 2019). With the advent of antiretroviral therapy (ART), HIV has become a chronic condition (Teeraananchai et al., 2017), and posing new challenges for PLHIV. Apart from psychological stress and ethnic differences, most PLHIV experience multiple physical symptoms, including fatigue, weakness and pain that also have a negative impact on medication adherence and quality of life (Zhu et al., 2019; Zhu et al., 2019; Lindayani et al., 2018; Kacanek et al., 2015). However, for Asian Americans, several studies focused on the social and psychological stress aspect of Asian Americans (Chen et al., 2015; Huang et al., 2020), such as acculturation and mental stress, studies focused on physical symptoms, coping strategies and sleep disturbances were limited.

Sleep disturbance, another common complaint among PLHIV, is described as difficulty falling asleep and achieving deep sleep, awakening early, or unrefreshing sleep (Lee et al., 2012; Chen et al., 2013b). The prevalence rates for sleep disturbances range from 47% to 73% in PLHIV (Allavena et al., 2016; Gutierrez et al., 2019; Wu et al., 2015). Sleep disturbances, physical symptoms and psychological status interact with each other; thus, sleep disturbances may be caused by depression, anxiety and physical symptoms such as pain, fatigue, and in turn exacerbate these symptoms in PLHIV (Robbins et al., 2004; Huang et al., 2017; Ren et al., 2018).

Coping strategies can help PLHIV effectively manage their HIV-related discomforts (Finkelstein-Fox et al., 2019). Coping strategies are often classified as either adaptive coping (including active coping, planning, suppression of competing activities, religious adherence, seeking emotional support and social support as well as accepting the illness), and maladaptive coping (including self-distraction, coping with alcohol and substance use, and disengagement and denial of their illness) (Carver et al., 1989; Safren et al., 2002). Research on coping strategies among PLHIV have revealed that adaptive coping strategies are associated with better psychological outcomes that can decrease depression (Fauk et al., 2020), posttraumatic stress symptoms (Yu et al., 2017; Golub et al., 2013), and anxiety

(Fekete et al., 2016; Willie et al., 2016). Adaptive coping has also been linked to elevated CD4 counts and viral load suppression (Kremer et al., 2015; Earnshaw et al., 2018). PLHIV who use adaptive coping strategies are more likely to adhere to ART (Guy et al., 2018; Poteat & Lassiter, 2019), use condoms more often (Evans et al., 2013), decrease substance use, and quit smoking (Skalski et al., 2019). In contrast, maladaptive coping strategies have been found to be associated with an increase in disease progression (Earnshaw et al., 2018), present with anxiety and depression (Seffren et al., 2018), as well as a high rate of risk behaviors and alcohol use (Wardell et al., 2018; Weiss et al., 2017).

Obviously, the different health-related outcomes depend on the coping strategies that PLHIV employ. Thus, it is important to explore the factors that can predict coping strategies. Researchers have examined the potential psychosocial causes of coping strategies in PLHIV and have often reported coping strategies as a mediating role of HIV-related stigma and psychological distress (Rachel et al., 2019; Meanley et al.,2019; Zhi et al., 2018) and of ART treatment (Earnshaw et al., 2018), social support, quality of life (Shrestha et al., 2019) and adherence to ART (Guy et al., 2018). In addition, other studies have explored whether socioeconomics, educational level, and gender factors may also affect coping strategies (Dan et al., 2019; Ismail et al., 2017). These studies support that PLHIV use coping strategies to manage their psychosocial and personal stressors. Currently, there is a lack of understanding as on to how the physical symptoms, sleep disturbances and coping strategies interact among PLHIV, even fewer on HIV-infected Asian Americans. As Asian American PLHIV is one of the hardest reach populations in the United States, therefore, in this study, we evaluated the activation effect of sleep disturbances and physical symptoms on coping strategies among Asian American PLHIV.

Theoretical Framework

We formulated a theory of stress and coping to build our hypothesis that described the process of coping activated by stressors (Lazarus & Folkman, 1984). The stressors are the situations or events that PLHIV perceive to be threatening to their physical, psychological, or social health (Lazarus & Folkman, 1984). Based on this, we proposed a study model that links the pathway between physical symptoms, sleep disturbances and coping strategies. In this model, we hypothesized that: (1) sleep disturbances can directly impact both adaptive and maladaptive coping, (2) physical symptoms can directly impact both adaptive and maladaptive coping, and (3) sleep disturbance and physical symptoms interact with each other.

Methods

Sample, settings, and procedures

There were two phases of the study: (1) Phase 1. From January to June 2013, a convenience sample of 50 HIV-positive Asian Americans was recruited in two cities (San Francisco and New York City). Participants were recruited from the Asian & Pacific Islander Wellness Center (A&PI Wellness Center) in San Francisco, the Chinese-American Planning Council, Inc. (CPC), and the Asian/Pacific Islander Coalition on HIV/AIDS Community Health Center (APICHA Community Health Center) in New York City. (2) Phase 2. From

September 2017 to January 2020, we recruited an additional 19 Asian American PLHIV from the CPC and Asian Pacific American AIDS Intervention Team (APAIT) in Los Angeles. The 69 participants were recruited by the convenience sampling methods.

The relevant institutional ethical review boards approved this study (#18–000025). The study inclusion criteria were as follows: (a) self-identified as Asian or Pacific Islanders, (b) confirmed HIV serostatus, (c) willing to participate in the survey, and (d) at least 18 years old. After securing written consent from the participants, we conducted cross-sectional audio computer-assisted self-interviews (ACASIs) or Research Electronic Data Captures (REDCap). All participants received a small reimbursement for their participation.

Measures

Participants completed a 60-minute ACASI/REDCap survey that consisted of standardized measures to assess demographics, sleep disturbances, physical symptoms and coping. These measures have been tested in Asian populations and have shown to have strong reliability and validity over time (Lee, 1992; Holzemer et al., 1999; Carver & Scheier, 1997).

Demographics: We collected the participants' ages, gender, marital status, ethnicity, educational level, employment status, immigrant status, years of living with HIV, HIV medications, and recent viral load.

Sleep disturbances: We used the 21-item general sleep disturbance scale (GSDS) (Lee, 1992) to ask participants' frequency of various sleep-related behaviors during the past week, from 0 (not at all) to 7 (every day). Items refer to the multidimensional aspects of falling asleep and maintaining sleep, as well as aspects of daytime functioning, such as feeling tired or sleepy during the day. The items were summed to obtain a total mean score ranging from 0 (no sleep disturbance) to 7 (frequent sleep disturbance). The overall Cronbach's alpha reliability estimate for this sample was 0.93.

Physical symptoms: We used the 64-item revised Sign and Symptom Checklist (SSC) (Holzemer et al., 1999) to assess the intensity of symptoms being experienced by PLHIV in the past 24 hours, including 0 (no/not at all), 1 (mild), 2 (moderate), or 3 (severe). Intensity was summed across symptoms; a higher score indicated higher HIV symptom intensity. In this study, the intensity of the 20 most severe physical symptoms were summed up as the physical symptoms scores. The physical symptoms included rectal bleeding, abdominal pain, chills, prominent leg veins, easy bruising, sore throat, tingling of arms, gas/bloating, rash, fever, day sweats, shortness of breath at rest or with activity, constipation, concern over weight gain, heart racing, chest pain, swollen feet, and itchy skin. The overall Cronbach's alpha reliability estimate for this sample was 0.72.

Coping strategies: We used the 28-item brief COPE inventory (Carver & Scheier, 1997) to measure participants' adaptive and maladaptive coping strategies. Adaptive coping is characterized by active coping, planning, use of instrumental support, positive reframing, acceptance, use of emotional support, humor, and religion. Maladaptive coping is characterized by self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame. Each item scored from one ("I haven't been doing this at all") to four

("I've been doing this a lot"). Higher scores reflected a higher tendency to implement the corresponding coping strategies. The overall Cronbach's alpha reliability estimate for this sample was 0.87.

Data analysis

We conducted data analyses using SPSS 24.0 and AMOS 23.0 (IBM, Chicago, IL). In this study, the data meet the assumptions of normality (a one-sample Kolmogorov-Smirnov test did not show statistical significance). The continuous variables were expressed as means and standard deviations (SD). Categorical variables were expressed as proportions or percentages. We tested the hypothesized pathway in three steps. First, we conducted Pearson's correlation analyses to examine the relationships among sleep disturbances, physical symptoms, and coping strategies. Second, we used pathway analysis to test the hypothesized pathway (Fig. 1) with the Bayesian analysis method. The following fit indices were used (Hu & Bentler, 1999): normed chi-square ($\chi 2/df$, 1.0±3.0, p >0.05), root mean square error of approximation (RMSEA <0.08), comparative fit index (CFI >0.9), and Tucker-Lewis Index (TLI, >0.9). Third, after controlling for key demographic variables (age, gender, marital status, ethnicity, educational level, employment status, immigrant status, years of living with HIV, HIV medications, and recent viral load), we removed the parameters that did not significantly differ from zero. We applied the bootstrap method (repeated 1,000 times) to obtain more stable and valid standard errors of the estimates of the direct and indirect effects of these factors to investigate the relationships between sleep disturbances, physical symptoms and coping strategies through different pathways. Standardized regression coefficient (β) and p values for β of direct, indirect, and total effects were identified and reported by path analysis. We replaced missing data using full information maximum likelihood; p <0.05 was considered significant.

Results

Descriptive and bivariate analysis

Demographic characteristics are presented in Table 1. Among the total sample of 69 HIV-infected Asian Americans, 78.30% were male (N=54), with a mean age of 51 years (SD =10.50, range = 31–72) and average years of living with HIV is 14.54 years (SD =6.33, range= 2–33). Results of bivariate analyses are summarized in Table 2. The results suggest that sleep disturbances, physical symptoms, adaptive and maladaptive coping are significantly correlated with each other.

Pathway analysis

After controlling for the participants' demographic and disease characteristics and deleting the statistically insignificant relationship between sleep disturbances and adaptive coping (p >0.05), we found that most of the hypothesized relationships were significant and supported by the data; the final pathway fit well to the data ($\chi^2(18) = 3.284$, $p = 0.05$, RMSEA = 0.07, CFI = 0.94 & TLI = 0.85). The coefficients for all paths are shown in Figure 2. The standardized direct, indirect, and total estimates of the final model's paths are shown in Table 3.

Direct and indirect effects of factors affecting adaptive coping—According to the pathway, physical symptoms directly affect adaptive coping (β = 0.302). Although sleep disturbances had no significant direct effect on adaptive coping, they still had a positive total effect (β = 0.083), which can be seen to be mediated by the physical symptoms (indirect β = −0.083).

Direct and indirect effects of factors affecting maladaptive coping—Sleep disturbances directly affected maladaptive coping (β = 0.340) and had a positive total effect on maladaptive coping, which can be seen to be mediated by the physical symptoms (indirect β = 0.066). Physical symptoms had a similar path to maladaptive coping.

Discussion

Coping strategies adopted by PLHIV have very important practical applications because such strategies determine the PLHIV's quality of life (Dan et al., 2019; Finkelstein-Fox et al., 2019). Studies have tended to emphasize the mediating role of coping strategies on health outcomes (Shrestha et al., 2019; Ye et al., 2018). Conversely, the present study's perspective focused on the activation of participants' adaptive and maladaptive coping strategies. To our knowledge, this is one of the initial reports to offer pathway evidence that links sleep disturbances, physical symptoms, and coping strategies among HIV-positive Asian Americans. Our models show that sleep disturbances and physical symptoms are important factors in the participants' coping strategies. As such, implementing effective strategies in targeting sleep disturbances and physical symptoms can improve adaptive coping and reduce maladaptive coping among Asian American PLHIV.

Physical symptoms and sleep disturbances are common complaints among PLHIV (Wilson et al., 2016; Chen et al., 2013a). In the present study, specifically, self-reported sleep disturbances had a bi-directional association with the intensity of the physical symptoms, which ultimately led to different coping strategies. First, consistent with previous research (Babson et al., 2013), we observed that the PLHIV with more severe sleep disturbances suffered from greater self-reported HIV-related physical symptoms intensity and vice versa. Second, sleep disturbances may indirectly trigger the adaptive coping strategies by the mediation of physical symptoms. Third, for Asian American PLHIV, sleep disturbances can directly trigger maladaptive rather than adaptive coping strategies. That is, Asian American PLHIV suffering from sleep disturbances, difficulty falling or staying asleep, awakening too early, or unrefreshing sleep in combination with some daytime sleepiness or irritability (Chen et al., 2013a) tend to use maladaptive coping strategies to solve the problems, e.g., venting negative emotions, coping through alcohol and substance use and disengagement or denial of their illness (Carver & Scheier, 1997).

In the present study, similar to our previous study on Chinese PLHIV (Chen et al., 2020), we evaluated the physical symptoms of PLHIV as a whole and found that physical symptoms were a critical factor that can contribute to both adaptive and maladaptive coping strategies. The finding indicates that Asian American PLHIV tend to respond with all kinds of coping strategies when physical symptoms are presented (e.g., fatigue, shortness of breath, weakness, rash, tingling of arms). On one hand, participants presented with HIV-

related somatic symptoms trigger the adaptive coping strategies, which are characterized by active coping, planning, use of instrumental support, positive reframing, acceptance, use of emotional support, humor, and religion (Carver & Scheier, 1997). These can all contribute to direct active coping (e.g., information-seeking and social support) to relieve somatic disorders. On the other hand, physical symptoms can also trigger the use of maladaptive coping strategies. For example, Asian American PLHIV can escape or ignore the physical discomforts by diverting attention or denial of the potential supports (Dan et al., 2019).

This present study highlights three potentially modifiable factors, including sleep disturbances physical symptoms, and coping strategies. This path analysis can also identify the potential pathways among these three factors. This finding highlights the significant roles of sleep disturbances and HIV-related physical symptoms on coping strategies. Healthcare providers should assess the sleep quality and physical symptoms of PLHIV to understand the potential coping strategies that were used during the HIV management.

Furthermore, this path analysis also shines new research directions for culturally relevant, integrated intervention programs that can enhancing sleep quality and decreasing physical symptoms, and lead to enacting adaptive coping and reducing maladaptive coping among PLHIV, especially for Asian Americans. Currently, very limited evidence is focusing on sleep and symptom management for Asian American PLHIV (CDC, 2013). The present study proved that sleep hygiene education can be effective, including setting up a regular bedtime and exercise, eliminating noise and clocks from the bedroom, regulating bedroom temperature, avoiding the use of sleeping pills, caffeine, alcohol, and naps during the day, engaging in relaxing activities before bed, limiting liquids, taking warm baths, and using the bedroom only for sleep (Chen et al., 2013a), as well as cognitive-behavioral therapy for insomnia (e.g., sleep restriction therapy and stimulus control therapy; Taibi, 2013). Whether these interventions are suitable to improve sleep disturbances among Asian American PLHIV warrants further exploration in future studies.

Limitations

There are several limitations to this study. First, its cross-sectional nature limited casual inference, two data collection phases, and the small sample sizes of Asian Americans PLHIV participants potentially limited the interpretation of causality among sleep disturbances, physical symptoms and coping strategies, and generalizability. Asian Americans PLHIV, however, are one of the hardest-to-recruit populations and this paper will be one of the first few articles focusing on this population. Second, in this analysis, all variables were measured using self-report scales, which may lead to some potential bias (e.g., social desirability response and error in recall) in estimating associations. Thus, future research should include longitudinal design to examine how the relationships among these variables unfold over time. Last, to assess participants' objective sleep data (e.g., total sleep time, wake after sleep onset) the use of biological and behavioral indicators should be considered with self-reported surveys, such as sleep-awake monitoring devices (Chen et al., 2013b).

Conclusions

In this paper, we examined the associations among sleep disturbances, HIV-related physical symptoms, and coping strategies among Asian American PLHIV. This is a vulnerable group with significant sleep and physical distress, yet reports are limited regarding their experience to activate adaptive or maladaptive coping strategies. This exploratory study proffers that sleep disturbance and physical symptoms are important factors in activating adaptive/ maladaptive coping strategies among Asian American PLHIV. Interventions designed to decrease sleep disturbances and physical symptoms should be developed to enhance adaptive coping and reduce maladaptive coping among Asian American PLHIV. Therefore, self-management strategies can be improved and reduce health disparities among Asian American PLHIV.

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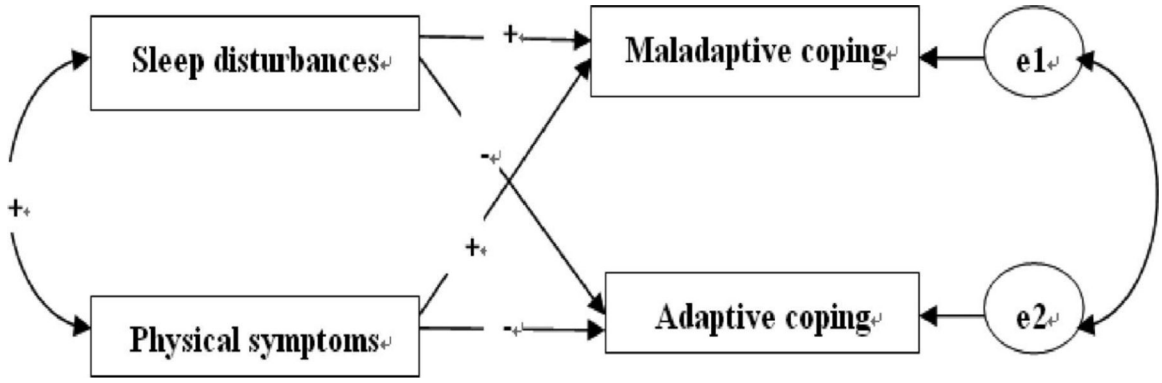

Figure 1.
The hypothesized pathway.

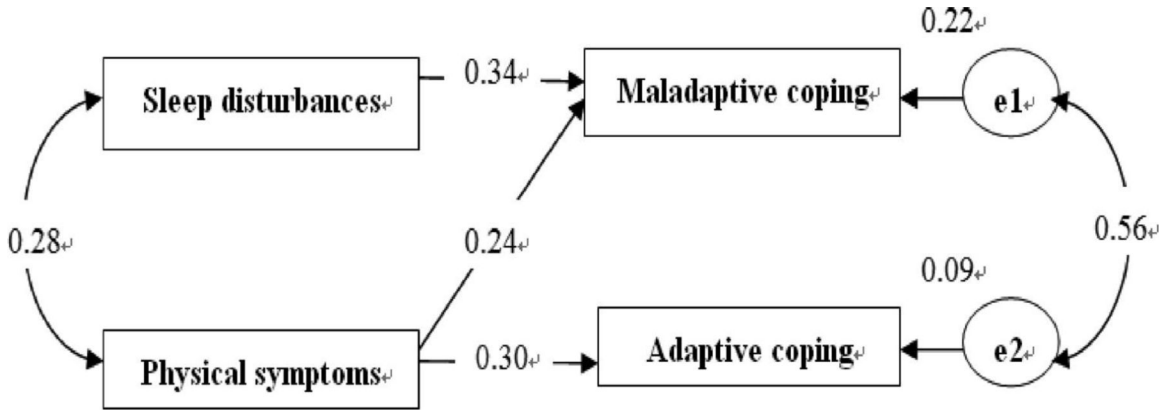

Figure 2.
The final pathway.
Note: $\chi^2/df = 3.824$, $p = 0.05$; CFI = 0.94; TLI = 0.85; RMSEA = 0.07.

Table 1.

Socio-demographic characteristics of participants (n = 69).

Variables	*n* (%)
Gender	
Male	54 (78.26%)
Female	15 (21.74%)
Ethnicity	
Chinese	35 (50.73%)
Philipino	11 (15.95%)
Japanese	3 (4.35%)
Malayscian	5 (7.25%)
Indonesean	1 (1.44%)
Vietnamese	7 (10.14%)
Other	7 (10.14%)
Are you an immigrants to the U.S	
Yes	63 (91.30%)
No	6 (8.70%)
Education level	
11th grade or less	33 (47.81%)
High school or GED	20 (29.00%)
2 years of college/AA degree/technical school training	10 (14.49%)
College (BA or BS)	5 (7.25%)
Doctorate/medical degree/law degree	1 (1.44%)
Currently working status	
No	49 (71.02%)
Part time	10 (14.49%)
Full time	10 (14.49%)
Marital status[a]	
Married	22 (31.88%)
Divorced	7 (10.14%)
Single	33 (47.83%)
Cohabited	3 (4.35%)
Widowed	2 (2.90%)
HIV medication	
No	3 (4.30%)
Yes	66 (95.70%)
Recent viral load[a]	
Undetectable	50 (72.46%)
I know my viral load	7 (10.14%)

Variables	*n* (%)
Don’t know	11 (15.94%)

a: missing data.

Table 2.

Bivariate Correlation among variables.

	Sleep disorder	Physical symptom	Maladaptive coping	Adaptive coping
Sleep disorder	/	0.287[b]	0.404[b]	−0.156
Physical disorder	0.287[b]	/	0.347[b]	0.302[a]
Maladaptive coping	0.404[b]	0.347[b]	/	0.524[b]
Adaptive coping	−0.156	0.302[a]	0.524[b]	/

[a] $p < 0.05$

[b] $p < 0.01$.

Table 3.

Effect coefficients of the final model.

Endogenous variables	Predicting variables	Standardized direct effect β	Standardized indirect effect β	Standardized total effect β
Physical symptoms	Sleep disorder	0.276[a]	/	0.276[a]
	Adaptive coping	0.302[a]	/	−0.302[a]
	Maladaptive coping	0.240[a]	0.094[a]	−0.334[a]
Sleep disorder	Physical symptoms	0.276[a]	/	0.276[a]
	Adaptive coping	/	0.083[a]	0.083[a]
	Maladaptive coping	0.340[a]	0.066[a]	0.406[a]

[a] $p < 0.01$.