Many people living with HIV/AIDS find it challenging to attend to daily tasks of living, participate in moderate to vigorous physical activities, or have sufficient energy or vitality to engage in an active social life while managing HIV/AIDS. Fatigue or low energy has been associated with both physical and psychological morbidity and poor quality of life in persons with HIV/AIDS. In addition, fatigue and a CD4 T cell count less than 500 are associated with physical limitations and disability. Among HIV-positive patients, disease progression is related to decreasing energy and increasing difficulties with daily activities and pain.

Recent psychological research with people living with HIV/AIDS has reflected a conceptual shift toward perceiving HIV/AIDS as a chronic disease. According to this conceptual shift, quality of life is defined in terms of five domains: physical functioning, energy/fatigue, social functioning, role functioning, and overall health and pain. Research has demonstrated that the ability to maintain well-being in these domains is essential to higher quality of life for persons living with chronic illnesses such as cancer and AIDS.
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Perspective, the development and use of adaptive coping strategies to deal with the stress of a chronic life-threatening illness are necessary for improved health outcomes. The lack of adaptive coping strategies has been associated with poorer outcomes. For example, in a group of men and women living with HIV/AIDS, use of denial as a coping strategy was associated with greater pain. Moreover, in a group of 212 people living with HIV/AIDS, coping by disengagement or avoidance was associated with greater health-related stress.

In addition, poor social functioning may be associated with greater use of avoidance coping strategies such as withdrawal and conflictual social interactions. Social isolation and conflictual social interactions have been shown to interact to increase stress, resulting in poorer overall social functioning. People living with HIV/AIDS who increase their use of avoidance coping strategies such as behavioral disengagement and self-distraction as well as their use of alcohol and drugs may have poorer physical and social functioning. Complex role functioning (i.e., career, housework, and educational pursuits) has been shown to be even more limited than physical functioning in people living with HIV/AIDS, suggesting that coping by avoidance may directly reduce an individual’s productivity.

Age has been associated with quality of life. Worse quality of life in the areas of physical and social functioning has been attributed to older age among people living with HIV/AIDS. Findings of gender differences in HIV disease progression and CD4 T cell count suggested that women may have a more rapid decline in health than men, although the mechanism mediating this relationship has not been established.

Individuals develop strategies to manage stress by identifying resources that can be used to decrease stress and improve their overall quality of life. Unfortunately, some coping strategies used to reduce immediate stress may incur a high cost in terms of poorer quality of life over time and are therefore considered less adaptive.

Factors associated with improved physical functioning, energy/fatigue level, social functioning, and role functioning in persons with HIV/AIDS include the levels of pain and maladaptive coping. The results of previous research on the relationship of antiretroviral treatment and quality of life are mixed. Although many individuals have experienced positive outcomes from pharmacological interventions, the numerous side effects can reduce levels of physical functioning and energy.

Pain (peripheral neuropathy, abdominal pain, chest pain, headaches, and pain in the mouth, lips, or gums) has been shown to play an important negative role in physical and mental functioning as well as in the overall quality of life of people living with HIV/AIDS. In addition, age, household income, and gender are known correlates of pain.

Most studies examining quality of life for HIV-positive patients have been done primarily among gay and bisexual men and have examined adaptive coping strategies. As the incidence of HIV infection continues to rise among women, gender-balanced studies are needed to examine the influence of gender on coping and quality of life among people living with HIV/AIDS. In addition, scrutiny of the use of maladaptive coping in people living with HIV/AIDS provides an opportunity to address behaviors that have been shown to be pliable in clinical settings. This study examined the relationship between coping and physical quality of life in a diverse, gender-balanced group of people living with HIV/AIDS. We hypothesized that individuals who experienced greater pain and who made greater use of maladaptive coping strategies would report poorer functional quality of life in the four domains of physical functioning, energy/fatigue, social functioning, and role functioning.

METHOD

Participants

The appropriate institutional review boards approved the study. Written informed consent was obtained from all participants before their participation in this study. Men and women over the age of 18 years who provided documentation of their HIV diagnosis were recruited from 1996 to 1999 as part of an ongoing randomized clinical trial evaluating the effects of group psychotherapy for HIV-positive people. Recruitment was solicited through newspaper advertisements as well as directly from three major county hospitals, the AIDS Community Research Consortium, in Redwood City, Calif., and several medical clinics in the San Francisco Bay area. Participants ranged from asymptomatic seropositive patients to those with clinical complications associated with AIDS. This study had a cross-sectional design and examined data from the baseline questionnaires completed before random assignment of 142 HIV-positive men (N=81) and women (N=61) to study groups in the evaluation of group psychotherapy. Participants received $25 for the completion of the baseline questionnaires.
Participants completed questions on demographic characteristics and a brief medical questionnaire that assessed current HIV-related symptoms, HIV-related infections, time since HIV diagnosis, and use of antiretroviral medications over the previous 3 months. Data on CD4 T cell count were obtained from participants’ medical records.

Coping strategies used by participants in the previous 3 months were assessed with the Brief COPE. The Brief COPE includes 24 items measured on a 4-point Likert-type scale with responses ranging from 1, “I have not done this at all” to 4, “I have been doing this a lot.” Five of the 12 Brief COPE scales were used to test the hypotheses of this study. The scales were as follows: 1) self-distraction (e.g., “I’ve been turning to work or other activities to take my mind off things”), 2) behavioral disengagement (e.g., “I’ve been giving up trying to deal with it”), 3) substance use (e.g., “I’ve been using alcohol or drugs to make myself feel better”), 4) denial (e.g., “I’ve been saying to myself, ‘this isn’t real’”), and 5) venting (e.g., “I’ve been saying things to let my unpleasant feelings escape”). Internal consistency reliability coefficients (Cronbach’s alpha) for the five scales were 0.40, 0.70, 0.90, 0.50, and 0.60, respectively. These values were consistent with previous research, except for the coefficient for self-distraction, which differed from the Cronbach’s alpha of 0.71 found in Carver’s study of community residents who experienced Hurricane Andrew. However, the coefficient for self-distraction in the current study was consistent with the reported alpha of 0.45 in Carver’s study of undergraduates who completed the full COPE. The variability in the reliability coefficient across these studies may indicate that this scale is more reliable when measuring acute stressors (i.e., hurricane) than when measuring chronic, ongoing stressors such as those associated with being an undergraduate student or living with a chronic illness. Clearly, more studies that use this scale across different types of life stressors, both acute and chronic, are needed to fully understand this observed difference.

Functional quality of life in the past 4 weeks was measured with questions from the Medical Outcome Study–HIV (MOS-HIV). We included the following four scales from this survey: 1) physical functioning, 2) energy/fatigue, 3) social functioning, and 4) role functioning. We excluded the overall health scale, which did not directly address limitations to activities and behaviors. The scales used in our study were derived from the Medical Outcomes Study Health Survey. We were interested in the current physical functioning of participants, and, therefore, we asked how their health limited their current activities rather than their activities during the time frames covered in the original scale (more than or less than 3 months at the time of the survey). The revised physical functioning scale included six items, with possible responses of 1, “yes, limited a lot”; 2, “yes, limited a little”; and 3, “no, not limited at all.” The interviewer first asked the stem question, “Does your health now limit you in these activities?” then listed various areas of physical functioning, including eating, dressing, bathing, using the toilet, moderately strenuous activities (moving a table, carrying groceries, or bowling), and vigorous activities (bending, lifting, or stooping). The energy/fatigue scale included four items, with possible responses ranging from 1, “all of the time,” to 6, “none of the time.” The stem question, “How much of the time during the past four weeks . . . ” was followed by specific questions such as, “Did you feel full of pep?” “Did you have enough energy to do the things you wanted to do?” and “Did you feel worn out?” The social functioning scale consisted of the single item, “How much of the time, during the past 4 weeks, has your health limited your social activities?” with possible responses ranging from 1, “all of the time,” to 6, “none of the time.” The role functioning scale included two dichotomous (yes/no) items that assessed whether work, housework, or schoolwork was impeded by the participant’s health.

Each quality of life measure was standardized on a scale from 0 (worst) to 100 (best). Cronbach’s alphas showed strong internal consistency for the physical functioning (alpha = 0.89), energy/fatigue (alpha = 0.85), and role functioning (alpha = 0.86) scales.

The pain scale on the MOS-HIV included two items. The first item was “How much bodily pain have you generally had during the past 4 weeks?” Possible responses ranged from 1, “none,” to 6, “very severe.” The second item was “During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?” Possible responses ranged from 1, “not at all,” to 5, “extremely.” Scores on the two items were weighted to account for variability in response categories and were summed to create a total pain scale score.

Data Analysis

To examine the relationships of maladaptive coping and pain with functional quality of life, we conducted three
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hierarchical regression analyses. The data were subjected to diagnostic analyses to ensure that they met normality assumptions and that no problems with multicollinearity existed. An examination of Pearson product moment correlations resulted in exclusion of severity of symptoms as an independent variable because of its significant correlation with pain ($r = 0.52, p<0.01, N = 142$). The dependent variables in this model were the four functionality scales from the MOS-HIV: physical functioning, energy/fatigue, social functioning, and role functioning. Covariates were entered in three blocks. Age, household income, and gender were controlled for in the first block. In the second block, we included three health-related variables to control for their effects in the regression model: CD4 count, self-distraction, behavioral disengagement, substance use, denial, and venting) were entered stepwise in the third block to identify which, if any, coping strategies contributed significantly to the overall variance.

RESULTS

Participant Characteristics

The 142 participants included 81 (57%) men and 61 (43%) women between the ages of 21 and 59 years, with the mean age for men (mean = 42, SD = 8) significantly greater than that for women (mean = 39, SD = 7) ($t = 2.22, df = 140, p<0.05$). More than half of the participants were Caucasian ($N = 74, 52$% ), 26% ($N = 36$) were African American, 10% ($N = 14$) were Latino, 1% ($N = 1$) were Asian American, and 12% ($N = 17$) were of mixed and other ethnic backgrounds. Overall, 52% of the participants ($N = 74$) identified themselves as gay or lesbian; however, the distribution of sexual orientation differed by gender such that 78% of the men ($N = 63$) identified themselves as gay and 77% of the women ($N = 47$) identified themselves as heterosexual ($\chi^2 = 56.96, df = 1, p<0.0001$). Thirty-six percent of the women ($N = 22$) and 24% of the men ($N = 19$) reported an income of less than $20,000 a year.

The mean CD4 T cell count was 377 (range = 2–1400), suggesting that the participants in this study varied considerably with regard to disease status and were below the normal population range of 500–1300 cells/mm$^3$. The mean age for men (mean = 42, SD = 8) significantly greater than that for women (mean = 39, SD = 7) ($t = 2.22, df = 140, p<0.05$). More than half of the participants were Caucasian ($N = 74, 52$% ), 26% ($N = 36$) were African American, 10% ($N = 14$) were Latino, 1% ($N = 1$) were Asian American, and 12% ($N = 17$) were of mixed and other ethnic backgrounds. Overall, 52% of the participants ($N = 74$) identified themselves as gay or lesbian; however, the distribution of sexual orientation differed by gender such that 78% of the men ($N = 63$) identified themselves as gay and 77% of the women ($N = 47$) identified themselves as heterosexual ($\chi^2 = 56.96, df = 1, p<0.0001$). Thirty-six percent of the women ($N = 22$) and 24% of the men ($N = 19$) reported an income of less than $20,000 a year.

The mean CD4 T cell count was 377 (range = 2–1400), suggesting that the participants in this study varied considerably with regard to disease status and were below the normal population range of 500–1300 cells/mm$^3$. Overall, 42% of the participants ($N = 60$) reported using protease inhibitors at the time of the study. Moderate to very severe bodily pain was reported by 40% ($N = 57$) of the participants, and 61% ($N = 87$) reported that pain interfered with their work (ranging from “a little bit” to “extremely”).

Univariate Descriptive Analysis

Descriptive statistics for the dependent and independent variables used in this study are shown in Table 1. Participants reported a wide range of physical functioning based on incremental levels of activity, with the largest proportions of participants reporting the least amount of health-related limitation in daily tasks of living ($N = 116, 81.7$%) and the most limitation in vigorous activities such as lifting heavy objects or running ($N = 97, 68.3$%). Participants reported a great deal of variability in physical functioning (mean score = 71.7, SD = 28.7). Participants responses about energy/fatigue were less variable, with only 2.9% ($N = 4$) reporting that they never had enough energy to complete their activities and 11.4% ($N = 16$) reporting that they always had sufficient energy. Most of the respondents ($N = 122, 85.7$%) reported having some degree of energy. As for social functioning, 57.0% ($N = 81$) of the participants reported some limitation in their social activities due to their health. A majority ($N = 72, 50.7$%) reported some limitation in role functioning, i.e., being unable to complete work, housework, or educational pursuits due to health.

Of the five types of coping strategies assessed in this study, the two most frequently used strategies were self-distraction and venting, with 58% ($N = 82$) and 43% ($N = 61$), respectively, reporting moderate (“I have been

<table>
<thead>
<tr>
<th>Measure</th>
<th>Score</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>Brief COPE $^{34}$ coping style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-distraction</td>
<td>4.95</td>
<td>1.59</td>
<td>2–8</td>
<td></td>
</tr>
<tr>
<td>Behavioral disengagement</td>
<td>2.82</td>
<td>1.24</td>
<td>2–8</td>
<td></td>
</tr>
<tr>
<td>Substance use</td>
<td>2.80</td>
<td>1.47</td>
<td>2–8</td>
<td></td>
</tr>
<tr>
<td>Denial</td>
<td>2.70</td>
<td>1.08</td>
<td>2–8</td>
<td></td>
</tr>
<tr>
<td>Venting</td>
<td>4.32</td>
<td>1.61</td>
<td>2–8</td>
<td></td>
</tr>
<tr>
<td>Medical Outcome Study–HIV$^{35}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>61.80</td>
<td>27.32</td>
<td>0–100</td>
<td></td>
</tr>
<tr>
<td>Physical functioning</td>
<td>71.65</td>
<td>28.66</td>
<td>0–100</td>
<td></td>
</tr>
<tr>
<td>Energy/fatigue</td>
<td>51.84</td>
<td>22.47</td>
<td>0–100</td>
<td></td>
</tr>
<tr>
<td>Social functioning</td>
<td>74.89</td>
<td>28.22</td>
<td>0–100</td>
<td></td>
</tr>
<tr>
<td>Role functioning</td>
<td>54.96</td>
<td>46.79</td>
<td>0–100</td>
<td></td>
</tr>
</tbody>
</table>
doing this a medium amount”) to frequent usage (“I have been doing this a lot”). In addition, participants reported moderate use of behavioral disengagement (N = 55, 39%), substance use (N = 44, 31.0%), and denial (N = 53, 37%) as coping strategies.

The use of protease inhibitors was not associated with any of the functional quality of life scales. It is interesting to note that CD4 T cell count was positively and significantly related to both social functioning (r = 0.19, p < 0.05, N = 142) and role functioning (r = 0.24, p < 0.01, N = 142) such that individuals with a higher CD4 T cell count also reported greater social and role functioning. Two demographic variables, gender and income, were negatively associated with physical functioning. Men (r = -0.25, p < 0.01, N = 142) and participants who lived in households with incomes greater than $20,000 (r = 0.35, p < 0.01, N = 142) reported better physical functioning. Scores on all four functional quality of life scales were positively and significantly related to the pain score. Participants reporting less pain also reported better physical functioning (r = 0.70, p < 0.01, N = 142), higher energy levels (r = 0.59, p < 0.01, N = 142), better social functioning (r = 0.58, p < 0.01, N = 142), and better role functioning (r = 0.57, p < 0.01, N = 142). Greater pain severity was positively associated with greater interference of pain in work activities (r = 0.78, p < 0.0001, N = 142).

Multiple Regression Analyses

The results of the multiple regression analyses are presented in Table 2. A lower CD4 T cell count was positively associated with lower social and role functioning (p < 0.05). Being older was positively associated with a higher level of energy (p < 0.05). Participants who reported more interference from pain in their lives were more likely to report lower physical functioning (p < 0.001), less energy (p < 0.001), lower social functioning (p < 0.001), and lower role functioning (p < 0.001).

Three types of maladaptive avoidant coping behavior (i.e., behavioral disengagement, self-distraction, and substance use) were significantly related to quality of life scores. Behavioral disengagement was positively associated with lower levels of energy (p < 0.01) and with lower social functioning (p < 0.05). The use of self-distraction as a coping strategy was associated with lower levels of energy (p < 0.05). The use of substances was significantly related to lower social functioning (p < 0.5). Neither venting nor denial was a significant predictor of quality of life.

DISCUSSION

Our findings confirm our hypotheses that pain and the use of maladaptive coping strategies are associated with reduced physical functioning, energy/fatigue, social functioning, and role functioning in persons living with HIV/AIDS. Even after CD4 count and the use of protease inhibitors were controlled in the analyses, the association of pain and maladaptive forms of coping with functional quality of life accounted for a significant amount of the total variance in the models, ranging from 34% to 50%. Indeed, HIV-positive persons who experienced greater pain also experienced a reduction in quality of life in terms of lower physical functioning, less energy, lower social functioning, and lower role functioning. These findings are consistent with previous research on pain and these dimensions of quality of life.9,10,39,40 In our study, a substantial proportion of participants reported pain. After the pain score was controlled, the use of maladaptive coping strategies was not significantly related to either physical functioning or role functioning. Consistent with prior research,30 this finding suggests that, at least for the physical functioning dimension, pain may play an important role in impeding quality of life in people living with HIV/AIDS. Thus, when treating patients with HIV, health care providers must attend not only to disease status but also to the individual’s reports of pain. This is particularly important given that pain is often undertreated in AIDS patients.31 Our study results indicate that pain management may be effective in improving physical quality of life. In addition, assistance in developing more adaptive coping strategies for people living with HIV/AIDS may further enhance their quality of life.

Unlike some earlier studies, our study did not find a significant relationship between age and physical or social functioning.19,41 It is interesting to note that older participants in our study reported higher levels of energy than younger participants. Although our research design did not allow examination of the mediators of this relationship, older patients may have had higher levels of energy because they had developed effective coping strategies. For example, older HIV-positive patients may have been living with the illness longer and therefore may have had more time to develop adaptive coping strategies, or they may have had more experience with and more time to adjust to their medication regimes, which may have resulted in their feeling better. Our findings strongly suggest the need for further research on aging in relation to quality of life among HIV-positive men and women.
Our finding that participants’ CD4 T cell counts were significantly related to social and role functioning suggests that sicker patients are less able to actively engage in social activities such as visiting with friends or close relatives and less able to perform work-related tasks in job, home, and educational settings. This finding is important in light of earlier findings on the beneficial effects of social support on the health status and survival of patients with malignant melanoma\textsuperscript{42} and metastatic breast cancer.\textsuperscript{43,44} Conditions that limit the ability to actively engage in interaction with friends, close relatives, or colleagues may significantly decrease the stress-buffering effects of social support. Given the health benefits of social support for chronically ill patients, additional research is needed to examine the relationship between immune function and social and role functioning among HIV-positive populations.

Greater use of self-distraction, behavioral disengagement, and substance use coping strategies was associated with less energy and poorer social functioning. These findings suggest, as has been shown in prior research,\textsuperscript{45} that providing HIV-positive patients with the skills to deal directly with the stress associated with their illness may decrease social isolation and improve well-being.

The cross-sectional design of this study and the use of predominantly self-report measures constrained our interpretation of the results. Directionality of causality could not be determined for the relationships of pain and maladaptive coping with quality of life that we found. Decreased physical functioning may have contributed to an increase in the experience of pain, or pain may have contributed to decreased physical functioning. Similarly, we could not determine from this cross-sectional research design whether the use of dysfunctional coping strategies causes decreased energy and poor social functioning. Furthermore, this design did not facilitate the discovery of an unidentified third factor, such as something in the social context that could be responsible for the relationships of pain and use of coping strategies with quality of life. The nature of self-reports contributed to a lack of certainty about the validity of responses. Factors such as social desirability, dislike of disclosure of personal information, and impression management might have contributed to less than frank responses.\textsuperscript{46}

Another methodological limitation of this study was the restriction of study participation to individuals who volunteered to be part of a larger clinical trial examining the

### TABLE 2. Multiple regression analyses of predictor variables associated with functional quality of life measures in 142 men and women living with HIV/AIDS

<table>
<thead>
<tr>
<th>Predictor variables</th>
<th>Physical Functioning$^a$</th>
<th>Energy/Fatigue$^a$</th>
<th>Social Functioning$^a$</th>
<th>Role Functioning$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta$^f$</td>
<td>t</td>
<td>Beta$^f$</td>
<td>t</td>
</tr>
<tr>
<td>Age</td>
<td>–0.07</td>
<td>–1.19</td>
<td>0.16</td>
<td>2.45$^*$</td>
</tr>
<tr>
<td>Gender</td>
<td>–0.11</td>
<td>–1.57</td>
<td>–0.06</td>
<td>–0.81</td>
</tr>
<tr>
<td>Household income</td>
<td>0.11</td>
<td>1.66</td>
<td>–0.11</td>
<td>–1.42</td>
</tr>
<tr>
<td>CD4 count</td>
<td>0.09</td>
<td>1.31</td>
<td>0.08</td>
<td>1.10</td>
</tr>
<tr>
<td>Use of protease inhibitor</td>
<td>0.05</td>
<td>0.82</td>
<td>0.11</td>
<td>1.45</td>
</tr>
<tr>
<td>Pain</td>
<td>0.63</td>
<td>9.89***</td>
<td>0.53</td>
<td>7.17***</td>
</tr>
<tr>
<td>Coping style$^g$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-distraction</td>
<td>n.s.</td>
<td>n.s.</td>
<td>–0.17</td>
<td>–2.45$^*$</td>
</tr>
<tr>
<td>Behavioral disengagement</td>
<td>n.s.</td>
<td>n.s.</td>
<td>–0.20</td>
<td>–2.76$^{**}$</td>
</tr>
<tr>
<td>Substance use</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Denial</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Venting</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

$^a$From the Medical Outcome Study–HIV (35).

$^b$Adjusted $R^2=0.50$, $F=24.46$, df=6, 135, p<0.001.

$^c$Adjusted $R^2=0.42$, $F=13.83$, df=8, 133, p<0.001.

$^d$Adjusted $R^2=0.39$, $F=12.29$, df=8, 132, p<0.001.

$^e$Adjusted $R^2=0.34$, $F=13.21$, df=6, 134, p<0.001.

$^f$Standardized beta.

$^g$Analyses of coping styles controlled for age, gender, household income, CD4 count, use of protease inhibitors, and pain.

*p<0.05.

**p<0.01.

***p<0.001.
effects of group psychotherapy. Indeed, the participants in this study, who sought out or were referred to a study that had a mental health focus (i.e., group psychotherapy), may not have been representative of all persons living with HIV/AIDS. However, despite these limitations, we believe that the robust relationships found (after medical factors were controlled) between pain, coping, and functional dimensions of quality of life have significant health implications for persons living with HIV/AIDS.

The results of this study highlight the need for future research to examine the effect of pain on health and well-being among men and women living with HIV/AIDS. In addition, although this study did not find the use of protease inhibitors to be a significant predictor of quality of life, future research involving people living with HIV/AIDS should investigate the effects on quality of life of highly active antiretroviral therapy, including the length of time subjects have received this therapy, their adherence to the active antiretroviral therapy, including the length of time.

Moreover, longitudinal research designs are needed to examine factors associated with disease status, coping, and quality of life over time. Developing adaptive coping skills to deal with the stress of living with HIV/AIDS may be a particularly effective strategy for improving overall health. Finally, future research should examine whether providing more effective pain management for people living with HIV/AIDS can significantly improve quality of life.

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