

Stress management interventions for HIV-infected individuals: review of recent intervention approaches and directions for future research

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Abstract: To promote psychological wellbeing and adaptive coping among people living with human immunodeficiency virus/acquired immune deficiency syndrome (PLWHA), a number of stress management interventions have been designed and evaluated. This paper reviews recent stress management intervention approaches designed to improve the coping skills of PLWHA and reduce psychological distress. First, a summary of findings from previous narrative reviews and meta-analyses of the stress management intervention literature for PLWHA is provided. Next, recent stress management interventions for PLWHA that fall into one of four categories are reviewed: (a) interventions to improve coping and modify other health behaviors (ie, highly active antiretroviral medication adherence, sexual behaviors), (b) meditation, mindfulness, and relaxation-based stress management approaches, (c) computer-delivered interventions, and (d) interventions that target specific populations including older individuals, individuals with childhood sexual abuse histories, and women. A critique of recent stress management interventions for PLWHA is provided as well as directions for future research.

Keywords: stress management intervention, stress, coping, cognitive behavioral stress management, review, HIV, HIV-positive, HIV-infected, AIDS

Introduction

The Centers for Disease Control and Prevention estimates that there are now more than 1 million people living with human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (PLWHA) in the United States with approximately 53,600 new HIV infections diagnosed annually.^{1,2} Highly active antiretroviral therapy (HAART) has improved the long-term health outlook of PLWHA and has markedly decreased HIV-related mortality.^{3,4} However, HIV poses a number of unique psychosocial challenges associated with living with a chronic, stigmatized disease.⁵⁻⁷ These challenges are compounded by the fact that HIV-infected individuals experience high rates of mental health difficulties and substance abuse.⁸⁻¹⁰ To reduce psychological distress and improve coping among PLWHA there is a clear need to develop efficacious stress management interventions.

Despite the improved medical prognosis following an HIV diagnosis, PLWHA face a number of ongoing coping challenges. PLWHA must cope with a variety of challenging stressors, including concerns surrounding serostatus disclosure, challenges posed by HAART adherence and medication side effects, and navigating decisions about sexual activity and pregnancy desires.⁷ While some PLWHA are able to effectively manage their care and lead fulfilling lives, a significant proportion report difficulties

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copied with stress.¹¹ Elevated psychosocial stressors, coupled with poor stress management skills, can exacerbate existing psychiatric illnesses or heighten an individual's risk for a new disorder including major depression, alcohol or drug dependence, and anxiety disorders.^{12,13} Indeed, research suggests elevated rates of psychiatric illness among PLWHA relative to noninfected samples.⁹ For instance, a recent investigation found a 19% prevalence rate for major depressive disorder among PLWHA, compared to only 5% in a noninfected comparison sample.¹⁴

Elevated psychological distress may contribute to poor disease management and negative health outcomes among PLWHA.^{15,16} Prior investigations demonstrate that heightened psychological distress is associated with accelerated disease progression,¹⁷ as indicated by CD4 decline, increased viral load,¹⁵ and fewer natural killer cells.¹⁸ Lower engagement in protective health behaviors may mediate the association between psychological functioning and disease outcomes.¹⁹ Mental health difficulties may also be associated with suboptimal medication adherence^{20,21} and less engagement in preventative health practices, including missed medical appointments²² and sexual risk taking.^{23,24} Thus, there is increasing evidence that psychological distress is associated with poor health outcomes and less engagement in protective health behaviors among PLWHA.

Stress management interventions for PLWHA address an important public health need. Stress management training is increasingly viewed as integral to the broader goal of assuring that PLWHA maintain adequate self-care for their illness.²⁵ Insofar as stress management interventions can reduce distress and, potentially, improve disease management and health outcomes, research that evaluates the efficacy of stress management interventions among PLWHA is of considerable importance. To date, a number of promising stress management interventions have been developed and evaluated. This review provides a summary of key findings from the previous narrative review and meta-analyses that have examined the efficacy of stress management interventions for PLWHA.^{26–28} Next, the existing reviews are updated by highlighting recent stress management interventions designed to reduce psychological distress and improve coping skills among PLWHA. Specifically, this review describes core components of recent intervention approaches, reviews intervention efficacy findings, and offers guidance for future research. Thus, this review seeks to summarize the state of the science and outline key research priorities for stress management interventions for PLWHA.

Summary of previous stress management reviews

To date, one narrative review²⁶ and two meta-analyses^{27,28} have reviewed the stress management intervention literature for PLWHA. In what follows, this review provides a succinct summary of findings from each of the reviews. For each of the previous reviews, this review summarizes the format and content of the interventions, reports on the efficacy of reviewed interventions, and notes intervention characteristics associated with differential intervention efficacy.

Brown and Vanable²⁶ conducted a narrative review of 21 stress management interventions for PLWHA that included both cognitive (eg, modification of automatic thoughts) and behavioral skills training (eg, progressive muscle relaxation).^{29–55} Across the reviewed cognitive behavioral stress management (CBSM) studies, 95% of programs were delivered in a group format with group sizes ranging from four to ten members (mode = seven group members). Most interventions consisted of multiple sessions (range = 6–20 sessions; mode = ten sessions) and were between 1 hour and 2.5 hours in length (mode = 2 hour session). Stress management interventions focused primarily on HIV-infected men who have sex with men and more than half (57%) of the reviewed studies excluded PLWHA because of current or past psychiatric, substance abuse, or personality disorder histories.

Overall, there was evidence that stress management programs were effective in reducing perceived stress levels and improving overall psychological adjustment (ie, depression and anxiety symptoms, global psychological functioning) and psychosocial functioning (ie, quality of life, social support). Although a primary aim of all of the reviewed studies was to improve adaptive coping, there was little consistency in approaches used to assess coping and findings were, at best, mixed. Among a small subset of studies that included measures of coping self-efficacy, there is some evidence to suggest that stress management interventions improve PLWHA's self-efficacy to effectively cope with stressors. When examining health status markers, there was little evidence to suggest that the interventions improved biological markers of immune system functioning including stress hormones, CD4 counts, natural killer cells, naïve T cells, and cytotoxic T cells. In summary, CBSM interventions for PLWHA show promise as an approach to reducing psychological distress. However, the authors identified a number of methodological limitations in the reviewed studies and also noted that the use of group-delivered, multisession interventions may

not be feasible to implement in resource-limited HIV medical centers.

In addition to the narrative review conducted by Brown and Venable,²⁶ two recent meta-analyses have been published examining the efficacy of cognitive-behavioral²⁷ and stress management interventions.²⁸ Table 1 provides the effect size estimates for outcomes from each of the meta-analyses. The meta-analysis conducted by Crepaz and colleagues²⁷ included 15 cognitive-behavioral randomized controlled trials (RCTs) designed to modify maladaptive cognitions, reduce negative affect, and improve immune functioning among PLWHA.^{29,32,35,39,41,43,44,47,50,51,53,56-61} Fourteen of these interventions included coping skills and stress management training; the remaining study focused exclusively on cognitive-behavioral therapeutic approaches to alleviate depressed mood and reduce anxiety, excluding modules on coping. This meta-analysis found that cognitive-behavioral interventions resulted in significant decreases in depression, anxiety, anger, and stress across studies (Table 1).²⁷ Effect sizes across outcomes were typically small; however, there was a large effect for the interventions' efficacy in reducing anger. In contrast, findings provided no evidence that the reviewed interventions led to improvements in immune functioning as measured by CD4 count.²⁷ An evaluation of participant characteristics and research methodology features associated with differential intervention efficacy indicated that interventions were more efficacious in improving depression and anxiety outcomes under the following conditions:

Table 1 Summary of cognitive behavioral and stress management intervention effect size estimates from Crepaz et al²⁷ and Scott-Sheldon et al²⁸

	Effect size estimate	
	Crepez et al ²⁷ (N = 15 RCTs)	Scott-Sheldon et al ²⁸ (N = 35 RCTs)
Stress and coping outcomes		
Coping	–	0.10
Stress	0.43	–
Psychological and psychosocial outcomes		
Social support	–	0.01
Depression	0.33	0.28
Anxiety	0.30	0.28
Anger	1.00	–
Distress	–	0.19
Quality of life	–	0.16
Fatigue	–	0.38
Health status markers		
CD4 counts	0.08	0.04
Viral load	–	–0.09
Hormonal level	–	–0.14

Abbreviation: RCTs, randomized controlled trials.

(a) less than 50% of the sample consisted of men who have sex with men, (b) participants were not excluded due to depressive symptoms, (c) stress management training was provided, (d) interventions were led by trained research staff, (e) ten or more sessions were conducted for the intervention, and (f) the study's retention rate was greater than 80%.

A second meta-analysis conducted by Scott-Sheldon and colleagues²⁸ included 35 stress management RCTs.^{29,32,35,36,39,41,44,46,53,59-83} In contrast to the Crepez et al study,²⁷ this meta-analysis utilized broad inclusion criteria for studies including psychosocial, behavioral, or educational stress management approaches to promote adjustment among PLWHA. The meta-analysis included studies testing cognitive-behavioral interventions, as well as less traditional stress management approaches, including massage therapy, relaxation education, and tai chi, among others. Among the reviewed studies, stress management interventions resulted in significant improvement on the outcomes of anxiety, depression, psychological distress, fatigue, and quality of life (Table 1).²⁸ All effect sizes for these outcomes were small. However, stress management programs did not result in significant changes for coping, social support, CD4 counts, viral load, or hormonal outcomes.²⁸ Stress management programs resulted in greater reduction in anxiety symptoms when samples included more women, individuals with higher anxiety at baseline, and younger participants.²⁸ In addition, intervention approaches that included medication adherence training were less efficacious than other interventions.²⁸ Furthermore, when entering all of the moderators into a multiple regression model, inclusion of medication adherence training as part of an intervention remained as the only significant predictor of poorer intervention outcomes.²⁸

Consistent with findings from the narrative review,²⁶ findings from both meta-analyses^{27,28} suggest that stress management programs for PLWHA result in the greatest change for psychological outcomes, such as depression and anxiety. In contrast, stress management interventions showed less consistent effects for improvement in coping and health status markers such as CD4 counts. Efficacious interventions typically included multiple, group-based sessions that provided a combination of psychoeducation and cognitive and behavioral strategies to improve stress management skills. In what follows, this review highlights recently published stress management interventions for PLWHA.

Literature search method and criteria for inclusion

Database searches of PsycINFO, PsycARTICLES, Medline, and PubMed were conducted to identify published articles

in peer-reviewed journals that evaluated stress management interventions for PLWHA published subsequent to the three previous reviews.^{26–28} Combinations of the following search terms were used to identify relevant articles: stress management, stress, coping, relaxation, intervention, HIV, HIV-positive, HIV-infected, and acquired immune deficiency syndrome. A search of references cited in relevant studies was conducted to identify additional articles. English language articles published in peer-reviewed journals were screened for inclusion. Studies were included if they met all of the following criteria: (a) the intervention's primary goal was to improve stress management skills, (b) the study's sample was composed of only PLWHA, and (c) the intervention did not focus exclusively on modifying other health behaviors (eg, sexual risk reduction, improvement in HAART adherence). For this review, studies that were not conducted with United States samples were excluded. Figure 1 depicts the selection process for articles included in the review.

Recent stress management intervention approaches

The goal of this segment of the review is to summarize stress management interventions for PLWHA that have been published since the narrative review²⁶ and meta-analyses.^{27,28} First, key intervention content included in the reviewed interventions is outlined. Next, the efficacy of stress management programs that fall into one of four categories is reviewed: (a) interventions to improve coping and modify other health behaviors (ie, HAART medication adherence, sexual behaviors), (b) meditation, mindfulness, and relaxation-based stress management approaches, (c) computer-delivered interventions, and (d) interventions that target specific populations including older individuals, individuals with childhood sexual abuse histories, and women. Table 2 summarizes key study characteristics for each of the reviewed intervention

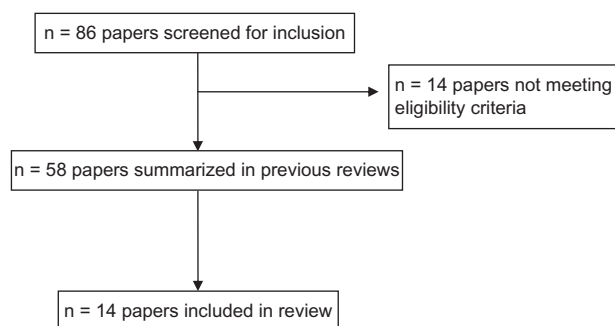


Figure 1 Selection process for inclusion in the review.

trials including methodological features and core intervention content areas.

Intervention components

All of the reviewed interventions sought to improve PLWHA's coping skills by encouraging the use of cognitive and behavioral stress management strategies (Table 2). For some of the reviewed studies, a core intervention component was provision of psychoeducation about the nature and health consequences of stress (Table 2). Across studies, the majority of stress management programs sought to modify general coping strategies that could be implemented across a range of stressful situations. Additionally, a minority of studies also targeted changes in specific, HIV-related health behavior domains, such as sexual risk behaviors and antiretroviral medication adherence.

Across the interventions, cognitive and behavioral approaches were designed to facilitate adaptive coping and reduce the negative effects of stress. Emotional regulation strategies and reducing overall psychological distress were often specified as goals of the interventions. As a behavioral strategy, the majority of studies (77%) included a relaxation training component (Table 2). Furthermore, across interventions, the use of other active coping strategies (eg, problem solving) was stressed as more adaptive than avoidant coping strategies (eg, substance use).

In most of the reviewed recent coping interventions, stress management skills training also included modules on the use of cognitive strategies to modify PLWHA's appraisal of stressors and encourage the use of active problem solving strategies. For instance, cognitive distortions and automatic thoughts about HIV-related stressors were often identified and targeted via cognitive restructuring. In studies evaluating variations of coping effectiveness training, the focus was on the stress appraisal process and matching the stressor's level of perceived changeability with the use of either problem- or emotion-focused coping strategies. Similarly, problem solving approaches taught PLWHA to identify characteristics of specific stressors, brainstorm potential solutions, select a coping strategy, and evaluate the effectiveness of the chosen solution for the problem situation.

Stress management combined with health behavior change Adherence

High levels of adherence are required to achieve optimal viral suppression and to prevent the development of drug-resistant HIV strains.^{64,84,85} Three recent studies have examined the

Table 2 Key characteristics of recent stress management interventions for persons living with human immunodeficiency virus

Study citations	Sample gender and sexual orientation; ethnicity	Study exclusion criteria	Study conditions	RCT	Number (length) of intervention sessions	Core intervention components	Assessment time points
64	N = 52 men, 11 women; ethnicity NR	HAART, C/P, MH	E: individual SM, MAT C: standard care	✓	E: 4 (75 min)	HBC, GB	Pre, post
86	N = 226 men, 23 women; 55% Caucasian, 19% African-American, 15% Hispanic, 11% other	HAART, C/P	E: individual SM, MAT C: WLC	✓	E: 5 (60 min)	HBC, GB, GC, SAM, PS	Pre, 3 mos, 6 mos, 9 mos, 12 mos, 15 mos
87	N = 130 MSM; ethnicity NR	HAART, C/P, MH	E: group SM, MAT C: MAT, condensed group SM	✓	E: 10 (135 min), 1 (60 min), 2 (30 min) C: 1 (60 min), 2 (30 min), 1 day session E: 15 (90 min)	HBC, GB, GC, R, SAM	Pre, post, 9 mos, 15 mos
94	N = 674 men, 262 women; 45% African-American, 32% Caucasian, 15% Hispanic, 8% other	SB	E: individual SM C: WLC	✓	E: 8 (120 min), 1 (360 min) C: 1 day session	HBC, GB, GC, SAM, R	Pre, 5 mos, 10 mos, 15 mos, 20 mos, 25 mos
97	N = 43 men, 5 women; 50% African-American, 21% Hispanic, 23% Caucasian, 6% other	HIVSX	E: group SM C: condensed group SM	✓	E: 8 (120 min), 1 (360 min) C: 1 day session	R, GB	Pre, post
98	N = 75 men, 8 women; 52% Caucasian, 31% African-American, 15% Hispanic	MH, C/P	E: group SM C: psychoeducational videos	✓	E: 5 (90 min) C: 5 (90 min)	R, GB	Pre, post, 10 wks, 22 wks
99	N = 152 men, 100 women; 75% African-American, 23% Caucasian, 2% Hispanic	MH, C/P	E: group SM C1: group Tai-Chi C2: group spiritual growth C3: WLC	✓	E: 10 (90 min) C1: 10 (90 min) C2: 10 (90 min)	R, GB	Pre, post, 6 mos

(Continued)

Table 2 (Continued)

Study citations	Sample gender and sexual orientation; ethnicity	Study exclusion criteria	Study conditions	RCT	Number (length) of intervention sessions	Core intervention components	Assessment time points
101	N = 60 women; 70% African-American, 21% Caucasian, 9% other, 8% Hispanic	C/P	E: computerized SM C: time-delayed computerized SM	✓	E: 1 (90 min) C: 1 (90 min)	GB, GC, SAM, R	Pre, 1 mos
102	N = 197 men, 98 women; 49% African-American	C/P	E: group SM C1: support group C2: individual therapy on request	✓	E: 12 (90 min) C1: 12 (90 min)	GB, GC, SAM, R	Pre, post, 4 mos, 8 mos
104–106	N = 129 women, 117 men; 68% African-American, 17% Hispanic, 10% Caucasian, 5% other	C/P, MH	E: group SM C: support group	✓	E: 15 (90 min) C: 15 (90 min)	HBC, SAM, GB, GC	Pre, post, 4 mos, 8 mos, 12 mos
108	N = 39 women; 90% black, 5% Hispanic	MH, C/P	E: group SM C: condensed group SM	✓	E: 10 (135 min) C: 1 (5 hours)	R, GB, GC, SS, HBC	Pre, 9 mos
109: Study 1	N = 451 women; ethnicity NR		E: group SM C1: individual psychoeducation	✓	E: 10 (135 min) C: 10 (135 min)	GB, GC, R, SS	Pre, post, 6 mos, 12 mos
109: Study 2	N = 482 women; ethnicity NR		E: group SM, HBC C1: individual psychoeducation	✓	E: 10 (135 min), 6 (150 min) C: 10 (135 min)	GB, GC, R, SS, HBC	Pre, post, 6 mos, 12 mos, 24 mos

Note: When multiple papers were written on a single intervention trial, study citation numbers for these papers are listed in succession.

Abbreviations: C, comparison/control condition; C/P, excluded because of cognitive impairment or psychosis; E, experimental stress management intervention; GB, general behavioral coping skills (eg, variety of behavioral approaches); GC, general cognitive therapeutic approaches (eg, cognitive restructuring); HAART, excluded based on current medication status; HBC, health behavior change modules (adherence, substance use, sexual risk behaviors); HIV-Info, human immunodeficiency virus informational condition; HIVSX, excluded based on human immunodeficiency virus symptoms or acquired immune deficiency syndrome diagnosis; MAT, medication adherence training; MH, excluded due to mental health difficulties; min, minutes; mos, months; MSM, men who have sex with men; NR, not reported; P, psychoeducation about stress management; Post, postintervention assessment; Pre, preintervention assessment; PS, problem solving; R, relaxation; RCT, randomized controlled trial; SAM, stressor appraisal and matching of coping approach; SB, stressor appraisal and matching of coping approach; SS, stress management; SM, social support enhancement and utilization; wks, weeks; WLC, waitlist control.

efficacy of supplementing stress management interventions with content to address HAART medication adherence.^{64,86,87} Balfour and colleagues⁶⁴ examined the efficacy of a four-session intervention to reduce depressive symptoms and enhance readiness to start HAART medication. Results indicated that the intervention reduced both depressive symptoms and enhanced PLWHA's readiness to start HAART medication.⁶⁴ A second study sought to improve stress management skills and enhance PLWHA's ability to cope with HAART medication side effects.⁸⁶ Individuals who completed the five individual stress management sessions were less likely to report nonadherence and were more likely to seek out additional information about medication side effects and utilize social support to cope with HAART side effects.⁸⁶ A third study compared a 10-week CBSM intervention supplemented with four brief medication adherence training sessions delivered by a pharmacist to a medication adherence training only group.⁸⁷ There were no differences in viral load between the two groups; however, PLWHA in the intervention condition who had a detectable viral load at baseline had decreased viral load relative to the medication adherence training only group.⁸⁷ Additionally, decreases in depressed mood among the intervention group participants explained the decreased viral load across the 15-month follow-up period.⁸⁷

Sexual risk reduction

Despite increased secondary HIV prevention efforts to reduce sexual risk behaviors among PLWHA,⁸⁸ reports suggest that some PLWHA have difficulties engaging in consistent safer sex practices.^{89,90} Unprotected sexual encounters pose the risk of HIV transmission to uninfected partners and increased possibility of negative health consequences for PLWHA through acquisition of other sexually transmitted infections or drug-resistant HIV strains.^{91–93} To improve stress management skills and reduce sexual risk behaviors among PLWHA, one intervention examined the efficacy of a 15-session individual intervention relative to a waitlist control condition.⁹⁴ There were no improvements in psychological functioning across a variety of measures including anxiety and depressive symptoms, burnout, perceived stress, positive affect, positive states of mind, coping self-efficacy, and perceived social support.⁹⁴ Furthermore, there were no intervention effects for decreasing psychological distress among PLWHA who had mild to moderate depressive symptoms when starting the study.⁹⁴ However, the intervention resulted in decreased frequency of unprotected sexual acts with partners who were HIV-negative or of unknown serostatus.⁹⁴

Meditation- and relaxation-based stress management interventions

Mindfulness-based stress reduction (MBSR) is an empirically validated treatment consisting of 8–10 weeks of mindfulness meditation training.⁹⁵ This intervention approach focuses on developing greater in the moment self-awareness through guided exercises.⁹⁶ A meta-analysis examining the efficacy of MBSR for a variety of medical (eg, heart, pain) and psychiatric (eg, anxiety disorders) conditions found medium effect sizes, indicating that MBSR interventions result in improvements in psychological distress, health functioning, and coping skills.⁹⁶ Although MBSR has been used with a variety of medical populations, one recent study suggests that the mindfulness-based approach may be helpful for PLWHA. Creswell and colleagues⁹⁷ examined the impact of an eight-session MBSR intervention relative to a one day control seminar condition for increasing CD4 lymphocyte counts. PLWHA in the control condition demonstrated greater declines in CD4 lymphocyte counts relative to those in the MBSR condition.⁹⁷ Additional analyses indicated that PLWHA who attended more MBSR sessions had greater CD4 lymphocyte counts.⁹⁷

A second study examined the efficacy of a group-based mantram intervention for PLWHA.⁹⁸ A mantram is a spiritual word or phrase that is repeated throughout the day as a form of meditation to focus one's attention.⁹⁸ Primary outcomes from this RCT were reviewed in Scott-Sheldon and colleagues' meta-analysis;²⁸ this secondary analysis examined positive reappraisal and distance coping as mediators of the intervention effects for reducing anger.⁹⁸ Findings indicated that the mantram intervention reduced trait-anger by enhancing positive reappraisal coping.⁹⁸

A third study compared the efficacy of 10-week interventions of CBSM, tai chi, and spiritual growth relative to a waitlist control group.⁹⁹ Compared to the control group, individuals in the CBSM and tai chi interventions utilized less emotion-focused coping strategies and had improved lymphocyte proliferative functioning.⁹⁹ However, there were no differences between groups for quality of life, impact of HIV life events, neuroendocrine functioning, and HIV-specific health status.⁹⁹

Computer-delivered interventions

Stress management interventions have typically been administered in a group format led by a clinician (eg, psychologist, social worker) or an experienced health educator. Such an approach may not be feasible in resource-limited HIV clinic settings. To address this concern,

computer delivery is a promising modality for implementing stress management interventions that can be cost effective and flexibly administered. In a recent pilot study, a brief, interactive cognitive-behavioral computerized stress management intervention for HIV-infected women was evaluated relative to a delayed intervention control group.^{100,101} All participants successfully navigated the computerized program, demonstrating intervention feasibility and most found the intervention to be acceptable.¹⁰⁰ While women demonstrated improved stress management knowledge, there were few differences between the intervention and control groups on psychological distress, perceived stress, and coping self-efficacy outcomes.¹⁰¹

Stress management for specific populations

Older adults

Given the improved long-term prognosis of PLWHA with HAART medication, there is a clear need for stress management programs to address the psychosocial stressors experienced by older individuals. One study tested a twelve-session coping intervention relative to an interpersonal support group intervention and a mental health service upon request condition for older PLWHA.¹⁰² Results from this RCT indicated that individuals in both the coping intervention and interpersonal support group reported fewer depressive symptoms than the treatment upon request control group.¹⁰²

Individuals with childhood sexual abuse histories

Rates of childhood sexual abuse are high among PLWHA, and it is often associated with greater psychological distress in adulthood.¹⁰³ To improve coping skills and address psychological sequelae associated with childhood sexual abuse, the efficacy of a 15-session CBSM intervention for both male and female PLWHA with childhood sexual abuse histories relative to a time-matched support group or waitlist control group was evaluated.^{104–106} In addition to core cognitive and behavioral stress management approaches, the intervention sessions also incorporated content to address individuals' trauma histories.^{104–106} This intervention resulted in decreased symptoms of traumatic stress and reductions in the use of avoidance coping for individuals in the treatment group compared to patients assigned to a waitlist condition.¹⁰⁵ In addition, individuals in both the intervention and support group conditions endorsed fewer intrusive thoughts linked to the trauma.¹⁰⁵ Although not a direct focus for the intervention, participants in the stress management intervention reported

fewer instances of unprotected sex with all sexual partners and with partners who were HIV-negative or of unknown serostatus.¹⁰⁶ While the intervention did not directly focus on reducing substance use, longitudinal analyses also indicated that individuals in the stress management condition reduced the quantity of alcohol consumed and decreased their use of cocaine; however there were no changes in marijuana use.¹⁰⁴ Thus, this stress management intervention that incorporated content to improve coping and also address trauma history was efficacious in decreasing psychological distress and other health risk behaviors.

Women

Rates of HIV infection are on the rise among several subgroups in the United States, including low-income, minority women.¹⁰⁷ However, relatively few stress management programs have been developed for HIV-infected women. In addition to the computer-delivered intervention developed by Brown and colleagues for HIV-infected women,^{100,101} two intervention trials evaluated the efficacy of a CBSM intervention tailored to the unique psychosocial stressors faced by HIV-infected women.^{108,109} The first study examined the impact of a 10-week CBSM intervention on cervical intraepithelial neoplasia, the neoplastic changes that occur following sexual transmission of human papillomaviruses and are precursors to cervical cancer.¹⁰⁸ Women in the intervention condition endorsed decreased perceived life stress and had lower odds of cervical intraepithelial neoplasia over 9 months relative to the one psychoeducational control session.¹⁰⁸ Weiss and colleagues¹⁰⁹ summarized the findings from two linked intervention trials of a CBSM intervention for HIV-infected women. The first trial compared a 10-week intervention to an individual psychoeducational condition.¹⁰⁹ Women in the intervention condition endorsed decreased depression and anxiety symptoms, less use of denial coping, and decreased health distress. In addition, participants reported greater social support, improved coping skills, improved quality of life, and increased medication adherence. The second trial was a continuation of the initial trial that enhanced the first intervention by adding six additional sessions focused on modifying other health behaviors (eg, medication adherence, reducing sexual risk behavior and substance use, increasing physical activity). Women in the enhanced CBSM condition endorsed decreased depressive symptoms, improved mental health quality of life, decreased risky sexual behaviors and alcohol use, and enhanced medication adherence, nutrition, and physical activity.¹⁰⁹ Thus, the core CBSM intervention decreased psychological distress, and when supplemented

with additional health promotion sessions, resulted in improvements across a variety of health behaviors.

Conclusion

There is considerable promise in the use of stress management interventions to improve the lives of PLWHA. Combined with findings from previous reviews of the literature, there is a growing body of evidence demonstrating that stress management interventions for PLWHA reduce psychological distress and improve psychosocial functioning. Recent intervention studies have targeted other important health behaviors, utilized meditation and mindfulness approaches, used technology-delivered intervention formats, and designed interventions for specific subpopulations of PLWHA. The latest stress management interventions highlight the need to tailor intervention approaches to specific populations and address related challenges faced by PLWHA, including consistent safer sexual behaviors and adherence to medication regimens.

Across the reviewed recent interventions, the majority were delivered via a group format ($n = 8$), with three individual-delivered interventions, and one computer-delivered intervention. Most recent interventions consisted of multiple sessions (mode = ten sessions) that were typically over an hour in length. Although group-delivered training provides the added benefit of fostering social support, some PLWHA may be reticent to attend groups due to confidentiality concerns or dislike of group meetings. Thus, the usefulness of group stress management interventions is limited to the subset of patients who are willing to participate in a group-based program. Group interventions also require significant financial resources to implement and may not be feasible in some resource-limited clinic settings. Moving forward, research should examine strategies to enhance the dissemination and uptake of evidence-based stress management interventions, particularly in resource-limited care settings. Such research should also examine the cost effectiveness of interventions and ways to improve retention in stress management interventions.

Few stress management interventions have addressed the unique psychosocial needs of HIV-infected patients using briefer, more cost-effective formats. An important gap in the literature is to examine the efficacy of briefer psycho-educational stress management approaches that can be of use to a broader range of patients. To date, only one brief stress management intervention delivered via computer has been pilot tested.¹⁰¹ While this approach was feasible and acceptable to PLWHA, the intervention demonstrated only modest improvements in stress management knowledge.¹⁰¹

Thus, additional research to understand characteristics of PLWHA for whom briefer stress management approaches are most effective is needed.

Given the multitude of challenges faced by PLWHA, integrated, multidisciplinary HIV treatment centers offer the potential to conduct ongoing assessment of individuals' psychological distress, psychosocial functioning, and health behavior engagement. The use of ongoing assessment combined with adaptive intervention approaches¹¹⁰ could guide the selection of an appropriate stress management intervention approach for a particular individual. Adaptive clinical trials allow for planned, reactive treatment changes throughout the trial based on initial treatment response.^{110,111} Thus, for PLWHA who do not demonstrate improved psychological functioning after receiving a stress management intervention, such an approach could facilitate appropriate treatment referrals for more intensive psychiatric or substance use services.

In sum, the stress management literature indicates that stress management interventions facilitate positive adjustment and improve coping skills to effectively manage stress. Future research should examine mechanisms responsible for these positive changes and adapt the interventions to best meet the needs of the broader HIV patient population. Particularly important is the need to design and test more cost-effective, brief treatment approaches that can be implemented in under-resourced treatment settings.

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Disclosure

The authors report no conflicts of interest in this work.

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